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BEEP-RE
IIEC
BASE

Integration of Renewable Energy in Buildings in India

GUIDELINE REPORT

For

Business Models and Financing Instruments for Integration of Renewable Energy in Buildings in India

November 2022

Submitted By:

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Integration of Renewable Energy in Buildings

BASE IIEC

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1. Table of Contents

TABLES

FIGURES

2. Executive Summary

Between 2019 and 2023, the Swiss Agency for Development and Cooperation (SDC) commissioned the International Institute for Energy Conservation (IIEC) and the BASE Foundation to identify potential renewable energy technologies that could be integrated into buildings in India, as well as business models and financing strategies that could facilitate and accelerate their market deployment. In addition, IIEC has been working on pilot projects to serve as demonstration projects for renewable energy integration in buildings. Such an objective aims to provide guidance on how the uptake of renewable energy in buildings can be facilitated by analysing preselected technologies and developing financing and business models suitable for their integration.

This report focuses on the analysis of business models and financing strategies that can contribute to the integration of renewable energies in buildings, overcome the various barriers identified and, in addition, take advantage of existing opportunities in the Indian market to make them competitive and accessible. The proposed business models and financial strategies in this report aim to overcome these barriers. The objective of this report is to describe the different business models and financing strategies and provide guidelines for the implementation of the proposed strategies.

The main aims of this report are to (I) propose business models and financing strategies that can scale up the proposed RE technologies in India; (ii) define the key stakeholders, resources and time requirements for the implementation of the proposed business models and financing strategies, and (iii) provide recommendations to potential donors on their role and support required to enable the market conditions to implement the proposed business models and financing strategies in India.

The recommendations on business models and financial strategies included in this report are a set of financial and non-financial strategies, that includes:

(a) Build capacity and enable key stakeholders to offer to customers and provide financial support for the deployment of RE technology solution under an OPEX contractual arrangement,
(b) Put in place a specialised self-sustaining partial credit guarantee that can facilitate access to competitive financing support to RE technology providers that offer OPEX or leasing contracts;
(c) Put in place an innovative financial risk mitigation mechanism in the form of a partial payment guarantee that mitigates the payment default risk of customers on their OPEX contracts with providers;
(d) Build capacity and adopt internal processes of banks to mainstreaming lending to RE technology projects and providers offering OPEX contracts
(e) and enabling the market conditions to create a secondary market for RE technologies that can facilitate lenders to consider the RE assets as collateral.

The proposed business models and financial strategies are the result of the in-depth analysis of different aspects, which helped to identify barriers and opportunities related to the different stakeholders involved in the value chain. The analysis included consultations with key stakeholders such as tech providers, DFIs (such as the World Bank and Asia Development Bank), LFIs (such as Tata Financials, SBI) and other key public stakeholders (such as EESL), and building customers. Additionally, the analysis covered national policies related to RE technologies and buildings, existing initiatives, and cost-benefit analysis of RE compared to conventional solutions.

Priority sectors and technologies

Buildings require various inputs of energy whether it's for heating, cooling or electricity. The building sector is responsible for approximately 38% of carbon emissions globally, coming from the operating cycles and building construction.[1] Commercial, Industrial and public buildings offer huge potential for RE integration. Therefore, buildings must play a key role in the clean energy transition.

Depending on the location, purpose and the type of building, suitable renewable technologies can be identified and integrated. The proposed approaches focus on all building types covering public / private, residential, commercial and industrial sectors. It also focuses on buildings that are already built (not in planning or in the construction stage).

Priority technologies:

- Small Wind Turbines
- Biomethanation / Bio-digestors
- Solar photovoltaic (PV)

Renewable technologies usually have high up-front costs. However, the lifetime operational costs tend to be lower when compared to a building using fossil fuel-based energy. Furthermore, building owners might not have the right incentives to dedicate funds to invest in renewable energy solutions and replace or displace the conventional energy services they are receiving. Normally, there are other investment priorities that compete with investing in RE solutions in buildings. Financing strategies and service-oriented business models that remove the up-front investment of renewable energy integration should be adopted to transform the market and de-risk investment.

The potential in India is huge, especially considering that all new buildings should have >25% of dedicated space (rooftop or the site) for the future installation of renewable energy systems.[2] Looking at government estimates from 2024 to 2025, India will aim to spend USD 1.4 trillion on infrastructure. Currently, residential and commercial buildings in India account for an estimated 30% of total electricity consumption and this is only expected to increase to 48% by 2042.[3]

It is important to highlight that even though smart business models and financial strategies can help to reduce market barriers and motivate stakeholders, policy has a very important influence on the development of the market and can affect business models in a positive or negative way. Even though this effort is not focused on providing policy recommendations, this aspect was considered to be able to propose the models and strategies.

Brief overview of proposed business models and financing strategies

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[1] UNEP Report "2020 Global Status Report for buildings and construction". Available online: https://globalabc.org/news/launched-2020-global-status-report-buildings-and-construction Last accessed: 13 September 2022.

[2] Energy Conservation Code 2017. https://beeindia.gov.in/sites/default/files/BEE_ECBC%202017.pdf last accessed 13 September 2022]

[3] Finance Minister Smt Nirmala Sitharaman releases Report of the Task Force on National Infrastructure Pipeline for 2019-2025. Available online from: https://pib.gov.in/PressReleseDetail.aspx?PRID=1598055 [last accessed 23 August, 2022]

The main objective of these business models is to remove barriers, increase attractiveness, make them more competitive, reduce the perception of risk, involve key stakeholders, and facilitate access. Business models seek to change or improve the way renewable solutions are offered.

As mentioned above, the renewable energy technologies being included are proven and reliable technologies that exist in the market. However, the way in which these technologies are commercialised, or are offered, or are financed, can significantly change the decision-making and investment choices of decision-makers and users about these technologies.

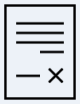
The implementation of any business model or financial strategy requires the participation of different stakeholders, such as: users, building owners, technology solution providers, financial institutions, or insurers. Each one carries a liability, a risk, an opportunity and/or a decision-making role while developing and implementing.

BASE recommends several models comprising financial and non-financial mechanisms designed to build trust and credibility among stakeholders. In addition, the market in India is familiar with some of these proposed business models or financial strategies that are being implemented for other types of projects, for other technologies, for other types of customers or in slightly different manners. The business models and financial strategies proposed below are based on the identification of market barriers, the risk perception of different stakeholders, and the business opportunities presented by these technologies in the Indian market. This information was obtained from both primary (interviews) and secondary (existing literature) sources.

Proposals:

OPEX/Servitization: This model requires a contract where a provider makes energy available to their customer, who pays per unit of energy. A service is provided for an agreed period of time (usually via a power purchase agreement (PPA) and there are little or no upfront costs paid by the end-user. In contrast to CAPEX where the user must pay the capital costs, OPEX covers the operational side only.

Rational: removes the upfront investment requirement by the customer. As well, allows the building owner to avoid comparing the RE investment against other investment opportunities.

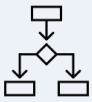


Recapitalisation: This model requires a contract where the user pays a fixed recurring amount to the owner of the asset. The owner is in charge of installation, maintenance and repair since the user is not the owner of the equipment. In the case of RE, it can be seen as swapping an energy bill for a lease.

Rational: Financing mechanism that allows beneficiaries to benefit from the system under off-balance lending conditions and periodic payments similar to the cost of using a conventional energy source.

Guarantees: This can be either a credit or payment guarantee, similar to a credit enhancement. This financial mechanism covers the partial or full cost in case of default. This occurs in the event that an asset becomes a non-profitable asset (NPA). It is considered a third-party credit risk mitigation measure to the lender or RESCO through the full or partial absorption of the lender's losses on a loan and usually involving a percentage fee or a premium.

Rational: Facilitate access to credit by reducing collateral requirements.



Mainstreaming RE lending process: This includes capacity building and making the credit process standardised and included within the main functioning of the financial institution. It should in turn decomplicate the process and reduce associated costs.

Rational: Building opportunities to access finances for RE

Secondary Market: Essentially a second hand market where previously owned and used equipment can be sold. Specific to the case of RE, it is a method for the financing institutions to recover loan defaults from the sale or reallocation of the RE systems.

Rational: Allowing assets to be considered valuable and part of collateral requirements

Value chain stakeholders:

Demand:

- Enterprises
- Public Entities

Technology Supply:

- Technology Provider

Financial Supply:

- Banks
- Funds

Recommendations

The overall finding of the assessment is that access to finance is the key barrier to the integration of RE into buildings in India. A shift in market models as well as mindset is needed in order to accelerate the uptake of RE for buildings.

Overall, stakeholders (technology providers) were extremely supportive of the concept of the OPEX model. However, as mentioned it is key to have access to financing in order for the providers to cover the CAPEX costs. This will also give them more flexibility when offering PPA contracts. They strongly felt that guarantees would solidify their credibility and de-risk their projects in the eyes of lenders. However, these must be affordable. Technology providers expressed the view that options to reduce interest rates, ensure timeliness and remove hard collateral requirements are crucial to the success of their projects and scale up.

It is recommended to:

- Standardise OPEX/Leasing contractual arrangements between the provider and client;
- Dedicate a credit or payment guarantee to support technology providers.

Secondary findings include the fact that a secondary market can also provide the required support and that close work must be done with banks to streamline renewable energy credit lending.

It is recommended to:

- Standardise internal operating processes and incentivize credit officials;
- Build a secondary market that financing institutions can use to recover loan defaults from the sale or reallocation of the systems.

3. Introduction

3.1 Objective

The broad objective of the "Integration of Renewable Energy Technologies in Buildings in India" project was to design, showcase and monitor 2-3 buildings with integrated and innovative renewable energy technologies suitable to and affordable in the local condition and applicable for multi-storey buildings.

The project will contribute to various global processes in the areas of climate change mitigation, urban development and resource efficiency improvement. The work will also contribute towards the 2030 Agenda for Sustainable Development, which includes:

- Goal 7: Affordable and Clean Energy;
- Goal 8: Decent work and Economic growth;
- Goal 9: Industry innovation and Infrastructure;
- Goal 11: Sustainable Cities and Communities ;
- Goal 13: Climate Action and the Paris Agreement.

The specific objectives of the project are:

- To demonstrate the technological interventions for building integrated renewable energy in India;
- To develop research, monitoring methods and manuals to measure the performance of systems established during the implementation of project;
- To provide capacity building support to government and private sector stakeholder in India;
- To prepare and disseminate knowledge products for effective implementation of the programme.
- To propose business models and financing strategies that can support the deployment and adoption of renewable energy technology solutions in buildings in India.

The report describes the different business models and financing strategies, and provides guidelines for the implementation of the proposed strategies. The outcomes of this report include:

(i) propose business models and financing strategies that can scale up the proposed RE technologies in India;

(ii) define the key stakeholders, resources and time requirements for the implementation of the proposed business models and financing strategies, and

(iii) provide recommendations to potential donors on their role and support required to enable the market conditions to implement the proposed business models and financing strategies in India.

3.2 Methodology

The first step was to analyse the main barriers, risk perceptions, and market opportunities in relation to access to renewable energy technologies in buildings. The market context, regulation, building characteristics, and other aspects were also analysed. For this purpose, it was necessary to have an in-depth understanding of the challenges and opportunities for the different stakeholders when implementing renewable energy technology solutions in buildings. For this purpose, interviews were

conducted with the supply side (technology providers), the demand side (users and building owners), financial institutions, and development banks, regarding the financing of renewable energy solutions. The analysis also evaluated the financial sources and existing mechanisms that provide financing support to the supply or the demand side. Additionally to this it was analysed secondary information (reports) that described the current market context, barriers and opportunities.

To define business models and financial strategies it was needed to analysed the following aspects:

- Who the main key stakeholders are in the RE technology sector and the financing sector in India;
- What are the main barriers and opportunities for customers, providers and financiers;
- What are the current offered business models;
- What are the current financing sources and conditions;
- Policy framework affecting RE in buildings
- Analysis of market gaps, market disconnections,
- Business models and financial strategies in other countries that potentially can be replicated in India
- Overview for implementing the business models and financial strategies.

The analysis carried out to propose the business models and financial strategies was carried out using a combination of desk research, interviews and consultations with key stakeholders (customers/building owners, financial entities, technology providers, public entities). In total, 18 stakeholder interviews were held. A list of the interviewees is included in Annex 1.

A key element for the definition of business models and financing strategy was the screening, assessment and prioritisation of sectors and viable renewable energy technologies in buildings. A detailed list of this assessment can be found in Annex 4.

Technologies were shortlisted according to pre-defined weighted criteria specifically:

- Suitability of technology to residential or commercial buildings/housing societies;
- Suitability of technology to Indian context;
- Market readiness of technology;
- Commercially availability in India (or potential to be in coming years);
- Financial viability / attractiveness;
- Potential for replication / scalability;
- Potential for capacity building.

3.3 Background

RE in Buildings - India

India's building sector is growing rapidly, with estimates stating a projected doubling of building space in the next 20 years. [4] There is some political support both for increasing clean energy as well as more passive methods linked to energy efficiency.

As of July 2022, India's renewable energy (RE) installed capacity reached 114 Gigawatts (GW). Solar energy contributes approximately 51% share of the total RE, making it the largest contributor followed by Wind Energy (36%), Bio-power (9%), and Small Hydro (4%).[5]

Solar Rooftops

According to the National Institute of Solar Energy (NISE), the total solar PV potential in India is approximately 749 GWp, including solar PV rooftop.[6] Most renewable energy in India so far has mainly taken place in large utility-scale projects. The country has installed a total of 57.7 GW of solar power generation capacity, of which only 7.6 GW are decentralised solar PV on rooftop systems by 31 March 2022, against a target of 40 GW planned for this year.[7]

To increase the deployment of renewable energy in buildings, new business models, innovative financing structures and strengthened policy will be needed.

Small wind turbines

For comparison, the total GW of energy coming for wind energy as a whole is approximately 40 GW. However, this project is focused on micro-wind turbines on site. This would allow the generation of wind power to be decentralised where the production of energy would occur at the point of consumption. The International Electrotechnical Commission (EIC) labels small wind turbines (SWT) with a rated power of less than 50-100 kilowatts (kW).

For this project, we will focus on wind technologies involving Micro wind turbines which are suitable for application at the building scale and are called 'Building Integrated Wind Turbines' or 'Vertical Axis Wind Turbines.' Their capacity range is 200 W-10kW and have a height from 2 to 10 metres. These can be used as stand-alone systems or as grid connected systems, or even paired photovoltaics.[8]

Biomethanation /Bio-digesters (waste-to-energy)

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[4] India Energy Outlook 2021. Available online: https://iea.blob.core.windows.net/assets/1de6d91e-e23f-4e02-b1fb-51fdd6283b22/India_Energy_Outlook_2021.pdf [last accessed 24 August 2024].

[5] Ministry of New & Renewable Energy, India 2022. Available online: https://mnre.gov.in/the-ministry/physical-progress [last accessed 24 August 2022].

[6] Now Solar - Overview of Rooftop solar. Available online: https://now.solar/2021/03/10/overview-of-solar-rooftop-sector-in-india/ [last accessed 24 August 2022].

[7] PV Magazine news, ' India's cumulative installed PV capacity tops 57.7 GW', https://www.pv-magazine.com/2022/07/29/indias-cumulative-installed-pv-capacity-tops-57-7-gw/ [last accessed 30 November 2022].

[8] RE in Buildings, Shortlist technology tipsheet. SDC/IEEC 2020. Available online: https://www.iiec.org/document-library/iiec-project-publication/handbooks-and-manuals/227-integration-of-renewable-energy-in-buildings-in-india/file [last accessed 30 September 2022].

India has significant potential to expand its bioenergy sector using inputs varying from organic agricultural waste to municipal solid waste. India produces a total of 2.07 billion m³/year of biogas but the potential is much larger and could range from 29-48 billion m³/year.[9]

Our focus is on small biomass facilities on site via an anaerobic digestion systems. Small is defined as being below 5000 m³ biogas per day. In India, the production of biogas for off-grid electricity was 8,015 x 1,000 m³ in 2019 and is much higher for cooking reaching 1 589 506 x 1,000 m³ also in 2019.[10]

Energy use and energy prices in India (Specific to the building sector)

India is expected to build 40 billion m² of new buildings by 2050. Currently, buildings are responsible for one third of India's total energy consumption[11].

Energy prices in FY 2020-21 are outlined in Table 1 below.

Table 1: Energy prices

Energy source	Price Rupees/unit		Price USD/unit	
Electricity price (Industrial)	7.75[12]	Rs/ kVAh	0.097	USD/kWh
Electricity price (Individual connections)	8[8]	Rs/ kVAh	0.10	USD/kWh
Gas LP	67.60	Rs/Lt	0.841[13]	USD/Lt

India's Energy Laws and Policies

In 2021, the Indian government established a commitment to reach net-zero greenhouse gas emissions by the year 2070. At the United Nations Framework Convention on Climate Change's 26th Conference of Parties (COP 26), the Indian government commitments were as follows:

"1. India will take its non-fossil energy capacity to 500 GW by 2030.

2. India will meet 50 percent of its energy requirements from renewable energy by 2030.

3. India will reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030.

4. By 2030, India will reduce the carbon intensity of its economy by more than 45 percent.

[9] Mittal, S., Ahlgren, E. O., & Shukla, P. R. (2018). Barriers to biogas dissemination in India: A review. Energy Policy, 112, 361–370. https://doi.org/10.1016/j.enpol.2017.10.027 [last accessed 24 August 2022].

[10] Off Grid renewable energy statistics 2021. IRENA. Available online: https://irena.org/-/media/Files/IRENA/Agency/Publication/2021/Dec/Off-grid_Renewable_Energy_Statistics_2021.pdf [last accessed 24 August 2022].

[11] Yu, S., Tan, Q., Evans, M., Kyle, P., Vu, L., & Patel, P. L. (2017). Improving building energy efficiency in India: State-level analysis of building energy efficiency policies. Energy Policy, 110, 331–341. https://doi.org/10.1016/j.enpol.2017.07.013

[12] Electricity Tariffs 2020-21 – BRPL, BYPL, TPDDL & NDMC.

[13] Global Petrol Prices 2022. Available online: https://www.globalpetrolprices.com/lpg_prices/ [last accessed 24 August 2022].

5. By the year 2070, India will achieve the target of Net Zero".[14]

However, looking at taxes on RE, the Goods and Services Tax (GST) has increased the cost of solar photovoltaic (PV) power generation by nearly 6%. GST is biased in favour of coal-based power[15].

In terms of energy consumption, in India buildings consume an estimated 29% of the total energy, this is divided into residential consuming ~20% and commercial consuming ~9%.[16]

The Indian building sector follows the Energy Conservation Building Code (ECBC) for new commercial buildings. The ECBC sets minimum energy standards for commercial buildings having a connected load of 100kW or contract demand of 120 KVA and above. Within the National Building Code (NBC) and the Energy Conservation Building Code (ECBC 2017), there are provisions which require the installation of Renewable Energy Systems. It is noted that "all buildings shall have provisions for installation of renewable energy systems in the future on rooftops or the site." [17]

A tax incentive for commercial and industrial users of electricity is that they benefit from the accelerated depreciation of the fixed assets associated with their solar power plant. This is 40% depreciation for solar PV systems and approximately 15% for others.[10]

Incentives for Solar Rooftop

There are specific incentives for solar rooftops in India such as Generation Based Incentives. Some states (i.e. Haryana and Delhi) provide rebates for the end users on tariffs for solar energy consumed.

There are also subsidies by the government (MNRE) for the project owner. These tend to be limited to performance but can cover 30% of capital cost for residential consumers and institutions in Indian general category states and union territories. However, this can go up to 70% of capital cost for special category states and union territories. Some states have an additional capital subsidy. Solar also has an exemption on the custom duty tax and in some states the solar system components are exempt from VAT.[18]

Existing programs

There are several existing programs in India that have been made available to support enterprises that are providing RE technologies, all with varying levels of success. For example, there is an off-grid and decentralised Solar PV application Programme. However, the focus is on the installation of solar power

[14] International Institute for Sustainable Development. India's Energy Transition: The Impact of the Goods and Services Tax on Solar Photovoltaic and Coal Power Costs. 2021. Available online: https://tinyurl.com/2z72accv

[15] International Institute for Sustainable Development. Mapping India's Energy Policy 2022. Available online: https://www.iisd.org/publications/mapping-india-energy-policy-2022 [last accessed 24 August 2022].

[16] Bano, F.; Kamal, M.A. Examining the role of building envelope for energy efficiency in office buildings in India. Archit. Res. 2016,6, 107–115.

[17] Bureau of Standards (India). National Building Code of India. Available online: https://www.bis.gov.in/index.php/standards/technical-department/national-building-code/ and https://beeindia.gov.in/sites/default/files/BEE_ECBC%202017.pdf [last accessed 13 September 2022].

[18] Ministry of New & Renewable Energy, India 2022. Available online: https://mnre.gov.in/solar/schemes [last accessed 29 August 2024].

plants of individual size up to 25 kWp in areas where grid power doesn't reach or isn't reliable.[19] This is more about rural access to energy rather than greening urban buildings.

The Indian Renewable Energy Development Agency Limited (IREDA) also gives out specific loans. For example, a MoU between IREDA and Bank of India was signed in August 2022 to co-lend and co-originate for Renewable Energy projects including Small Hydro and Ethanol projects.[20]

3.4 Barriers

Although investments in RE technologies present attractive savings and also offer other benefits including reduced pollution and emissions, there are barriers that inhibit the integration of these into buildings. There are several implementation barriers, such as lack of trust or credibility.

The barriers presented below are divided by relevance to each stakeholder group, namely demand, technology supply and financial supply. The barriers presented were identified through stakeholder interviews with technology providers and financial institutions.

Table 2: Demand, specifically enterprises and public entities barriers

Barrier	Description
a) RE is not an investment priority	Enterprises generally have many competing investment priorities, and most owners tend to prefer using their capital and financing capacity to grow their firms (rather than investing in savings or environmental improvements). The focus for them tends to be on core business. It can also compete with other investment opportunities. This is linked to many companies having low financial capacity.
b) Long term payback	Renewable energy projects require high initial capital investment (which is a barrier below). It is often the case that the net pay back period is high. The combination of having a high cost of capital and a lack of capital means that many projects with long term payback periods become unviable.
c) Lack of trust	Trust from all stakeholders is a key factor as it can impact agreements, costs, perceived risk as well as willingness to pay. This is also linked to public acceptability of renewable energy projects.
d) High upfront costs of RE technologies	Several technology providers feel that price/investment was the main barrier to moving to RE. CAPEX costs are high and accessing competitive financing is often very difficult for these companies.
e) Climate argument not sufficient motivation	For profit driven business, social or environmental motivation alone is not sufficient unless it's matched by financial viability and the capacity to scale. It must make business sense in order to succeed and be financially sustainable for the company.

[19] Ministry of New & Renewable Energy, India 2022. Available online: https://mnre.gov.in/solar/schemes [last accessed 24 August 2024].

[20] Indian Renewable Energy Development Agency Limited (IREDA).Available online: https://www.ireda.in/home [last accessed 24 August 2022].

Table 3 : Technology supplies, specifically Technology Provider or (Renewable) Energy Service Company RESCO/ESCO barriers

Barrier	Description
a) Small Enterprises	Many Small/Medium Enterprises (SME) have limited capacity both structurally and financially. It is also difficult for Micro and Small Enterprises to apply for funding and scale up as needed. Smaller projects also tend to be more costly.
c) Energy prices	Electricity prices are heavily subsidised by the government, particularly the oil and gas sector. Subsidies for coal remain stable and there are low GST rates for domestic LPG.
d) Lack of access to finance, high interest rates, low financing capacity	Many technology providers identified access to finance as a key barrier. Apart from this, the loans accessed usually have high interest rates and high transaction costs. Interest rates also depend on the credibility and size of the company and market.
Niche market	It is a specific market, with specific players that require specific energy needs. The sale of services in this sector depends on only a select number of products.
Low professional competition	Some companies do not behave morally or scrupulously towards their customers and can reduce interest and trust for other similar companies. Unskilled technical professionals and lack of training institutes also results in low professionalism in this sector.

Table 4 Financial suppliers, specifically banks and funds barriers

Barrier	Description
a) High risk perception, and lack of credibility	The risk profile of off-takers impacts their ability to acquire finance. The off taker is an entity who has contracts via Power Purchase Agreements (PPA). There is a risk that the offtakes stop paying and defaults on the loan. This is perceived as a high-risk scenario for the lender. Many lenders carry out credit checks and appraisals, usually having a minimum standard credit rating (e.g. above BBB+).
b) High risk perception of some technologies	Though not normally the case for solar, biogas and wind are perceived as high risk in terms of achieved saving and performance.
c) Lack of mitigation strategies	Currently, most banks ask for collateral in order to ensure that they don't have losses on loans. There are few other options apart from a limited number of credit enhancement programmes.
d) Small scale projects	There are high transaction costs associated with the evaluation of a project and this results in a higher percentage cost if the project is small. A way around this is to aggregate projects but this can lead to issues with average credit ratings. Usually, this also results in higher interest rates.
e) Special projects	Renewable Energy projects are classified differently within financial classification systems. They tend to be classified as 'Special' and are usually sent to a specific team. Apart from taking a longer time to approve, in many cases this process is not standardised.
f) Prioritise low hanging fruit	Both in terms of projects and financial products, many banks and loan officers will prefer to take on uncomplicated, traditional projects that they perceive to have a lower risk.

3.5 Defining Business model/Financial strategy

A business model is a framework that explains how a company or project will create value. Business models define the way in which a product or service is offered to benefit a customer. A business model answers fundamental questions about the problem to be solved, how it will be solved and the opportunity for growth within a given market.[21] This is especially true for innovative technologies since a business model is needed for these new technologies to disrupt the market and satisfy unmet customer needs. The feasibility and success of a business model depends very much on the product or service. There are a plethora of business model options.

In terms of renewable energy, there are alternative business models that allow for the deployment of new technologies. These are designed to overcome various barriers and risk perceptions, and facilitate access mostly linked to investments. Though most are financial barriers such as upfront costs and high risks, others may be linked to regulation or existing infrastructure. Usually, business models are categorised as CAPEX as a ownership model or OPEX in the form of a service model. A service model focuses on providing services and requires different operational processes. For an OPEX/leasing contract, several stakeholders are involved in order to match supply and demand. A financing institution such as bank or fund, provides the funds to the technology provider or a Renewable Energy Service Company (RESCO). Then this company provides a service to meet the energy demand of an enterprise or public entity.

Financial strategy consists of mechanisms (financial and non-financial) that help to provide and facilitate access to financial resources to different stakeholders so that they can offer or purchase products or services. The financial strategy includes aspects related to capacity building, raising awareness, or improvements related to standardisation, systematisation, risk management, and monitoring of financial operations. Within this report, the proposed financial strategies include concepts related to the streamlining of credit processes for RE projects, the development of new financial products and services, and the creation of incentives. Other tools are financial or credit guarantees, which aim to reduce the perception of risk and stimulate the supply of financial resources. This can be particularly useful when banks are unfamiliar with the sector, resulting in a perception of high risk and high collateral requirements.

RESCO/ESCO Definition

ESCO stands for a ”energy service company” and adding the R, RESCO, is a term specific to a “renewable energy service company”. These are companies or entities that deliver energy services in an energy user's premises, and accept some degree of financial or performance risk in doing so.

These might include:

- Technology Provider (supply and install)
- Contractor
- Specialised Fund
- Engineering and contractor Firm

[21] Harvard Business review. What is a business model?Andrea Ovans, 2015. Available Online: https://hbr.org/2015/01/what-is-a-business-model [last accessed 29 October 2022].

- Utility providers

In India there are companies called RESCOS or ESCOS. These companies are radically changing the market and have the potential to boost the implementation of renewable energies in Indian buildings. From discussions with these companies, it is clear that so far it has been difficult for them to offer renewable energy projects in buildings under contracts where the RESCO assumes some risk. However, they all agree that the OPEX model has the potential to help market development and remove the barrier of upfront investment by customers/users.

A RESCO/ESCO also has the capacity to offer performance contracts, or to provide financing to its customers in the form of credit or leasing.

Leasing

Leasing on its own is a financing instrument within an OPEX model. However, this is slightly different. In leasing, ownership of the asset remains with the technology provider (RESCO/lessor) until the end of the contract, and at the end of the contract the asset ownership passes to the customer (the lessee) at a residual value. In the Opex - servitization model, the ownership of the asset never passes to the customer, the ownership of the asset is always in the hands of the supplier (RESCO).

There is also a distinction in fiscal terms. In the leasing model the regulation regarding the accounting consideration of the contract has so far in India been considered off-balance sheet for the customer (according to interviews with suppliers and customers), which means that it is not considered as debt or liability for the customer. This situation is changing in the world where several countries are implementing IFRS16 (International Financial Reporting Standards: Leases) recommendations, where leasing is no longer considered off-balance sheet, but as debt. Sooner or later this situation will change in India.

Whereas the Opex - servitization model is considered off-balance sheet. In this case, it is evident that the technological characteristics of the renewable energy system are not relevant for the customer, since the customer is more interested in the outcome, which is what he pays for. This approach is very similar to the residential opex electricity service which is paid month after month to the utility company. We as customers are more interested in the quality of service than the characteristics of the power plant that generates the electricity. Furthermore, there is no clause in our contract where the ownership of the asset (the power plant) becomes the property of the user.

For the purposes of this report, both the leasing and servitization models are being considered as off-balance, as this is the current practice. In addition, ownership of the asset is considered to be transferred at the end of the contract between the opex provider (RESCO) and the customer.

Leasing is also considered in this report as a mechanism to refinance projects for RESCOs, this is detailed in section 1.5.

Leasing rates are usually higher than loan rates due to the higher risk for the lessor. The lessor usually takes the equipment (asset) as collateral. The owner of the equipment also benefits from any subsidies

or other advantages linked to the RE system. It is important to note that leasing is not simply a form of passive lending, but also a commercial agreement. Leasing can be suitable for modular technologies that are relatively easy to relocate such as solar PV or wind. They can be removed and then adapted for other clients. This may be a bit more complicated for biogas systems. It would be helpful for banks to work closely with technology providers and establish methods that ensure that the systems would be successfully moved in case a client defaults on the lease payments. Risk mitigation strategies such as this are key.

Financial leasing can be seen as a way to finance growth and scale up, i.e. how to liquidate the investments in a faster way. An interesting example of this are loans given by Rural Infrastructure Development Fund (RIDF). The goal is to (re)finance projects and thus change the risk perception and increase funding for renewables. In India, infrastructure Debt Funds are regulated by the central bank (Reserve Bank of India). IDF's potential to leverage equity and catalyse finance makes it a unique refinancing instrument. India has about 84GW RE projects in pipeline which would need USD 60 billion capital infusion for their operationalisation[22]. Refinancing could help fill this gap. The current bank lending rules and protocols for RE projects lead to a mismatch in asset liability for commercial banks.

In India, several changes are required in order for leasing to become more widespread. Currently, penetration of financial leasing is low. Firstly, the taxation environment must change to support these models and be considered financial transactions. Secondly but of equal importance, the regulatory environment needs to change in parallel. At the time of reporting, micro-finance intuitions are not permitted to engage in leasing, which can be limiting. Overall, the financial sector in India is focused on lending requirements from banks. Leasing exposures to MSME are not considered priority sector lending by banks[23].

3.6 Summary of Technologies and Market

Technologies

Based on the outcome of the sector analysis, we assessed the most significant technologies in the identified priority sectors. Based on a set of relevant economic, technical, environmental and policy criteria we identified the three most relevant RE technologies for buildings that can be used on-site.

Figure 1 Image: BioUrja Automatic wet waste Biogas plant

Below is a brief explanation of each of the technologies:

Biomethanation / Biodigesters

Biogas systems are anaerobic digesters that generate gas through a biological process in the absence of oxygen. Key is having a high rate anaerobic digestion process for the treatment of diverse

[22]Renewable Energy Focused Infrastructure Debt Fund (RIDF) in India Invvestment Teaser 2021, https://gggi.org/wp-content/uploads/2021/09/GGGI_Asia_India_Renewable-Focus-Infrastructure-Debt-Fund_Project-Investment-Teaser.pdf [last accessed 29 Septmber 2022]

[23]Evaluation of leasing in India 2019. Available online: https://www.ifc.org/wps/wcm/connect/098d9d0e-a553-4d2a-9b46-bf1701b19bf4/Evolution+of+Leasing+in+India_Aug+30+2019.pdf?MOD=AJPERES&CVID=mQ-Gi0B [last accessed 29 September 2022]

feedstock. In the case of one of our interviewees, GPS Renewables, their system digests biowaste and produces clean bioCNG (biogas which contains high percentage of methane).

Small Wind Turbines

For this RE technology, wind is used to produce electricity using the kinetic energy created by air in motion. This energy is transformed into electrical energy using wind turbines or other wind energy conversion systems. If on-site for building, their size is limited and usually the product would have an aerofoil design that is able to convert a certain % of the energy in the wind into useful energy to charge batteries for storage.

Solar Photovoltaic PVs

Solar PV systems convert sunlight directly into electricity. The focus for this report is on rooftop solar projects, usually on-site.

Market

The Indian renewable energy market is expected to register a CAGR of more than 10% from 2022 to 2027. India was the second largest market in Asia for new solar PV capacity and third globally (13 GW added in 2021). Off-grid solar power is also growing in India, for example 392,000 off-grid solar products were sold just in the first half of 2021.[24]

The Indian renewable energy market is fragmented. The key players in the market include Tata Power Company Limited, NTPC Limited, Suzlon Energy Limited, Vestas Wind Systems AS, and Siemens Gamesa Renewable Energy SA.

[24] India Brand Equity Foundation. RE in India. Available online: https://www.ibef.org/industry/renewable-energy [last accessed 29 August 2022]

4. Strategy and rationale of proposed models and financial strategies

4.1 OPEX / Servitization

In simple terms, this model is the sale of a service to a user, not the equipment or the assets. With an OPEX model, the user is not responsible for the investment (upfront investment) in the RE equipment and systems themselves. With a solar PV rooftop system, for example, electricity is generated and is used on-site or in some cases exported to the grid. Here the focus is on a servitization model where the end user is paying per unit of energy used. Usually, the energy generated by solar rooftop systems meets the load requirements of the consumer. However, in some cases, there may be excess and the price the grid buys it from the service provider is set as the feed in tariff by the electricity regulator. An important factor is the difference between the levelized Cost of Energy Generation and the tariff adopted by the electricity regulator.

In India, third-party ownership (OPEX) contracts are common, mainly for utility-scale solar or wind projects. Indian utilities and governments use these types of contracts because of their ability to access renewable energy at very competitive costs and without the need for upfront investment. In addition, because these are large projects, they are able to access competitive financing costs, and these types of contracts transfer many of the technological and operational risks to the investor, not to the government or utility, who only pay for the power generated.

The Opex model has enormous potential for use in renewable energy projects in buildings, i.e. small-scale projects. Furthermore, the opex model has enormous advantages not only for solar energy, but also for other types of renewable energy technologies such as wind, biomethanation, electricity storage, solar cooling, fuel cells and others. However, so far this type of contract remains untapped and has not been introduced to the market, such as in the case of scale utility projects.
It may go without saying but these business models make sense only in cases where the cost of solar energy generated is lower than the cost of utility energy, which is the case for many types of buildings (commercial and industrial) and customers in India. There may be some variation as the cost is impacted by various factors such as the size of the system, market, subsidies and other tax rules. It is important to note that a RESCO usually has to lease a rooftop. They then generate power and sell it back to the rooftop owner through a power purchase agreement (PPA).

The process works as follows: the end user (client) signs a PPA with a third party (RESCO) and possibly a Net/Gross Metering Agreement with the utility. The difference is that if *Gross Metered,* part of revenue generated by exporting the generated electricity from the system to the grid is shared with the rooftop owner. If *Net Metered,* the electricity generated by the system is used for (client) internal consumption.

A Power Purchase Agreement (acronym PPA) is the name of the contract between the supplier and the client under the OPEX model. The provider or RESCO instals, owns, and operates the RE system on the clients property. The client purchases the electric output in units over the course of the contract. The PPA stipulates the tariff (Rs./kWh). This rate is usually lower than that of the utility provider, resulting in financial savings. A PPA differs from loans in that PPAs are based on the client paying an agreed tariff for the electricity produced (i.e. kWhs), instead of fixed fee per month regardless of

generation (which is the case with leasing). While most PPAs do not transfer ownership, some companies do over this after the PPA time frame (typically after 15 years), sometimes allowing for almost free power for the remainder of the solar system's life (typically 25 years). A similar model could also be suitable for the other priority technologies with some modification. For example, the space occupied by a biogas plant or wind power equipment could also be leased.

In summary, many of the barriers identified can be overcome by building capacity using an OPEX model. To do this, it is helpful to standardise the OPEX contractual agreements between the provider and the client. Digital technologies can help streamline this process.

Building an initial pipeline and capacity of key market stakeholders

Different business models can provide new business opportunities for many technology providers. Technology providers have strong experience in selling and installing equipment (Turnkey/EPC[25] Contracts), but not so much experience in selling energy as a service (Opex contracts). Therefore, building capacity is necessary. It is important to note that a structural change is required in the stakeholder's approach to Opex contracts. A change in revenue streams is also needed, as well as a change in the way opportunities are assessed and risks mitigated. The RESCO offering an Opex contract will have continuous revenue streams that are likely to change the way money is spent and reinvested within the company. It also establishes a different relationship with their customer, as the Opex contract requires a long-term relationship with their customer, and not just a short-term one as in the turnkey, or supply and installation contract.

Technology providers in India understand the Opex contract potential, and the challenges involved. Most of them are very knowledgeable on the technical aspects of their technologies and able to estimate cost savings and predict maintenance and operational requirements. These are parameters they control when making a sale under a turnkey or EPC contract. Providers have difficulty estimating the cost of the service per unit under an Opex contract, as this involves amortisation of the investment, financing, maintenance, monitoring and risk associated with the contract period. They also have difficulties in accessing competitive financing (due to lack of collateral or financial strength) and in presenting a bankable project to obtain competitive financing from banks. In addition, technology providers may find it difficult to convince customers to sign long-term contracts, as contracts often have terms of up to 20 years.

Technology providers in India understand the servitization potential if they understand the potential and risk associated with the technologies they offer. Most of them have the knowledge and capacity to estimate cost savings and predict maintenance and operation requirements. This is usually done in the form of a fixed cost per unit of energy or a price linked by a percentage to state tariff (e.g. always 10% below the normal electricity rate). Additionally, technology providers may have difficulties convincing clients to sign up for longer periods, as contracts tend to have tenures of up to 20 years.

Some of the advantages of the OPEX contracts for the customers include:

- No upfront investment needed. The customer just pays to use it.

[25] EPC = Engineering, procurement, and construction

- RE investments do not need to compete for resources with other investment opportunities for clients. Their investment resources can be focused on their core business.
- For accounting purposes, the Opex contract is reflected as an expense for the customer (not as an investment) on its balance sheet. This has tax advantages for the end user.
- No investment or performance risk for the customer. The investment and performance risk is borne by the technology provider or the RESCO.
- Lower energy costs and greater predictability. Lower energy costs for the end user and more predictable costs as they do not fluctuate according to the price of oil or gas.
- Foreseeable payment structure: This is relevant for both the end user and the RESCO as well as the bank/lender.

Most potential Opex contract providers in India need support to integrate this contract as a line of business for their business. Basic aspects such as contracting, pricing, risk mitigation, financing, monitoring and commercial strategy are necessary and need to be standardised to enable them to offer this type of contract in the market and to build trust with customers.

Raising awareness and building capacity of key stakeholders is key to scale up the OPEX model. There are different areas where the Providers, Financiers and the clients need support such as:

a) Contractual arrangements
b) Pricing of an OPEX service
c) Standardise MRV practices
d) Financial structure and bankability of projects

For example, for the Financing structure a key aspect for the Providers is how to finance or refinance the OPEX projects.

Refinancing is a form of asset financing, where one party sells an asset to a buyer and the buyer leases the asset back to the seller. In the case of RE systems and an OPEX model, though the ownership changes the service can continue to be provided. It does carry some risks related to incorrect valuation of assets or other issues linked to third-party rights.

In a typical transaction involving a solar project, the RESCO will install, operate, and maintain the RE system via an OPEX model with a customer signing a PPA over the long term. The RESCO covers all the costs. Then the RESCO sells the facility to an investor usually in 3 months. The investor leases the project back to the developer for a lease term approximating the term of the PPA. The RESCO normally can use the PPA as collateral for the recurring lease obligations.

The investor is considered the owner of the project for tax purposes, claiming any tax benefits. Ideally, the investor shares its tax savings with the RESCO in the form of reduced rents.

Part of this task is to define the financing evaluation process and internal flow of information. BASE will develop initial financing criteria, due diligence protocols, and integration of RE as part of the credit assessment process.

This is linked to financial leasing as a re(financing) option. An analysis will be carried out to find ways to promote this as an option for RESCO financing.

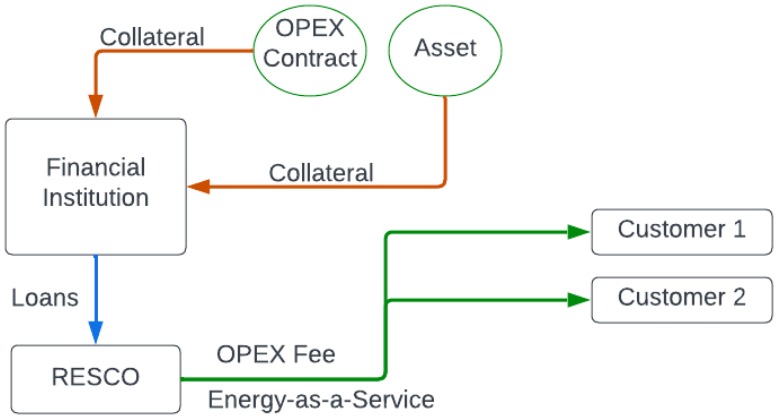

Figure 2 Stakeholders and processes in the recapitalization process

Two options for financing projects under an OPEX contract are:

1) 'Special Purpose Vehicle'. This mechanism is aimed to help RESCO invest in the project. It is expected extant to supply, build and ensure the successful roll-out of the system. This involves a fund manager, who is responsible for the SPV and has the financial capability. This vehicle has the advantage that the supplier does not have to be financially sound to absorb credit, as the financial risk is borne by the SPV, which assumes the role of RESCO. The SPV finances the project directly to the customer. The SPV's fund manager normally has its own funds (equity) which are complemented with bank financing to invest in Opex projects. The SPV seeks to maximise the equity/debt ratio, the higher the proportion of debt (at a competitive cost) and the lower the proportion of equity the better for the SPV to maximise its return on equity. The SPV bears the risk of customer default. The risk of system malfunctioning is also borne by the SPV but can be transferred to the supplier. The SPV enters into agreements with providers to supply, install and maintain the system, as most fund managers are financial rather than technical specialists.

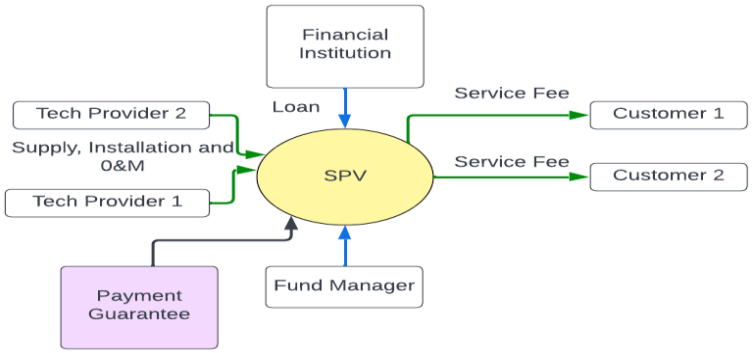

Figure 3 Stakeholders and framework via SPV

With this financing mechanism, RESCOs can focus on selling, technical aspects, and providing maintenance and operational service without having to deal with financing. Fund managers are responsible for conducting customer due diligence.

2) Financing to RESCO using an ESCROW account as a guarantee for the Bank.

This mechanism is useful when the RESCO has a limited credit history and doubtful financial capacity, yet manages to sign an OPEX contract with a client with a high creditworthiness. In this case, the bank provides the RESCO with the economic resources to invest in the project. The bank reduces the risk of default of the RESCO by taking as collateral the assets and the contract that the RESCO has with the customer. This means that in case the RESCO defaults on its loan commitments, the owner of the assets and the payments coming from the customer will be the financial institution and not the RESCO. In addition, the bank requires the RESCO to have the customer's periodic payments executed as part of the OPEX contract deposited into an ESCROW account. An ESCROW account is a temporary pass-through account held by the bank for the duration of the contract between the RESCO and the customer. The ESCROW account can incorporate specific instructions on when payments related to the OPEX contract are received, according to which priority is given to paying the bank for the credit granted to the RESCO and the remaining balance is transferred to the RESCO to cover its operational expenses, and profits. The ESCROW account aims to build trust between the RESCO and the bank on the basis of the robustness of the contract due to the high trust of the customer. The system is based on the assumption that the project will operate without failure during the contractual period and that the customer will not default on the periodic payments of invoices resulting from the contractual OPEX commitments. Otherwise, the bank would have to solve these issues as well.

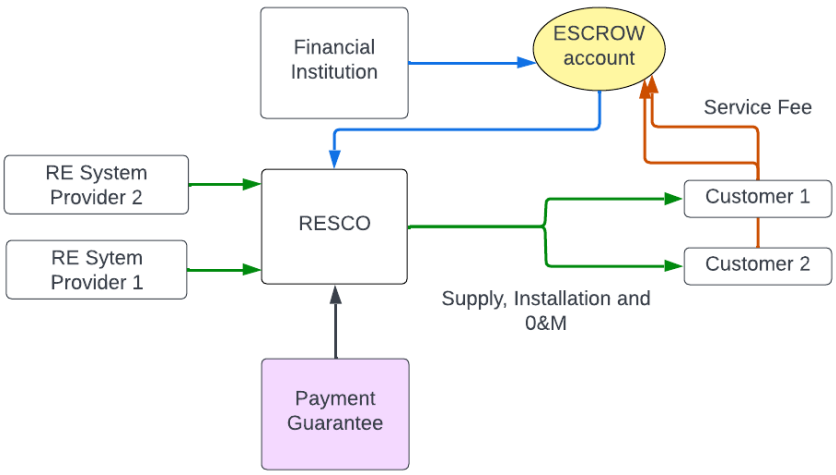

Figure 4 Stakeholders and framework via RESCO/ESCROW account

As mentioned above, access to competitive financing by RESCOS is a key obstacle to the OPEX model, and one of the major challenges is the lack of credit history and the lack of assets that can serve as collateral. In addition, the risk of non-payment of the commitments set out in the Opex contract by the customer is a factor that impacts the risk assessment of both the banks and the RESCOS themselves. If the customer does not pay for the service, the RESCO will find it difficult to meet its credit commitments.

Having a payment guarantee in both financial frameworks explained above reduces the risk exposure significantly for both the RESCO and the bank and would facilitate the adoption of the OPEX model. The objective would be to have a payment guarantee that covers the risk of customer default. The payment guarantee would help the SPV and the fund manager to reduce their risk exposure (not the RESCO). In the case of the ESCROW account, it also significantly reduces the risk for the RESCO and the bank.

4.2 Partial payment guarantee

Formal financial institutions and RESCOS are more interested in providing services and OPEX contracts to utility-scale projects than to small and medium-sized renewable energy projects in buildings. Banks are not particularly interested in financing OPEX and RESCOS contracts of these sizes for several reasons, among them:

(i) the lack of economies of scale;
(ii) high transaction costs;
(iii) the perception that RESCOS and SMEs are not creditworthy;
(iv) the uncertainty of small and medium-sized RE projects in buildings.
(v) the high failure rate and the vulnerability of SMEs to economic and market changes.
(vi) the high administrative costs of lending to REACOS and small and medium RE projects, which reduce the profitability of loans; and
(vii) the inability of RESCOS to provide the collateral required by formal financial institutions. As a result, access to credit is severely limited for RESCOS and OPEX contracts.

RESCOS that have the potential to offer Opex contracts for small-scale projects in India find it difficult to access credit on competitive terms. RESCOs offering such contracts (and the financial institutions that support them) focus mainly on large utility-scale projects, and not on RE projects in buildings, which are considered small-scale. These types of projects have difficulties to be implemented under OPEX contracts, either because the projects are considered riskier to enter a long-term contract, or because the RESCOs that can offer OPEX and service this market sector are small and medium-sized and are perceived as being riskier by the financial institutions. The partial payment guarantee has the potential to help mitigate these issues.

A payment guarantee is a non-bank financial instrument aimed at building trust between the main stakeholders - customer, providers, investor and financial institution- in OPEX contracts and facilitating access to finance for RESCOs (typically SMEs) at competitive lending conditions. Payment guarantees mitigate the risk of non-payment of the payment commitments set out in the OPEX contracts by the customer. In practice, the payment guarantee replaces, or at least reduces, the need for other forms of collateral and thus allows RESCOS to access loans at competitive conditions (interest rate and tenors).

The principle of the payment guarantee is that, in case the building owner (or the tenants) do not make the payments for the accrued services, the payment guarantee fund would cover the payments corresponding to the amortisation of the investment (not the maintenance part), so that the RESCO can recover its investment and meet its financial commitments. The payment guarantee would help to motivate RESCOs offering OPEX contracts in buildings (due to the reduced risk) and financial

institutions to lend funds to these types of projects on more favourable terms, as the guarantee improves the risk profile of the companies.

The payment guarantee would operate in a similar way as credit guarantees or credit insurance, where the beneficiary (RESCO) would submit an application for access to a payment guarantee on an OPEX contract in exchange for the payment of a premium. The guarantee would be managed by an entity in India with the capacity to operate and manage the funds allocated to the guarantee. The entity managing the guarantee has to ensure that the projects and RESCOs being guaranteed meet the objectives and eligibility criteria of the programme.

This guarantee is specifically for covering the risk of payment defaults of the end user, where the main beneficiary is the RESCO. This means that the payment of the claim would go to the RESCO. However, the RESCO could arrange to endorse the benefit of the guarantee to their issuing financial institution, this can help the RESCO in their credit negotiations. Guarantees are especially appropriate for projects with a high perceived credit risk. It allows for mobilised lending and usually also positively impacts the ability of the RESCO to acquire CAPEX funding from a bank or similar lending institution. These guarantees are usually partial in that they cover 50-80% of the outstanding payment. In terms of contract enforcement as a way to recover losses, it usually takes several years and can involve expensive legal fees. This isn't enough to convince banks and is usually why banks ask for collateral also.

The RESCO can claim payment of the guarantee only after the customer has defaulted for a certain period of time, e.g. at least four months/payments.

For a guarantee to be attractive to stakeholders (RESCO and Banks), it has to respond to claims effectively, not one year after the damage has occurred. For example, the payment of a claim should be made in due time (e.g. 5 days after the claim). Furthermore, the guarantee should not be perceived as a "blank cheque", but as a short-term solution, in order to maximise the impact of the leverage ratio of the guarantee and not deplete the resources behind it. The payment of the guarantee does not remove the RESCO's responsibility to try to recover outstanding payments from its customers. Even if the RESCO has received the guarantee payment, it must continue its efforts and legal proceedings to try to recover payments from its customers.
Although the payment guarantee aims to alleviate the risks of formal commercial financial institutions and RESCOS, in order to avoid problems of "moral hazard" and opportunistic behaviour, the payment guarantee should not cover the full value of the loans. The Payment guarantee should not remove the RESCO from its overall responsibility to properly assess its clients or to discourage RESCOs from performing their job properly. Having a partial guarantee ensures that RESCOS, banks and other entities continue to share a part of the risk and that there is a shared responsibility for the repair/recovery of amounts owed.

The credit guarantee aims to share the perceived risks associated with Opex contracts for small-scale renewable energy projects in relation to default on service. The guarantee aims to support

stakeholders in familiarising themselves with the Opex model. Once stakeholders become familiar with access to finance and understand the risks, the payment guarantee may be no longer relevant.

The payment guarantee should be managed by a specialised in-country guarantee fund manager organisation (payment guarantor). The role of the guarantee manager is to assess the risk of the requesting RESCOS, to assess payment guarantee requests for OPEX contracts, to check that RESCOS and projects meet eligibility criteria, to issue guarantee policies, to manage the funds available to back the guarantees and meet the corresponding claims and to ensure that resources are maximised to benefit as many projects as possible.

As for accessing insurance, RESCO would have to pay a premium to access the risk coverage of this guarantee. This premium would serve to cover the cost of the organisation in charge of managing the guarantee and make it self-sustainable.

In addition, as part of the application process for the guarantee, the RESCO would have to assess the creditworthiness and carry out due diligence on its client in order to assess the risk of entering into an OPEX contract. However, RESCOs are usually not experts in assessing creditworthiness or financial risk, but only technology experts. To support the financial and risk assessment of their potential customers and reduce the possibility of non-payment, an external agency or bank would have to perform a credit check of the end-user to ensure that he/she is able to pay for the service within the agreed timeframe.

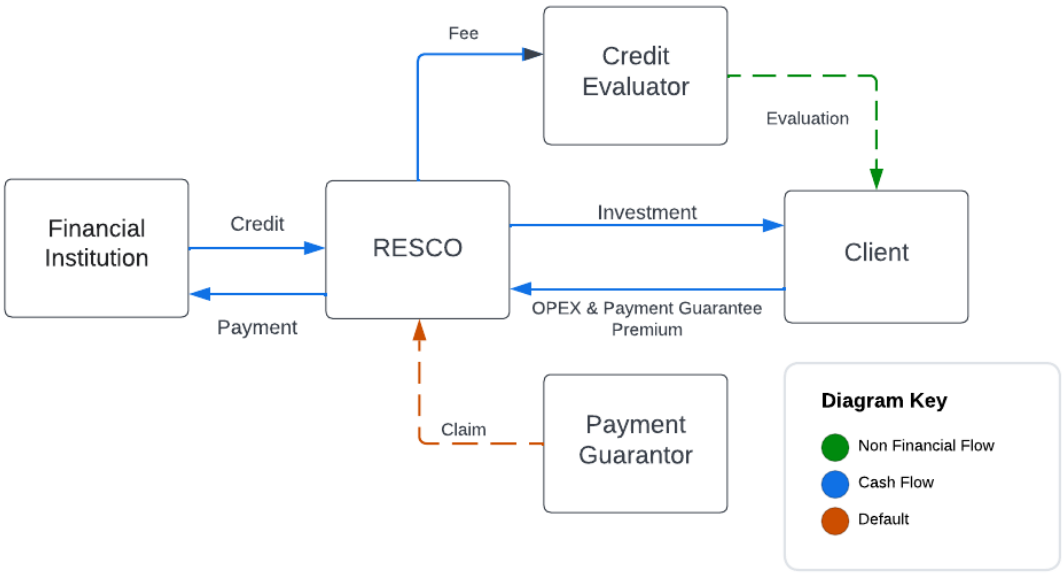

Figure 5 The connection and role in the partial payment guarantee mechanism

As is shown in the image above, the key players are the RESCO, the end client, the bank and optimally a third party due diligence checker (credit score evaluator). A bank could also carry out the role of checking the clients due diligence on behalf of the RESCO.

4.3 Bank Engagement

The development of a market and the growth of a business model require that stakeholders have access to competitive and efficient financing. The key actor that provides financing at competitive rates and with adequate time periods is commercial banks. For example, the sale of automobiles was triggered in several markets when banks implemented attractive credit systems and systemic rating and mitigation mechanisms. The same is true for mortgage lending, which has become very sophisticated in terms of risk assessment and mitigation. Furthermore, in these sectors, a very competitive market has been created among banks to offer the most favourable terms to customers. For example, a car loan is evaluated and approved in most banks in India in less than 24 hours, the car is used as collateral, and banks offer investment loan rates that would only be offered to companies with high credit ratings. This sophistication and lending conditions are not present in small-scale renewable energy financing.

Although several banks have been financing renewables and many have specialised teams to assess these projects, it is still considered by banks as a specialised segment that requires the credit application to be evaluated in a special way. Normally credit applications for renewable energy projects in buildings use the same channels as for large-scale projects, which results in high transaction costs for banks to evaluate small-scale projects, and this is reflected in the cost of credit for these projects.
It is required that banks systematise their risk evaluation and mitigation processes, as well as enable their sales force and conventional credit assessment in order to use the full potential of the bank and reduce transaction costs. In other words, this type of credit needs to be mainstreamed into the bank's operational systems, from the loan origination, evaluation, risk mitigation, loan disbursement and loan recovery.

Currently, loans for renewable energy projects in India take an average of 6-8 months to be approved, which can lead to loss of customers and other problems. Therefore, there is a need to streamline the process to reduce the waiting time. Within this process, internal operational processes need to be standardised and normalised. In addition, there must be a process of internalisation of these technologies and capacity building. Compared to mortgage loans, or car loans, bank loan officers can explain and assess in a basic way the main characteristics of cars or real estate and the different financing options, risk mitigation and improved the bankability for the customer. This is not the case for renewable energy. It is also important to incorporate appropriate incentives to motivate lenders to lend for renewable energy in buildings. Banking products related to climate change mitigation and adaptation should also be designed and improved, in particular offers to finance solar photovoltaic systems, wind energy systems and biomethanation. Some of the internal processes that need to be strengthened include the following:

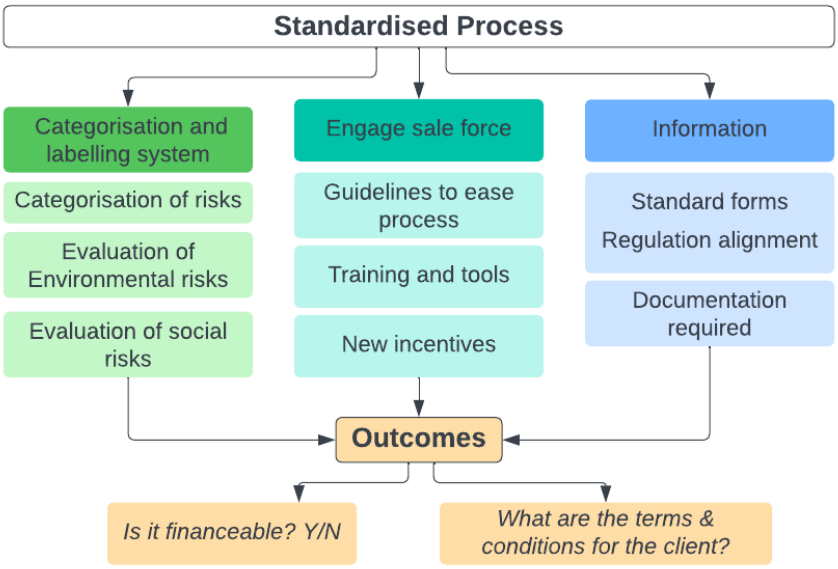

Figure 6 : Aspects of standardising a banks internal operating processes in support of RE credit finance

The aim would be to support a few banks with technical assistance to integrate renewable energy financing in buildings in a systematic way. In this way, other banks would want to implement and mainstream similar financing products and services and competition in the market would be generated, which in the end would benefit RESCOs and customers.

The most advanced Opex market for renewable energy in buildings is the United States, where there are several banks that finance both RESCOS and directly to customers by offering them PPAs (power purchase agreements).

4.4 Secondary market

One of the challenges faced by banks financing renewable energy and RESCOS offering OPEX contracts in India is the lack of a formal secondary market to help them relocate or resell projects and technologies quickly and safely to other clients to recover part of the investments when there are defaults. There is a formal secondary market for cars and real estate that banks use to recover credit. These secondary markets are part of the banks' risk management and recovery mechanisms.

Furthermore, the existence of a secondary market helps these assets to be considered as collateral (movable assets), as they could be assigned a depreciated value that is understood in the same way by the key market stakeholders.

RESCOs and banks can enter into agreements, to set up buy-back programmes to ensure the recovery, refurbishment and eventual resale of the systems. The ultimate goal is to create a secondary market so that renewable energy equipment (as movable assets) can be used as collateral for both RESCOs and banks.

Key terms include:

Secondary market: Also "after-market," or "resale market" refers to a system where the ownership of an asset can be transferred. Key is the arrangement for the sale of repossessed movable assets via a strong secondary market platform.

Collateral: An asset of value that a lender can seize from a borrower if they don't repay a loan as agreed. Traditionally, it takes the form of land or property.

Movable Assets: These are non-traditional but valuable, portable and transferable assets like equipment, vehicles or machinery that can be used as collateral to guarantee a credit. They consist of all non–real estate assets.

Movable Asset Based Lending (MABL): The method of using moveable assets as a collateral mechanism for financing.

Due to the investment costs and residual value of renewable energy systems, it is necessary to develop a secondary market. This will greatly increase the availability of financing products and services for these technology solutions and motivate OPEX contracts. Finance providers will be able to better manage their risk when lending to SMEs with verified movable assets or RESCOS. Financial institutions will then be able to use this market as a method to recover loan defaults from the sale or assignment of ER systems. This may be easier in the case of modular technologies and it may be worthwhile to redesign RE products with the secondary market in mind. In general, a reliable and robust secondary market environment can support the development of competitive funding sources and OPEX-type business models, where projects can be used as collateral and provide a practical way to manage credit risk.

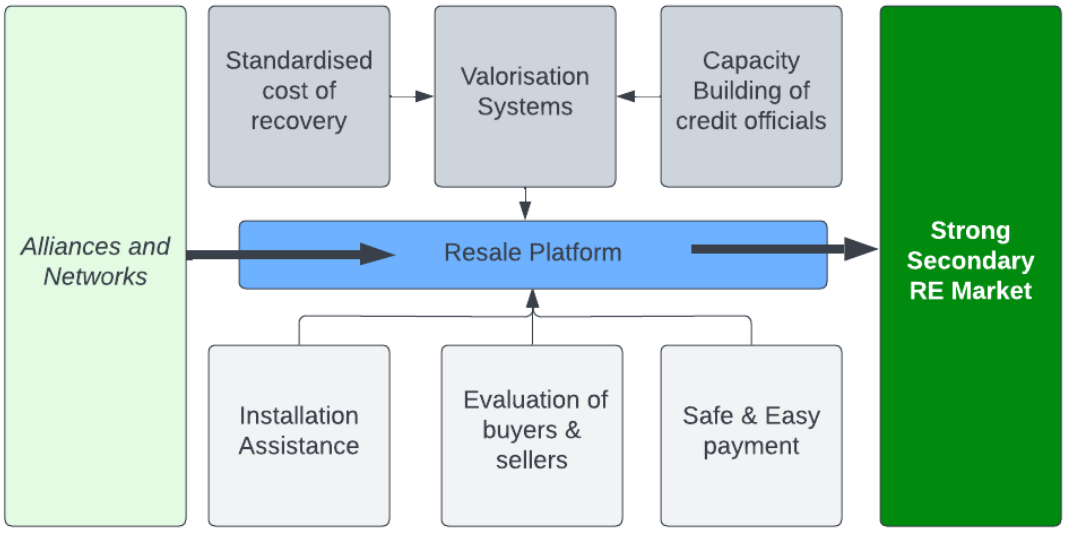

Figure 7 : Process to create a secondary market

Secondary markets for movable assets exist in India, but they are mainly fragmented and based on traditional communication means. Online portals do exist (e.g. eBay or SecondHandBazaar.in) but

most are not specific to RE equipment. As a note, we did find one platform called *SecondSol*, which has some partners in India but is a worldwide platform[26]. It is imperative to provide a comprehensive solution that can facilitate trade in multiple types of movable assets for India.

Renewable energy systems are movable assets, which retain a large part of their value during their useful life or while in service. For this to be accurate, an external valuation of the assets, including depreciation costs and other variables, would have to be carried out. Accepting these assets as collateral would help RESCOs to access financing, as it would allow them to use the systems to cover CAPEX costs.

Is this common practice? In developed markets it is. For example, in the USA 63% of loans to SMEs are collateralized using movable assets. [27] However, this is not the case in India leading the International Finance Corporation (IFC) to support a 2015 project called India Collateral[28]. In a related report, IFC makes reference to the importance of policies and schemes as well as to promote movable asset support SMEs. They recommend introducing a comprehensive set of regulations to promote movable asset lending, which is key to RESCOs that lack access to land and property collateral. It is important to note some progress in this area. For example, the Central Registry of Securitisation Asset in India (CERSAI) now includes movable assets such as jewellery, stock inventory, and more (previously they only accepted immovable property). [29] This registration is crucial as it can ensure no other lender has rights to the same collateral. However, some barriers are linked to legal aspects such as a limitation of the scope of movable assets that can be used as collateral and the fact that enforcement in the event of default can only be done through courts.

We note that in the case of having guarantees, BASE suggests removing the entire collateral requirement as it's covered by the guarantee. The idea is that a RESCO can provide a service without impacting its balance sheet or its capacity to take out additional credit. We also presented the recapitalisation options within financial leasing as a way to finance growth and scale up linked to an OPEX model above in section 2.2.

Overall, it is necessary to establish a robust secondary market system and create an efficient digital platform to allow for the resale of repossessed RE system assets, thereby adding values to these movable assets.

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[26]SecondSol, solar equipment platform (the photovoltaic market place) https://www.secondsol.com/en/marktplatzfilter/?kat2=40939&kategorie=17&modul_art=355&counterval=&level3=false Last accessed: 30 September 2022.

[27] Charles W. Calomiris, Mauricio Larrain, José Liberti, Jason Sturgess, How collateral laws shape lending and sectoral activity, Journal of Financial Economics, Volume 123, Issue 1, 2017, Pages 163-188.

[28]IFC Disclosures. Available online: https://disclosures.ifc.org/project-detail/AS/580667/technical-assistance-to-collateral-registry-in-india [last accessed 29 August 2022]

[29] IFC. Financing India's MSMEsEstimation of Debt Requirement of MSMEs in India. 2018. Available online: https://www.ifc.org/wps/wcm/connect/region__ext_content/ifc_external_corporate_site/south+asia/resources/financing+indias+msmes+estimation+of+debt+requirement+of+msmes+in+india Last accessed: 14 Septmeber 2022.

5. Implementation

This section focuses on providing a roadmap of activities and resources that would be needed to implement the proposed business models and financial strategies. Resources and support will be needed to enable market conditions, build the capacity of key stakeholders, develop tools that help standardise processes and market practices, and provide initial risk mitigants to help the market adopt the suggested business models and financing strategies. The objective of this section is to describe the next steps in moving forward the proposed business models and financing strategies from theory to practice.

This section also includes an explanation on how the proposed business models and financing strategies overcome the barriers and challenges that are preventing the integration of renewable energy in buildings in India.

For each recommendation, the time required for implementation, the required actors and the necessary activities have been estimated. The costs that would be required to implement these activities have also been estimated and linked to the possible outcomes.

5.1 OPEX / Servitization

As described in the previous section, one of the biggest barriers to incorporating renewables in buildings is the large upfront investment involved and the hesitation of investors to divert resources to these solutions, as they compete with other investment opportunities that may be perceived as more profitable and less risky. The OPEX model removes this barrier from the decision-making process, as there is no need for investors to divert resources.

The Opex model is well known in the country, and there are several stakeholders seeking to implement and support it (including financial institutions), but they are mainly focused on utility sales projects and solar PV. The reason for including an initiative to expand the Opex model in India is to focus on small-scale projects (in buildings) and also on technologies other than solar PV (small wind, energy storage, biomethanation).
In order to scale up the Opex model in small-scale projects in India requires building supplier capacity, standardising practices, improving the attractiveness and bankability of projects, and raising awareness in the market (with customers).
Capacity building and raising awareness is where efforts for the implementation of OPEX/Service models are focused. In general, a change of mindset and behaviour is needed in the market with regard to how to invest in and access renewable energy, especially for buildings. These activities aim to integrate the OPEX model on both the supply side and the demand side. Activities include:

Model 1: Development and implementation of the OPEX model

1: Raise awareness and build capacity of key stakeholders / RESCO Incubator
2 Standardised contract
3 Pricing calculation and tool
4: Monitoring, Reporting and Verification; digitalization (carbon emission reductions, maintenance, invoicing, etc.)
5: Financing structures for the OPEX/leasing provider

6: Risk mitigation mechanisms (specific to each technology and OPEX contracts)

1: Raise awareness and build capacity of key stakeholders / RESCO Incubator

The main objective of this activity will be to raise awareness and train different stakeholders in the integration and use of the OPEX model for different technologies, as well as to assist in the promotional and commercial strategies of RESCOs.

Many of the RESCOs are start-ups or SMEs and may lack resources, experience and networks. This activity would function as a knowledge centre providing know-how to help RESCOs integrate the OPEX model as a business line. In addition, it will provide assistance related to access to tools and offer linkages to funding sources, legal services, accounting, marketing/promotion, networking and other aspects necessary to adopt the OPEX model.

Crucial to the successful integration of the OPEX models is being engaged with key market stakeholders. It is important to have the endorsement of technology providers and key business associations and leading companies. This can be done through roundtable discussions with technology providers, government officials, and potential clients.

The tools available can be presented and any concerns can be addressed. The purpose of this roundtable/workshop is threefold: (i) promote the program with key actors; (ii) increase credibility and acceptance of the program; and (iii) identify potential first movers.

Developing a promotion strategy that is able to raise the awareness of key clients, and engage technology providers will ensure the success of the project. The promotion strategy will include a communication strategy and marketing material to promote the models. BASE has been developing strategies that are effective when promoting RE in buildings, and will advise and support RESCOs in the promotion strategy, include the following activities:

- *Marketing strategy.* Draft a marketing communication outline that will include a description of the objectives, target group insights, needs of the targeted client, and state the main benefits of the proposed business models. This outline will be used by the marketing specialist to develop the marketing strategy and material.
- *Marketing material.* Develop material for printouts, such as posters, flyers and brochures that will be used by technology providers and bank officials to promote the business models and approach clients, and other activities such as designing a booth for display at trade exhibitions, or presentations for a forum, etc.

Several potential technology providers have already been identified through the consultation and workshops conducted during this project. It is important to engage and promote the OPEX services that the different technology providers are doing. As part of this activity, an effort should be made to showcase the services and experiences under this model in India. It is also important to create quality standards to prevent the market from being corrupted, so it is required to evaluate the services and quality, as well as to evaluate them in order to create trust in the market. This is a critical activity as the main objective is for technology providers to see the OPEX model as a useful commercial step that can be used to increase their sales of RE products and for customers to see it as a feasible and reliable solution.

For this activity we suggest engaging and working with at least 3 technology providers per technology. The strategy is to concentrate efforts on these suppliers and disseminate their achievements, with the aim of encouraging other RESCOs to follow similar business and marketing strategies.

Supporting activities include:

- Identify and engage the most reliable technology providers of the prioritised technologies;
- Guide the first projects and technology providers through the initial process;
- Develop marketing material (flyers, online material) so that technology providers can market their service products;
- Actively connect potential clients with technology providers. This could be through roundtable discussions or together with larger players.

2: Standardised contract

An important element of the Opex model is the contractual agreement between the parties. The agreement reflects the responsibilities and risks associated with each party. It is important to standardise a contract that can be used by both parties and that is the standard under which renewable energy projects in buildings in India are signed. The contract should be simple to understand, balanced in responsibilities and adaptable to different technologies, and should be aligned with the Indian regulation. The contract is only a guideline to facilitate the negotiations of market stakeholders. The fact that the contract might come from a neutral entity (not from the provider or the client) is intended to create trust between the parties.

The outcome of this task will be to create a template contract. The contract will be the commercial agreement between the end user (client) and the RE technology provider. It will contain contractual elements such as the main clauses and the commitment of the technology provider. It will set out the tariffs, space lease/rent agreements providing legal access to install and maintain the RE assets and the tenure of the agreement.

It is very important to have a standardised methodology for managing the repair and maintenance of the systems. The contract should include clearly defined responsibilities for the provider to repair and maintain the system but also the responsibilities of the end user, such as repairing and maintaining the rooftop (in the case of solar PV). It should also define if the rooftop owner will pick net meeting or grid interconnection (if relevant). Another important aspect of the contract will be the termination and exit clauses and the penalties for early termination. It is crucial that these are fair and safeguard the project.

The contract should include the conditions for contract rescission. The requirements for each party should be clearly defined. For example, if the termination is due to the Customer's breach of the OPEX contract. As another example, in case the Customer does not pay its invoices related to its commitments to the OPEX contract, the contract should define the measures the Provider can take to claim deflated payments, depending on how many months of delay will be considered a breach. It is also important to mitigate losses in case of other situations, such as if the supplier needs access to the customer's property to remove or repair equipment. It is important to reflect these situations in the contract to clarify the responsibilities of each party.

On the other hand, the conditions and protocols in the event of termination by the lessor/RESCO should be described. For example, when is the lessor or RESCO considered to be in breach of contract, and how much time of unavailability of the RE system would be considered a breach? It is also necessary to agree on the minimum performance of the systems. In terms of early termination by either party, indemnity or other termination clauses should be included. It is important to consider how equipment will be reallocated to other customers, taking into account the impact of early termination on the viability of the project. The term of the contract, as well as the impact of price and liabilities, should be reflected.

3: Pricing calculation and tool

Another important element for mainstreaming the Opex model is to support suppliers and customers in defining a fair and equitable price for renewable energy projects under this type of contract. Technology providers have extensive experience in preparing and planning budgets for turnkey contracts, but there is difficulty in estimating the price of an OPEX contract since the price is given on a unit and usage basis. For example, hours of use.

The objective of this activity is to develop an open source tool that can be used by Providers to help them define the price of a technology under an OPEX contract. The tool should take into account various aspects such as equipment investment, usage, energy price, maintenance, equipment depreciation, etc. It will also take into account the likely average usage of the equipment. It will also take into account the likely average usage per customer depending on the size and type of equipment. The tools may also take into account the characteristics of the contract, such as the contract period and the value of the equipment at the end of the period. The tool can help to calculate the adjustment of the service price in each month, considering also the indexation to consumer prices and energy inflation.

4: Monitoring, Reporting and Verification; digitalization

An important element is the standardisation of processes and methodologies for monitoring the performance of renewable energy technologies and reporting on the economic and environmental benefits. This activity aims to develop guidelines and manuals for suppliers to report to their customers, and to serve as a reference for the disclosure of the environmental impact of renewable energy solutions in buildings.

In addition, this activity aims to standardise how OPEX suppliers should report on the use of the system for billing purposes.

This activity focuses on developing protocols and procedures, as well as assessing the incorporation of information management systems that Suppliers can incorporate to make the process more efficient and reliable and help mainstream the OPEX model.

This activity includes the following efforts:

- Methodology to calculate: i) the baseline, ii) estimated energy consumption, and iii) actual energy consumption of equipment (e.g. biogas, wind or solar PV). The methodology should

explain the evaluation protocols.

- Formats to standardise the information requested for projects for banks and from RESCO.
- Evaluation protocols to verify correct installation of equipment and criteria for rejecting or accepting the installed equipment.
- Evaluation protocols to verify cost per unit of energy and it's reporting
- Format to inform clients and technology providers about the cost and emission savings assessment report.
- Format for invoicing
- Internal evaluation procedures, flow of information and sources of information to carry out the different validation mechanism procedures.
- Evaluate and Propose different existing MIS for managing payments and billing

Existing methodologies and standards for MRV, such as the principles of ISO 50006 (Energy Management Systems), should be used to establish methodologies and procedures.

As part of this activity, the integration of digital tools to manage the process should be considered and part of this is the use of a web-based Management Information System (MIS). For example using blockchain and data loggers to identify performance or usage deviations. This can also help mitigate risks with financial institutions and investors.

The following items are included as part of this activity:

- Define users access permissions of the different target users
- Website public content
- Integration of the validation procedures
- Define reporting formats and incorporate them into the online platform
- Define reporting formats and incorporate them into the online platform

5: Financing structures for the OPEX providers

One of the key barriers identified for the expansion of the OPEX model in India is the difficulty for providers to access financing. This activity aims to outline the different options and structures that providers have to finance their projects under OPEX contracts with competitive resources.

The outcome of this activity is to provide guidance on the different funding sources and structures that can be implemented to finance or recapitalise projects that are signed under an OPEX contract. It also provides guidance on the requirements and characteristics of each funding source, as well as guidance on how to improve the bankability of projects.

Different strategies for encouraging financing for OPEX business models as well as methods to safeguard these contracts should be analysed. One of the proposals of this project is to investigate in more detail how project assets can be used as collateral and how this impacts on credit.

Defining recapitalisation possibilities is key, as this can be an interesting strategy for RESCOs to exit their investment from one project and use it in subsequent projects. This includes strategies such as exit and leaseback, or aggregation, or securitization. These resources will allow the Provider to grow and continue to invest in new projects.

6: Risk mitigation mechanism (specific to each technology and service contracts)
To mainstream the OPEX model it is also necessary to incorporate financial and non-financial instruments that can mitigate some of the risks involved in this type of contract. Related risks for both the customer and the supplier.

This activity focuses on identifying all risks and how best to mitigate them. Identify and involve entities (e.g. insurance) that can offer these risk mitigants.

For example, two instruments to mitigate risks are a) partial credit guarantee; This instrument facilitates providers' access to credit by replacing the collateral that banks request from borrowers b) breakdown damage insurance; this instrument covers the Client for a potential damage in case of a breakdown of the system. e.g. a solar-powered cold room that breaks down can potentially damage the perishable products stored in it. Insurance would pay for the damage to the Client.

Risk and risk mitigants should be worked out in collaboration with financial institutions to develop an example of good practice, defining the cost, risks, market acceptance and suitability of the mechanisms. Part of this activity includes developing guidelines on how the instruments will work and who will cover the costs associated with the insurance premiums.

For example, in the case of credit guarantees, the premium fee could be around 1-3%. This is further elaborated below. See section 3.2 on credit guarantees.

Apart from this, discussions with bank authorities about the value of the asset itself will be held. With the aim of decreasing perceived risks from banks and pushing for a secondary market, specific details of the secondary market are outlined below in section 3.5.

<u>Output 1:</u>

- Standardised contract
- Risk coverage guidelines
- Best practice method with validation entity, identification and assessment of validation entities
- Validation formats, protocols and invoicing methodology
- Organising and documenting the outcomes of the roundtable discussion/workshop with technology providers and potential clients
- Terms and outline for the WEB page
- Outline for the marketing material

Key Stakeholders

Develop strategic alliances

Key stakeholder groups are outlined below. Part of the implementation phase is selecting and engaging the most promising providers from the prioritised technologies, and influential actors (such as business sectors associations) from the target sectors. An initial list of potential partners is outlined below.

Table 5 Strategic alliances and potential partners for BMs

Stakeholder group	Potential partners
Development Bank	IFC - International Finance Corporation. They are working on a Green Building Knowledge Center concept that can be linked to this activity. The IFC Knowledge Center aims to prepare suppliers to incorporate green building related measures and align with their EDGE standard. IFC has expressed a strong interest in collaborating with this programme and specifically with this initiative to incubate and prepare RESCOS in the OPEX model. IFC could be the perfect partner for leading the implementation of this activity.
Knowledge and Implementing Organisation	IIEC - International Institute for Energy Conservation. This entity has a large experience and network of technology providers in India that already offer OPEX contracts or can potentially incorporate the OPEX model. IIEC has a strong track record in building marketing strategies and bridging initiatives with the political dialogue.
Knowledge and Implementing Organisation	BASE Foundation. This entity has extensive experience in developing tools and contracts to standardise processes related to the OPEX model. It has also developed management information systems that assist management and monitoring, reporting and verification of different stakeholders. BASE has extensive experience in working with and strengthening the capacities of Providers, Financial Institutions, Investors, Insurers, etc.
Business sector associations	NSEFI - National Solar Energy Federation of India is an umbrella organisation for solar energy stakeholders in India. It works in the area of policy advocacy and is a national platform to address all issues related to the growth of solar energy in India, including business models and financing mechanisms. NSEFI consists of key international, national and regional companies, and includes solar developers, manufacturers, EPC contractors, rooftop installers, system integrators, balance of plant suppliers and manufacturers, small and medium enterprises, and works in a complementary manner with the central and state governments.
Public entity	BBEE coordinates key stakeholders and recognises, identifies and utilises existing resources and infrastructure to carry out its functions under the Energy Conservation Law, which include raising awareness and disseminating information on energy efficiency and conservation, arranging and organising training for staff and specialists, and promoting innovative financing of energy efficiency and conservation technology projects, among others. BEE would be a good partner to coordinate the capacity building and the development of the tools.

Resources needed for the development and implementation of OPEX models

The development and implementation of support to promote the OPEX models will require the participation of local and international experts, and will imply some costs. The following table outlines the expected expenses and resources needed for developing and implementing the business models.

Table 6: Expected costs for developing and promoting the OPEX model

Model 1	
International expert	350,000
Local team of experts	250,000
Communication and Marketing Firm	150,000
Legal consultants	50,000
IT Consultants	50,000
TOTAL	**850,000**

* Cost can vary depending on negotiations with consultants. The cost estimates are based on experience with similar project development and implementation activities in other countries and are intended to give an overview of the additional total costs if there were no internal absorption capacities.

Work plan

The development and implementation of activity 1 will require the coordination of several actors and experts. It is estimated that the development and implementation of the models will take around 24 months. The following work plan set out the activities and duration for *each activity* based on BASE's previous experiences developing similar programs.

Table 7: Work plan (Q1-Q4) - aim to work with 10 companies for OPEX integration

Model 1: Development & preparation of the OPEX enabling mechanisms	Year 1				Year 2				Year 3			
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1: Raise awareness and build capacity, Incubator												
1.2 Standardised contract												
1.3 Pricing calculation and tool												
1.4 Monitoring, Reporting and Verification; digitalization												
1.5 Financing structures for the Opex provider												
1.6 Risk mitigation mechanism												

5.2 Payment guarantee

The payment guarantee is an innovative instrument that does not exist in other countries, but similar financial products exist, such as payment insurances that guarantee the payment of customers, or surety insurances to guarantee commitments set out in contracts. However, these products do not exist for Opex contracts in the Indian market.

There are two structures for managing the payment guaranteeF: (a) through the creation of a specialised company with its own legal entity or (b) through an existing multi-purpose structure. In the

first case, it is an established legal enterprise to manage the guarantee fund, while in the second case, the guarantee fund is linked to other activities of an existing organisation. Based on experience, the structure will depend on the size of the fund to be set up, as its management will involve transactional costs. Given that the size of the payment guarantee fund may be small, it is better to spread the transactional costs of the guarantee across other activities rather than burdening all transactional costs of managing a single activity, so a multi-purpose structure would be more suitable.

A guarantee scheme will only be sustainable if the institution managing the fund is sufficiently independent and has specialised staff. Eligibility criteria and coverage conditions should be discussed and defined well in advance with the commercial banks and RESCOs that would participate as beneficiaries of the payment guarantee.

The payment guarantee should be designed to be self-sustaining over time (operate as a revolving fund). If there are "signals" in the market indicating an unsustainability of the Opex model for RE in buildings or RESCOs, and a possible depletion of the guarantee funds, the payment guarantee should be halted. The purpose of the payment guarantee is to build trust and mitigate perceived risks. The Opex market in India has very favourable conditions to develop, grow and be sustainable, but there is a high risk perception and lack of awareness among key stakeholders that is impeding this, and the payment guarantee can help build this trust and awareness.

The support of the regulator is a prerequisite for the success of the initiative, and every aspect of the proposed operation must be discussed in detail. The team has pre-consulted with several fund managers and public entities on the feasibility of the payment guarantee and the feasibility of having them manage it. It has been confirmed that it is possible to implement this instrument in India.

Activities to set up a payment guarantee include:

Model 2: Payment guarantee
1: Engage the payment guarantee fund manager.
2: Governance and general framework of the Payment Guarantee Fund (PGF)
3: Build strategic alliances with RESCOS, banks and potential customers.
4: Political dialogue, advocacy and piloting

1. Engage the payment guarantee fund manager.
This component is focused on identifying and engaging the enterprise that will manage the payment guarantee fund. The activities include:

1.1 Identify, evaluate, select and negotiate with a fund manager based on their experience, and their capacity to manage this guarantee. We suggest that the manager of the payment guarantee fund be the Small Industries Development Bank of India (SIDBI) or a non-bank institution, such as Mahindra Finance, Tata Capital or HDB. It will be required to define and negotiate with the selected fund manager the management fees, and the operational costs. In addition, it would be good to try to involve them in providing resources to complement the funds provided by the potential donors for the payment guarantee fund.

1.2. Contractual and framework agreements between potential donors and the fund manager. The agreement should define roles, responsibilities, objectives, workplan, milestones, and deliverables for the fund manager.

2. Governance and general framework of the Payment Guarantee Fund (PGF)
This component focuses on the development of the regulations and operating procedures for the payment guarantee. The guarantee includes a governing body that provides strategic decisions and oversees the fund manager's operations. This component also includes the operating guidelines of the governing body. The component includes the following activities:

2.1. Understand the legal and regulatory framework affecting the operation of the payment guarantee.

2.2. Define the Governance structure. Members, responsibilities, decision making, contracts between governing board members and fund manager. Internal controls, risk management framework.

2.3. Operational framework. Development of the operational manual - pricing policy, collateral application process, claims process, claim payment requirements, etc. - contracts with RESCOS. The operational framework should also include defining the continuous improvement process.

2.4. Monitoring and reporting protocol. Define information flow, processes and protocols for data collection, monitoring and reporting. Define the financial and environmental performance reports to be required by the governing board.

2.5. Implement an Management information system to support manage assurance and provide the platform to manage the monitoring, reporting and verification of project performance. Includes developing the ToR to contract external IT specialists.

2.6. Develop eligibility criteria. Selected RE technologies, RESCOS and projects (positive list) are required to meet certain criteria to be eligible for access to the guarantee.

2.7. Develop RESCOS eligibility criteria. Select the indicators and eligibility thresholds to be assessed based on the report of the assessment company. RESCOS will be assessed annually in order to be subject to apply for a payment guarantee.

2.8. Develop the process, guidelines and requirements for banks to consider payment guarantee as collateral for credit to RESCOS.

3. Build strategic alliances with RESCOS, banks and potential customers.
This component focuses on generating the necessary partnerships with key stakeholders - RESCOS, banks - in order to ensure alignment and demand for the payment guarantee. The activities include:

3.1. Generate alliances with associations to train their members on the OPEX model (RESCOS and Clients).

3.2. Develop material for training workshops

3.3. Identify potential RESCOs. Develop a directory of RESCOS companies with relevant information (e.g. technologies offered, years in the market, services offered, interest in participating in the programme, etc.). The list can be made public. Some companies might include U Solar, SunEdison, among others.

3.4. Organise regular workshops. The main audience would be RESCOS, Banks, Private Equity Funds, and potential clients.

3.5. Involve owners of real estate (buildings), with whom pilots could potentially be made.

3.6. Matchmaking events to generate partnerships and collaboration agreements between Banks and RESCOS.

3.7. Workshops to disseminate the programme and the payment guarantee. Training of banks' loan officers to incorporate the guarantee as part of the credit assessment of RESCOs or SPVs.

4. Political dialogue, advocacy and piloting
This component focuses on linking the payment guarantee with the policies and initiatives being undertaken by government and stakeholders to scale up renewable energy in buildings. It also includes activities to communicate and raise awareness with different stakeholders, and to generate pilot projects that generate momentum in the market.

4.1. Communicate and coordinate efforts with the different public authorities. Generate a constant dialogue with the different Government entities (BEE, MNRE, Ministry of Housing and Urban Affairs, EESL, among others).

4.2. Develop a communication and promotion strategy for the guarantee, including a website with information on the Guarantee and support resources, and events.

4.3 Generate pilot projects (an initial portfolio of 5 projects). Pilot projects refers to the first projects to be supported that will require further support.

4.4. Operationalise the guarantee, governing board meetings, reports and audits. Monitor the operation of the guarantee. Establish a constant dialogue with RESCOs, Banks, Clients, PPS Companies and

4.5. Implement continuous improvement process (eligibility criteria, performance indicators, pricing structure, risk mitigation, monitoring, reporting and verification process).

To launch the programme, it is recommended to constitute a payment guarantee fund of at least USD 5 million from potential donors to have some available funds in the payment guarantee to mobilise financing for OPEX pilot projects, and to facilitate the leveraging of funds with local entities, multilateral/bilateral organisations or other international donors. To attract other investors or donors, initial donor funds can be used as first loss, so that the risk of other co-financiers would be very low. In addition, some USD 700,000 in technical assistance will be needed to set up the guarantee and implement the above components. These technical assistance funds would help to establish the guarantee fund and partially cover part of the operating costs of the fund manager during the first years.

This type of project may have a default rate on funding that might be in the range of 2% to 10%. Currently, SIBDI's partial credit guarantee for energy efficiency projects has a default rate of less than 3%.

<u>Output 2:</u>

-

- Payment Guarantee mechanism programme
- Operating manual, governance structure policies
- Launch of programme
- Marketing and commercialisation plan
- Pilots

Key Stakeholders

Table 8 : Strategic alliances and potential partners for payment guarantee

Stakeholder group	Potential partners
Strategic alliances/collaborators	SIBDI - Small Industries Development Bank of India and Ministry of Micro, Small & Medium Enterprises (MSME), - they jointly set up the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE). They expressed strong interest in managing the Payment Guarantee.
	PFS - Is a NBFC classified as "Infrastructure Finance Company (IFC) promoted by PTC India Ltd. PTC is the leading provider of power trading solutions in India. PFS provides financial instruments focused on power generation. The company provided a letter of interest in managing the Payment guarantee.
	ADB - Asian Development Bank - They have aCredit Guarantee and Investment Facility to promote financial stability and boost long-term investment in the region. This could be expanded or a new branch could be created for RE.

Resources needed for the development and implementation of the payment guarantee

Table 9: Expected costs for developing and promoting a payment guarantee.

Model 2	
Funds for the Payment Guarantee	5,000,000
Setting up the Payment guarantee	400,000
Management fee (2 years)	300,000
TOTAL	**5,700,000**

Work plan

The development and implementation of the payment guarantee will require the coordination of various stakeholders and experts. It is estimated that the development and implementation of the programme will take about 24 months. In addition, 3 years will be required to test and report on the functioning of the guarantee. The following work plan sets out the activities and the duration of each activity based on previous experience of developing similar programmes.

Table 10 : Work plan (Q1-Q4) - for payment guarantees

Model 2: Payment guarantee in India	Year 1				Year 2				Year 3			
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1: Engage the payment guarantee fund manager.												
Component 2: Governance and general framework of the Payment Guarantee Fund (PGF)												
Component 3: Build strategic alliances with RESCOS, banks and potential customers.												
Component 4: Political dialogue, advocacy and piloting												

5.3 Mainstreaming RE lending process within banks

Activities

The objective of this activity is to support banks in adopting renewable energy financing in buildings in a systematic way and as a standard practice. This activity aims to mitigate risks for banks in different ways, both with financial and non-financial mechanisms. As mentioned above, it is key for the renewable energy market in buildings and the Opex model that banks are involved so that they can facilitate the financing that is the key factor for this sector to develop in India.

The activities to be undertaken by this proposed intervention are as follows:

Model 3: Mainstreaming RE lending process within banks

1. Banks engagement and diagnostic

2. Standardise internal operating processes

3. Appropriation and alignment with sustainability policy

4. Commercial and promotional strategy

1. Banks engagement and diagnosis.

This activity focuses on identifying and engaging banks to be part of the programme, and involving bank management. The aim is to invest in and work with at least three or so banks. The aim is for these banks to lead the way and encourage other banks to adopt similar practices.
As a first step, an initial diagnostic should be carried out to identify the banks' strengths and areas of opportunity. Also, it would be necessary to identify and analyse the banks' internal processes from origination to disbursement, their sustainability policy, their risk analysis policy and their commercial strategy. In addition, an analysis of their portfolio will be carried out to analyse the sectors they are financing and to analyse how they link with renewable energy in buildings and the OPEX model.

This activity also includes an analysis of the bank's potential demand given its characteristics and potential market demand. The idea is to be able to define also the characterisation of the potential

customers and the amount of financing needed per project. Finally, a detailed strategy with a roadmap would have to be agreed for each bank involved. In order to be able to carry out this activity, it will be necessary to hold discussions with various bank departments (commercial - corporate, SME, risk, credit evaluation, treasury, internal systems, etc. and to engage different market specialists to provide technical assistance.

2. Standardise internal operating processes

It is important to establish systems and processes that facilitate the origination, assessment and financing of renewable energy projects in both buildings and OPEX.

Processes that need to be in place include:

(a) categorisation and labelling. It is important to identify renewable energy credits. Currently most banks are financing renewable energy but this is not identified internally as other market segments. For example, banks are currently aware of the value and characteristics of SME loans or auto loans. But very few have identified the sustainable energy portfolio. This scoring system requires the incorporation of a taxonomy that defines what is considered a renewable energy project in buildings and what is not. This can be done by means of a positive list and a negative list.

b) Incorporate monitoring, reporting and verification systems. It is important to include in the evaluation systems questions that help to estimate impact. For example, KWp installed. This will help to estimate ex-ante the emission reduction of the project using a predefined parameter (e.g. for each KWp installed on the roof 1000 tCO2 are displaced per year). This parameter can be verified and adjusted year by year on the basis of an audit of a sample of funded projects. Processes also need to be established to generate reports that aggregate the financing and the environmental and economic impact of the financed RE projects. These reports can feed into the bank's annual sustainability report.

c) risk assessment and risk mitigation. It is key to be clear on the risks as well as on the different risk mitigation instruments, both financial and non-financial for this type of projects and loans to RESCOs where OPEX contracts are financed. For example, one of these instruments could be the requirement of the payment guarantee and the endorsement of the RESCO's guarantee to the bank. The bank may also request a technical and financial validation of the RESCO by a third party, as well as a creditworthiness analysis of the customer of the RESCO to fulfil the OPEX contract.

The contract between the RESCO and the customer may serve to mitigate some risks. The bank may require a (standard) OPEX contract to be signed beforehand. It is also possible to require as a standard process that both the OPEX contract and the assets function as collateral for the loan. In addition, the bank may require insurance coverage to mitigate risks related to theft of the system, damage to the equipment or system by third parties or natural causes, as well as customer indemnity insurance (not RESCO) as a consequence of the system breakdown (e.g. production stopped and the customer has heavy losses that would be covered by the insurance).These and other risk mitigation mechanisms will assist in the risk assessment of this type of financing.

3. Appropriation and alignment with sustainability policy

Appropriation in this case means that the different areas of the bank are familiar with the financing of renewable energy in buildings and the OPEX model, in the same way as they are familiar with the financing of vehicles or mortgages. It is also about the bank's teams keeping in mind how the financing of these technologies is aligned to the bank's sustainability policy and goals.

To do this, the processes and systems will have to be adopted to help bank staff identify, assess and guide the financing process and to be able to talk to clients about the best options. It will also require a major capacity building effort. Not only for the sustainability area of the bank, but for staff who are directly involved with clients and credit assessment. For example, one of the banks interviewed in India has about 10,000 loan officers. Credit officers and the commercial division of most banks are evaluated on the basis of the number and size of loans they place each month. Part of their monthly remuneration is structured as an incentive that fluctuates according to their performance. In order to have a massive programme for financing renewable energy buildings, it is necessary to engage and enable this sales force to finance such projects.

As part of capacity building efforts, work with bank management to develop webinars, workshops and training materials to support the transition of loan officers' objectives and goals.

4. Commercial and promotional strategy

The bank can adapt existing financial products and services to finance RESCOs and OPEX contracts for renewable energy projects in buildings. The bank can use existing products and services, as they have a large variety (one of the interviewed banks has 400 different financial products and services). It is important that credit conditions are competitive and standardised. For example, car financing is very standardised. Credit appraisal is done in less than 24 hours, the vehicle is taken as collateral, and the rates for 24, 36 or 48 months are around 7% (very attractive) in rupees. Financial products or services can include different financial approaches such as financing for investment or recapitalization (sale-leaseback, securitisation, factoring, among others). For RESCOs and OPEX loans, the credit requirements have to be feasible, the financial conditions have to be attractive and the evaluation process has to be efficient.

A commercial strategy should be developed to promote loans to renovators in buildings, and to access different markets. For example, alliances with project developers, alliances with companies with several real estate properties, alliances with RESCOS and associations. Commercial strategies are also applied in segments such as car financing where alliances are made with distributors and zero-rate loans are offered to stimulate market demand.

Part of the strategy should include to showcase success stories of projects, RESCOS and Banks. This can be done through publications, videos and presentations at various events. Part of the objective is to expose the main banks that are financing these types of projects and RESCOS to motivate and mobilise other stakeholders to get involved with these types of projects and OPEX contracts. In order to showcase such projects and practices, an award/recognition for the best new green finance product from a bank or RESCO company in India can also be implemented.

<u>Outputs 3:</u>

- Engage 3 banks and prepare their roadmap to finance RE in buildings and RESCOS

- Internal processes and systems
- Implementation of financial products and services
- Commercial and promotional strategy to finance RESCOS and OPEX

Key Stakeholders

Table 11: Strategic alliances and potential partners for bank engagement

Stakeholder group	Potential partners
IFC	The IFC (linked to the IFC's EDGE green building certification tool) is planning on setting up a "Green Building Knowledge Centre" to train various stakeholders, including banks. They are currently seeking funding and partners to carry out this effort. The IFC's efforts may fit well with the efforts planted in this report.
Banks	3 banks will be chosen to work together to carry out the activities outlined above. Possible banks could be: State Bank of India Banks already working with SIBDI - Small Industries Development Bank of India (linked to the credit guarantee programme)
Global Green Growth Institute, GGGI	They have been working with banks and financing instruments. They could be a good partner for this model.

Resources needed for the development and implementation of the proposed models

Table 12: Expected costs for bank engagement

Model 3	
International Experts	300,000
Local Experts	200,000
Communication and Marketing Firm	25,000
Workshop, sessions	25,000
TOTAL	**550,000**

Work plan

Table 13: Work plan (Q1-Q4) - aim to work with 3 banks (bank engagement)

Model 3: Mainstreaming RE lending process within banks	Year 1				Year 2				Year 3			
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.1 Banks engagement and diagnostic												

3.2 Standardise internal operating processes												
3.3 Appropriation and alignment with sustainability policy												
3.4 Commercial and promotional strategy												

5.4 Secondary Market

Activities

Secondary markets facilitate the trading of transferable assets, which in this case would encompass ER. This helps these assets to be used as collateral to secure repayment of loans or contracts.

The implementation of a secondary market is aimed to benefit various stakeholders, including banks and RESCOS. It also aims to standardise practices that can contribute to building trust among stakeholders and to the mainstreaming of this market.

This effort includes the standardisation of the evaluation of the condition of the systems, as well as their economic valuation (cost) of the assets taking into account their depreciation during the time, market value, system damage, etc. Auction processes should also be standardised to make them transparent. In addition, processes and methodologies should be developed for recovering and relocating systems, as well as defining the costs associated with this. This can be developed within a digital platform that showcases available market opportunities to all interested parties.

According to consultations with different stakeholders in India, the secondary market would present a huge opportunity to facilitate financing for RE projects, as well as to help link different market players. This would mean that banks could consider the RE asset itself as collateral. A key way to facilitate this is to create a digital platform to bridge the gap, aid decision-making and foster greater collaboration between key partners. As the platform flourishes, a critical mass in terms of the variety of asset types listed would allow the market to function and second-hand renewable energy systems to increase in value. We could take the strong secondary market for second-hand vehicles as an example. It would be highly beneficial if a similar market for the resale of renewable energy equipment were to develop in India. Modularity, durability and design should be taken into account in the early stages of the manufacturing and installation process.

Model 4: Developing a secondary market

1. Standardised cost of recovery (tool for secondary market value)
2. Validation/Valorisation system
3. Identify and build alliances and capacities of Banks and RESCOS
4. Build a platform to facilitate the commercialization of second hand systems
5. Analysis of the legal implications related to the secondary market and asset recovery

1. Methodologies and tools for valuing the system (in a secondary market)

The aim of this task is to provide guidelines and tools to support the economic valuation of a renewable energy system, including the cost of system recovery and relocation. The tools should take into account equipment depreciation, usage, market value, recovery and relocation cost, among other aspects, as well as provide guidance on the approximate current market value of similar renewable energy installations. Tools and guidelines need to be put in place to evaluate the prices of systems in the secondary market. This valuation is important for banks to be able to consider systems as collateral. In some cases, banks may be reluctant to accept movable assets as collateral in the absence of a legal framework to regulate it. Therefore, discussions will also need to be initiated at the regulatory level in India. This will also provide support to RESCOs and increase access to finance.

2. Valuation certifiers and methodologies

There is a need to build the capacity of certified valuation experts who can provide independent valuation of the system. Valuers must be certified by a regulator, as is the case for real estate valuers who have to sit for examinations and are certified by The Institute of Company Secretaries of India (ICSI) a premier national professional body in India under the ownership of Ministry of Corporate Affairs, Government of India with the objective of promoting, regulating and developing the profession of company secretaries in India, or by the Insolvency and Bankruptcy Board of India (IBBI). The aim of this activity is to prepare and certify persons or companies that may have the role of expert valuers.

3. Identify and build alliances and capacities of Banks and RESCOS

It will be important to identify potential partners that could benefit from the secondary market, including banks, RESCOs and other supporting entities such as installers, insurances. There should also be an effort to link stakeholders through collaboration agreements, as well as to strengthen the capacities of the key stakeholders in order to create a robust and efficient secondary market.

In order to consider the value of the assets within the new secondary market system, training and ongoing support will be required for credit officials and to RESCOS. For this implementation step, this should occur in several banks in order for them to understand how to evaluate the value of an asset and how that can be used as collateral to provide finance to RESCOS or customers. A key factor is also to estimate the economic life of the asset compared to the loan tenure.

4. Platform to facilitate the commercialization of second hand systems

This activity focuses on the development of a digital platform that helps different stakeholders to interact and enables the sale and valuation of specific assets. Success will require the involvement of several partners. In particular, the portal will need to provide a detailed description of the RE items offered for sale. This may include serial numbers, detailed specifications and accompanying photos and videos (as required). The credited valuations can be used to secure a base payment to creditors. Payment should be easy and can be linked to a real-time payment service provider.

The need for investment to develop an efficient and comprehensive technology platform is crucial. The platform can facilitate the trading of multiple asset classes within the secondary renewable energy market.

The platform must also provide key value-added features that support decisions and address institutional deficiencies in the market. As noted above, these include issues such as asset valuation, filtering/assessment of buyers and sellers, facilitation of payments (i.e. online purchase for resale) and transparency in the pricing of foreclosed assets.

Table 14: Key steps linked to platform for a successful secondary market of RE systems.

Steps for successful of Secondary market	How portal addresses this
Develop a critical amount of buyers and sellers	- Facilitate trade, link players (buyers and sellers) - One stop shop - Develop competition in the market
Develop review and value	- Base the platform of a valuation and second life evaluation programme - Include insurance and delivery services
Develop trust and security	- Facilitate payments to ensure the auction offer - Screen and evaluate participants (via the registration process)

5. Analysis of the legal implications related to the secondary market and asset recovery
This activity focuses on analysing the status of the physical recovery/withdrawal of systems and all legal and contracting aspects related to the auctioning of systems on the secondary market.

For the recovery of the systems, the legal procedure to be followed in India to legally record the payment claim and to be able to recover the payments needs to be analysed. Challenges and opportunities to access the sites where the systems are installed (e.g. rooftops) in order to uninstall the system and recover the system must also be analysed. This activity should examine the legal rights and obligations of the RESCO to recover the system in case the customer defaults on its co-payments under an OPEX contract, and define mechanisms to ensure that it does not fail to recover the system in case the customer defaults on its co-payments under an OPEX contract.

This activity should define the mechanisms to ensure that they do not prevent the recovery of the asset, regardless of whether it is due to early termination, termination of the contract or reasons of non-payment by the customer. This activity should also define the methodology for recovering a system, putting it on the platform, reselling it and relocating it to a new customer. The methodology should take into account the needs and expectations of the various stakeholders.

Outputs 4:

- Recommendations for standardised secondary market metrics
- Platform developed (as a pilot)
- Workshop and training material for credit officials
- Market recommendation document

Key Stakeholders

Table 15: Strategic alliances and potential partners for secondary market

Stakeholder group	Potential partners
Technology providers	Partnerships with technology providers/RESCOS will be key to the success of the program. Also, key to engage with associations.
CERSAI - The Central Registry of Securitisation Asset Reconstruction and Security Interest of India -.	CERSAI was established under section 20 of the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interests Act 2002 (SARFAESI Act) to register assets as collateral. They have been implementing the registration of immovable property (real estate). They have also advanced efforts with the World Bank and the IFC to create a registry of mobile assets so that they can be used as collateral.
IFC	They have worked in the past on programmes in India to facilitate credit to SMEs through movable assets. It is well prepared to manage this effort and has expressed interest.
Strategic alliances/collaborators	SIBDI. They have expressed interest to support this effort Open discussion and identify potential validators. Engage in discussions with: Solar Energy Corporation of India (SECI) The Indian Renewable Energy Development Agency (IREDA) National Institute of Wind Energy (NIWE) National Institute of Solar Energy (NISE)

Resources needed for the development and implementation of the proposed models

Table 16*: Expected costs for building a secondary market*

Model 4	
International Expert	250,000
Local Expert	150,000
IT Consultant	100,000
Legal consultants	100,000
TOTAL	**600,000**

Work plan

Table 17: Work plan (Q1-Q4) - aim to work with 10 companies for secondary market

Model 4: Secondary market	Year 1				Year 2				Year 3			
Activity	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

4.1 Standardised cost of recovery (tool for secondary market value)												
4.2 Validation/Valorisation system												
4.3 Identify and build alliances and capacities of Banks and RESCOS												
4.4 Build a platform to facilitate the commercialization of second hand systems												
4.5 Analysis of the legal implications related to the secondary market and asset recovery												
4.6 Link the credit guarantee with the secondary market												

6. Recommendations to donors

The objective of this section is to provide recommendations for the potential donors and propose next steps. The information and steps in this section should provide guidance and inputs to potential donors on the key aspects of their intervention. The section includes the role of potential donors and should provide clarity to the potential donors on what business models and tools they will and can support. This section will also provide a general overview of the resources that potential donors should invest in order for each of these models to be implemented. BASE also has provided an overview of potential impacts of these activities.

6.1 Role of Donors

Overall, the potential donors' vision is to support the transition to a sustainable world and to increase engagement with the private sector to achieve greater positive impact and support innovation. To this end, potential donors have created the Global Programme Climate Change and Environment (GPCCE), recognising the urgency of action in the built environment.

Currently, RESCOs in India have very limited access to finance and, although many have shown interest in shifting to an OPEX model and meeting the growing demand, they have largely failed to do so. In addition, tools and guidelines need to be put in place to support the standardisation of the model and help develop the OPEX market. Furthermore, banks play a key role in the development of the market for renewable energy in buildings and it is essential to involve them and develop their capacity to make this type of financing available at competitive rates and with market-accessible requirements.

Potential donors can be instrumental in encouraging and accelerating this transition in the market. SECO support can focus on developing RESCOs, the OPEX model, financing, the secondary market and the involvement of banks. If this funding and technical support is not provided, the market may not develop at the speed required and stakeholder disarticulation will persist.

Donors in Switzerland can support for this project has several relevant elements, among them:

a) India is a priority country for Switzerland in Asia.
b) The importance of India is affirmed in Switzerland's Foreign Policy Strategy 2020-2023 which seeks to further strengthen ties with India.
c) In a similar capacity, the SDC has been supporting a project called the "Indo-Swiss Building Energy Efficiency Project (BEEP)".
d) The SDC's role is to help foster a more advanced conversation between Swiss, international and Indian experts and institutions to introduce innovative solutions and share best practice examples.

The potential donor can play a key role in motivating Indian stakeholders to integrate renewable energy in buildings and develop the market in the following ways:

- Linking and supporting different stakeholders, which would result in greater collaboration and increased financial volume of support to RE projects;
- Building trust through financial (and non-financial) actions and mechanisms. For example through guarantee programmes;

- Strengthening raising awareness and capacity building of key actors;
- Developing new approaches and instruments, suitable for promoting and financially supporting promising business models, as recommended in this report.
- Generating pilots and evidence of successful projects using the proposed financial models and instruments in order to mobilise market actors.

The figure below provides context and explains the synergies between the business models and financial tools at different stages.

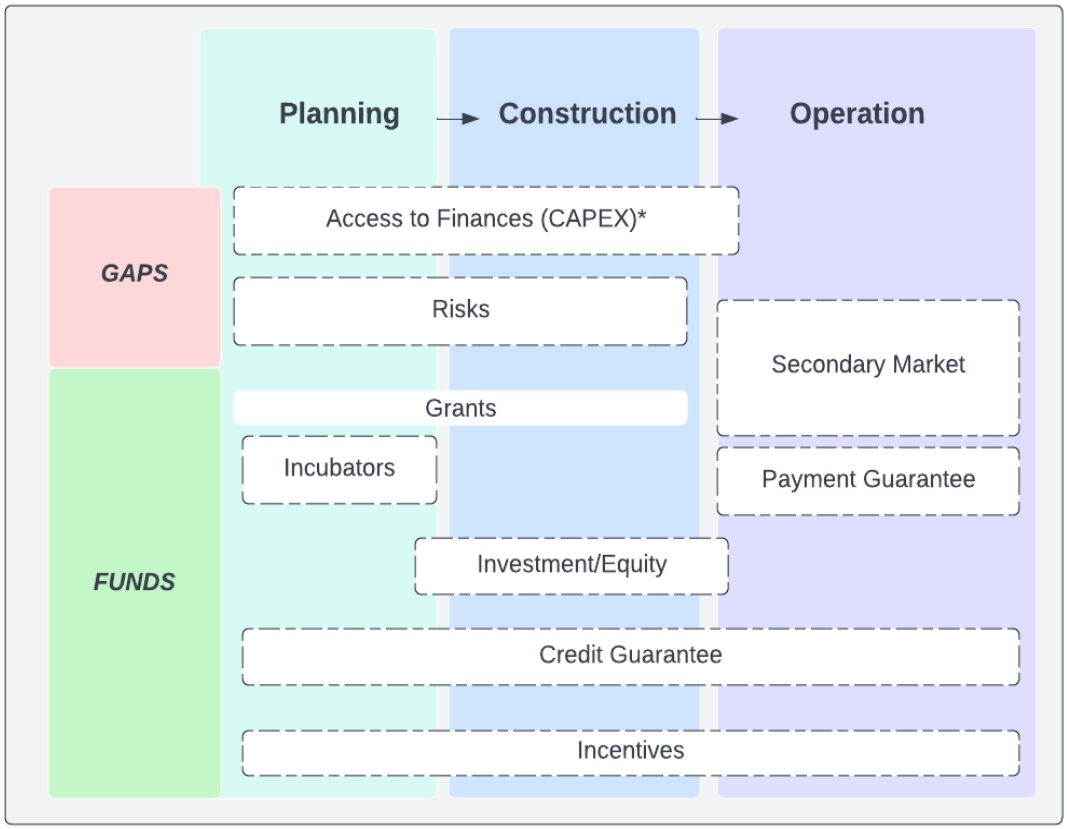

Figure 8 : Timeline map of proposed business models and financial tools suitable for the integration of RE in building in India

6.2 Resources required

Several large donor organisations have extensive experience in programme development and should consider financially supporting market creation through specific business models and funding strategies to help support this sector in India. To carry out the above activities, it is estimated that the following resources will be required:

Model 1 Development and implementation of the OPEX models: USD 850,000
Model 2 Payment guarantee: USD 5,700,000
Model 3 Mainstreaming RE lending process within banks: USD 550,000
Model 4 Developing a secondary market: USD 600,000

Total: USD 7,700,00

6.3 Next steps for Donors

The next steps focus on the implementation of the proposed models and instruments.

It is recommended that priority be given first to short-term catalysts and then be extended to medium to long-term market solutions. Based on this consultation, payment guarantees would provide a short-term solution and allow many example projects to be launched. The OPEX model would be a catalyst for this. In the longer term, the other tools presented, especially the development of a mature secondary market, may allow REs to stay in the market. The following table shows a strategy implementation plan.

Model	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Model 1. Development and implementation of the OPEX models.										
Model 2. Payment guarantee										
Model 3. Mainstreaming RE lending process within banks.										
Model 4. Developing a secondary market.										

6.4 Impacts

The impact of the different models can be quite significant. The table below shows the resource mobilisation that would occur, the leverage with the funds and the environmental impact related to such a model.

For the purpose of estimating the potential impact, some basic parameters were assumed, the following table shows the assumed parameters. Furthermore, in the calculations it is assumed that all projects are solar PV projects, which would not be the case in reality, as there will be a mix of different renewable energy technology solutions.

Table 18 Assumptions for estimating the impact

Size per project	250	KWp
Investment per project	300,000	USD
Carbon emission intensity of the grid in India	0.85	tCO2/MWh
Performance of the solar systems in India	1,200	KWh/KWp
Energy production per year	300	MWh
CO2 emission reductions per project per year	255	tCO2/year
CO2 emission reductions per project in 20 years	5,100	tCO2/20 year

According to these parameters the following impact could be reached from each of the models. The impact was estimated for a period of 20 years.

Table 19 Estimated impact of proposed models

Model	Grant	No. projects	Mobilised investment (USD)	Leverage ratio	tCO2 emissions	MWp
Model 1 Development and implementation of the OPEX models.	850,000	600	180,000,000	212x	3,060,000	150
Model 2 Payment guarantee	5,700,000	276	82,800,000	15x	1,407,600	69
Model 3 Mainstreaming RE lending process within banks.	550,000	1440	432,000,000	785x	7,344,000	360
Model 4 Developing a secondary market	600,000	1080	324,000,000	540x	5,508,000	270

The impact was estimated separately for each of the models. Ideally there should be a combination of models so that the impact can be more effective. The following table shows the impact of combining different models.

Table 20 Estimated impact of combinations of proposed models

Model	Grant	No. projects	Mobilised investment (USD)	Leverage ratio	tCO2 emissions	MWp
Model 1 + Model 2	6,550,000	876	262,800,000	40x	4,467,600	219
Model 1+2+3+4	7,100,000	2316	694,800,000	98x	11,811,600	579

7. Annexes

7.1 Annex 1: List of stakeholder interviews conducted by BASE

#	Name	Category	Person interviewed	Designation
1	SunEdison Infrastructure Private Limited	Solar Developer	Mr. Shankar Sivan	Chief Strategy Officer
2	U-Solar Clean Energy Solutions	Solar Developer	Ms. Dhwani Sunku	Manager Sales & Marketing
3	GPS Renewables	Biomethanation service provider	Rajesh Ayyappasur	Director - Business Development & Partnerships
4	Radiance Renewables	Solar Developer	Shweta Das	Head- Business Development
5	Mahindra Lifespaces	Pilot owner	Ms. Sunita Purushottam	Head-Sustainability
6	Big Basket	Pilot owner	Mr. Brahma Prakash	Head- Marketing
7	cKers	Venture Capital fund (PE and lender)	Mr. Jayant Prasad	Executive Director
8	Electronica Finance Limited	NBFC	Mr. Ashutosh Puntambekar	Sr. Vice President & Head
9	1Crowd	Crowdfunding platform	Mr. Anil Gudibande	Co-founder
10	SIDBI	Bank	Mr. P.R. Reddy	Chief Technical Specialist
11	World Bank	Multilateral Bank	Dr. Ashok Sarkar	Senior Energy Specialist
12	Grip Invest	Leasing Solution Providers	Mr. Nikhil	Founder
13	World Bank	Multilateral Bank	Mr. Abhinav Goyal	Energy Consultant
14	IFC	Multilateral Bank	Mr. Autif Sayyed	Technical lead of the Asia and Pacific green building program
15	Tata Cleantech	Commercial Bank	Mr. Mudit Jain	Head - Research
16	Tata Cleantech	Commercial Bank	Mr. Arunavo Mukerjee	
17	KfW	Multilateral Bank	Ms. Ekta Mehra	Senior Sector Specialist
18	ADB	Multilateral Bank	Mr. Keerthi Kumar Challa	Project Officer

7.2 Annex 2: RE programs or government initiatives in India including loan options

Program, project or fund	Activities
Solar Energy Corporation of India (SECI)[30] - budget of US$ 132 million	Funds were allocated from India's Union budget (2022-2023) to Solar Energy Corporation of India (SECI) in order for them to further develop the entire renewable energy sector.
Production Linked Incentive (PLI) scheme -budget of US$ 2.57 billion[31]	Funds given by the government and linked to the Ministry of Electronics & Information Technology - with the aim to boost manufacturing of high-efficiency solar modules.
Guidelines for Development of Onshore Wind Power Projects[32]	Ministry of New and Renewable Energy Government of India has set a target of reaching 60 GW of wind power installed capacity in the country by 2022. The guidelines support this target.
New rules promoting generation, purchase and consumption of green energy.	Rules aim to encourage large-scale energy consumers, including industries, to use more renewable energy. It aims to enable a simplified procedure for the open access to green power. It was launched in June 2022.[33]
Grid Connected Rooftop Solar Scheme	Linked to the Rooftop Solar Programme Phase II, the Ministry of New and Renewable Energy aims to install RTS capacity of 4,000 MW in the residential sector by 2022 with a provision of subsidy. It includes a Simplification of Procedure updated June 2022.[34]
Energy from Urban, Industrial, Agricultural Wastes/Residues and Municipal Solid Waste Programme[35]	Government loans for Waste to Energy (WTE) projects as well as Biomass Gasifier development.
Promotion of Biomass-based Cogeneration in Sugar Mills and Other Industries in the Country Programme[36]	This government programme offers Central Financial Assistance (CFA) for projects using biomass like bagasse, agro-based industrial residue, crop residues, wood produced

30 SECI Annual report. 2022 Available Online: https://www.seci.co.in/Upload/Finacial/637743906411295250.pdf [last accessed 14 September, 2022]

31 Indian Government, Ministry of External Affairs, Available Online: https://indbiz.gov.in/sector/electrical-machinery/ [last accessed 14 September, 2022

32 Ministry of New and Renewable Energy Government of India. Guidelines for Development of Onshore Wind Power Projects. Available] Online: https://mnre.gov.in/img/documents/uploads/19a0b0b1068f4dea86db70282d4bc997.pdf [last accessed 14 September, 2022]

33 The government of India, Another Major Reform to promote Renewable Energy through Green Energy Open Access. Available Online: https://pib.gov.in/PressReleseDetailm.aspx?PRID=1831832 [last accessed 14 September, 2022]

34 The government of India. Simplification of Procedure - Rooftop Solar Programme Ph-II, 20220. Available Online: https://solarrooftop.gov.in/notification/137_notification.pdf [last accessed 14 September, 2022]

35 The government of India WTE Schemes. .Available Online:https://mnre.gov.in/waste-to-energy/schemes

36 The government of India. Bioenergy Schemes. Available Online: https://mnre.gov.in/bio-energy/schemes

	through energy plantations, weeds, wood waste produced in industrial operations, etc.
State Bank of India loans for rooftop solar for Commercial & Industrial Entities including Micro, Small & Medium Enterprises and RESCOs (With World Bank)	They are giving loans up to 75% of the project cost, with a rate of interest MCLR+120 to 190 bps. They have an exclusive charge of all fixed assets, movable assets, lease rights, cash flows, etc. The bank may seek Collateral if Fixed Asset Coverage Ratio (FACR) is below 1.10.[37]
SIDBI (STAR) Term Loan assistance for rooftop solar PV plants	The loan amount is from 10 Lacs to up to 350 Lacs, up to 5 years tenure. The rate of interest specified as Marginal Cost of Funds Based Lending Rate (MCLR) based interest rate depending on the internal rating.[38]
State Bank of Inai - Surya Shakti – Solar Finance[39]	This is credit covering the installation of Solar rooftop / ground mounted grid-connected systems up to 1 MW capacity. The maximum loan amount is Rs.4 Crores. The repayment period is up to 10 years. Collateral Security is not mandatory, if security coverage is adequate as per Bank's assessment. However, a personal guarantee may be required.
cKers Finance[40]	The focus of this is on Developers, Asset Owners or Original Equipment Manufacturers or System Integrators operating in the sustainability space.
Tata Cleantech Capital Limited[41]	They provide credit for strong creditworthy borrower/borrower groups with established track records.
Karnataka Bank Limited- Ravi Kiran - Finance For Solar Projects[42]	They are offering loans up to 10 Lacs, with an interest rate 11.76% p.a. Also, includes farmers and traders.
Electronica Finance Limited Solar Rooftop loan[43]	They are offering a loan amount up to 75% of the project cost, with a 4 years repayment period. Focused on customers looking for rooftop installations for their own captive usage.

[37] SBI – World Bank. Grid Connected Rooftop Solar Photovoltaic (GC-RSPV) programme 2021. Available Online: https://www.sbi.co.in/documents/16012/13986967/130921-SBI_WORLD_BANK+GCRSPV+Brief_August+2021.pdf [last accessed 14 September, 2022]

[38] SIBDI. Products. Available Online: https://sidbi.in/en/products [last accessed 14 September, 2022]

[39] SIDBI. Surya Shakti Solar Finance Available Online: https://sbi.co.in/web/business/sme/sme-loans/surya-shakti-solar-finance [last accessed 14 September, 2022]

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7.3 Annex 3: Evaluation matrix of priority technologies

ITEM	Technology (brief description of technology and purpose)	1	2	3	4	5	6	7		
		Residential or commercial buildings/housing societies	Indian context	Market readiness of technology	Commercially available in India (or potential to be in coming years)	Financial viability / attractiveness	Potential for replication / scalability	Potential for capacity building	TOTAL SECTOR ANALYSIS	Assessment verified by company [Yes or No] (No responses imply an internal assessment by BASE)
		50	50	25	25	25	25	25	**1125**	
1.1 Renewable Energy Technologies (electric)										
1	On-grid Modular PV system as an easy to install plug-in kit of micro-inverter and 300W PV panel. Possibility to interconnect those kits into a network (Mesh Network) allowing efficient energy sharing (and in future possibly trading) of energy.	5	4	5	2	4	5	5	87%	Yes
2	Off-grid Modular storage & 400 W AC Power PV System. The system is modular and specifically designed for off-grid environments but can also be used as back-up power to bridge power outages from unreliable public networks. Units can be stacked and interconnected. They automatically form a private 230V AC grid (mini-grid). Units can be connected and synchronzes based on swarm algorithm. Build-up of a mini grid up to 50 - 100 units (40 - 80 KW power).	2	1	1	1	1	5	4	40%	Yes
3	Energy solutions PV, Combined Heat and Power (CHP). Decentralised energy production with combined heat and power generation is one of the most economical ways of obtaining electricity and heat while conserving resources. Practically no lost exhaust heat or transmission losses.	5	3	5	4	2	4	2	73%	No
4	Energy Harvesting pavement tech (mechanical). Mechanical tiles that harvest energy.	3	4	4	3	2	4	4	69%	No
5	Solar paint	4	1	1	1	1	5	5	51%	No
6	Solar Window with integrated PV	2	1	1	1	1	1	1	24%	No
7	PV Tiles	3	1	1	1	1	1	1	29%	No
	PV Tiles									
8	Wind - technologies involving vertical axes wind turbines specifically designed for building integration on roofs with low wind speeds (> 4 m/s) Detailed information will be provided, if technology is if interest.									
9	Waste to energy									

* only example image - full matrix is a deliverable to the project

** -> SCORE 5 - 1 (High to Low)

7.4 Annex 4: Roundtable consultation workshop participants

Name of participant	Organisation
Mr Abhishek Dhupar	International copper Alliance
Mr Ankit Bhalla	GRIHA Council
Mr Arunavo Mukerjee	Tata Cleantech Capital Limited
Mr Ashish Jindal	EESL
Mr Ashish Nigam	PTC Finance India
Mr Atul Kaushik	India-U.S. Triangular Development Partnership, The Asia Foundation
Mr Bhuvnesh Kumar	PLUSS
Prof Dibakar Rakshit	IIT Delhi
Ms Disha Ahuja	Ahuja Engineering Services Pvt. Ltd
Ms Disha Khosla	EESL
Mr Grija Shankar	EESL
Mr Hemanth Kumar	International copper Alliance
Mr Ishvinder Singh Gill	Geothermal
Mr Marcus Wypior	GIZ
Mr Mudit Jain	Tata Cleantech Capital Limited
Ms Natasha Kothari	1Crowd
Ms Pooja Aswani	cKers Finance
Mr Rajesh Ayyappasur	GPS Renewables
Mr Ravi Kaushal	State Bank of India
Mr Ravindranath	Unitron
Ms Selna Saji	Sunedison
Mr Siddharth Arora	Revayu energy
Mr Vishnu Sasidharan	PLUSS
Mr Yogesh Kumar Singh	MNRE

7.5 Annex 5: Questionnaire outcome notes

Name	Organisation	Designation
Markus Wypior	GIZ	Dep. cluster coordinator energy principal Advisor
Atul Kaushik	The Asia Foundation	Chief of party
Selna Saji	Sun Edison	Head policy advocacy and market strategy
ASHISH JINDAL	ASIAN development Bank	Clean Energy Expert
Disha Khosla	Energy Efficiency Service Limited (EESL)	Consultant - IB
Prof. Dibakar Rakshit	IIT DELHI	Associate Professor
Ankit Bhalla	Green Rating for Integrated Habitat Assessment (GRIHA)	DG- Technical
Ashish Nigam	PTC India Finance service Limited	Vice President
Bhuvnesh Kumar	Pluss Advanced Technologies pvt. Ltd.	Project Manager
Vishnu Sashidharan	Pluss pvt. Ltd.	VP - new products
Arunavo Mukerjee	Tata cleantech Capital ltd.	VP - advisor
Mudit jain	Tata cleantech Capital ltd.	Head research
Rajesh Ayyappasur	G P S Renewables	Director BD

Yogesh Kumar Singh	ministry of new & renewable energy (MNRE) Ex- NISE	Senior research scientist

Results

The event had a total of 24 participating organisations ranging from technology providers, financial institutions, technical support agencies, including academia, and the government represented by the Ministry of New and Renewable Energy (MNRE).

Out of the 24 participants, 14 responded the questionnaire, including the following questions:

Q1. From the business models/ Financial Mechanisms presented, which one do you think are important to accelerate the market of RE integration into buildings in India?

Q2. In a potential future programme, in which of the following business models/ mechanisms do you see your organisation participating/ collaborating actively (e.g. engaged in capacity building, testing the model/ financing mechanism in the market, providing financial resources etc.)

It was mentioned that the focus on business models and financial mechanisms was to identify a way to motivate stakeholders and gain traction in the market. It was also clarified that the solutions put forward will only address a small percentage of the total market potential, however it was mentioned that experience has shown that as the market develops, policy tends to follow. There was also some discussion on the promotion of energy certificates for buildings that could serve as a mechanism to boost the market for new buildings and retrofits.

In summary,

- It is clear that the OPEX/service model is the way forward for implementing renewables in construction, but the model needs the support of a well-structured guarantee to minimise the risk of repayment.
- According to the questionnaires, 65% of the participants believe that among the proposed solutions the Opex/service model is important to accelerate renewables in India and the same 65% believe in the importance of credit guarantee as an enabler. In contrast, only 21% of the participants agree with the leasing mechanism.
- In addition, the need to develop a specialised guarantee/insurance to cover non-credit risks, such as the performance risk due to pollution in cities (affecting the performance of systems), the risk of policy change by the government (affecting the profitability of projects) or the risk of non-payment by the customer to the RESCO (in OPEX contracts) were discussed. This mechanism was only accepted by 21% of the participants, so they do not see it as a priority.
- It was discussed the importance of banks in financing RESCOs so that they can offer OPEX contracts in a competitive manner. It was discussed that banks normally tend to see these types of credits/projects/clients as special and small-scale deals. Banks' internal credit assessment processes are slow and demanding, increasing their costs (high transactional cost). This is reflected in higher collateral requirements and higher interest rates. 50% of the participants agree with the need to support financial institutions in integrating RE into the "standard" credit process and that they should not be seen these credits as a "special"
- Regarding the proposal to build a secondary market as an option for financial institutions to recover defaulted loans from the sale and reallocation of assets, 42% of respondents agreed

with the mechanism. However, as this implies that the new products would be "competing" with a second-hand option, this option is not very attractive to providers (RESCOS). This hypothesis is derived from the results of the consultation in which only 16% of the participating technology providers agreed with this proposal. In contrast, financial institutions agreed by 75% that the development of a secondary market is important to accelerate credit for renewable energy deployment in buildings and Opex contracts.

- Other relevant options mentioned by participants to accelerate RE in buildings are: The need to incorporate an energy rating in buildings, as well as the need to develop the capacities of the different stakeholders.
- Regarding the different renewable energy technologies proposed in the programme, although the event had participants specialised in wind energy and biomethanisation, it was clear that there is a strong tendency to think of solar photovoltaic energy when talking about RE in buildings. This was referred to by some of the participants as a lack of technological knowledge and capacity building on the part of customers and the financial sector.
- All participants expressed their interest in the next steps of the programme and indicated their willingness to contribute to the development and testing of the different financial mechanisms proposed, including: offering capacity building, piloting an opex model for renewable energy in buildings (solar, wind, Biomethanation, etc.), developing standardised contracts, developing tools to establish appropriate OPEX contract pricing, establishing risk mitigation mechanisms, among others.

7.6 Annex 6: References

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