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Mini-grids | Empowerment | Enterprise

100 AND COUNTING

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.





MINI-GRIDS POWERING MICRO-ENTERPRISES

JAIDEEP MUKHERJI CEO, Smart Power India

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 firsthand 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, Chanpatiya, 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.



 \mathcal{A} \bigcirc VISION MISSION To spur economic development in villages through access to reliable electricity provided by renewable Enable an ecosystem that drives socioeconomic development through sustainable renewable energy energy mini-grids. mini-grids in 1000 villages, impacting a million lives. 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 Remote Monitoring Telecom Tower Solar Power Plant Commercial Loads 計** の Households Shops





Policy Framework

PATHWAYS LEADING TO 'POWER FOR ALL'

Framing Supply Resilience and Customer Management Through Mini-Grids

Hardik Pokhrel, cKinetics Neeraj Ramchandran, cKinetics Atul Mudaliar, Shakti Sustainable Energy Foundation Deepak Gupta, Shakti Sustainable Energy Foundation



espite intensified government efforts and a major thrust laid on rural electrification infrastructure under India's Deen Dayal Upadhyay Grameeen Jyoti Yojana (DDUGJY), about 50 million households (250 million people)¹ in rural India continue to remain unelectrified as on October 2016. Even as this center-backed 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 Yojna (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 rural development, employment generation and poverty alleviation; in practice, almost all transformers in the villages electrified under the erstwhile RGGVY scheme



were single phase and couldn't cater to productive loads like flour mills, rice huller, oil expeller, etc. which require three-phase power.

Even though under the recent phase of DDUGJY, three-phase transformers have been installed in many villages, the infrastructure augmentation and/or revamp has focused only on those where electrification or intensification was undertaken in recent years. The villages that were electrified in the past have not been catered to in the same vein. Moreover, augmentation needed in these villages as per revised norms of the DDUGJY scheme requires relatively higher resource allocation (and it is not clear whether these would be covered under DDUGJY).

In many cases, these significant investments will have to be made through the business plan of the DISCOM but with major utilities joining the Ujjwal Discom Assurance Yojana (UDAY) scheme, it is unlikely that the Discom will incur these investments in this area, or appropriately address the lack of requisite capacity and

There still remain a few bottlenecks, which may come in the way of India achieving its "24x7 Power for All" goal by 2018-19 purely through centralized grid extension

skills within its staff managing their rural operations.

These key gaps are thus likely to persist for a while, given that progress or success is measured in terms of electrification intensification. To ensure appropriate focus on addressing these gaps and enabling a realistic "24x7 Power for All" outcome, there is a need to revisit and enhance the definition of village electrification, which has been in effect since 2004-5 to specifically include aspects such as:



a) Availability of three-phase power

b) 100% household-level electrification

c) Assured supply during critical hours, which is typically the peak for the distribution system

This is important to ensure that spending is aligned to adequate and sustained outcomes on the ground, specifically with regards to livelihood resilience. If not, adverse ramifications on economic and human development which manifests as unemployment and poverty will continue to plague India.

Emerging directions for rural supply: Need for an alternate model

The unelectrified households in the country are concentrated across a few specific geographies offering a target area for mini-grid interventions. Almost half of the 50 million unelectrified households in the country are in Uttar Pradesh (35%) and Bihar (15%), followed by Madhya Pradesh (9%), Odisha (8%), Assam (7%) and Jharkhand (6%).

^{1:} State wise summary of DDDUGJY as of October 2016



if Even DDUGJY for progress under 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 discom grid for almost 1.5 GW² capacity, even at basic lifeline³ consumption. Apart from the needs of unelectrified households, based on peak deficits in areas with less than 18 hours of supply, an additional 765 MW⁴ would be needed at the tail-end of grid, to support needs of these electrified rural households.

This need for this tail-end capacity, coupled with the gaps discussed in the previous section makes a strong case for the need for an alternate model that assures high-quality power supply and supports both domestic and economic needs of a rural area.

In response to this need, there has been a growing interest and uptake of Decentralized Renewable Energy (DRE)-based solutions, including mini-grids. Mini-grids in particular, have the potential to emerge as a

2: DDUGJY program updates REC; cKinetics analysis

3: Basic Lifeline Consumption of 1 kWh per day

there is significant comprehensive community level solution for rural electrification-either as a substitute to the national grid in areas that are deemed to remain unelectrified or as a complementary solution to the grid to address under electrification in other rural areas. In short, with the appropriate policy support, these DRE-based mini-grids could emerge as holistic rural utilities. This transition requires a paradigm shift to ensure that these assets are dovetailed at a comprehensive level in the rural electrification planning.

> Recognizing this, the government through the National Tariff Policy resolution released in January 2016, acknowledged the role of mini and micro grids and specifically mandated the State Electricity Regulatory Commissions to develop suitable regulatory mechanisms to protect mini-grid investments. The Policy mandates the Commissions to establish the tariff mechanism for any uplinks to the main discom grid. Some states are already in the process of creating appropriate frameworks to build on these provisions and institute

state-specific policies aligned to the needs of the concerned state.

In response to this

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(DRE)-based

mini-grids.

Renewable Energy

solutions, including

In addition, the Union Ministry of New and Renewable Energy (MNRE) is in the advanced stages of drafting a national mini-grid policy which endeavors to implement 10,000 mini-grids across the country with a minimum installed RE capacity of 500 MW by 2021. The draft national policy also projects mini-grids as an intervention that can provide energy services beyond lighting loads and can assure reliable and cost-effective energy service that can cater to the productive and commercial loads, accommodate future loads, and connect with grid to feed surplus power, if needed.

Renewable Energy Service Providers (RESPs) that operate the minigrids can also help address several concerns regarding supply resilience during peak hours and the quality of supply. They have the ability to truly emerge as a "Rural utility", institutions with comprehensive capabilities to leverage electricity as an enabler for holistic needs ranging from basic services, such as water to indicators of higher standards of living, such as entertainment and internet.

Mini-grids that are operational today in rural India are already catering to a wide variety of loads, such as rice hullers, flour mills and irrigation loads. They have successfully done so at a relatively minimal investment compared to grid extension, when considered at a consumer level. The cost of a connection for a productive load, such as a flour mill in a village without a three-phase transformer necessitates the prospective consumer to bear the investment in the transformer and additional poles, which can typically range from INR 2.5-3 lakhs5 to INR 10 lakhs6. 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

Current activities undertaken by MGOs

- Decentralized generation
- Local manpower
- Capital for investment
- Technical expertise on O&M



5: Uttar Pradesh Site Survey Data : cKinetics

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 beachhead for discoms 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

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

If the existing MGOs are appropriately equipped as rural utilities, their last mile performance will improve significantly and sustainably.

frames desired by the Central Government. bottlenecks to "Power for All".

MGOs (or budding 'rural utilities') are For this, the MGOs would not only have 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

For All" goals to be met closer to the time but also address the residual causative

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, transparent measurement and а 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 assuring energy access, the for 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

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

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 being made for rural electrification and enable "24x7 Power for All" within the stipulated timeline.

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



00-00





The unit has assured electricity supply from a 3-phase connection from Smart Power mini-grid. The aarment 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.



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





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







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.





ini 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.

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.

People



DESH DEEPAK VERMA Chairman, UP Electricity **Regulatory Commission**

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. Furthermore, the people beyond the 40 meters access circle, such as the residents of adjoining hamlets, are unable to electrify their communities. In addition, there are communities that have been outside the grid's reach due to issues with geography or the terrain.

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,

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.

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.



incorporating factors such as assured

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.



INNOVATING POWER SOLUTIONS

Providing 24x7 metered connections

Manoj Sinha, Co-Founder and CEO, Husk Power Systems



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

hen people have power, 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 cobbs etc - which is feedstock for biomass gasification) available locally. In 2008, options such as Solar Energy were way too expensive-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

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

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 such as welding machine shops, telecom towers, and rice and flour mills. AC power provides rural customers the opportunity to operate off-the-shelf appliances such as TVs, refrigerators, and industrial machineries. With this solution, we have also been able to bring down the storage battery cost by 60%.

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 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)

Number in kWh



Source: Husk India



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.

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 forwardlooking 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.







Community Engagement

SMART POWER

A New Value Proposition for Village Communities

Kanika Verma, Priyali Bhardwaj, and Ayesha Bhatnagar, Tara Urja



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.

is an accelerator for For example, Siyaram Pandey runs a economic growth. Access to carpentry enterprise called the Shree electricity can have a dramatic Vishwakarma Saw Mill for the past nine years impact on the well-being of in the village of Bheldi 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 Systems and FreeSpanz to tap latent demand and set up electrification, thousands of farmers and local new enterprises that run on electricity supplied by the company, thus making mini-grids more financially viable. entrepreneurs in states, such as Uttar Pradesh and Bihar are forced to rely on diesel-powered generators to irrigate The CELAMeD approach enables new technology-based enterprises and expands existing businesses, making local fields and run small businesses. Unfortunately, these generators run at a cost that is over three times that of grid business owners and entrepreneurs more productive, electricity. Virtually all electrification programs have been competitive, and capable of serving many more customers geared towards household electrification. There has been in the village community. 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, ranging from anthropometric aspects of locating lights in and Micro-enterprise Development) approach adopted by a house and cook stove design, to the ergonomic suitability TARA vies to fulfil the multiple objectives of mobilizing of equipment recommended for new microenterprises. communities around the plant location and helping ESCOs such as TARA urja, OMC, DESI Power, Husk Power In our experience, the benefits of reliable energy access,



Prioritizing local needs, TARA enables and supports entrepreneurship through three modes:

Local Economic Development: Includes a broad spectrum of businesses in light of new opportunities emerging from the ground, such as tech-enabled models (more than 1 KW load) and nano production and service-based enterprises that are an integral part of the village economy (less than 1 KW load).

Gender Inclusive and Basic Need Fulfilling Enterprises: Those set up with an aim to empower rural women to be able to define and make choices for themselves and their children.

Enhancing Productivity and Extension Services: These demonstrate increases in agricultural productivity and highlight local value addition opportunities.

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,



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 businesses since they can run their business at their preferred time of the day.

Furthermore, the wave of new businesses that couldn't be run without electricity (RO water filter, biomass pellet, computer centers etc.) further underlines the financial stability offered by the model and the improved access offered to basic needs, as these are manufacturing and available at the local level. While the ESCO assures good quality power supply, TARA guides the entrepreneur on how to use their electricity in

the most productive manner. Support services offered incorporate hard and soft components, such as technology selection, forward market linkages, broadcasting, and promotion. Women form one of the primary target groups for TARA, where special focus is laid on setting up and supporting women-run enterprises. These are provided stronger handholding services too.

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 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.

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, continuetoundervaluetherolewomen 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 being 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.





EXPANDING BUSINESS OPPORTUNITIES



JAGRAM

Ram Mishtan Bhandar Shivpura, Uttar Pradesh

ne of the first rural entrepreneurs to Uuse 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. 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 ahead and constantly asking TARA's Micro-enterprise Development team for new ideas to expand his business further. Jagram says. "I am constantly in search of innovative ideas to expand my business and am thinking of using more appliances, like a coffee machine, improved cook stoves and pellets, and a television to keep my customers engaged and loyal".

PROMOTING NEW ENTERPRISES



 B_{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**

Tailoring trainee Bhardolia, Uttar Pradesh

Tira Kasodhan, one of the 15 girls enrolled at the Krashak Mandhu Laghu Madhyamik Vidhyalyay 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 skilling 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.

ESCO Voice

STIMULATING INTEGRATED RURAL DEVELOPMENT Providing assured energy for livelihoods

Sudeshna Mukherjee, Deputy Country Director (India), Mlinda









electrification through ural 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.

Productive Loads as Anchor Loads in Village Grids

Establishing the commercial viability of mini-grids in remote rural tribal 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,

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.

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. MIInda 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 (.75 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. With help from Smart Power India, Mlinda is in the process of incubating a 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 34 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, farmers clubs, user groups, and local governance structures to grow the productive pie.

This synergy of growing productive loads through access to clean energy empowers local economies and contributes to agricultural productivity, thereby spurring integrated rural development. Field level inputs combined with strategic inputs from Mlinda's Paris headquarters help build a scalable and replicable mini-grid model based on sustainable growth in productive demand.

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.

The Rockefeller Foundation

SMART POWER FOR RURAL DEVELOPMENT

Helping Rural Communities Help Themselves

Deepali Khanna, Director, Smart Power for Rural Development, The Rockefeller Foundation



Today, our mini-grids power more than 3,500 small businesses and illuminate the homes of over 38,500 people.

ormer 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

one million lives and establish self-sustaining momentum in the energy market for a new rural electrification model that empowers lives.

SPRD is the first to develop a mini-grid sector with the scale to fuel enterprise and drive economic development beyond just one village

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 minigrid operators. Additionally, The Rockefeller Foundation supports entrepreneurial energy companies to build mini-grids by providing lowinterest 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%.

The SPRD initiative is the first to pursue the creation of a mini-grid sector that is big and robust enough to fuel commercial enterprises and drive economic development beyond just one village.

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.

Impact

PROVIDING RELIABLE POWER SUPPLY

Transforming the Rural Electricity Experience

Ramanshu Ganguly, Sambodhi

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.

T t was a late October evening. We were 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.

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. ESCOs, 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.

SPRD has contributed to the rural banking system in its catchment area. The branch of





With the assurance of uninterrupted power supply, the bank is considering installing an automated teller machine at Janigaon.

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.

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 smartpowerCONNECT 3



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 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.

Impact Stories

FROM A MIGRANT WORKER **TO ENTREPRENEUR**

The story of Janki Prasad's car washing and polishing unit



ESCO- Tara Uria

Janki Prasad. Car wash proprietor, Shrawasti, Uttar Pradesh

he India Census 2011 says to send his family every month 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 The entrepreneur in this 25 year 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

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.

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 Balrampur 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.

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 motorcycles 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

THE MAN BEHIND ARARIA'S 'SONAM' APPARELS

How Sunil Yaday built a new brand



Sunil Yadav, Tailor, Araria, Bihar

ahalgaon is a densely populated village with more than households, spread over 846 hectares in the Araria district of Bihar. Inhabited primarily by an economically and socially backward caste population, more than 50 percent of households fall below the poverty line. Despite being close to the state highway, this village is still not connected to receive grid electricity.

For over a long period of time, kerosene had been the primary source of lighting for both households as well as small commercial units. The productive loads, a few in number, were mostly connected to a dieselgenerator. Kerosene



"I get a lot of customers during the agricultural season. The tractors usually get muddy while on the field. They are my main customers."

JANKI PRASAD

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 where 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.

lamps did not help small shop owners increase their business hours. For the larger productive units, the diesel generator supply proved to be too expensive. This left villagers with few options to expand their businesses; people began migrating to far off places in search of work. Since agriculture is the mainstay of this village, there is little activity during the non-agricultural seasons.

DESI Power's initiative, under the SPRD program, to install a solar power plant in the village in January 2015 proved to be a blessing for this village. More than 200 households and 80 shops are now connected to the mini-grid. Though most of customers use mini-grid power for basic lighting, there are a few tailoring and

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 apparels 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 curtailing 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.

MORE PRODUCTIVITY, MORE PROFITS

How Shyam Babu welded a brighter future



Shyam Babu,

Welder, Shrawasti, Uttar Pradesh 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.

I operate both the machines simultaneously now. The welding machine runs on diesel while the cutter is operated using the mini-grid connection.

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 level finances too. With his diesel requirement going down by almost half, Shyam has started saving more. He spends only INR 1,000 on the SPRD connection thus saving close to INR 6,500 additionally.

Shyam looks ahead to the sugarcane season this year, when he wants to use the cutting machine for this purpose as well. "We have become competitive in the market, and our capacity to fulfill the demand for our service has increased since we got connected to the TARA Urja mini-grid. Our customer base has also improved and people from the neighboring villages have started approaching us as well," says Shyam Babu.

SHYAM BABU

to ensure power in rural areas: CN

p with a Mini-grid Policy

SMART POWER IN THE NEWS: MEDIA MENTIONS

Microarid

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

Pranav.Chaudhar @timesgroup.com

OW

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Patna: Raj Kumar Shahof Siwan exemplifies entreprenewhose business has grown over the past few months owing to the setting up of a decentralized renewable energy (DRE) minigrid plant under the Smart Power for Rural Development (SPRD) programme Rai Kumar owns a general

store cum printing shop near the main village market. Its being one of the few printing shops among the 150 other shops in Nabigani village, he has a regular customer influx. However, till a year ago, his printing business didn't reap desired profits; the technology was time-worn, electricity availability was a ma-

NEW INITIATIVE

jor hindrance and his financial condition didn't allow for any kind of investment towards machine upgrade. He was losing business of close to Rs5.000 per month because of his inability to deliver the services on time

Now, there are 25 operational plants across East Cham-West Champaran. paran. Araria, Supar' Cava Saran and Gopalgar THE RIOK

tional model to association the service of electricity is inade

operated, m intained by dia's (SPI) Service Cor These are b

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mass) technology. Approximately, 800KW of renewable capacity has already been commissioned in the state. The decentralized electricity generation can make use

of different renewable ener

state. Since I culture based areas have ry biomass and I theruralareas or ini-grid sector: Rockefeller solar energy Press Trust of India | New Del

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which is an inn ket-based mode ALSO READ tes through dece

Aus can assist India in newable energy improving skill development:Think-tank grids powered Congress free India is a distant dream says Arunachal MP such as solar at Sustainable DRE go beyond househ Modi betrayed people of India: with a focus on use by creating an DRI auctions tre Rs 60,000 cr under MSS that drives socio development, shes Cong assails govt over Nagrota Currently, the terror strike one anchor custon com tower) at the l

Discover Visualization Reprogram Your Subr Mind To Unlock Pass creativevisualization.com/Free tments for Sale in

har. Two pla How Clean Energy Mini-Grids Can Empower Rural India

in Saran district.

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of a carpentry shop in Siwan, a district in Bihar, used to take iged. Today his shop is buzzing with the sound of powe owered minLas

> Pradesh and Bin e less than top of rural house te 2014 to bring ectricity to the rural poor at a

Mini grids are small enough to construct quickly, rely on renewable power such as solar, [and] provide enough consistent energy to light le homes and businesses within

changing the batteries. changing the batteries. It in-creases the cost of capex," Khazanchi said. New technology for batteries The institute is currently vill soon electrify India's offtesting three new battery er facilities. The Instisformative Techchemistries from across the world - lithium ion; adnologies (ITT) is currently working on three different battery types in the hope of re-ducing cost and increasing the lifespan of batteries. Sanjay Khazanchi, Chief Ex-Access to Electricity

ned that (India), ITT, explai

vanced lead acid batteries betential and high de ing produced in Australia; and a sodium ion chemistry "Globally, the industry is watching how India is going to do the off-grid rural electri ny in the US. fication. Unfortunately, the we have on the Lifecycle tests

and the visibility of he volumes likely to be th in the future is still low. It's a catch 22 situation. Maybe technology is not since the there and storage is expensive because of that the volumes are low but if we bring in a solve the problem and make

lenges in giving a life," Khazanchi said.

tial to attract more inv

Newer batteries with exten-

ded life spans have the poten

in the market, which is cur-

rently lagging despite big po

orkable "he said. Deepali Khanna, Senior Associate Director of the Rocke-feller Foundation, explained that the uptake of renewable still rather slow in nergy "By 2030, renewables would

he 17 per cent of the total

Energy efficiency Rockefeller has

mint RISING DEMAND

UP becomes lab for green energy firms looking to tap rural market Companies, non-profits are testing the viability

of supplying power from mini-grids and

BY GIBEESH CHANDRA PRAS

tiar Pradesh, home to about 16% of India's 1.2 sting ground for nor

elcos, white the second ned \$75

for setting up micro-elps these utilities in anchor cuties

New battery tech to bolster off-grid solar plants For maintaining a solar plant for 25 years, batteries have to b changed more than five times

nergy mix in India. There is a people want to go beyond light bulbs and productive ot more that needs to be happening here," she said.

invested \$1.5million with ITT to resolve the storage crisis. Besides stor-age, Rockefeller is also looking at facilitating more en-ergy efficiency appliances in an effort to make it feasible for citizen of rural India to use

use and are looking at if the could hook up a TV, a fan or fridge. So, we are looking a how to get more energy effi cient appliances because we know their capacity to pay fo electricity is limited. The can't pay more than ₹500 per month and that is also a lot when you are taking a

I MINI-GRIDS

t of the sta months from the say erange for loans

Access to reliable energy has give local entrepreneurs the means an confidence to sustain and expan own businesses - from compute and convenience stores to motor enterprises and water purifying

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gogues Like Trump Pose 'Profound It To Human Rights,' Watchdog Say ent Is Cons

lere's What Aamir Khan Has To Say In Jesponse To Meryl Streep's Golden Gk

Arbaaz Khan Opens Up About His Separation From Wife Malaika Aro





No flucts

The Rockefeller Foundation, which has launched an

the mini-grid sector in India.

30 000 people

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initiative to use renewable power-based mini grids to light

up villages, today said it is working with the government to

develop central and state policies that support growth of

Through its initiative, the US based foundation currently

has 94 fully operational plants that are serving about

I not be able to power mient, motors, etc. Mukherjee said. mini grid is a larger em that converts direct

(AC) and it safety as per REC

"Beye 'Mini grids can power rural economic activity and CEA standards," he ex-plainer coming from the power coming from the single coming from the BC energy. While it is good for the single community's re-ductions, it does not sat-subscenes, be said. The power generated from a mini grid, can be Even fro point of vi portant er a village grid is too is at least the area tower, p or bank up a sig the end the min

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mini grid can y going through

No fluctuations "The power that comes out is regular and standard with no fluctuations," Mr Mukherjee said. Apart from commercial enterprises, rural banks or schools, Mr. Mukherjee said that a large part of the doment for minit grids came

demand for minigrids came from telecom service pro-viders for powering mobile towers. "They (mobile towers) how a presence across rural have a presence across ruffer India and all of them suffer from inadequate power and so have to use diesel." Mr. Mukherjee said. "There is a Makherjoe said. "There is a national mandate to green 50-60 per cent of the tele-cont owners and also the cont of using diesel is very high and it (the risk) in chides diesel theft and a the other nefarious activi-ies that go along with it o to meniton the pollution

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el grids is in the outers, the lure of grids is in the cost, n According to Sundi Jain, chief executive officer of Hero Inarroune innertal



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where solar power is available to households and shops, con-sumption of electricity is grow-ing steadily on the back of affordable solar the back of

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operations in other too," said Mukherji, Zia Khan said i

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LETTERS TO THE EDITOR

Helping us understanding better, thank you!



CEO Smat

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Media Scan

NEWS IN BRIEF HIGHLIGHTS FROM THE DRE SECTOR



Policy and Environment

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 connections by May 2017, a year before the 1000-day deadline set by the NDA government ends. Other issues discussed were projection exercises and hydroelectric projects.

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/7Ma344

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/oAglQ0

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/bLzEC1



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/DKOPSC

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 Pivush Goval said. 17 states have signed MoUs with the central government to address issues of mounting discom 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/1m6jjD

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 villagers in Jaisalmer district.

goo.gl/5XpAk5



smartpowerCONNECT 43



India creates opportunities for social solar entrepreneurs

Upendra 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/dFkByh





The village has about 600 homes - 450 without power. The 150odd 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 Vitran Nigam Limited (DVVNL), the village's Pradhan Yogesh Kumar told The Indian Express.

https://goo.gl/bLdOza

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 pretty. 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 revolutionize 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/C5tEYy



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/l41XcD

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.

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/g5w4m8



India and US launch \$95 million clean energy project

The US today announced two financial projects in India, worth US\$ 95 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/9IGUw4

The power of plants

The US Agency for International Development (USAID) has awarded an INR 1.98 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/rJwYzC



Solar power lights up three remote villages in Jashpur

Off-grid solar panels have brought electricity to three remote villages in Jashpur district, lighting up the lives of people who could not get power connections since Independence. Being located on hill tops, providing power supply for these villages was extremely difficult. Despite challenges of geography, the government established solar panels in the region, which has elated villagers.





Use of solar pumps for irrigation being prioritized to improve farm productivity and provide drinking water in rural & inaccessible habitations

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 fullfledged implementation in terms of impurities and subsidies required.

https://goo.gl/Mg4VZL

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.

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/ZEEHOn



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/OlPjqD

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.



Jaideep Mukherji, CEO, Smart Power India

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.



Deepali Khanna, Director, SPRD program, The Rockefeller Foundation

WORLD



Jaideep Mukherji (L) and Deepak Gupta, Shakti Foundation



Zia Khan, Vice President, The Rockefeller Foundation



Desh Deepak Verma, Chairman, UP Electricity Regulatory Commission



yra रास्ते को आसान कि बनाता है.





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.

Smart Power India

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