

# **INSTITUTIONAL ARRANGEMENTS AND SUPPORT FOR RENEWABLE ENERGY BASED ENTREPRENEURSHIP IN INDIA**

## **–A CRITIQUE**

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### **ABSTRACT**

The purpose of this study is to examine and critique various institutional arrangements that aid in the construction of an appropriate environment for solar-based entrepreneurial activities that contribute to rural development. Three significant actors, SELCO, TERI, and AIWC, have been chosen as institutional arrangements supporting RE entrepreneurs. In order to study the determinants that enable solar-based entrepreneurship in India, the current paper has employed deductive as well as inductive methodologies, as well as a theme analysis. The research continues by examining a list of characteristics that serve to encourage solar entrepreneurs and demonstrates that the outcomes achieved by the various institutional structures are similar. While SELCO demonstrates a private approach by having all of its partners be private firms, AIWC and TERI possess public-private and public-private-people cooperation models, respectively. In conclusion, the three institutions studied provide insight into three distinct institutional arrangements, all of which create an appropriate entrepreneurial environment and factors for RE-based entrepreneurship.

Keywords: Institutions, Entrepreneur, RET, Models, Sustainability

### **1. INTRODUCTION**

Major energy system transformations toward sustainability ('sustainability transitions') are a communal aim that necessitates action from a wide range of public and commercial players with varying interests, clout, and authority. (Barrett, 2015) A transition to sustainable development is expected to be full of conflicts and contestations among various actors, with no win-win remedies; simultaneously, such sustainability transitions may differ significantly in different countries based on the institutional environment, which sets up different needs, priorities, imaginaries, and levels of capability. With special reference to SELCO, TERI, and AIWC, this research critically analyses and analyses the institutional mechanisms that aid in the building of an enabling environment for promoting solar-based entrepreneurial activities that contribute to rural development.

### **2. RESEARCH METHODS**

This is a multi-faceted research project with the goal of identifying the institutional arrangements that help provide a suitable environment towards solar technology based business activities that contribute to rural development.

### **2.1 Study of Institutions**

SELCO, TERI and AIWC are just a few of the organisations that have been looked into. The following criteria were used to choose these institutions: 1) on-going collaboration with industry, academia, and SETs companies; 2) contractual arrangements with major SETs manufacturers; 3) stakeholder alliances; and 4) political commitment

### **2.2 Data Collection methods**

Fieldwork was carried out in 2021 in order to undertake qualitative research. Researchers who are familiar with the institutional context have an advantage, according to Barley's (2010: 779) research if a translator is hired to translate the regional language based content before sharing with another region/state reduces problems such as language barriers and difficulties conducting research in an unfamiliar institutional context. The study used both primary and secondary data sources to achieve its purpose of data collection. Both of these methods were effective in acquiring thorough information regarding various RET initiatives and its impact. Secondary data sources were also used to supplement the primary data sources, ensuring that the information gathered was of high quality and accuracy.

Sample size: 20 (Officials of SELCO, TERI and AIWC in New Delhi)

### **2.3 Method of analysis: thematic analysis**

For my research, I picked the qualitative technique of thematic analysis as the method of analysis. In general, thematic analysis is the most widely method used in case of qualitative research while interpreting interviews. As per Braun and Clarke (2006), thematic analysis is a technique for identifying and assessing themes inside the data (2006: 79). I chose this method since a rigorous theme strategy can yield an instructive analysis which answers specific research issues (Braun and Clarke, 2006, p.97). Furthermore, this approach supported the research questions by allowing an assessment of the interview data from two perspectives: first, from a data-driven and inductive coding standpoint; and second, from a research question standpoint, to ensure that the data kin in sync with the established objectives.

## **3. SOLAR ELECTRIC LIGHT COMPANY OF INDIA (SELCO)**

### **3.1 Actors**

SELCO collaborates with a variety of stakeholders, each of whom plays an important part in the operational and business management components of their business strategy. To figure out how they engage with one another, you must first figure out who they are and what their interaction style is:-

- To begin, SELCO has been working in collaboration with RRBs, credit cooperatives, and microfinance organisations to secure the necessary loans for their solar technology customers. SELCO only works with local vendors. SELCO required durable electrical components for rural India, even if this meant sacrificing technological expertise. Not all

innovation (at least product innovation) can be achieved just through collaboration with suppliers, thus SELCO collaborates with a number of NGOs and community-based groups. In rural areas, for example, SELCO collaborates with SEWA (Self Employed Women's Association) and a number of community-based/voluntary organisations (Chakravarty, 2013).

- The entrepreneurs, as well as SELCO's sales and R&D teams, are two more groups of stakeholders who are critical to the company's success. As previously stated, product and design innovation is based on feedback from entrepreneurs (referred to as 'clients' by SELCO), so it is critical that SELCO maintains regular contact with them and develops new ways to support their businesses by improving solar-based technologies suitable for specific intent.

### **3.2 Patterns of Interaction and Outcomes Generated**

It is important to understand SELCO's effective methodology and the scope to which they interact regularly with a broad range of stakeholders - primarily clients (end users), suppliers, sales and R&D teams, and research think tanks - in order to support solar based entrepreneurial initiatives by understanding their interaction patterns and what results are generated from the same. Each of these areas has codes that can be used to conduct a theme analysis.

Client interaction and feedback loops are maintained to tailor demand-based products and services. Customers are served by SELCO through 25 service centres located throughout India's rural districts. Customers' needs and their ability to pay the loan instalments are taken into account while designing the lighting solution provided by SELCO's solar lights. As a result, it is highly typical for solar RETs to be demand tailored and personalised - this occurs after the sales and R&D teams have thoroughly studied the needs of a family.

### **3.3 Partnering with banks to offer innovative financial support to clients**

SELCO's financial innovation in the RE sector has revolutionised the way banks think about RET-based enterprises in remote regions. SELCO has been collaborating with RRBs, credit cooperatives, and microfinance organisations to secure sufficient credit for their consumers, but will not be involved in the financing process. However, there are times when SELCO provides a credit line if they believe a community or individual is in such bad shape that they can't even get the margin money together. Even in such circumstances, the money owed to SELCO is collected through the agency that handles the rest of the finances to eliminate any potential conflicts of interest.

### **3.4 Continuous and interactive relationship with suppliers**

The players and their interaction patterns establish a strong interdependency. All of SELCO's other electronic components are sourced locally. When SELCO recognised that the technology available from TATA BP was suited for European conditions, it understood it needed to build relationships with local suppliers. SELCO needed durable electrical components for rural India, even if that meant sacrificing technological expertise. With all of its suppliers, SELCO maintains a high level of openness, and they are ready to support one another in the event of limits or obstacles. Integration of stakeholders would mature the market; such cooperation and business understanding amongst stakeholders at both local and regional levels increases the breadth and

sustainability of the company, and as a result, the market would be more mature. (Goyal, 2010)

### 3.5 Analysis of support for solar based entrepreneurs

<b>Patterns of interaction and outcomes</b>	<b>First order codes</b>	<b>Second order codes</b>	<b>Themes</b>
1. Providing customised products and services, tapping into specific household need	1.Products are customised based on household needs 2.Continuous feedback loop and knowledge sharing	1. Regular communication between clients and SELCO staff 2. Considering the nature of lighting needs at the household level	Knowledge sharing, feedback loop between SELCO and clients, understanding individual lighting needs
2.Developing a financial innovation in offering	1.Word of mouth communication 2.Interaction between clients and SELCO staff 3.Faster response to RET product issues 4.Banks interacting with villagers 5.Banks offering loans to solar based businesses 6.Banks receiving repayments on daily	1. SELCO arranging bank loan facilities to their client 2. Formation of clients and bank relationship	Availability of start-up finance for solar based enterprises, developing banking practice

### 3.6 Knowledge sharing, feedback loop between SELCO and clients, understanding individual lighting needs

The first thing that stands out in both the themes and the codes is SELCO's focus on individual lighting needs and the importance of client participation in product design. The utilisation of interview quotes as well as secondary data helps to understand how the lights are utilised for vital activities (not only for domestic lighting, but also for income-generating RET rentals) and how they affect the clients' everyday lives. As a result, the quality of products and services given receives a lot of attention. It can also be seen that a business model has developed around solar RETs, which gives cash to both enterprises and street sellers.

### 3.7 Faster new product development, quicker response to client issues

Partnering with a local distributor and purchasing from a small firm for customization has a number of advantages for product development. It is also critical that these ties be maintained over time; however, one thing to note is that these suppliers are not large in scale and do not have

direct business relationships with large RETs producers (e.g. Kotak Urja, TATA BP). As a result, their partnership with SELCO offers the latter with security and a competitive advantage. It's also a terrific chance for solar entrepreneurs to fine-tune their goods from time to time based on tiny changes that SELCO can quickly respond to.

### **3.8 Working with local communities, creation of new needs, trust building in networks**

Even design and manufacturing innovation can be found. SELCO has also collaborated with NGOs as it would be impossible to break into the rural market without prior understanding of the area. Omofonmwan and Odia (2009; Omofonmwan and Odia, 2009; Omofonmwan and Odia, 2009

In terms of institutional structures, these innovations and modifications were made possible not only by SELCO, but also by their collaboration with a) SEWA (self-employed women's organisation) and b) the area in which the solar technologies were introduced. Without SEWA, it would be extremely impossible for SELCO to access a village region and investigate a delicate topic like childbirth, let alone introduce renewable energy technologies - from this perspective, SEWA's engagement in the agreement benefited the parties. Second, because the end - user would be the community, including the midwives in the process from the start improved the outcome even more. (Chakravarty, 2013) Once again, the two things that can be observed are a) involving end users in the process from the beginning and b) studying the nature of demand and need in great detail - these two can be applied to home lighting systems, solar lamps, lanterns, and other RE technical development that SELCO has offered thus far.

### **3.9 Support for RE based entrepreneurship**

SELCO provides a context in which RE-based entrepreneurship can be encouraged in a variety of ways.

- First, there are the promised inspections (two times a year plus one emergency call), but there are also monthly field visits to confirm that the technology is being used for the purpose for which it was supplied in the first instance.
- Second, the staff is noted for returning 65 percent of client calls within 24 hours and resolving 80 percent of concerns within that time frame. This ensures not only that they have a high level of operational efficiency, but also that the clients in the villages have a high level of intrinsic faith in them. These elements play an important role in promoting RE-based businesses.
- In both the rent and ownership models of RETs, finance plays a significant role in RE-based start-up initiatives. The arrangements that SELCO has with other financial institutions market stakeholders such as regional rural banks, credit cooperatives, and microfinance agencies are especially helpful – on the one side, this is the crucial component to arranging the provision of credit to SELCO's clients without getting into direct financing, while on the other hand, it is developing rural 'villager – banker' interaction and relationship that was missing before SELCO came into being.

## **4. ALL INDIA WOMEN'S CONFERENCE**

### **4.1 Actors**

Apart from having a headquarters in India, AIWC is a regional organisation with affiliates in



other South Asian countries. It is the Ministry of New and Renewable Energy's (MNRE) nodal agency for distributing alternative energy resources, raising awareness, and empowering women via them. The AIWC's training and pilot projects are also supported by IREDA, the MNRE's financing arm. The group has worked with the MNRE (formerly known as MNE) for over 25 years and has close ties to the Ministry's resources focused to RET development and green entrepreneur incubation. The majority of the AIWC's training programmes, on the other hand, are planned and provided by academic institutions, research think tanks, and NGOs and VOs. Every education and pilot programme includes numerous layers, beginning with an awareness campaign, interactive meetings, and taught lessons to women entrepreneurs by a team of facilitators from AIWC's various partner institutions. In many ways, no training or incubation project could go through and deliver as planned without these partners. Omofonmwan and Odia (2009; Omofonmwan and Odia, 2009; Omofonmwan and Odia, 2009)

#### **4.2 Patterns of Interaction and Outcomes Generated**

It is important to understand AIWC's operating plan and the extensiveness to which they interact regularly with a broad range of stakeholders, primarily clients, research bodies, MNRE, and IREDA, in order to know their patterns of interaction and the outcomes generated for solar-based entrepreneurial initiatives. In each of these parts, codes are determined that will aid in the thematic analysis offered later in this work. The following are discussed as part of the variety of services provided by AIWC to their clients.

##### **4.2.1 Working with partners to facilitate training and development programmes**

The absence of basic and experiential learning is one of the most significant obstacles facing any solar-based micro firm. Women and children who run solar-based businesses are unable to handle minor problems with solar devices, as well as maintain, repair, and install them. They rely on an external source, which is an expensive and time-consuming operation. As a result, the AIWC's training programme aimed to identify and improve the capability and capacity of low-income women/youth from recognised relocation settlements to develop into prospective entrepreneurs capable of assembling, repairing, and maintaining solar devices/energy efficient devices, as well as creating a self-sustaining framework and local eco-system.

##### **4.2.2 Engaging with unemployed youth/women who are potential 'solar engineers**

The ultimate purpose of AIWC's training programmes is to give trained women and kids the opportunity to do the following.

- Work with a solar producer and service firm to construct their private service centre
- Earn money by offering services such as solar device maintenance, repair, and installation
- Maintain their own solar-powered charging station
- Open a sales centre

Each of the stages listed above involves a variety of actors who all contribute to the ultimate result. The role of NGOs is critical to an organization's success since it aids in collaboration with various actors at the grass roots. The following are the several levels at which non-governmental organisations (NGOs) play a critical role in encouraging citizens through technology transfer:

The following are some of the advantages of NGOs participating in local initiatives:

- Generating awareness by exhibiting technologies • Speaking to the people and discovering what their needs are
- People must be motivated; this necessitates a catalytic mindset of streamlining the process in the local context after examining the local conditions, needs, and people's mentality.
- Why Once people embrace the technology, demand will increase — this can only occur with a bottom-up approach, which is typically pursued by NGOs.
- NGOs can obtain immediate feedback from users on the technology' strengths and weaknesses.
- While transferring technologies, it is also critical to teach people in the use and management of these systems.

#### 4.2.3 Working with partners in different regions to replicate the business model



Figure: Business process breakdown of AIWC

The above Figure above shows how the simulation is carried out step by step.

#### 4.2.4 Develop self-sufficiency in youth/women to run energy-based businesses

AIWC undertakes a number of activities, ranging from public awareness and training to the establishment of small businesses with solar charging points and the replication of successful models elsewhere in order to expand the organization's knowledge library. The growth of identity in youth/women to manage energy-based companies is visible as a result of this process. This cannot be attributed solely to AIWC, but also to the connected agencies and other stakeholders who have a significant role to play in completely implementing and realising the project design, delivery, and evaluation. However, as the following quotation shows, self-sufficiency is a sense that pervades the beneficiaries.

The sense of personal achievement takes time to develop; it begins with training programmes in which participants are informed about the potential benefits of operating an energy-based business and that they are no longer reliant on their local council or gramme panchayat for social protection benefits. Women were also persuaded that they did not need to leave their base, that most programmes could be run from home, and that they could send their children to school.

We've been providing proper training to these ladies for over 20 years now, for a variety of programmes. It began with the simple technology of a parabolic solar cooker, which was new at the time, and has progressed to solar charging stations, which are now quite common. (AIWC, Staff)

#### 4.3 Analysis of Support for Solar Based Entrepreneurship

<b>Patterns of interaction and outcomes generated</b>	<b>Codes</b>	<b>Themes</b>
Working with partners to facilitate training and development programmes	1. Practical training 2. Skill based test 3. Simulation programmes 4.Guided and participatory process	Participatory training and learning, simulation opportunities
Engaging with unemployed youth/women who are potential 'solar engineers'	1. Support from apprentice to start-up stage 2. Participatory learning support 3. Women maintain and repair solar technologies	Comprehensive long run entrepreneurial support, women repairing RETs
Working with partners in different regions to replicate the business model	1. Importance of situational Factors 2. Inclusion of entrepreneurs as a part of the simulation to share learning 3. Identifying the right business to choose and grow 4. Cultivate entrepreneurial ability	Situational factors of business, identifying right business and region specific, funding available for startups
Develop self-sufficiency in youth/women to run energy based businesses	1.Early awareness meetings 2.Developing sense of independency 3.Ensuring of stability 4.Support from training stage to business take-off	Focus on awareness and knowledge sharing, entrepreneurs developing sense sufficiency



The AIWC's operation uses a public-private partnership model, which is intriguing. NGOs, MNRE, IREDA, sustainable energy producers, trainers, and executives from university and business are among the actors working with the AIWC at various levels.

#### **4.3.1 Participatory training and learning, simulation opportunities**

The examples and cases given above demonstrate that a variety of institutions collaborate with the AIWC to develop and conduct training and learning programmes. Trainers and facilitators from universities and research institutions participate in the training programmes and interact with the entrepreneurs in person, transforming it into action learning and answering any queries.

#### **4.3.2 Comprehensive long run entrepreneurial support, women repairing solar renewable technologies**

AIWC creates 'solar engineers' who are also female entrepreneurs, as shown before in this section. In other circumstances, males are in charge of a solar power outlet while women are in charge of repairs and maintenance. The AIWC's procedure for developing female entrepreneurs is lengthy. They begin with public awareness initiatives that describe the benefits and drawbacks of employing RETs. This includes not just explaining the advantages of utilising renewable technologies or being an entrepreneur, but also concerns like women not having to leave their communities and businesses being run from home, ensuring stability and security.

#### **4.3.3 Situational factors of business, identifying right business and region specific, funding available for start-ups**

AIWC also hosts a variety of educational programmes on topics such as biogas plant operation and maintenance, solar cooker improvement, and other renewable energy technologies such as wind turbines, solar stills, solar dryers, and solar lanterns. Under the banner of 'strategies for integrating women in technology and science, policy formation, development, and dissemination,' these established a regular series of projects. Because AIWC is one of the MNRE's important and dominant nodal agencies, money and access to resources are not an issue, and the programmes have been proved in various places on a regular basis. This provided stability and regularity, which maintained the interest and motivation of the growing number of participants who advocated for the use of RETs.

### **5. THE ENERGY RESEARCH INSTITUTE OF INDIA (TERI)**

#### **5.1 Actors**

To mobilise rural regions around the initiative, TERI collaborates with local NGOs. Illuminating a Billion Lives was founded in 2007 with the goal of providing cheap solar light to India's un- or under-electrified communities. Poor women account for one-fourth of all solar entrepreneurs. Because of 'Lighting a Billion Lives,' 3,50,000 houses in India that are still not connected to the national grid now have access to clean light. The programme is available in 22 Indian states. Afghanistan, Pakistan, Nepal, Bangladesh, Myanmar, Uganda, Ethiopia, Kenya, Malawi, Mozambique, Ghana, Niger, and Sierra Leone have all received assistance. This section will feature a few solar entrepreneur voices from throughout India, drawn from TERI's resources as

well as my own personal communication during research.

TERI collaborates closely with local educational agencies, NGOs, the state (MNRE), RE manufacturers, banks, and end users/energy entrepreneurs, as seen in the diagram below.

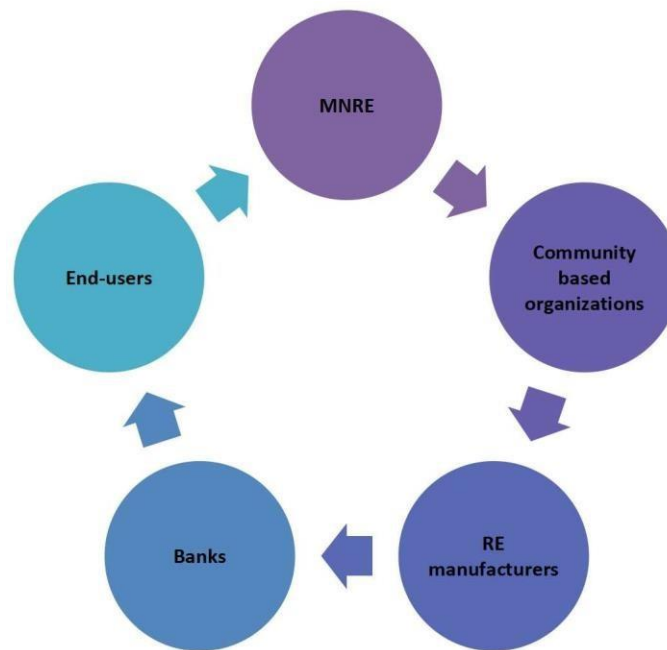


Figure: Stakeholders of TERI

While some of the TERI's partner organisations, primarily banks, provide seed capital to households so that they can purchase a renewable technologies (e.g., solar home lighting systems, lanterns, etc.), the other partner organisations, namely community-based organisations, are primarily there to a)'sensitize' the local region about benefits and limitations of adopting new technologies and b) assist in the implementation of the software hand-in-hand with the end customers so that the system

## 5.2 Patterns of interaction and outcomes generated

### 5.2.1 Partnering with local community organisations as well as the MNRE

- First, TERI collaborates closely with community-based organisations; second, TERI's collaboration with MNRE and RE manufacturers provides a deeper understanding perspective. For product development, there is a feedback mechanism that emphasises the importance of user needs.

### 5.2.2 Partnering with financial institutions and offering after-sales service to clients

TERI's LaBL is based on the public-private-people partnership paradigm and shows how it may help development plans and efforts, especially in the area of rural access to energy. To fund the campaign, TERI transitioned from a grant-based business to a fee-for-service delivery one, then progressively transitioned to a more open equity and capital based model. This method has helped address two main challenges: I ramping up and (ii) broadening of finances, by proving confidence through outcomes on the ground and proof of concept. LaBL has matched its strategy with the government agenda to increase the likelihood of success by providing financial viability,

technology customization, and an effective surveillance mechanism. They've teamed up with microfinance banks to provide energy entrepreneurs with on-the-spot financing. LaBL has also partnered with microfinance institutions to support new and current rural businesses, such as establishing solar charging points with microfinance banks that receive funds from NABARD and government rural livelihood programmes. They've also been supporting innovative solar charging station financing alongside YES Bank Limited to build and execute a sustainable semi-commercial business strategy for solar charging station financing.

Energy Enterprises is a service platform developed by TERI (Uttam Urja Shops). LaBL works with a network of local institutions to help with segments and sub of project deliverables, training and building capacity, and after-sales support. An Energy Enterprise (EE) is a local business that provides after-sales care to LaBL solar charging points (SCSs) and is also permitted to promote and sell TERI-approved clean energy items such as solar lighting in a given area. Aside from offering close proximity and dependable after-sales service, the EE also aids in the development of local capacities of rural youth for the implementation of additional energy access projects in the area.

TERI is leveraging public-private partnerships to deliver renewable energy and increase energy access, in addition to fee-for-service and credit finance methods. The following are some examples of how to help RE-based enterprises. (Sharma and Paul, 2013)

- Providing sewing training to rural women at the LaBL solar charging points, in addition to the provision of solar lanterns, in cooperation with Mawana Sugars and Usha International; generating revenue generation opportunities for rural women entrepreneurs by coaching them on selling mobile telecom services, in collaboration with the DoT.

### 5.2.3 Working with energy entrepreneurs to develop more energy based micro enterprises

TERI offers training programmes in collaboration with TERI University as well as other partner organisations, and 'torchbearers' can also organise training seminars with energy entrepreneurs. These classes provide a thorough understanding of the research as well as how to use it to the creation of income-generating microbusinesses.

### 5.3 Analysis of support of solar based entrepreneurship

<b>Patterns of interaction and outcomes</b>	<b>Codes</b>	<b>Themes</b>
<i>Partnering with local community based organizations as well as the MNRE</i>	1. Partnering with local and community institutions as well as national level public institutions 2. Partnering with an energy entrepreneur	<b>Public-private people Partnership</b>

<i>Partnering with financial institutions and offering after sales service to clients</i>	<ol style="list-style-type: none"> <li>1. Working with financial institutions</li> <li>2. Door-step financing to entrepreneurs</li> <li>3. Helping individuals graduate off poverty</li> <li>4. Forming knowledge partners at different levels</li> <li>5. Offering faster after-sales service and maintaining communication with clients</li> </ol>	<b>Provision of solar based start-up loans, forming knowledge partners</b>
<i>Working with energy entrepreneurs to develop more energy based micro enterprises</i>	<ol style="list-style-type: none"> <li>1. Partnering with academic and industry experts for developing training and sharing learning</li> <li>2. Monitoring the use of RETs for multiple purposes while keeping the core purpose intact</li> </ol>	<b>Multi-level partnership, monitoring of entrepreneurial performance</b>

### **5.3.1 Public-private people partnership**

TERI interacts with private RE producers and also community based level organisations in addition to the MNRE as well as other governmental institutions. At various levels, the partnership arrangement works. The collaboration with community-based organisations aids in the development of a target rural area by utilising local contacts and knowledge, as previously said. This information is then relayed to TERI, which then comes in with the RETs and implements a development intervention.

### **5.3.2 Provision of solar based start-up loans, forming knowledge partners**

The torchbearer concept, established by the LaBL initiative, is extremely unique and practical. These pioneers go out to the target areas and gather information from the businessmen to feed back to the TERI headquarters, enlisting the help of individuals from academic think tanks, students from universities, and local youth who are eager to volunteer. In many situations, the torch-bearers work with a local context and nurture energy companies. TERI historically cooperated with NABARD and RRBs to provide loans to entrepreneurs, but they now have their own financing body. When entrepreneurs monetize the use of a RET to launch a micro-business, they are offered start-up funding.

### **5.3.3 Multi-level partnership, monitoring of entrepreneurial performance**

TERI's model can help entrepreneurial nurture business experience, set up and grow a micro

organisation, provide door-to-door financing when needed, and monitor performance outcomes using LaBL pioneers and community level institutions given the presence of different partners in both the public and private sectors, as well as energy business owners in rural areas. Because a wide range of stakeholders are participating in the process, the creative delivery model outlined previously functions efficiently.

## **6. CONCLUSION**

This article looked into three different institutional mechanisms used by three organisations in India to foster RE-based entrepreneurship: SELCO, AIWC, and TERI. It examined the three elements proposed by the IAD section of the theoretical model employed in this study - actors, interaction patterns, and outcomes generated. A thematic analysis was conducted using both deductive and inductive approaches in order to investigate the determinants that favour solar-based entrepreneurship in India. Finally, the research suggests that the outcomes achieved by various institutional structures are similar, and it discusses a list of characteristics that aid solar entrepreneurs. While SELCO demonstrates a private approach by having all of its partners be private firms, AIWC and TERI have public-private and public-private-people cooperation models, respectively. In conclusion, the three institutions studied provide insight into three distinct institutional arrangements, all of which create an enabling entrepreneurship culture and factors for RE-based entrepreneurship.

The table below shows the similarities and variances in institutional arrangements discovered across three organisations.

<b>Institutional approach</b>	<b>SELCO</b>	<b>AIWC</b>	<b>TERI</b>	<b>Similarities</b>	<b>Differences</b>
Nature of collaboration	Working with local communities, creation of new needs, trust building in networks	Participatory training and learning, simulation opportunities	Public-private people partnership	<i>Yes</i>	<i>SELCO doesn't work with the government</i>
Funding mechanism	Availability of start-up finance for RETs enterprises, developing banking practice	Funding available for start-ups, Situational factors of business, identifying right business and region specific	Provision of RE based start-up loans, forming knowledge partners	<i>Yes</i>	<i>SELCO and AIWC don't offer institutional finance themselves, but arranges the same from a third party financial source</i>
Development of business acumen	Faster new product development, quicker response to client issues	Comprehensive long run entrepreneurial support, women repairing RETs	Multi-level partnership, monitoring of entrepreneurial performance	<i>Yes</i>	<i>None</i>



Knowledge management	Knowledge sharing, feedback loop between SELCO and clients, understanding individual lighting needs	Focus on awareness and knowledge sharing, entrepreneurs developing sense sufficiency	Initiation of sensitisation in communities months in advance before introducing the technologies and working with local partners, working with entrepreneurs directly at a later stage	<i>Yes</i>	<i>none</i>
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Table: Similarities and differences observed in institutional arrangements across three organisations

Overall, the consequences of multinested actor collaborations and participation are viewed as favourable determinants for promoting solar entrepreneurship. Although the various components required for all various organizations are generally the same – solar technology companies, distributors, financial origin (private or public), local partners, community engagement in project design, the nature of collaboration and sectoral engagements are not really the same notwithstanding the generating similar (or in most cases, same) outcomes – it's interesting to see that the nature of collaboration and sectoral engagements aren't always the same. As shown in the table above, AIWC and TERI collaborate with the government/MNRE, whereas SELCO does not.

In regard to credit, both AIWC and TERI provide financial assistance to solar small business owners by drawing funds from the MNRE, but SELCO, as effective as the other two organisations, connects solar startups with public owned and regional local banks in the regions where they operate without implicating the financial mechanism itself. The main approach followed by all three is fundamentally the same – from nurturing by first sensitising target areas before introducing solar technologies to developing and assisting solar entrepreneurship once their micro firms are set up and ready to operate. Both similarities and differences would be useful for both current and future studies.

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