IMPACT ASSESSMENT AND REPORTING FOR DECENTRALISED RENEWABLE ENERGY (DRE) ENTERPRISES

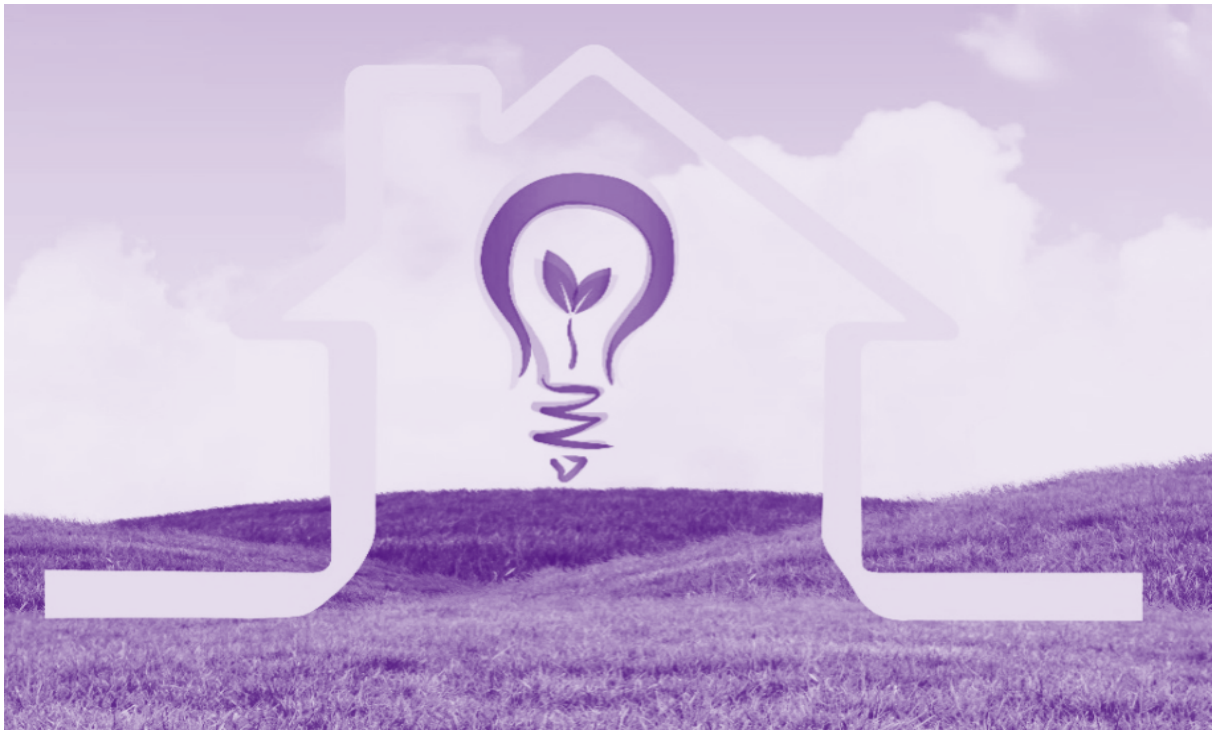
CASE STUDY

SHAKTI SUSTAINABLE ENERGY FOUNDATION

intellecap

1.1 Context

Shakti Sustainable Energy Foundation (SSEF) is a not-for-profit organisation committed to support India's developmental and energy security objectives. SSEF commissioned Intellecap Advisory Services to enhance access to finance for decentralised renewable energy (DRE) enterprises by providing requisite advisory support to such enterprises. As a part of the program, Intellecap is supporting DRE enterprises in designing solutions for existing business-related issues that impact scale and sustainability as well as in implementing strategies for expansion and growth so as to guide them towards investment readiness. This document draws the key learnings of working with one of the DRE enterprises and captures the context, key challenges faced, solutions recommended and the expected outcomes over the near to medium-term.



About the Company

Gram Oorja is a 9-year old enterprise that provides electricity access to households in remote locations of India - locations that are not connected to the grid or are unlikely to be connected in the near future. The enterprise specialises in installations of micro-grids and solar pumps. The projects are executed in partnership with NGOs, using government grants and/or Corporate Social Responsibility (CSR) funds. The key differentiator of the enterprise is its ability to design and install energy access systems based on the power requirements of households in a particular community. The company also trains local entrepreneurs to manage installations, thereby encouraging community involvement and ensuring limited disruptions in power supply.

The enterprise is currently active in remote off-the-grid villages in Maharashtra, Jharkhand and Karnataka.

Background

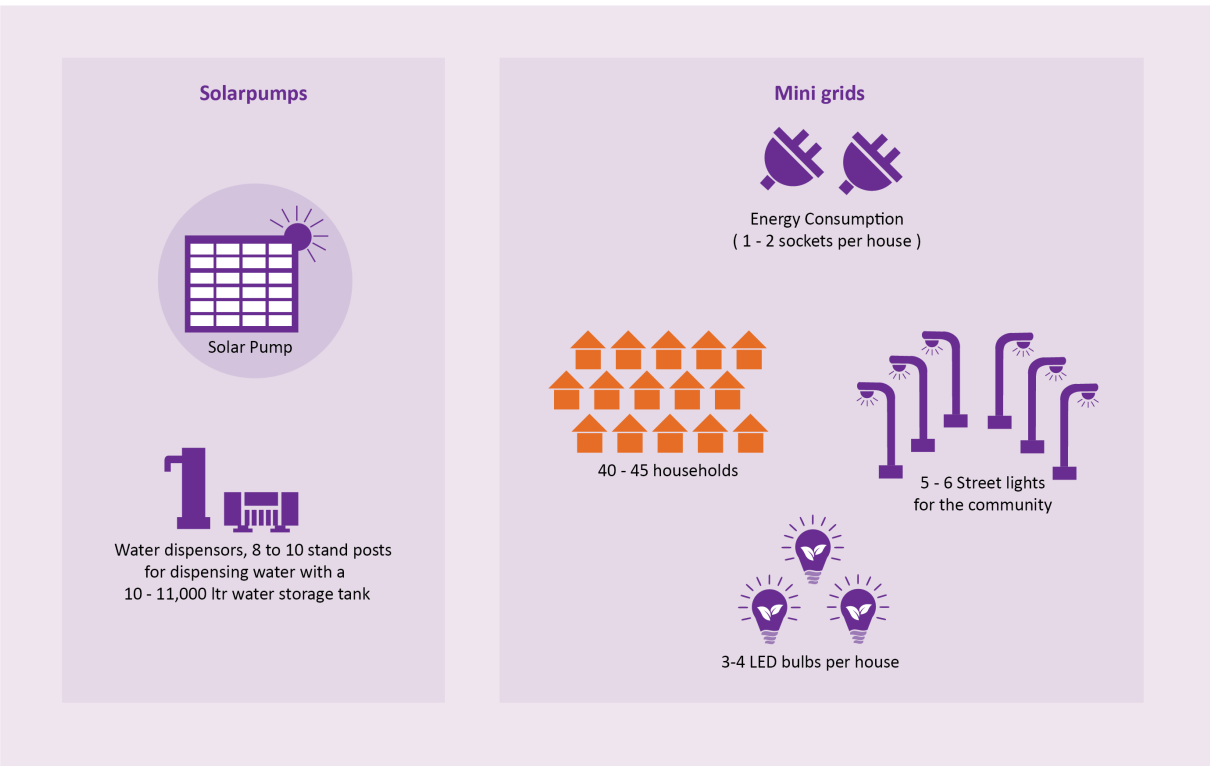
Enterprises need support in setting up and institutionalising the process of identifying relevant impact metrics as well as tracking and reporting the impact on a periodic basis.

Impact measurement helps social enterprises in identifying the need for refining business model by evaluating the impact of their operations against the envisaged benefits at the time of launch. It also enables the quantification and validation of the positive impact of access to energy on the communities served.

Many studies have been conducted to assess the technology and operation of different solutions, but comparatively fewer studies have been undertaken on effectively demonstrating the economic, social and environmental impact created by these solutions. Enterprises are often unable to engage in periodic impact assessment due to lack of time and resources. The resulting data asymmetry in the industry restricts access to finance for energy access enterprises. Enterprises thus need support in understanding aspects such as impact parameters that should be measured, techniques to monitor the parameters, and reporting potential impact of their solutions on an on-going basis.

Consequently, the aim of the engagement was to assess the impact of micro-grid and solar pump installations of the enterprise as well as to help the enterprise in institutionalising the impact measurement process.

Figure 1: Offering of Gram Oorja for households



Source: Intellecap analysis

1.2

Key Challenges

There are several challenges associated with performing impact assessments for a nascent sector/industry such as renewable energy. Enterprises find it difficult to identify the right parameters to measure ("what to measure"), establish the right time to measure ("when to measure") and to finalise a suitable method of measurement ("how to measure"). Some of the key challenges are highlighted below:

Identification of relevant measurement parameters

DRE installations have a social and environmental impact beyond the typical financial outcomes. This necessitates an integrated approach to identify the relevant parameters for measuring such impact. Currently, in the DRE sector, there is a lack of industry-wide best practices on the parameters to be tracked for impact assessment. Further, different types of investors require different metrics to be tracked. As a result, with the need to measure multiple metrics, impact measurement becomes multi-dimensional and an increasingly complex endeavour.

Impact measurement is costly and not a one-time activity

Enterprises are often unable to engage in periodic impact assessment because of a paucity of time, resources, and established practices. Ideally, a baseline data should be collected by enterprise and periodic assessment should be conducted in an interval of 6-9 months to evaluate the impact of installations. However, most of these enterprises are start-ups or early stage companies and remain predominantly occupied with developing their business. As such, they have limited resources to conduct impact assessment on a periodic basis. Third party impact assessment is costly and enterprises have limited ability to pay for such assessments on a periodic basis.

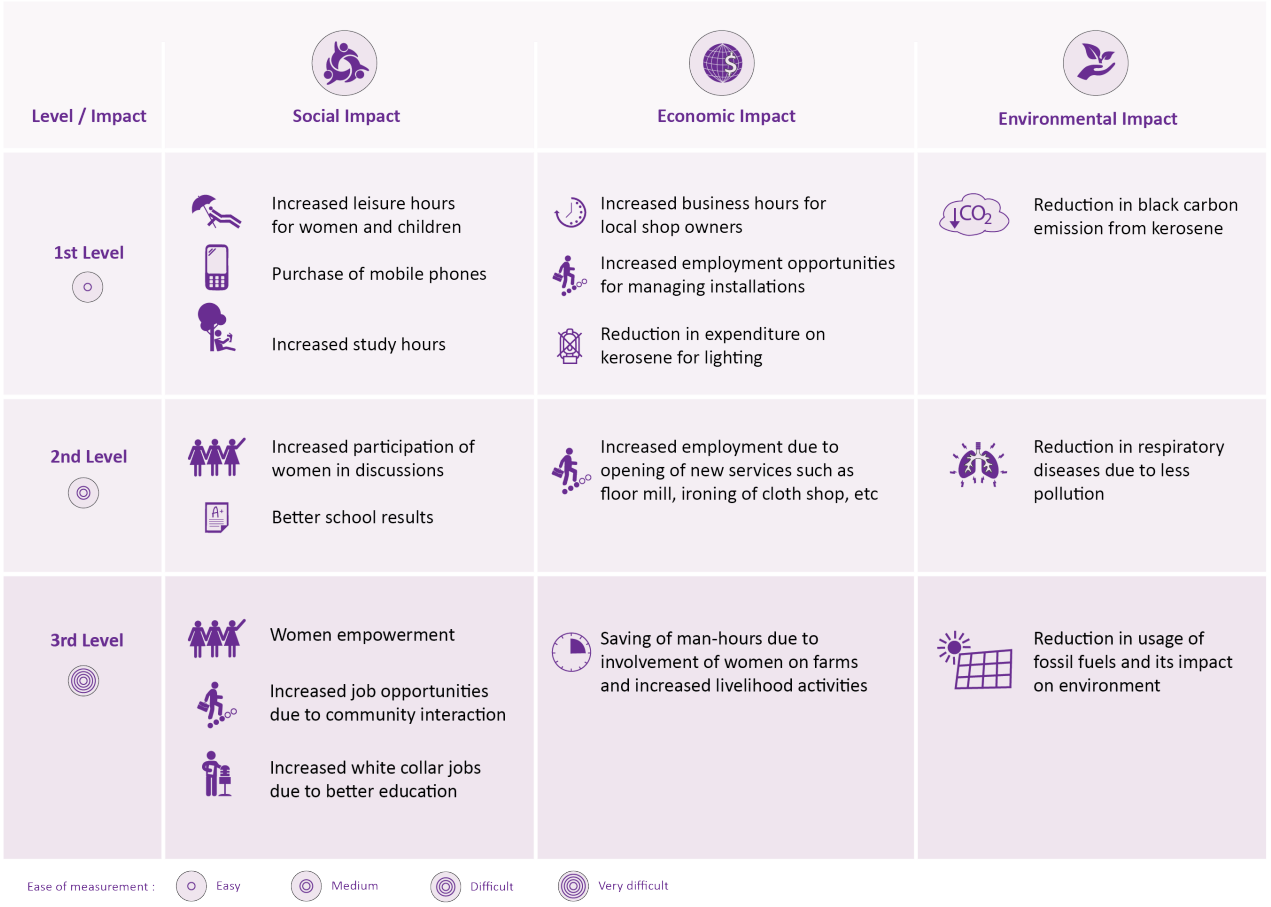
Correlation of impact and cause

It is difficult to directly correlate and assess the social, economic and environmental impact of any product/installation. Impact is not necessarily a direct outcome and could happen at different levels. While direct impact of DRE installations such as increase in study hours for children could be measured easily, it is difficult to correlate the same to the increase in white collar jobs in future. Increase in job opportunities could also be the result of better nation-wide economic conditions that offer better job opportunities to the unemployed in the future. An intricate chain of events could lead to an impact and tracing the impact back to the cause is not always possible.

Measurement of impact

While economic impact (such as increase in income due to growth of economic activities or savings on fossil fuels) is relatively easier to measure, social impacts (like those on education, health and safety parameters) are more challenging to quantify. Environmental impact is even more difficult to measure for enterprises since tracking daily/ hourly usage of home lighting systems or mini-grids that result in reduction in use of kerosene may require physical on-ground presence or expensive technologies. It has become increasingly difficult to measure social as well as environmental impact in the absence of defined and broadly acceptable metrics.

Figure 2: Impact types, levels and ease of measurement



Source: Intellecap Analysis

1.3 Solution Themes

Based on time and cost concerns, multi-Impact assessment for DRE solutions, especially mini/ micro-grids can broadly be aligned to three pillars – social, economic and environmental – that are critical for donors and investors. Data collection is imperative for impact measurement, but enterprises should follow a comprehensive step-by-step approach to track and collect impact-data and report on a periodic basis.

Enabling identification of relevant measurement parameters

Understanding the beneficiary profile

Understanding the profile of beneficiaries before the start of the assessment is essential for contextual and accurate measurement of any impact. Enterprises should understand the economic and social condition of beneficiaries for correlating the impact of their intervention on the lives of consumers. For the purpose of captioned engagement, this was done through well-guided, conversational interviews which were in-depth in nature and allowed people to share information about actual conditions before and after the DRE installations. Sometimes, consumers cannot correlate increase in income or better health to energy product penetration. Hence, understanding their profile before and after the installation helps in correlating the impact of DRE installations.

Determination of sample size

Enterprises need to conduct surveys with beneficiaries to be able to understand/evaluate the impact of their installations. It is critical to ensure that the sample size of survey respondents is representative of the larger beneficiary group. The formula in Figure 3 was used to determine an optimal sample size of the population to be surveyed. With a 90-95% confidence level, it was concluded that the behaviour of the sample reflects that of the population.

Based on time and cost concerns, multi-stage sampling was undertaken to select respondents for focus group discussions (FGDs) and the strata was designed using homogeneous parameters such as housing conditions, electrification scenario, and economic conditions.

Figure 3: Formula used to determine sample size

$$SS_{finite} = \frac{SS_{infinite}}{1 + (SS_{infinite} - 1)/Pop}$$

$$SS_{infinite} = \frac{(1-p)Z^2}{CI^2}$$

Where
Z = 1.96 (value at 95% confidence level)
CI ➡ Confidence Interval = .05
p = percentage picking a choice, expressed as a decimal
pop ➡ total households (supported by enterprise)= 2488(example)

Source: Intellecap Analysis

Data collection through FGDs and surveys

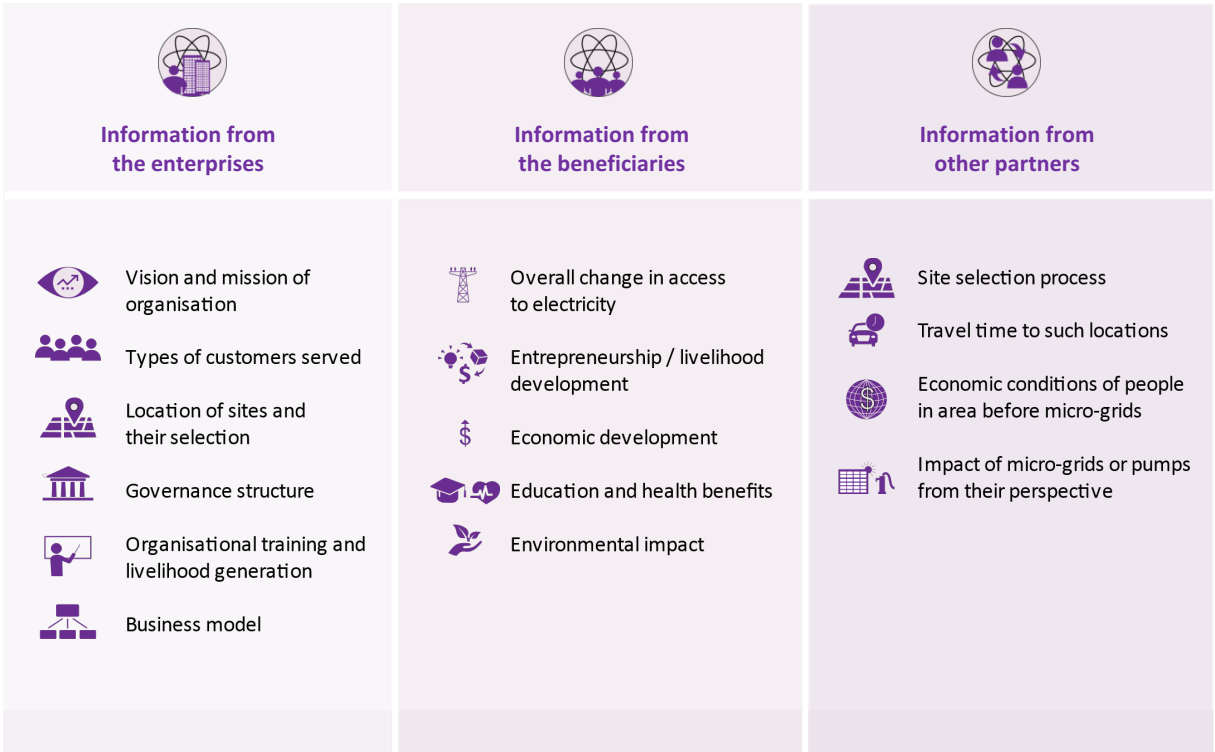
Assessment of impact was conducted using FGDs with beneficiaries to record the findings from a questionnaire-driven survey of beneficiaries. The enterprise's field agents were entrusted with the task of conducting surveys as well as FGDs for impact assessment. A step-by-step approach was deployed to accurately capture impact data. It involved:

- Discussions with key enterprise officials to understand the enterprise's vision, mission, and key activities
- Household surveys, both one-to-one and FGDs, to understand impact on the beneficiaries
- Discussions with partners (NGO, EPC contractors, donors, investors, others) to correlate the impact as suggested by the enterprise and beneficiaries.

Establishing correlation of impact and cause

Establishing the correlation between impact and its cause, especially in the case of third level impact, requires analysis of multiple criteria. The interactions, FGDs, and surveys helped establish the interrelationship between energy access and specific social, economic, and environmental changes. In the absence of clearly available metrics and data, proxies were also deployed to correlate the finding with impact on the community.

Figure 4: Indicative information to be captured from various stakeholders and beneficiaries



Source: Intellecap Analysis

Social impact

The social impact due to DRE installations could be traced to areas such as education, women empowerment, healthcare, safety, and increase in quality of life, among others.

A noticeable community-wide social impact was an increase in awareness of the outside world due to access to means of communication and information. This helped increase interactions within the community and beyond. For children, the impact was visible as there was an increase in the study-time and access to information. This, in the long run could be correlated to better livelihood opportunities for the beneficiaries. The community as a whole felt more secure due to street lights at night, as there was a reduction in incidents of snake bites as well as danger from other wild animals. A definitive impact was seen in quality of life with the beneficiaries reporting an increase in both productive and leisure time because of access to lighting.

A lot of time and effort was spent by women in getting water from a distant location (well or pond) to fulfil basic needs such as drinking, bathing and other household chores. Access to energy in the form of solar pumps brought water to their doorsteps and saved them both time and effort. Improvement in health conditions was also observed due to reduction in the task of fetching heavy loads of water every day.

Economic impact

First level economic impact was easy to measure due to increased business hours of shopkeepers with the presence of lights, and increased savings in bank accounts. The savings were a result of decrease in spending on alternate fuel such as kerosene. Second level impact, which enables livelihood and income due to opening of new business in presence of electricity (such as flour mill, ironing shop, and others), was also easy to correlate with DRE installations. However, third level economic impact could not be correlated by the beneficiaries and hence proxies were used to measure that impact. For example, increased participation of women on farms in the evening (due to availability of electricity at night for household work) was used to calculate additional man-hours generated. This metric was multiplied with the hourly wage rate; this helped in presenting the potential economic value created in the community through DRE solution. Such proxies need to be thought of and deployed by enterprises during baseline as well as end line surveys.

Environmental impact

Environmental impact due to the replacement of conventional energy sources with solar energy could not be correlated directly as perceived.

DRE systems offer significant environmental benefits when compared to conventional energy sources. Environmental impact associated with DRE systems could be land use impact, ecological impact, and impact on air, water and soil. Measurement of such impact needs expertise and specific data.

Along with direct reduction in kerosene usage, the measurement of savings in carbon emission is also important to assess the impact of reduction in use of kerosene due to DRE installations. This impact was important for the enterprise to track and measure because environmental impact is one of the key metrics used by investors owing to increased focus on climate change initiatives in the recent past.

Figure 5: Impact measurement of Gram Oorja installation

Source: Intellecap Analysis

1.4

Way Forward

Gram Oorja is in the process of institutionalising the impact assessment process. The enterprise has developed in-house expertise to conduct future impact assessments and is also open to the option of hiring professional impact assessment experts.

The enterprise has made arrangements to collect baseline data of all households in all of its current projects and henceforth plans to calculate impact on a regular basis.