The Rockefeller Foundation’s Smart Power for Rural Development Program’s 100th mini-grid plant was operationalised by Husk Power in Guruwalia in Kushinagar, Uttar Pradesh in February 2017.

It is widely accepted that significant poverty reduction cannot be realized without increase in electricity consumption. In India, about 237 million people, more than 90% of whom live in rural areas, have little or no access to reliable electricity, severely restricting economic opportunities. Addressing this chronic problem requires an innovative approach that goes beyond the default prescription of progressively expanding the government grid distribution.

Smart Power India (SPI), which is leading The Rockefeller Foundation’s Smart Power for Rural Development (SPRD) Program in India, has proven that mini-grids can be swiftly deployed to deliver reliable power and spur economic activity. So far, in the 106 villages where our seven partner ESCOs are operating, we are witnessing first-hand how rural communities are embracing mini-grids and using clean power to improve their lives and livelihoods.

In Kamlapur village in Uttar Pradesh, at an SPRD-supported apparel manufacturing unit, Rajni Shukla, a mother of two, acquired training in tailoring on an electric sewing machine. She and 50 women like her are now taking home around INR4000 monthly. In Gumla, Jharkhand, women self-help groups replaced rice hulling by hand with electric hullers financed by Smart Power India to increase by 100 times the volume of rice hulled per day - from 20 to 2000 kilos. This edition presents many such stories of rural micro-enterprises stimulated by reliable power from mini-grids.

The SPRD program in India has helped create the only significant cluster of mini-grids, built and operated by private-sector ESCOs. We are encouraged by the supportive policy initiatives under development by the government for the mini-grid sector. In addition, partnerships forged with global technology companies are helping to develop solutions to lower capex and improve functional capabilities of mini-grid systems. Together with our stakeholders, SPI is striving to create evidence of reliability and commercial scalability of mini-grids. Rather than a competing or an interim solution, mini-grids can be a force multiplier in an integrated energy plan to meet the government’s ‘Power for All’ vision. We hope that the learnings from India can help other countries facing similar electricity access challenge.

This issue of Smart Power Connect explores the efforts, success stories and challenges faced in our mini-grid journey so far. At Smart Power India, we continue to be inspired by the courage, dedication and creativity of our partners and associates in our mission to address the energy access challenge and empower lives.
WHAT CUSTOMERS SAY

MOHAMMED AFZAL ANSARI
Tailor, Chhanpatiya, Bihar

During festivals, we have to work till late to finish these tailoring jobs. We often work till 2am in the morning. Earlier, we had to rely on lanterns and emergency lights. Now we get better quality power, at any time when we need it.

SASHI SARITA LAKRA
Housewife, Sahitoli, Jharkhand

We bought a television soon after our village started receiving electricity from the mini-grid nearby. My husband and I also run a rice huller that is beneficial for the entire village.

SANTOSH KUMAR
Owner, Bajrang Mobile Repairs, Sareswa, Bihar

Since we do all forms of electronic repair services, we need assured electricity. We use [grid] electricity when it is available, but it is not reliable. You can’t run your business based on it. We not only use mini-grid electricity, but are paying for an energy-efficient printer in instalments.

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SMART POWER MINI-GRIDS
Providing electricity access to more than 100 Indian villages.

Impacting the lives of 40,300 people

Overall installed capacity: 3.5 MW

81% of plants use solar energy, 19% use biomass and some use solar/biomass hybrid technology.

3.5 MW

106 plants across UP, Bihar and Jharkhand

11,163 overall customers

7215 households

3261 shops

565 commercial users

97 institutions

25 telecom towers

WHAT IS A MINI-GRID?
A ‘Mini-grid’ is defined as a system having a Renewable Energy (RE) based power plant with capacity of 10KW and above, and supplying electricity to a target set of consumers, including households, shops, commercial load, institutional setups, telecom towers, through a distribution network.

Mini-grids can be powered by RE sources such as solar, biomass, wind, small hydro and can have diesel-based generator as a backup. Mini-grids have the provision of battery storage to supply electricity at night.

The Smart Power Mini-Grid Model

VISION
To spur economic development in villages through access to reliable electricity provided by renewable energy mini-grids.

MISSION
Enable an ecosystem that drives socioeconomic development through sustainable renewable energy mini-grids in 1000 villages, impacting a million lives.

As of 30-April-2017

SMARt PoWER MInI-gRIDS

Providing electricity access to more than 100 Indian villages.
Despite intensified government efforts and a major thrust laid on rural electrification infrastructure under India’s Deen Dayal Upadhyay Grameen Jyoti Yojana (DDUGJY), about 50 million households (250 million people) in rural India continue to remain unelectrified as on October 2016. Even as this center-based scheme enables states and discoms to strengthen grid infrastructure, there are several lacunae at the state level. For instance, areas already connected to the central grid continue to face issues related to: lack of reliable and assured electricity supply and poor service quality with voltage fluctuations; curtailed hours of supply due to generation or transmission capacity constraints; lack of maintenance of distribution infrastructure, including distribution transformers and meters; and/or delay in fixing transformers and grid lines. The release of connections in a timely manner and at official costs prescribed by the state also remains a challenge.

Another key, though under-reported, gap is the non-availability of three-phase connections for small and medium enterprises – productive loads largely remain deprived of electric power in many parts of the country. These instead operate on diesel engines that are polluting as well as expensive, impacting the income and prosperity of the rural community.

In 2005, at the launch of Rajiv Gandhi Gram Vidyutikaran Yojana (RGGVY) scheme (now subsumed into DDUGJY), infrastructure being planned and deployed was expected to cater to the demands and requirement of agriculture (irrigation pump sets) as well as the small and the medium enterprises, which would then facilitate overall infrastructure, including distribution transformers and meters; and/or delay in fixing transformers and grid lines. The release of connections in a timely manner and at official costs prescribed by the state also remains a challenge.

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Even if there is significant progress under DDUGJY for household-level electrification (assuming 80% of unconnected households do get connected over next 2 years), there would still be need for alternate sources to supplement the centralized discos grid for almost 1.5 GW capacity, even at basic lifeline consumption. Apart from the needs of unelectrified households, based on the previous section makes a strong case for the need for an alternate solution to the grid to address the needs of the concerned state.

In response to this need, there has been a growing interest and uptake of Decentralized Renewable Energy (DRE)-based solutions, including mini-grids.

In the transformer and additional poles, which can typically range from INR 2.5-3 lakhs to INR 10 lakhs. Thus, a mini-grid makes better economic sense for the community and individual consumers residing therein – in addition to representing a more assured supply option. Many mini-grid operators (MGOs) are also leveraging their presence in these villages to provide several other utility services, including providing water as a service to farmers for irrigation purposes, and powering enterprises delivering improved drinking water services; facilitating household upgradation to efficient appliances, including LED lights, energy efficient fans and TVs, and even piloting broadband for entertainment and internet among rural communities. These MGOs are increasingly investing in customer management capabilities to ensure they can entrench themselves deeply into the chosen markets.

The MGOs and RESPs that provide end-to-end service, including generation, transmission, distribution, metering, billing and collection are often privately funded. Therefore, they are also self-driven to ensure high levels of supply and customer satisfaction. They are thus best suited to ensuring sustained supply to areas under their management and gain consumer trust and support, which in turn assures sustained payments. This provides a great headroom for discos in states to forge complementary partnerships with these RESPs.

If one were to go by policy advancements in 2016, the sector is already beginning to move in the direction of a prospective symbiotic construct.

Way Forward
A national-level programmatic framework could be an ideal way to facilitate the rapid evolution of mini-grid operators into a rural utility – this could be a core area of focus during the next phase of DDUGJY with provision enhancements that enable mini-grids to function as effective last mile entities to deliver a 24x7 power construct. This would enable “Power

Current activities undertaken by MGOs
- Decentralized generation
- Local manpower
- Capital for investment
- Technical expertise on O&M

Enhancements needed to emerge as true ‘rural utilities’
- Bulk energy purchase and supply flexibility (without the burden of a licensing construct)
- Flexible and cost reflective feed-in-tariff
For All” goals to be met closer to the time frames desired by the Central Government. MGOs (or budding ‘rural utilities’) are uniquely positioned to support discoms and deliver on several services that were originally foreseen to be derived through Distribution Franchisees. These services include the ongoing challenges of bridging peak hour deficit, AT&C losses, better management of consumer behavior with the current schemes, and assuring requisite technical expertise for sustained operations and (O&M) maintenance of the village-level infrastructure. If the existing MGOs are appropriately equipped as rural utilities, their last mile performance will improve significantly and sustainably. The framework could be shaped to even accommodate proposed amendments to the Electricity Act to segregate the distribution network business and the electricity supply business with carriage and content segregation. In case of such an eventuality, the MGOs role could evolve into an enhanced Retail Supply Licensee in the future. This approach would not only ensure sustained rural supply resilience but also address the residual causative bottlenecks to “Power for All”. For this, the MGOs would not only have to deliver on the requisite performance but also be monitored for their service performances. Regulators would need to formulate appropriate Standards of Performance for these RESPs to ensure that adequate services are provided to the rural community; in addition, a transparent measurement and verification (M&V) mechanism would need to be in place.

Given the conventional focus on centralized grid electrification as the only reliable and sustainable approach for assuring energy access, the regulatory framework of the past have been inadequate to mainstream DRE mini-grids in the national planning process. Most approaches were limited to pilot-scale implementation models which were mostly grant based. There was also limited appreciation for a sustained policy and regulatory outlook for the mini-grids segment. The under-developed regulatory environment had previously created significant uncertainty among early RESPs (Renewable Energy Service Providers) in this sector. There existed considerable ambiguity and opacity in regulation with regard to the operating framework for distribution of electricity on the following issues:

a) Alignment on project areas meant for mini-grids
b) Outlook on grid connectivity and interactivity frameworks to ensure sustainability of the mini-grid projects, once the main discom grid arrives

Over the last year or so, several measures were undertaken to address these ambiguities. Under the UP mini-grid policy as also the state regulatory framework, there are provisions to authorize RESPs as a franchisee by the Discom as also for grid interconnectivity which will enable a trusted last mile supply management, particularly in peak deficit hours.

A central tenet in these measures, as also in the National Tariff Policy 2016, is the provision for the electricity generated by mini-grids to be purchased by the discom, in case of the arrival or intensification of the national grid. This lays the basis for a collaborative and symbiotic construct.

The roadmap to achieving “Power for All”

While the existing national-level policies, such as the DDUGJY, are making massive headway with rapid electrification rates, limiting factors, such as maintenance of last-mile connectivity and the quality of supplied power can pose a threat to achieving the government’s aim of connecting all households by 2018-19. Also, the fact that productive loads cannot be catered in requisite measures through these plans represents clear limitations to achieving overall rural development, which is the primary intent of the scheme.

On the other hand, with the development of regulations complementary to DDUGJY, such as the National Tariff policy and UP mini-grid regulations, mini-grids have positioned themselves as trusted supply providers or generators who can play a pivotal role in connecting unconnected households along with providing productive loads for economic development. The framework of mini-grid developers acting as effective and empowered rural utilities represent a framework that can leverage existing investments to make massive headway with rapid electrification rates, limiting factors, such as maintenance of last-mile connectivity and the quality of supplied power can pose a threat to achieving the government’s aim of connecting all households by 2018-19. Also, the fact that productive loads cannot be catered in requisite measures through these plans represents clear limitations to achieving overall rural development, which is the primary intent of the scheme.

The framework of mini-grid developers acting as effective and empowered rural utilities represent a framework that can leverage existing investments
Micro-enterprise Development

TAILORING DREAMS WITH ASSURED POWER
A Photo Feature

Smart Power India partnered with Sattva to set up a garment manufacturing unit led by a local rural entrepreneur Riyaz in the village of Kamlapur in the district Sitapur of Uttar Pradesh.

The Sitapur belt is home to a talented pool of artisans who were bereft of regular employment opportunities. This micro-enterprise development program also helps provide market linkages for the unit to assure steady work for the unit.

Sattva’s need assessment shows that community members, who are forced to migrate for work were willing to work at 75% of the income they receive in cities, if the jobs are made available to them locally.

Women from neighbouring villages were trained in using electric sewing machines. Of the 83 trained, 50 women were selected to work in two shifts of four hours each.

Electricity from the OMC mini-grid in Kamlapur ensures that the garment unit receives reliable quality power to run the electric sewing machines.

What used to take me two hours to sew can now be done in less than an hour. While sewing on my hand-cranked sewing machine, my hands and back would pain a lot. Working on the electric machine is easier and faster. I am happy that I now have a new skill. We need the money that I can make with this sewing job.

Rajni walks two kilometres every day to work at the garment unit. She hopes to augment her family’s meagre income by working as a tailor trained on electric sewing machines.

The unit has assured electricity supply from a 3-phase connection from Smart Power mini-grid. The garment unit uses mini-grid electricity during the hours when there is no supply of grid electricity. It ensures that work at the unit continues uninterrupted.
MINI-GRIDS FOR MACRO RESULTS

India is at a stage where, on average, 98.6% of rural communities are stated to have access to electricity. Some states have already achieved the 100% rural electrification mark. Uttar Pradesh is currently said to have electrified 99.5% of its villages. However, there are still about eight crore (80 million) households in this country that have yet to be electrified. Two crore (20 million) of them are in Uttar Pradesh. There are villages classified as electrified, as per the Government of India definition, but the people living there have no realistic access to electricity. The only possible solution to this problem is a mini or micro-grid network.

It is not enough only to provide a subsidy for mini-grids; it is also necessary to put an integrated policy in place.

One of the primary reasons why so many people have no access to electricity is that in many villages, power does not actually reach the user. A power pole network provides access to electricity for people up to 40 meters from the pole. In many areas, even after drawing up power lines, the local populace did not take an electricity connection. The only possible solution to this problem is a mini or micro-grid network.

Here again, the solution lies with mini and micro-grids. However, it is not enough only to provide a subsidy for mini-grids; it is also necessary to put an integrated policy in place, which can clearly set up an approach for setting up a grid while delineating how these mini and micro-grids will be interconnected to the main grid. Eventually, the mini-grid will actually bring electricity to even the officially “electrified” villages. Therefore, we need a strategy to decide how mini-grids will integrate with the main grid.

If subsidies have to be given, they should be directed to setting up mini-grids in areas that are unreached by the grid, compared to areas where the grids are already present. There is a reason for both to exist, but some incentives are necessary to ensure geographically remote areas can be incorporated and considered too.

**UPERC Mini-grid Regulation**

On 6 April 2016, the Uttar Pradesh Electricity Regulatory Commission (UPERC) announced new regulations on mini-grids, renewable energy, and supply. They became effective less than a week later on 10 April 2016.

A salient feature of these regulations was that they tried to balance out mini-grid operators (MGO), discoms, and the consumers; while addressing the concerns of all the three categories comprehensively. The regulations aim to create a dynamic situation where the MGO can operate as a standalone system without the grid, and while connected to the grid; it has the option of feeding power in or out of the grid or operating independently. The regulations also allow MGOs to switch between operational models (feeding/receiving power from the grid or operating independently) at their own convenience.

Under these regulations, the UPERC does not regulate using the traditional tariff. Rather, it regulates based on different parameters related to the quality of supply, incorporating factors such as assured supply for a fixed number of hours or that if anybody is located within 40 meters of the grid, the operator is obliged to provide them with a connection.

The regulation also tries to cover investment risks by providing an exit option. When the grid eventually reaches an un-served area, the discom and MGO can negotiate terms such that the discom can take over all the assets of the MGO, or the MGO can feed their output into the grid on a mutually decided feed-in tariff. In case of any dispute, either party can approach the regulatory commission.

Thus, while not deciding the tariff, the commission will decide on issues of business interest where either party may be affected, and will aim to provide a level playing field to both sides. In the UPERC’s opinion, tariffs should be mutually decided between the consumer and the MGO, and the regulations reflect this idea.

**Mini-grids, the preferred alternative**

Mini-grids will also bring in an element of competition, which has so far been lacking in the sector and state, and which will spur the discoms to improve their efficiency. In fact, the commission found that in Hardoi in central Uttar Pradesh, an MGO that was supplying electricity at a cost slightly above the grid supply was actually the preferred supplier because of their quality and reliability. Furthermore, we have seen a decrease in power wastage. We believe that the model of tariff fixation by the company actually caters to the needs of people and therefore, I would recommend that it be a decision left to the MGO’s discretion.

The UP regulatory framework, in principle and direction, provides a comprehensive range of flexible options for all stakeholders. We hope that such a progressive policy will influence the structure and trajectory of future policy-making in the energy sector.
When people have power, incredible things happen. Placing ‘power’ in the hands of rural customers helps them realize aspirations and dreams they believed could never aspire for. Making this possible in every village is at the heart of everything we do at Husk. We are amongst the world’s leading off-grid utility companies providing 100% renewable, reliable and affordable power to rural communities and businesses – 24 hours a day, 7 days a week.

Innovation – A Journey for Husk
We strongly believe that innovation is neither a one-time process nor a predictive uneventful journey. Our own journey of innovation, which began in 2007-08, exposed us to multiple dimensions that innovation processes need to take into account to be disruptive. In 2007, when off-grid energy access sector was non-existent, we truly disrupted rural electricity access with decentralized power generation and distribution. We discovered that biomass gasification system could be a viable answer to rural customers’ electrification needs, given that there is plenty of biomass waste (rice husk, maize cobs etc – which is feedstock for biomass gasification) available locally. In 2008, options such as Solar PV panels were priced at a minimum of USD 5 per Wp.

Customer Aspirations Key to Husk’s Hybrid Power Generation System
People living in rural India and Africa face a set of common challenges: lack of access to essential services such as water, healthcare, education and income-generating opportunities. The availability of “reliable and affordable 24/7, 365 days power” is a prerequisite to address these issues.

Between 2008 and 2012, our customers were satisfied with 6-8 hours of power at night. But their aspirations were undergoing a transformation at a rate faster than we had anticipated. By 2012, data available with us revealed that a large percentage of our customers had begun aspiring for home appliances, such as refrigerators and TVs. They wanted to be able to use these as and when they liked. At that time, had we only considered solutions to meet their current demands, we would have failed to assess their growing needs.

With an understanding of this shift in customer aspirations in 2012-13, we were able to identify their demand for access to 24/7 reliable power. We developed an energy solution that gave our customers in India and Africa the freedom and flexibility they desired. In 2014, we pioneered a hybrid system (Solar PV + Biomass system) that could generate 100% renewable power 24/7 by synchronizing solar and biomass gasification power plants. The reliability of our systems were tested to see if we could maintain a regular power supply for 20+ hours a day, despite flooding experienced across some of our sites in July and August 2016.

Our solar-biomass hybrid power plants offer the lowest cost alternative current (AC) power solution to households as well as commercial customers.

Innovating Power Solutions
Providing 24x7 metered connections
Manoj Sinha, Co-Founder and CEO, Husk Power Systems

Global Pioneers in Waterless Scrubbing for Gasification
The gasification industry uses water scrubbing processes for cooling and cleaning the producer gas, an output of the gasification process. We set out to find an alternative, since we felt it was an unnecessary waste of clean water and also an aesthetically unappealing process. We designed a new plate-heat exchanger process, completely eliminating the use of water from the scrubbing process.

Number of Mentions
Customers can mention multiple changes

- Own new appliances
- More reliable power
- Lower rates
- More of the same
- Power of business
- Education
- Health and safety
- Own solar
- Cooking
In 2016, while India’s gasification industry continues to use water for the scrubbing-based gasification system, Husk uses a waterless process, thus not wasting a single gallon of water.

**Monetising Rice Husk Char, A Gasification Waste Product**

Rice husk char, a waste product of the gasification process, requires collection and disposal on a regular basis, which costs huge sums of money. We decided to design a process to convert the rice husk char into “incense sticks”. While we could have tried more complex processes to monetise this waste, we chose to convert waste into incense sticks. This method also provided an opportunity to create more employment opportunities for local women. We currently produce over 15 tons of incense sticks per month and employ around 70 women part time, giving them flexible working hours.

**Driving Productive Uses of Power by Small Businesses and Entrepreneurs**

Most people in rural areas have to rely on various polluting energy products, such as kerosene lanterns and diesel gensets, for their lighting needs. Some now have access to expensive solar home systems, which provide limited DC power for lighting and charging cell phones. Most importantly, people lack flexibility to alter their energy requirements – currently they are unable to add appliances or machinery at their discretion.

![Energy sold (Biz)](image)

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They would rather pay for the energy consumed rather than for procuring assets such as solar panels or batteries. In short, they want to be connected to a utility service that provides affordable and reliable electricity.

We devised a unique smart metering algorithm that combines a well optimized tariff plan and trained staff to promote productive uses of power. The chart below illustrates the increase in energy consumption by more than 250% of small businesses and factories in just under six months. This is another validation of the importance of providing flexibility with reliable and 24/7 power.

**The Journey Continues**

We stand at the cusp of a new future. Centralized grid expansion has been every country’s electrification model for decades. That model is rapidly changing even in developed countries. Some countries, including the United States and Germany are now witnessing a proliferation of decentralized power generation and net metering capabilities.

In India, we have a great opportunity to leapfrog and provide 24/7, 365 days reliable power to everyone in a sustainable and economical way. This is very similar to the telecom revolution that happened in India and Africa a few decades ago. Instead of spending several years waiting for a landline phone to be connected, the sudden penetration of cell phone technology ensured that more than 90% people had access to mobile telephony services.

Under its rural utility model, HUSK has built decentralized power generation assets to provide high quality and reliable 24/7 power. Additionally, HUSK encourages shops and agro-processing units to purchase machines to increase their efficiencies and spur economic activity. A good regulatory framework can promote such a forward-looking model. The integration of this rural utility model with the national grid will result in providing highly reliable 24/7 electricity in the fastest way possible.

At HUSK, disruption is a way of life with a team that is constantly motivated to innovate and challenge status quo to provide reliable energy to rural consumer 24/7 and for 365 days of the year.
Energy is an accelerator for economic growth. Access to electricity can have a dramatic impact on the well-being of rural communities, as demonstrated by the Smart Power for Rural Development (SPRD) program. As an organization committed to the development of resilient communities, TARA (an SPRD partner) has shaped this approach over the last two and a half decades. Our work revolves around the recognition of the dual roles played by people in village communities, that of producers and consumers. TARA uses electricity to put money “into people’s pockets” as against just seeking payments for the light they use. This is cash that can be used to pay for improved nutrition, education, entertainment, healthcare, and other needs.

For example, Siyaram Pandey runs a carpentry enterprise called the Shree Vishwakarma Saw Mill for the past nine years in the village of Ibeldi in Bihar. Siyaram’s business had been growing steadily, but extremely slowly. That changed when he got into a discussion with TARA’s enterprise development team about installing a combi-planar machine, something he could plan for because reliable and affordable electricity was available from Tara Urja’s solar powered micro-grid. This machine performs multiple functions like drilling, grinding, and shaping wood and consumes 2.5 units of electricity in an hour. He is now able to complete an average of five orders in a day as compared to two in the past. With the addition of this equipment, and two workers he could hire, the revenue of his enterprise increased by 22% in a span of three months, while his profits increased by 20%.

Even with the Government’s emphasis on rural electrification, thousands of farmers and local entrepreneurs in states, such as Uttar Pradesh and Bihar are forced to rely on diesel-powered generators to irrigate fields and run small businesses. Unfortunately, these generators run at a cost that is over three times that of grid electricity. Virtually all electrification programs have been geared towards household electrification. There has been little emphasis on supply to productive loads or on the adoption of innovative local level manufacturing models by communities. More importantly, what is missing is the development support required for an economy to use electricity to spark and accelerate growth at the local level. In this context, the realization of the consequent economic benefits can take its own course and in many cases become cross-generational. The decentralized renewable energy based model by TARA aims to drive social wellbeing and enable local businesses to grow. It has already started to bring about a transformation in the village economy, creating new jobs in the community, enhancing incomes to the tune of 15% to 20% concurrently, and increasing the accessibility of basic products with local manufacturing. Early signs of this change are visible in many villages.

Catalyzing Entrepreneurship

Electricity is helping unleash the true potential of entrepreneurship in building a resilient economic system. At the SPRD sites in Uttar Pradesh and Bihar, new manufacturing enterprises such as biomass pellets, paper plate, and incense stick making units are being set up with investments of less than INR 5 lakh (US$ 8,000). Existing businesses, including computer centers, barbers, and carpenters are looking forward to the next phase in their growth cycle, and critical local institutions, such as banks are able to provide better services. Through these entities, communities have access to better choices and opportunities at their doorstep, including clean cooking fuel and devices, safe drinking water, and faster connectivity.

Ultimately, the approach envisions each home in the village having access to innovative appliances in their household with the availability of affordable and reliable electricity. To cite examples, LED lights are replacing old kerosene-based lanterns, traditional chulha and dung-cakes are replaced by bio-mass fuel pellets, and potable water is available as opposed to untreated hand-pump or ground sourced water.

TARA’s Approach to Value Creation at SPRD Sites

The CELAMeD (Community Engagement, Load Acquisition, and Micro-enterprise Development) approach adopted by TARA vies to fulfill the multiple objectives of mobilizing communities around the plant location and helping ESCOs such as TARA urja, OMC, DESI Power, Husk Power Systems and Freespanz to tap latent demand and set up new enterprises that run on electricity supplied by the company, thus making mini-grids more financially viable. The CELAMeD approach enables new technology-based enterprises and expands existing businesses, making local business owners and entrepreneurs more productive, competitive, and capable of serving many more customers in the village community.

The Process of Change – Moving up the energy and economy ladder

In order to create a chain of successive benefits, a significant amount of effort is put into understanding the usage of energy (e.g. electrical energy for lighting, appliances, pumps and motors, thermal energy for cooking) and the nature of demand presented by various users. Human-centered design features prominently, ranging from anthropometric aspects of locating lights in a house and cook stoves design, to the ergonomic suitability of equipment recommended for new microenterprises.

In our experience, the benefits of reliable energy access,
even if it is at a relatively high price, are seen immediately in the form of higher earnings for well-lit shops, more study hours, ease of work, and greater safety for women. These improvements act as catalysts for quick conversions of existing businesses and local institutions from diesel to clean energy, and for the expansion of existing enterprises by the addition of new energy appliances that can create new jobs and improve productivity.

Consumers are assured reliable electricity with hassle-free services such as the rectification of any fault within 6 to 12 hours of registering a complaint. Customers are also rewarded with extended hours of supply during festive seasons. Consistent power supply with no voltage drops is a great support to the operations of micro grid operators (ESCOs) and create conditions in which they could complement the mainstream grid for last-mile service delivery and productive use.

This is where we foresee the process will reach the point of inflexion where women, children, and their families start experiencing socio-economic well-being and the program creates a force multiplier for local transformation.

TARA has seen interesting examples of mutual benefit where, to increase acceptability, the tariff packages were customized to suit both the ESCO and the customer. Monthly tariff packages were revised and bundled with the cost of the equipment provided to them. This led to 30 existing businesses being expanded across all sites in just a span of two months. This consumer financing model not only helps the customer pay back in instalments and helps mitigate his risks but the ESCO gets return on its investment in about 5-6 months, making it a win-win for both parties.

Policy Support for Scale

In the renewable energy space, greater policy recognition and supportive regulation of the kind that the Government of Uttar Pradesh has introduced in 2016 would legitimize the operations of microgrid operators (ESCOs) and create conditions in which they could complement the mainstream grid for last-mile service delivery and productive use.

In TARA’s view, the energy sector, and rural electrification in particular, continue to undervalue the role women can play in change processes. Their status continues to be predominantly that of beneficiaries— a view reflected in promotional campaigns run by Government agencies and many civil society partners. This needs to change. Greater authority and autonomy need to be given to women, particularly when acting in groups. The strength they have in solidarity can be used in synergy with greater access to energy to address hitherto unattended development challenges.

We also need to attract more resources into social ventures. It is imperative that the investment community ascribes greater value to social and environmental outcomes. This will facilitate a transition from grant-based, charity-driven approaches to more self-sustaining and scalable models.

The Way Forward

With support from the Smart Power for Rural Development (SPRD) program, TARA has been able to successfully validate enterprise packages for local businesses as well as tariff packages for the ESCO. Today, there are over 8,000 (and counting) customers across more than 80 villages in Uttar Pradesh and Bihar, that are benefitting from reliable access to utility grade electricity under the SPRD program.

In addition to thousands of homes being lit up through smart power, TARA’s current focus on local economic development, social inclusion, basic need fulfilment, and agro-resource centers has led to greater incomes, creation of new jobs, new enterprises run by women, and greater access to clean drinking water. When the supply of electricity through thousands of such mini-grids is coupled with demand creation by load development partners such as TARA, it will have a transformative effect on the rural economy. TARA plans to scale the proposed model by a factor of at least ten, expanding to 300 villages and 100,000 households. It plans to do so, through the unique mechanism of blending CSR funds with private investment and social capital existing within village communities.

Moving forward, TARA wants to combine the potential of technology with institutional processes to create a service delivery mechanism that brings clean, green energy to people’s doorsteps. In doing so, TARA intends to put control of a twenty-first century resource, renewable energy, in the hands of village communities, making them strong and self-reliant. They, in turn, will realize new, environmentally benign, economic opportunities and radically transform the quality of life in Indian villages.

TARA envisages a sustainable, commercial “multiplication” phase, in which the model will be adopted by ESCOs and NGOs to reach out to thousands of villages. As mentioned before, a reshaped national and global energy agenda will create breakthrough opportunities for transforming development policy and practice in the area of energy management.
Rural electrification through renewable energy is the flagship project of Mlinda. This initiative provides access to electricity to rural and tribal communities in West Bengal and Jharkhand, particularly in ecologically fragile areas and conflict zones, through a system of renewable-energy based pico and mini-grids that are paid for by the communities they power. To date, Mlinda has commissioned 310 pico and micro-grids, ranging from 150 Wp to 8 kWp, with an installed base of 105 kWp. To address the growing energy access aspirations of rural and tribal communities, our model evolved beyond lighting to meet holistic energy demands.

Since venturing into setting up mini-grids to meet village-level energy needs, Mlinda has commissioned 8 grids, each ranging between 22.5 to 40 kWp, with a total installed base of 210 kWp in Gumla district of Jharkhand. This will be augmented to 220 kWp with addition of wind-powered grids by June 2017.

Mlinda believes that clean energy access is not an end in itself; rather it acts as a catalyst for stimulating integrated rural development. By virtue of our deep community engagement and rapport, we have realized that providing clean energy access is a means to triggering productive demand growth towards sustainable livelihoods.

**EXPANDING BUSINESS OPPORTUNITIES**

**JAGRAM**

Ram Mishtan Bhandar
Shivpura, Uttar Pradesh

One of the first rural entrepreneurs to use electricity to ‘expand’ his business is Jagram, an ambitious middle-aged man in his 30s, who successfully runs the Ram Mishtan Dhaba in the village of Shivpura in Uttar Pradesh. Despite being surrounded by 20 to 25 similar small restaurants, Ram Mishtan is a preferred choice of the community, serving over 200 customers a day.

Encouraged by the potential of solar-powered electricity, he installed a deep freezer. After realising the worth it added to his business, he installed a juicer-mixer. After realising the worth it added to his business, he installed a deep freezer. As against his previous profit and revenue of INR 10,000 and INR 18,000 in a month, he now earns INR 13,000 and INR 25,000 respectively. He has also hired an employee to help him at the shop. Jagram is already thinking about further expansion.

**PROMOTING NEW ENTERPRISES**

**BACCHA IMAM**

Bachha Imam, a teacher at a local school in Nabiganj Bihar, was finding it difficult to make ends meet on a meagre income of INR 12,000 a month. He sensed an opportunity, and with TARA’s support, launched an RO Filtration enterprise in his village. Within a span of 40 days, he reached a customer base of 75 clients, 35 of them being households. Apart from this, he also takes orders from events like marriages and school functions. For the month of October, he secured an approximate profit of INR 27,000.

**EMPOWERING THROUGH ENERGY ACCESS**

**MIRA KASODHAN**

Mira Kasodhan, one of the 15 girls enrolled at the Krashak Bandhu Laghu Madhyamik Vidhyalay in Bhardolia, Uttar Pradesh, feels relieved as she is no more perceived as a ‘burden’ by her family. Though she has little formal education, she is currently receiving vocational training at the school. Her training in tailoring is expected to help her earn a living despite few educational qualifications to fall back on. This training center serves as a central hub for capacity-building and skillling of young girls, entirely changing the socio-environmental scenario in Bhardolia. While this is just the beginning, Mira feels optimistic for her future and plans to open her own tailoring shop.

**STIMULATING INTEGRATED RURAL DEVELOPMENT**

Providing assured energy for livelihoods
Sudeshna Mukherjee, Deputy Country Director (India), Mlinda

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**Productive Loads as Anchor Loads in Village Grids**

Establishing the commercial viability of mini-grids in remote rural villages is a
challenge; domestic loads are volatile, productive loads are seasonal and fossil-fuel-based, and anchor loads (such as telecom towers, fuel stations, institutions, and markets) are not universal. The challenge is further compounded by the fact that farm loads are seasonal and operate for 6 to 9 months in a year. Also, solar is considered as a short-term solution and the ultimate aspiration is to be connected to the central grid. Hence, to ensure the commercial viability of the mini-grid, it becomes imperative to invest in productive demand growth, and ensure 24x7 supply of good quality, reliable power.

An average-sized village of 150 households has three rice hullers (of 10hp each), three irrigation pumps (of 8hp each), and 20 pumps (of 1.5hp each). If these machines were replaced by efficient electric machines, powered by a reliable and responsive local mini-grid, it could lead to a significant increase in farm revenues. These electric machines would also act as anchor loads for the mini-grid and improve its utilization and commercial viability.

Agriculture is the primary livelihood of rural India. In states such as West Bengal, Jharkhand, Orissa, and Assam, paddy is the staple food crop. The agricultural economy of these states is dependent on irrigation pumps and rice hulling machines, which are presently powered by inefficient and emission-heavy diesel machines.

Mlinda has been working in the villages of Jharkhand from November 2014, and over time, has assisted farmers identify the electric equivalents to their existing diesel-fuelled farm machinery. This switch would make farming more viable and increase margins for the farmer. Mlinda also wants to grow the productive load beyond 70% in each grid such that the plant economics becomes commercially viable and the development of local communities becomes sustainable.

Mlinda now powers 74 small pumps (7.5 HP), 5 large irrigation pumps (7.5 HP), 4 pumps of 1.5 HP each and 4 pumps that have 5 HP capacity. Besides there are also 12 rice hullers powered in 8 villages. Mlinda has also supplied 27 energy efficient TVs and 32 low wattage fans across 8 village grids. In addition to farm loads, Mlinda generates more diverse, community-based ‘anchor’ loads. For example, in the tribal village of Narotoli, the lighting and heating of 58 poultry coops through infrared lamps serve as an anchor load.

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Mlinda’s Paris headquarters help build the mini cold storage ecosystem in the village of Pasanga that will act as an anchor load and contribute to increasing farm incomes. Apart from growing productive farm loads, Mlinda is engaging with domestic users to introduce low-wattage domestic appliances in local communities.

Mlinda finances all energy-efficient machinery and devices in order to make them affordable to rural consumers. With the availability of 24X7 reliable power, the local communities want to move beyond mere lighting solutions. They aspire to be connected to the outside world and add an element of entertainment in their otherwise mundane lives. To aid this, they have made low-wattage appliances, such as TVs and refrigerators, available to consumers. There is an additional demand of over 54 such appliances for the new grids.

Deep Community Engagement is the Mantra

The mantra that works for Team Mlinda is to ‘grow bottom-up’. By virtue of the deep community engagement and trust that we have engendered at the grassroots level, Mlinda tries to understand customer needs to incubate micro-businesses where they see a definite value proposition; in terms of their economic growth and in terms of the improvement they accord to the villagers’ quality of life. Mlinda is working with local tribal youths to build an impeccable energy service network by training them on repair and maintenance.

Mlinda’s engineers, who currently hail from urban areas, stay and operate in the tribal villages. Field teams work relentlessly with existing social capital and involve diverse stakeholders such as individual entrepreneurs, existing women groups, farmer clubs, user groups, and local governance structures to grow the productive pie.

In order to measure the impact of our rural electrification initiative through mini-grids, Mlinda has engaged Sambodhi as our Monitoring, Learning, and Evaluation (MLE) partner. Impact assessment is done at three key levels: increases in productive demand, growth in village GDP, and reduction in GHG emissions. These learnings will inform Mlinda on the best approaches to scaling up the mini-grid strategic plan.

Partnership with Ministry of New and Renewable Energy (MNRE)

Mlinda works closely with the Government of India’s Ministry of New and Renewable Energy (MNRE) to scale pico and micro-grids, for which it receives central financial assistance from the MNRE. Mlinda is also working with the MNRE to scale the village mini-grid model in tribal Jharkhand. Mlinda was empanelled by the MNRE as a ‘Rural Energy Service Provider’ (RESP) in May 2016.

Mlinda and Smart Power India (SPI)

SPI’s collaboration with Mlinda India incorporates knowledge sharing in the energy sector, optimizing supply chain and vendor management, influencing policy changes, and incubating the mini cold-storage business model. These are opportunities to grow productive demand, and provide clean and reliable power at affordable rates to rural and tribal consumers. Mlinda believes that this will stimulate the local economy and improve the overall social well-being of marginalized communities while bringing increased commercial viability to our inclusive business model. SPI is an enabler to help Mlinda achieve our objectives to scale this model, reach out to more rural and tribal communities with 24x7 reliable power, and fast track rural development.
Former UN Secretary-General Ban Ki-moon described energy as the "golden thread that connects economic growth, social equity, and environmental sustainability." These words – meant to spur action for the 1.2 billion people globally without access to power – could light up innumerable lives in the villages of Uttar Pradesh, Bihar and now, Jharkhand, arguably among the poorest states in India. A major factor that feeds into this poverty is the lack of access to reliable and sufficient power: fewer than 10 percent of rural households in these areas are connected to the national grid. And even when the infrastructure exists, too often, electricity does not reach the households and businesses that need it most.

Electrification means more than just lighting. Energy is required to run the farms, utility services and community-based businesses that, in turn, are the engine of the village economy. Access to electricity can also help bring socio-economic equity for the rural poor. Unlike the national grid or home systems, mini-grids are small enough to be constructed quickly and relatively cheaply, but powerful enough to provide enough consistent energy for multiple homes and businesses within a village. Mini-grids typically rely on renewable energy sources such as solar and biomass, ensuring a low carbon footprint as the potential for economic growth multiplies.

Mini-grids can supply reliable electricity, powering enterprises such as agricultural processing, commercial refrigeration and internet cafes, as well as shop lighting, water purification, semi-skilled and skilled workshops (carpentry, tailoring). The possibilities are endless. Indeed, our Smart Power for Rural Development initiative (SPRD) has proven that energy access gives local entrepreneurs the means and confidence to start their own businesses, enhancing their incomes as well as generating jobs for the community. Today, our mini-grids power more than 3,500 small businesses and illuminate the homes of over 40,000 people.

**Building the Smart Power for Rural Development initiative**

Since 2014, The Rockefeller Foundation has been working with our local partners across India to address energy poverty through a viable, market-based model. The SPRD model makes it profitable for smaller-scale, energy services companies (ESCOs) to bring electricity to rural India via mini-grids powered by renewable sources. Three years in, SPRD is already proving that ESCOs can build, operate, and maintain large numbers of mini-grids simultaneously. Ultimately, the Foundation’s goal is to positively impact more than one million lives and establish self-sustaining momentum in the energy market for a new rural electrification model that empowers lives.

While mini-grids are not new to India, SPRD is the first to develop a mini-grid sector with the scale to fuel enterprise and drive economic development beyond just one village. Through Smart Power India (SPI), a subsidiary company established to provide end-to-end implementation service to ESCOs, energy entrepreneurs are able to establish and grow their mini-grid business successfully. Working alongside ESCOs, state and central government authorities, and technology suppliers, SPI provides strategic expertise, connects ESCOs with the right partners, and works with end-users to maximize the potential of electrification such that it empowers livelihoods as it ensures a steady flow of revenue to mini-grid operators. Additionally, The Rockefeller Foundation supports entrepreneurial energy companies to build mini-grids by providing low-interest loans for start-up costs. In parallel, SPI also works closely with the Indian government on policies that support the expansion of the mini-grid sector in ways that is mutually reinforcing for the national grid. SPRD and SPI have since helped install 106 mini-grids in India with over 40,000 customers, with a collection efficiency of over 90%.
Enabling the ecosystem from the top-down

Critical to ensuring Smart Power’s success is fostering an enabling ecosystem where mini-grids can thrive. We are working with government authorities at almost every administrative level to promote policy and regulatory frameworks that help ensure the longevity and viability of the mini-grid sector, resulting in favorable policies such as in Uttar Pradesh. The Indian government has also demonstrated strong commitment to universal electrification and has recognized mini-grids as a viable option for extending energy access in rural locations. The Ministry of New and Renewable Energy (MNRE) has issued a draft national policy for renewable energy-based micro and mini-grids, with a target of deploying at least 10,000 mini-grids powered by renewable energy sources in the next five years in un-served and under-served regions of the country. This is welcome news as it paves the way for an increased role that the private sector can play in promoting electricity distribution. It also provides a clear framework to advance operational issues (e.g. land, clearances, subsidies, tariffs etc.).

SPRD has also seen increased interest among donors, investors and financial institutions, who are providing debt and equity to ESCOs that are planning to build viable and scalable mini-grid models. These companies have demonstrated the ability to integrate state-of-the-art technology, establish efficient supply chains, put in place the human resource capacity needed to operate clusters of plants, and maintain very high standards of service to paying customers across different segments from households and shops to enterprises, institutions, and telecom tower companies.

Scalable model, multiplier effect

There are over 600 million people living with little to no access to electricity in Africa, and another 400 million in the rest of Asia, excluding India. What we are learning and developing in India have the potential to transform the global energy access landscape for these regions. While every village, province, and national context is unique, the basic model is adaptable across multiple contexts in Africa and Asia. For India, this is another opportunity to assume leadership and light a path for other emerging economies in creating inclusive socio-economic growth, sparked by energy.

The market for mini-grids is unique because it provides an opportunity for the entire system – private sector, governments, investors, development organizations to come together and to enable electricity access in innovative and commercially viable ways. Importantly, it is faster to build, provides reliable electricity, and can interact with an operational government grid when needed. Supplying rural areas with strong and reliable electricity is never a simple proposition; but as the initial results of SPRD are beginning to make clear, universal electrification can be accelerated if there exists an enabling ecosystem that allows renewable solutions like mini-grids to take root and scale.

The experiences of rural residents in Bihar, Uttar Pradesh and Jharkhand illustrate the dividends of energy access. We at The Rockefeller Foundation are committed to doing our part to accelerate access to clean, reliable and sufficient power to spur economic development in India so that every village, family and individual have the opportunity to realize the potential power can bring.
PROVIDING RELIABLE POWER SUPPLY
Transforming the Rural Electricity Experience

Ramanshu Ganguly, Sambodhi

It was a late October evening. We were on our way to the hotel after a long tiring day at the SPRD sites in Shravasti. While discussing our day’s work in the car, it suddenly struck us that the hotel had repeatedly asked us to bring photocopies of our photo identity cards to complete the check-in formalities since their photocopy machine was defunct. Checking into the hotel without the ID proof copies was not allowed and by the time we would have reached Bahraich, the nearest town, shops would have shut down.

We were contemplating returning to Lucknow (a drive of four hours) when the cab passed through a well-lit market area. We had already dismissed that stopping at that village would be of any help. Nevertheless, we still got down to try our luck. Much to our surprise, there was a customer service center that also offered photocopying services. We were saved for the day!

The village was Bhardauliya, an SPRD powered site. This experience would be a major stereotype that rural areas have inadequate facilities.

In fact, the customer service center, also housed an Aadhar card enrolment station. That a small village in a remote location in Uttar Pradesh has offers such facilities illustrates the potential that electricity has to transform lives.

SPRD has come a long way from a largely lighting based customer base (98%) in February 2015 to a mix of lighting (84%) and productive loads (16%). What strikes the eye is not just the tenfold expansion of customer base but the types of enterprises the programme has been connecting with.

SPRD has contributed to the rural banking system in its catchment area. The branch of Aryavart Grameen Bank in Janigaon, connected to SPRD, has a catchment of around six Gram Panchayats (close to a population base of 10,000). The State Bank of India customer service kiosk in Katsa has a customer base of nearly 1,000 account holders. Although, these branches ran on diesel or grid power, the impact of SPRD on these units is evident in the improved operational efficiency. The unreliable grid connection often rendered these branches non-operational, compelling customers to travel to the nearest towns (at a distance of 20 kilometers). With the assurance of uninterrupted power supply, the bank is considering installing an automated teller machine at Janigaon.

While increasing the number of consumers has been the key driver, there has been a concerted effort towards increasing the diversity of medium enterprises (MEs) being connected. ESCDs, such as TARA Urja have stressed on micro-enterprise development and incubation. The last year of operation has witnessed the creation of a number of enterprises, whose benefit catchment is not limited to entrepreneurs but trickles down to the community as well.

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The customer service kiosk in Katsa has witnessed an increase in customer footfall as a result of a better-lit, more attractive kiosk. Shatrugan Prasad Singh, the customer service agent for the kiosk says, “While there has not been much change in my operational hours, the SPRD electricity has ensured a better ambience in this kiosk. I receive an uninterrupted supply from the mini-grid plant throughout the day. I have two fans running and a CFL lamp apart from my laptop and printer. It has indeed helped in enhancing the business. After all customer satisfaction is my duty.”

Account holders in this kiosk branch are happy with this local banking solution. Not only do they save resources on transport but also avail the services at their convenience. With the rural branches present in such areas, access to formal financial services has improved significantly.

The programme has also covered a number of skill-building institutions under its ambit. The computer-training center in Laliya provides computer education to 15 students aged between 8 to 20 years. And tailoring units in Bhardauliya and Tilakpur provide training to young girls and women in stitching. With a local trainer involved, these units not only provide employment opportunities, but also help create an employable work force in the villages by expanding local skill sets.

The increase in monthly revenues (-12%) apart, the uninterrupted supply of electricity has proven to be beneficial in increasing productivity. Several tailors have shifted from manual sewing machines to using electric ones. They are not only able to produce more garments but also reduce the human effort required through mechanization. Carpenters are also reporting interest in using electrical tools.

Access to health services is also improving. The SPRD site, Shivpura now also has an ultrasonography unit that ensures that villagers do not need to travel to nearby towns in case of medical emergency. Fuel stations using SPRD electricity also report smoother operations. “Earlier, while operating on diesel generators, we had to turn down customers at night, as it was not financially viable to cater to just one customer,” says Awadesh Kumar, owner of a fuel station in Pipariya.

Electricity has also helped make life simpler for women. Street lighting has helped improve their mobility after sundown too, increasing their scope for socialization too. Moreover, women-led enterprises, such as tailoring training centers also act as a platform for women to interact. Parents of school going children also say that children are benefitted by the improved quality of lighting at home.

SPRD has helped transform the perception of electricity from a luxury to necessity. It has been instrumental in transforming the electricity experience in the rural areas.
FROM A MIGRANT WORKER TO ENTREPRENEUR
The story of Janki Prasad’s car washing and polishing unit

T he India Census 2011 says that close to 38 percent of Indian males migrate in search of employment. Uttar Pradesh and Bihar are the states, which contribute the most to the migrant population in the mega cities. Uttar Pradesh alone contributes to around 45 percent. Janki Prasad, who hails from Ghorma Parsiya - a village of over 550 families in Ikauna tehsil of Shrawasti district - was forced to migrate to New Delhi in search of a livelihood. Close to 60 percent of the households in Ghorma, a village reliant on subsistence agriculture, have no regular source of income during the dry months due to inadequate irrigation facilities. Lack of a reliable electricity source prevented villagers from installing pumps for irrigation. Those who were better off used diesel to run these pumps. During the dry months, Janki’s family too had to rely on the odd jobs he secured in and around Ghorma Parsiya. However, since it was never enough to sustain a family of five, he migrated to Delhi and took up the job of a security guard.

Although he earned a good salary of Rs.10,000, there was little left to send his family every month after meeting his expenses in Delhi. He returned to Ghorma for a family emergency after which, he decided to stay back. “I needed to do something else to sustain my family. My daughter was very young. I didn’t want her to grow up amongst difficulties. But I was confused about what to do,” recalls Janki.

The entrepreneur in this 25 year old always wanted to set up his own enterprise. “It is always better to have your business than work for others. I didn’t want to leave my family and go to an unknown city to live all by myself. Moreover, I do not like being answerable to someone all the time,” says Janki. Janki decided to set up a car washing and polishing unit in his village. Ghorma is located off the highway connecting Shrawasti with Balmampur and Bahraich, two major markets in northern Uttar Pradesh. Tractors and mini-trucks carrying agricultural produce to these markets pass through Ghorma. Moreover since Shrawasti is a major Buddhist pilgrimage spot, the highway is rarely without traffic. Janki was sure that his business would find clientele.

A TARA Urja 30kWH plant in Ghorma proved to be the solution to Janki’s dilemma. With an assurance of a continuous supply of electricity, Janki got connected to the SPRD mini-grid in November 2015. “I get a lot of customers during the agricultural season. The tractors usually get muddy while on the field. They are my main customers,” mentions Janki.

With an investment of INR 100,000, Janki charges INR 100 for a tractor, INR 80 for a car and INR 30 for a two-wheeler. He usually manages to wash 2-3 tractors and a similar number of cars. Janki says that of late two-wheelers are also frequenting his shop. “Almost 5 motorcyles are brought for wash to my shop daily,” says Janki. After paying the INR 2,000 for the mini-grid connection and another INR 1000 for supplies, Janki is left with close to INR 15,000. With an investment of INR 100,000, Janki broke even in close to 7 months.

It is interesting to note how a car-washing unit changes social dynamics. With the washing unit present in the village, two-wheeler owners have started getting their vehicles washed there. “Earlier, I used to wash my own vehicle when I had the time. As a result, the motorcycle would stay dirty most of the time, especially during the cropping season. Now that this washing unit is in the village, it has become easier. I get it washed thrice a week. I don’t mind paying INR 30, if it adds to my convenience,” stresses Mukesh Kumar, a Ghorma farmer.

The impact of this SPRD-powered unit on Janki’s life goes beyond mere economic benefits. Janki started this unit at a time when the other option for him was to move away from his family and a young daughter. “I now make decent savings staying here. Moreover, this unit ensured I could stay back with my family when they needed me the most,” signs off an elated Janki Prasad.
The machine doesn’t work as well when operated manually. But the poor facility of electricity in my village forced me to use it manually. The diesel generated power was also not proving to be affordable.  

SUNIL YADAV

grain-processing units also drawing power from the mini-grid.

Sunil Yadav’s tailoring unit was one of the first to get connected. Sunil, an industrious and ambitious man in his early twenties, hails from a family of tailors. Due to the lack of livelihood options in his village, Sunil had migrated to Ludhiana to work in the hosiery industry. Sunil’s keenness to set up a modern tailoring unit in his village led to his investing in a multi-functional automatic sewing machine that could run on electricity supplied by the local diesel generator operator. However, he realized that the cost of operating the sewing machine on DG-supplied electricity was very high. He started using electricity only for bulk orders to earn some profits. For smaller orders, he ran the machine manually. But the results were not satisfactory.

Sunil says, “The machine doesn’t work as well when operated manually. But the poor facility of electricity in my village forced me to use it manually. The diesel generated power was also not proving to be affordable.”

This prompted him to try out the SPRD mini-grid connection. It has been over a year since he became a customer and Sunil has few complaints. He has a meter installed and gets daily power supply for almost 24 hours. At a fixed per unit rate (INR 22 per KWH), his monthly expenses depend on the number of units he consumes. Though he would like a cheaper tariff, he is aware of the benefits of having a reliable electricity connection. Stitching has become easier as it takes significantly less time now. Increased working hours due to availability of electricity till late in the evening has improved his overall production capacity. He also says that using an automatic sewing machine has improved the quality of his products.

“I can easily find gold but not electricity in this village. I am fortunate to be connected to SPRD; it provides consistent, reliable and high quality service.”

Sunil now markets apparel under the brand name of ‘Sonam’. He has also worked out the critical supply chain system for his enterprise. He imports raw material from Ludhiana and sells finished products in the neighboring local markets as well as in Kishanganj, a major market and in northeastern Bihar.

As business continues to grow, Sunil now has plans to refurbish the terrace of his house to create more work space. “Right now I am unable to fulfill the demand at my shop, therefore I decided to move the machinery to my home where I can buy some more machinery and hire people who can stitch.”

His sewing machine has the potential to turn out more than 100 pieces daily. However, due to lack of time and other engagements, Sunil is able to currently utilize only 30% of its capacity. He is also trying to raise investment to fund new machines. He is also simultaneously giving interested people in his village tailoring lessons. Many of his trainees support him in stitching at his enterprise.

Sunil feels the SPRD connection has played a major role in curtailting his out-migration. “If people are ensured about a source of income, why would anyone migrate? Migration to different places in search of work won’t be required at all.” Sunil strongly believes that his experience will definitely have an impact on the existing trend of migration.

Shyam, a 30-year old youth from a backward community of Sheopura, owns a metal welding and cutting shop. However, there was no access to a reliable and financially viable source of electricity to operate his machines.

For the first three years, Shyam sourced electricity from a diesel generator supplier. The connection could handle one appliance at a time restricting Shyam from using his appliances, the welding machine and the cutting machine, simultaneously. “I could not take much work because of this constraint even if I wanted to. Other than cutting metal, the cutting machine finds much use during the sugarcane season. There are a lot of sugarcane farmers in our village who need to get the sugarcane cut into smaller bits before it is sold in the market. Most of the time I would be involved in the welding work, hence could never exploit this opportunity,” remembers Shyam. “Moreover, the cost of diesel was also high. This alone cost me INR 15,000 a month. I could not afford more.”

The SPRD connection proved to be boon for Shyam’s business.

Shyam did not replace his diesel connection with the mini-grid but took an additional connection to operate the cutting machine. Shyam began seeing a marked increase in his productivity. “I operate both the machines simultaneously now. The welding machine runs on diesel while the cutter is operated using the mini-grid connection,” says Shyam happily.

This shift has had considerable impact on Shyam’s enterprise. “I operate both the machines simultaneously now. The welding machine runs on diesel while the cutter is operated using the mini-grid connection,” says Shyam happily.

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SHYAM BABU
SMART POWER IN THE NEWS: MEDIA MENTIONS

Smart power prog boosts small biz in state’s rural areas

New battery tech to bolster off-grid solar plants

Viable solution through DRE mini-grids

Working with govt to support mini-grid sector: Rockefeller

Miri grids can power rural economic activity

UP becomes lab for green energy firms looking to tap rural market

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NEWS IN BRIEF
HIGHLIGHTS FROM THE DRE SECTOR

All villages to be electrified by May 2017: Piyush Goyal

Minister of State for Power and New and Renewable Energy, Piyush Goyal, was addressing reporters on the second and last day of the Conference of Ministers for Power, New and Renewable Energy, and Mines of States and Union Territories. The Union Minister said that all the villages in the country would receive electricity by May 2017, a year before the 1000-day deadline set by the NDA government. Other issues discussed were projection exercises and hydroelectric projects.

goo.gl/5Odzh

Andhra Pradesh becomes second state to achieve 100% electrification

After achieving 100% rural electrification, Andhra Pradesh Chief Minister Chandrababu Naidu says the focus must now be on uninterrupted power supply. He added that access to electricity was a key socio-economic development indicator, but this was an area where there was still a significant gap in India. JM Financials published the report based on a national-level survey on electrification in various states.

goo.gl/TMa8q4

Andhra Pradesh becomes second state to achieve 100% electrification

Jharkhand will become power hub by 2019, says CM Raghubar Das

Jharkhand Chief Minister Raghubar Das assured that the state government will electrify its villages at any cost. He admitted that some areas of the state don't have basic power supply and said that government would make Jharkhand a power hub by 2019. He said that an upcoming power station would be complete within 6 months and the villages would be electrified in the following 3 months.

goo.gl/oAg9QD

For power to reach all, it will need a multi-pronged strategy, collaboration between Centre and states

Although the centre and various state governments claim to have achieved between 90 and 100% rural electrification, the ground reality is quite different. Discrepancies in definitions are allowing governments to make such dubious claims. To truly achieve the goal we set out to achieve we must have a multi-pronged strategy that addresses the various aspects of the issue.

goo.gl/bLGeCI

Centre expects all states to come under UDAY by next month: Piyush Goyal

The Centre expects all states to approve the UDAY scheme by next month, paving the way for them to issue bonds by March 2017 to tackle their mounting debts, Minister for Power Piyush Goyal said. It states have signed MoUs with the central government to address issues of mounting discoun debt. The Rural Electrification Corporation (REC) is in the process of drawing up a scheme for extending long-term basis soft loans to states at a flat rate to electrify all households for both APL and BPL populations.

https://goo.gl/1mLimD

Centre plans $2 billion fund for renewable energy sector

The Centre, along with state-run power entities National Thermal Power Corporation Ltd (NTPCL), Rural Electrification Corporation (REC), and Power Finance Corporation Ltd (PFCL), will soon launch a US$ 2 billion clean energy equity fund to support the government’s ambitious target to increase renewable energy capacity by 175 GW by 2022. But there are sceptics of this strategy in the state of Rajasthan. While renewable or ‘clean’ energy is all the rage, windmills have proven to be a headache for villages in Jaisalmer district.

goo.gl/3Xp4k5

Union power ministry bridges rich-poor divide in rural electrification plan

The Centre has expanded the ambit of its rural electrification scheme to include households above the poverty line, and assured cheap funds to increase the pace of lighting up an estimated 5.5 crore households in the country that are still without power. The Minister for Power illustrated how funds would be dispersed by the government to BPL families to achieve 100% electrification.

goo.gl/DKOpS5

Policy and Environment

India creates opportunities for social solar entrepreneurs

Upen德拉 Tripathy, who recently retired as the Secretary of the Ministry of New and Renewable Energy in India, sees tremendous opportunities for social entrepreneurs to play a role in expanding renewable energy there. He spoke about what his department has done to enhance solar power through various policy initiatives.

https://goo.gl/dKbdyb

Rural Electrification

Villagers in dark about why PM Narendra Modi said they have power

The village has about 600 homes — 450 without power. The 150-odd homes that do get electricity rely on illegal 'katia' connections: they have connected their homes to a transformer meant to run 22 tube wells, and, in return, pay Rs 395 for two months to the Dakshinanchal Vidyut Vipraan Nigam Limited (DVVN), the village’s Pradhan Yogesh Kumar told The Indian Express.

https://goo.gl/8LdOxa
All villages electrified, but darkness pervades

As per government data, nearly 98% of villages of the country have been electrified. However due to the obscure definition of rural electrification, the ground reality is far from it. On its website, the Rural Electrification Corporation (REC) has provided another set of data titled ‘intensive electrification’, which is one step forward after electrification. This process is still going on in all villages including ones that were deemed as electrified long ago.

https://goo.gl/8yXDM1

How solar power is turning rural India bright and shining

While the Indian economy is expected to grow at 7%, the primary hindrance is the lack of infrastructure in electricity, clean water, and sanitation. Given the huge opportunity, solar power can revolutionise the agricultural sector by providing power to areas not connected to the central grid. The decentralised and modular nature of solar power makes it easy to deploy for multiple rural applications, impacting key facets of life for rural populations, such as productivity, safety, health benefits, and access to clean water, heating solutions, and livelihoods.

https://goo.gl/C5EYtY

Mini-Grids

Solar mini-grid project in Pench buffer opens today

A solar mini-grid project initiated by the Satpuda Foundation, a wildlife conservation NGO in Central India, was completed in July. It received financial assistance from the Conservation Action Trust (CAT) and technical help from Bangalore-based SELCO Solar Light Private Limited.

https://goo.gl/9we4m8

India and US launch $95 million clean energy project

The US today announced two financial projects in India, worth US$ 85 million, to bring more energy-efficient appliances to the rural sector as part of its efforts to continue the global transition to zero and low-carbon energy sources. The US has committed US$ 70 million in Overseas Private Investment Corporation (OPIC) financing for renewable energy projects in India and announced to launch a US$ 20 million partnership this week with the philanthropic sector to bring more efficient appliances to rural Indian villages.

https://goo.gl/I9G1w4

The power of plants

The US Agency for International Development (USAID) has awarded an INR 138 crore Pace-setter grant fund for ‘Waste to energy-innovation at a small scale’ to GRE, a Bangalore based start-up. This would act as a propellant for USAID’s reliable and sustainable energy solutions initiative for grass roots energy. The founders of GRE have been working on the waste to energy project since 2012 and set up GRE in 2015. GRE sets up mini-grids using bio-energy in off-grid locations in India using local agro and farm resources. The organic waste is used as a feedstock and is processed and converted into biogas.

https://goo.gl/zjWvYtC

India’s power demand

The Ministry of New and Renewable Energy (MNRE) sees a huge potential for off-grid applications of solar PV in the country, as solar pumps for irrigation could provide access to water to unelectrified and remote areas, enhancing crop yield for farmers. Speaking to the media, various government officials from the Ministry of New and Renewable Energy have discussed the advantages of solar pumps and also the challenges to their full-fledged implementation in terms of impurities and subsidies required.

https://goo.gl/Mq4VZl

Off-grid solar can meet India’s power demand

Off-grid solar is increasingly being viewed as the way to bring sustainable and cheap lighting to the vast segments of India that are yet to be connected to the electricity grid, especially in difficult terrain. Due to better technology innovations and competitiveness of solar tariffs, solar energy is looking more and more economical and affordable. This will help achieve the governments’ renewable energy goals.

https://goo.gl/i2TCC6B

Solar Power

Stronger collaboration for greater energy access in Asia Pacific

Solar power can be an alternative for providing power to areas where the national grids can’t be accessed. However, there is need for adequate infrastructure and policy initiatives to support such a system.

https://goo.gl/ZEESH1n

Harvesting Solar – in fields!

The Government of India has set some very ambitious goals for itself in the areas of solar power generation and improving farmer income. Though this is a tall order, a single strategy can be used to achieve these two goals. Innovative policy initiatives in the solar power sector can trigger out of the box ideas. This could lead to a number of positive externalities which may address both goals.

https://goo.gl/OPIqD

Mini-Grids

The ‘next big thing’ in energy

Storage will be crucial in electricity generation and distribution. Achieving this is not easy but many companies are keen on investing in India. Although storage is fundamental to achieving energy security, its implementation possesses crucial challenges. However, a number of foreign investors are keen on India’s potential.

https://goo.gl/34tXcD

Modi’s dream project of electrifying dark villages set to miss December date

Prime Minister Narendra Modi’s dream project of electrifying all 18,500 dark villages in the country is likely to miss its “advanced” completion deadline of December 2016 as most states have failed to put up efforts for last-mile connectivity. The states of Odisha, Arunachal Pradesh, and Jharkhand are lagging behind. It took one and a half years to finish 60% of the work, and it would be impossible to achieve the target by December.

https://goo.gl/gu28wF

India’s potential

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Using solar power for irrigation being prioritized to improve farm productivity and provide drinking water in rural & inaccessible habitations

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Glimpses from Smart Power Events

HIGHLIGHTS FROM 2016

The 7th World Renewable Energy Technology Congress & Expo 2016

The 7th World Renewable Energy Technology Congress & Expo-2016 served as an energy platform for the global renewable energy industry to address various industry issues including innovations, new technologies, investment opportunities and project financing. Dr. Upendra Tripathy, Secretary, Ministry of New and Renewable Energy, Government of India delivered the inaugural address and highlighted the importance of promoting renewable energy, green technology for its sustainability.

India Energy Access Summit 2016

India Energy Access Summit 2016 brought together energy access practitioners to discuss future-proofing of energy technology, business models, quality standards, capacity and skill requirements to the evolving landscape of state and central government policies around energy access, as well as the financial and/or investment climate of the country. The one-day event on 10th August was conducted by The Climate Group in partnership with the Ministry of New and Renewable Energy, Government of India and the Clean Energy Access Network.
Smart Power India (SPI) was established by The Rockefeller Foundation to implement the Smart Power for Rural Development program in India. It promotes sustainable business models that deliver renewable electricity and spur economic development among underserved rural population in India. SPI aims to improve electricity access to rural India through distributed renewable energy mini-grids. It seeks to create an ecosystem that enables the productive use of electricity beyond household lighting. For this, SPI works as a key partner to private sector energy service companies (ESCOs), investors, NGOs and government bodies to catalyze and scale up mini-grids. We aim to impact over a million lives by electrifying more than 1000 villages.