PRODUCT LAUNCH STRATEGY FOR SOLAR POWERED WATER FILTER SYSTEMS

CASE STUDY

SHAKTI SUSTAINABLE ENERGY FOUNDATION

intellecap

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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

Grassroots and Rural Innovative Development (G.R.I.D.) Private Limited, established in 2015, aims to provide low-cost energy solutions to rural communities in South and SE Asia. The enterprise plans to set up micro-grids, home lighting systems, water purification systems, and irrigation solutions. G.R.I.D. has recently commissioned its first pilot of Solar Reverse Osmosis (RO) water filter systems of 20,000 litres per day capacity for a village comprising approximately 1200 households in Haryana. The community-run model provides water at rates ranging between 10-20 paisa per litre.

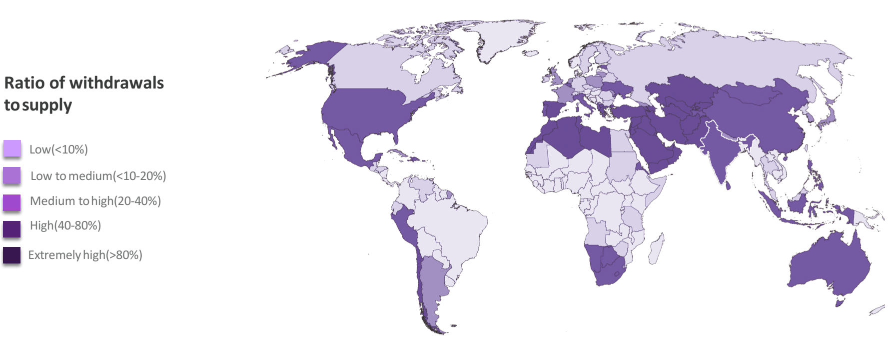
Background

Unsafe drinking water causes illness, death and impacts productivity negatively. The World Health Organization (WHO) estimates that 58% of deaths (~840,000 deaths) from diarrhoea in low and middle-income countries in 2012 were caused by inadequate, unsafe drinking water and poor hygiene. This, when seen in terms of Disability Adjusted Life Years (DALY) with one DALY being essentially a year of healthy life lost, translates into 1.5% of the global disease burden (5.5% in case of children under five).

India is one of the most water-stressed countries in the world, both in terms of water availability as well as water quality. According to Safe Water Network, India ranks 133rd in water availability and 120th in water quality. There are 800 million people in India who lack access to safe drinking water, out of which close to 80% reside in rural areas (as per the 2011 census). Limited access to electricity further worsens the issue as most water purification units run on electricity.

Innovative emerging DRE applications such as solar-powered RO-based water purification systems aim to combat the dual challenge of providing energy access and safe drinking water to communities in low-income markets.

Figure 1: Water stress levels by country



Source: Based on ratio of total withdrawals to total renewable supply, WRI Aqueduct, 2013, Community Safe Water Solutions: India Sector Review, Safe Water Network (2014)

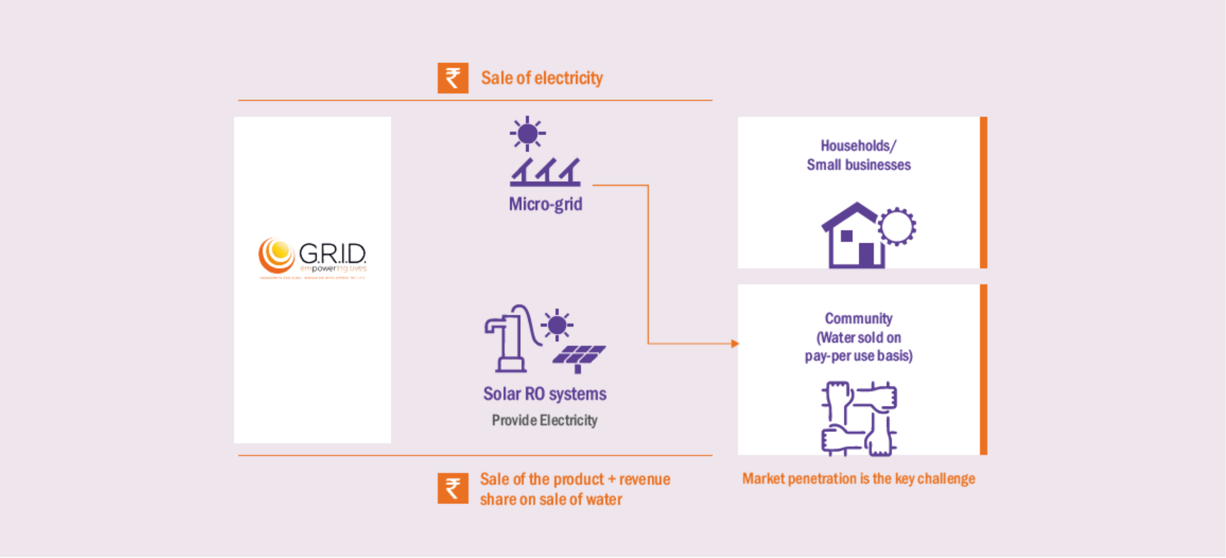
1.2 Key Challenges

The main challenge affecting micro-grids is that un-electrified villages lack base load to make such grids financially viable and semi-electrified villages cannot be connected due to the Electricity Act's prohibition on parallel grids. G.R.I.D.'s solution to this situation is to create an anchor load that could serve both un-electrified as well as semi-electrified villages and address the issue of access to water, which is the most critical need of any village.

Inadequate availability of safe drinking water along with limited access to electricity in India (~300 million people without access to electricity) makes the market ripe for solar-based water purifying systems. However, these applications are yet to demonstrate commercial viability.

In addition to this, achieving high penetration rates for such applications remains a challenge. As part of this program, an engagement with the enterprise was undertaken to develop a strategy for a solar RO product that could potentially help increase penetration of this product in low-income markets. The objective was to identify the right product configuration and features, as well as an appropriate marketing and distribution strategy to create an unmatched value proposition vis-à-vis other available alternatives.

Figure 2: Planned operational model for G.R.I.D.



Source: Intellecap analysis, primary interviews with senior management team at GRID

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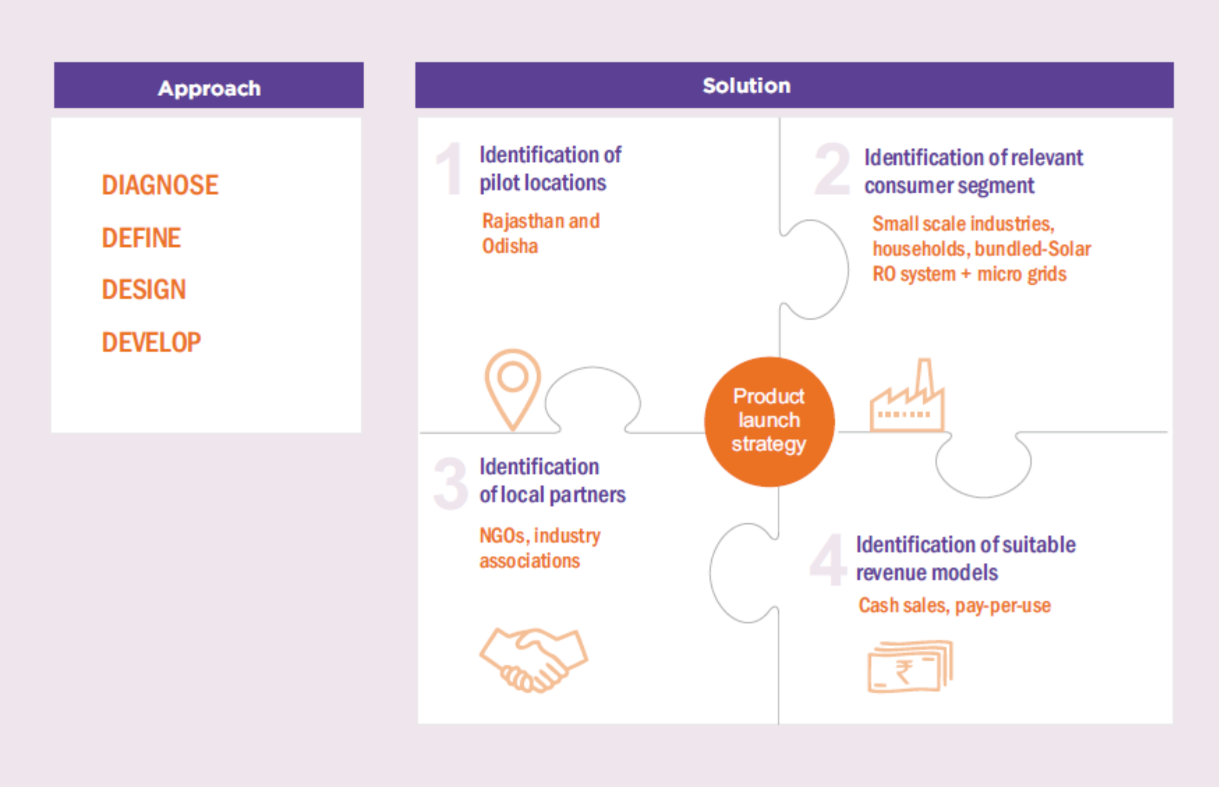
Solution Themes

The solution design focused on two key areas – identification of appropriate geographies for launching the pilot, and mapping potential customer segments.

States with high levels of water contamination and low levels of electrification were mapped to identify relevant geographies. The team also designed different product configurations in line with the unique needs of low-income customers and identified revenue models. An analysis of the costs and benefits for end consumers and competitive advantages over other substitutes contributed to the design of the product as well as to the development of the product launch strategy.

Figure 3: Product launch strategy for the solar RO systems

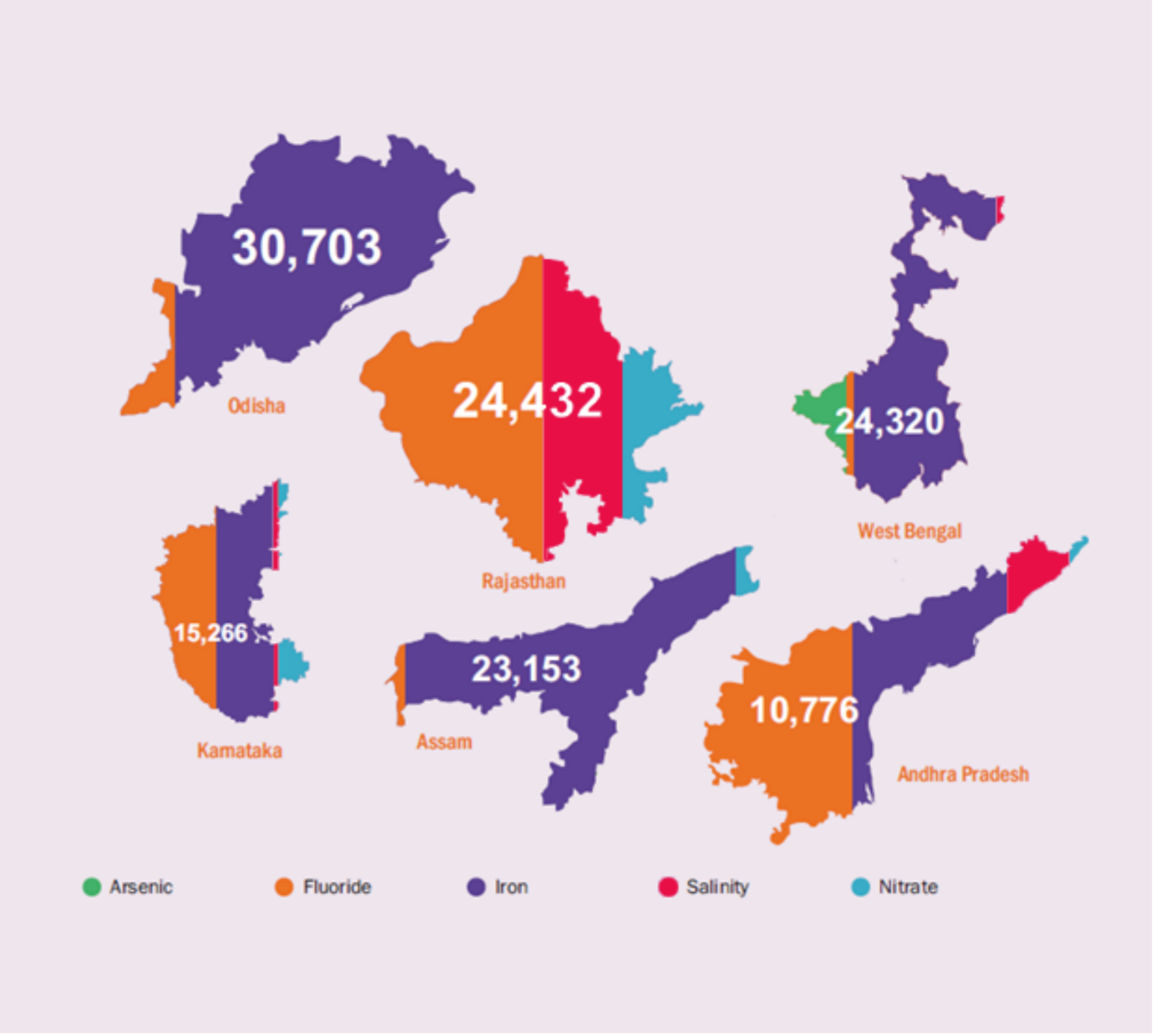


Source: Intellecap analysis

Solar RO systems could be highly effective in regions with high levels of water contamination and under-electrification, such as Rajasthan and Odisha. The presence of contaminants such as arsenic, fluoride, iron, nitrate and others in these states require RO technology to improve water quality. The prevalent TDS range of 3000-5000 mg/litre in the western state of Rajasthan makes it one of the most suitable regions for piloting solar RO (acceptable range for drinking water is < 300 mg/litre as per WHO). From their recently commissioned solar RO plant, G.R.I.D. provides water with TDS range of 5-20, which is at par or even better than bottled water.

For the pilot launch, the team identified specific districts with potential based on parameters such as state of development of districts based on electrification rates, level of water contamination, access to finance, population density, and consumers' ability to pay. For example, in Rajasthan areas like Jaipur, Jalor, Pali, and Jodhpur were recommended for establishing proof-of-concept for the solar RO product.

Figure 4: Number of contaminated habitations for the five major contaminants, 2015-16



Source: Intellecap analysis

Customer Segment Identification

Customer analysis, which involved assessing ability and willingness to pay, and ease of market entry, indicated that small-scale industries and households were potentially attractive and addressable segments. The analysis indicated that a bundled product comprising solar RO systems and micro-grids is likely to be well-accepted by these potential customer segments. The team developed customised solutions to meet specific segment needs. For example, in Rajasthan where 75% of the villages have more than 100 households and majority of the industries have more than 100 workers, the team suggested an optimum configuration of 2000 litres per day as a community solution and 1000 litres per day for industries.

The team analysed the benefits and costs of providing bundled and stand-alone products for energy access and safe water. It was found that the solar RO product could be scaled up by offering a stand-alone drinking water solution for an establishment or household. However, it was likely to be more effective and acceptable when offered as a bundled solution for access to electricity and clean water. Solar RO could function as an anchor load and enable a faster break-even for solar-based micro-grids. It could accelerate break-even by 2-3 years compared to 10 years in case of stand-alone mini-grids on account of the additional revenue stream from clean water sales.

Figure 5: Customer segment analysis

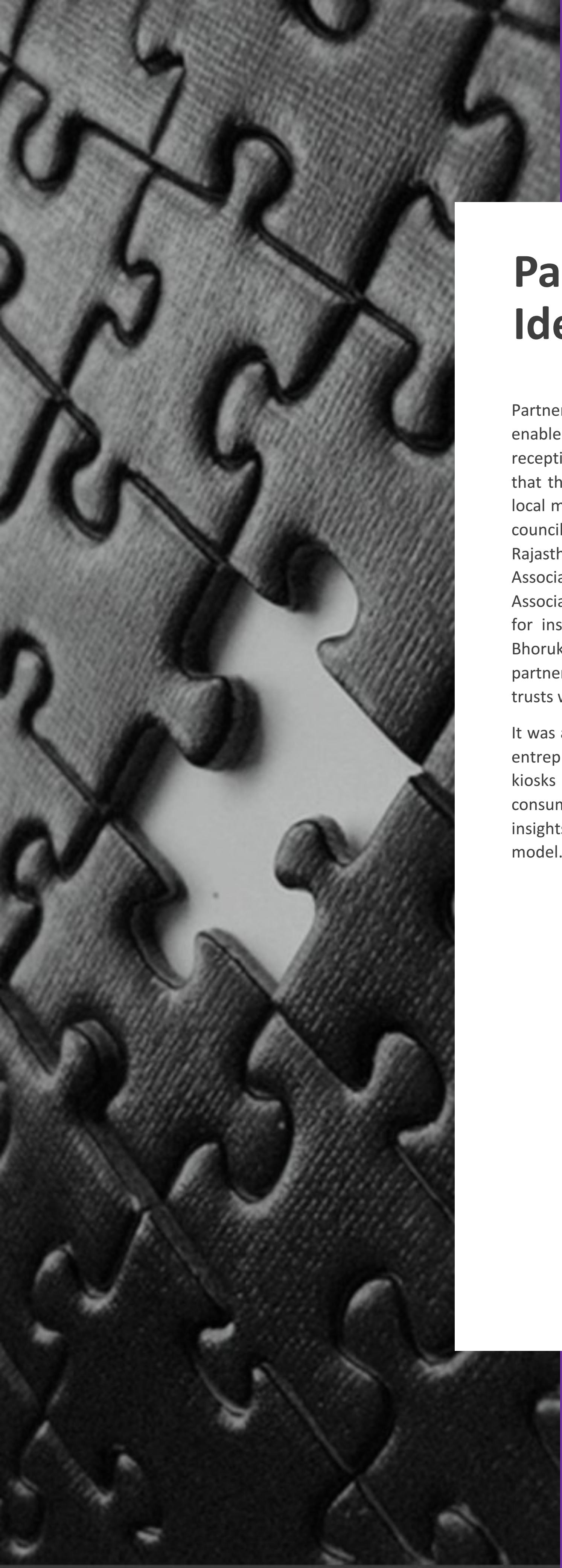
Revenue Model Identification

A differentiated revenue model for different customer segments will optimise cash flows for G.R.I.D. The team identified cash sales for the small-scale industries sales and a pay-per-use structure for households as the optimum mix of revenue models.

Different revenue models were explored based on the likely segments that the enterprise could serve. For industries, cash sales of stand-alone products were suggested as workers cannot be charged for purified water within the industry premises. Industries prefer to purchase the solar RO plant upfront, while households and communities prefer a pay-per-use model. Community-based RO systems are expensive with the initial investment requirement being INR 3 lakh (for 100 households). In the absence of grants or community funding, a pay-per-use model works out to be the most preferable with break-even potential in the third year of operation per plant.

In terms of prioritisation, the enterprise should initially target cash sales of stand-alone RO systems for industries and subsequently launch community water purification systems. Working with industries allows the enterprise to recover capital expenditure upfront, whereas stand-alone products with initial investment requirement of INR 3 lakhs is likely to achieve breakeven in 3 years. Community installations increase working capital requirement of the enterprise and limits growth with small amount of installations.

At a later stage, communities could be served using a bundled solution that includes a micro/mini-grid and a solar RO system that addresses the dual challenge of access to clean water as well as energy. Typically, such installations require a capital expenditure of INR 18 lakhs (for 100 households) with a breakeven period of about 6.5 years.



Partner Identification

Partnerships with local bodies will improve outreach and enable the enterprise to gain insights on product receptiveness amongst consumers. The program suggested that the enterprise could use deep community connects of local markets, local industry associations, NGOs, and village councils (*gram panchayats*) among others. Federation of Rajasthan Trade and Industry, Garment Exporters Association of Rajasthan, Jaipur and Jodhpur Industries Association, Jodhpur, were suggested as potential partners for installations in industry premises. Manthan Kotri and Bhoruka Charitable Trust were suggested as potential NGO partners in Rajasthan. Preliminary discussions with these trusts were well-received by them.

It was also recommended that a dedicated community-level entrepreneur network should be deployed to manage water kiosks and mini-grids, assess receptiveness amongst consumers, provide after-sales support, and garner the insights needed to help the enterprise tweak its business model.

1.4

Way Forward

In the next three to five years, G.R.I.D. aims at becoming the largest DRE-based solution-provider through commercial micro-grids and solar ROs with an aim to boost the local economy, health and employment. It has already initiated implementation of solar RO systems based on recommendations provided.

G.R.I.D. has commissioned its first pilot in Ugalan village in Haryana, funded by Param Mitra Sansthan. This pilot is serving a village of around 6000 people at 10 - 20 paisa per litre, using a village-led team model. The pilot currently employs three people in the village. It also provides home-delivery of water for households where children, women or the aged consumers cannot easily reach the point-of-sale. As next steps, the enterprise aims to commission similar projects in around 50 more villages this year in Haryana.

Going forward, the enterprise also plans to focus on off-grid markets in the North-East, Rajasthan and several other states across India.

Figure 6: Pilot of solar RO plant by G.R.I.D. in Haryana