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ENERGY ACCESS FOR DEVELOPMENT

Stories from Jharkhand on how reliable electricity
can power socio-economic development

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Transforming Rural India Foundation

Forum for the Future

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● About Transform Rural India Foundation

Transform Rural India Foundation (TRIF) was conceptualized in 2015 by a core team of senior professionals from India's leading rural development NGOs and Tata Trusts - one of India's most prominent private philanthropies. January 2016, Transforming Rural India Foundation was incorporated as an independent entity under Section-8 (Not-for-Profit) of the Indian Companies Act, 2013. TRIF aims to bring about a paradigm change in the lives of disadvantaged rural communities, more specifically the poorest 100,000 villages (Stranded India). TRIF's two major verticals engaged in graduating Stranded India comprise: One, civil-society/ community-led village transformation initiative and, two, TRIF public-system engagement vertical. It received registration as a 'charitable' organisation under relevant sections of the Indian Income Tax Act, 1961. It is also registered under other enabling acts like Goods and Service Tax Act, etc. It received the 80G and 12A permanent registration number under the Income Tax Act.

● About WRI India

WRI India, an independent charity legally registered as the India Resources Trust, provides objective information and practical proposals to foster environmentally sound and socially equitable development. WRI India's mission is to move human society to live in ways that protect Earth's environment and its capacity to provide for the needs and aspirations of current and future generations. Through research, analysis, and recommendations, WRI India puts ideas into action to build transformative solutions to protect the earth, promote livelihoods, and enhance human well-being. We are inspired by and associated with World Resources Institute (WRI), a global research organization. Currently over 150 researchers are working with WRI India in our offices at Delhi, Mumbai and Bengaluru.

● About Forum for the Future

Forum for the Future is a leading international sustainability non-profit with offices in London, New York, Singapore and Mumbai. They specialise in addressing critical global challenges by catalysing change in key systems, from food to apparel, energy to shipping. They do this by convening transformational collaborations to drive change, by partnering with stakeholders to help them lead by example, and by building a global community of pioneers and change makers.

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Shakti Sustainable Energy Foundation

Shakti Sustainable Energy Foundation seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following areas: clean power, energy efficiency, sustainable urban transport, climate change mitigation and clean energy finance.

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Photo by Climate change, agriculture and food security/flickr

Jharkhand is endowed with numerous resources. It has significant minerals and forest cover as well as a vibrant civil society and government that is committed to working across various sectors to enhance the state's development. Access to affordable and reliable electricity is a critical input to ensure effective service delivery in the healthcare, education, agriculture and livelihood sectors. **Here, we document stories of initiatives and efforts by organisations working in Jharkhand that acknowledge the need for reliable electricity supply to equip them to deliver services more effectively.** The intent of this document is not promotional. It is to spread awareness about inspirational initiatives undertaken in the state and to commence a dialogue on opportunities to scale such efforts to achieve socio-economic development through provision of affordable and reliable electricity for all. We acknowledge the efforts of individuals, government and NGOs to enhance electricity access, and thank stakeholders who have generously shared their efforts for the purposes of this document.

ENERGY FOR ALL

10 Stories from
Jharkhand on how
reliable electricity can
power socio-economic
development



Photo by Prashanth Vishwanathan / IWMI / flickr

Sustainable and reliable electricity can enhance primary healthcare and build public's trust in these facilities



The newly built health and wellness centre

Image courtesy: Ashok Kumar and Amjad Khan/ 2020/ Angara Block, Ranchi District, Jharkhand

Nawagarh Gram Panchayat in Angara, Ranchi, is home to a self-sustained Health and Wellness Centre (H&WC) that serves the local community.

With seven rooms, Nawagarh's H&WC is clean and well maintained. It is equipped with fans, lights, water heaters, a TV in the waiting room, and a water pump. The H&WC was commissioned in 2018 under the Ministry of Health and Family Welfare's Ayushman Bharat Programme.

This H&WC is visited for treatment of common illnesses, emergencies, as well as childbirth. The Operation Theatre for deliveries is equipped with a baby warmer, Doppler foetal heartbeat monitor, sterilizer and other essential equipment. On an average, eight deliveries take place in the facility every month. This H&WC is said to have a positive impact on the number of institutional child deliveries in the area too.

Improved facilities with reliable electricity

Image courtesy: Ashok Kumar and Amjad Khan/ 2020/ Angara Block, Ranchi District, Jharkhand



Dark days of diesel dependence

But this was not always the case. Before 2018, the H&WC services were limited to vaccination and first aid. It had no stable electricity supply and power cuts sometimes lasted up to 3 days.

During this period, a diesel generator was its source of energy, but this came with several challenges. Its bulky design made it difficult for staff to switch it on manually. It also caused significant air and noise pollution. The nearest fuel station from where the diesel to operate the generator could be procured, was 90 minutes away.



The battery back up for the solar PV system

Image courtesy: Ashok Kumar and Amjad Khan/ 2020/ Angara Block, Ranchi District, Jharkhand

Solar solutions

The decision to shift to a reliable solar photovoltaic (PV) system brought positive change to the H&WC. The facility can use this alternative electricity source to ensure their services are not disrupted, even during extended power cuts in the monsoon season.

Through the efforts of state government officials, the H&WC was fitted with a roof top 3.7 kWp solar photovoltaic (PV) system with a battery backup. It has proved to be critical to the running of basic and emergency healthcare services for the surrounding villages. Today, the staff is well-equipped to serve the community and provide a range of services to the residents.

Solar PV is powering critical healthcare loads during a pandemic in remote areas of Jharkhand



Nav Jivan Hospital in Palamu, 120 kms from Jharkhand's capital, Ranchi.

Image courtesy: Nav Jivan Hospital/ Palamu District, Jharkhand/ 2019

Robust medical facilities are few and far between in the remote areas of Jharkhand. Nav Jivan Hospital was established in 1961 in Palamu district to serve such remote communities. This hospital has the only Acute Care Unit in the region, and facilities to treat contagious diseases like tuberculosis. For several years, the hospital performed surgeries and child deliveries with flashlights and petromax lamps. While the situation improved when the facility got its electricity connection from the electricity utility, power cuts and voltage fluctuations continued to significantly hamper operations.

To fortify the 100-bed hospital's electricity supply, a doctor generously supported the installation of a 10-kilowatt peak (kWp) solar PV rooftop system in January 2020. Unbeknownst to the team, they were barely a month away from the COVID-19 pandemic. This investment turned out to be crucial, since even though the hospital was in a very remote area of the state, it was crisis ready.



Patients waiting

Image courtesy: WRI India

Facing a healthcare crisis

In April 2020, the Government of Jharkhand identified Nav Jivan as one of the main healthcare facilities for COVID-19 cases to cater to 450 villages in the region. Under the state's guidance, the hospital set up dedicated ward for COVID-19 patients. The critical equipment for the ward and the ICU ventilators are powered by electricity from the 10kWp solar PV system.

This hospital sets an example of how, with improved access to reliable energy, rural hospitals can upgrade its basic as well as critical-care services. Energy can empower rural hospitals with uninterrupted services, reduced diesel costs and pollution, and improve financial efficiency.

Learn more about this facility and WRI India's collaboration with Nav Jivan Hospital at

<https://wri-india.org/blog/fighting-covid-19-solar-powered-hospital-rural-jharkhand-takes-pandemic>



Registration Department

Image courtesy: WRI India



TB Unit

Image courtesy: WRI India

Reliable electricity in facilities is a critical input to handle emergencies

The COVID-19 pandemic has put Indian healthcare facilities in the spotlight. Local administrations need to be equipped with the necessary resources to respond in an effective and timely manner to such emergencies. Reliable electricity is one such resource.



An educational institution that was repurposed to become a quarantine centre.

Image courtesy: Ashok Kumar and Amjad Khan/ 2020/ Jharkhand

Repurposing facilities to adapt and respond to emergencies

Soon after the nation-wide lock down was announced in March 2020, several thousand people began returning to their home states. Those entering the state were mandated to quarantine themselves for 14 days. Several districts in Jharkhand repurposed schools, anganwadis, colleges, and polytechnics (which were closed due to the COVID-19 pandemic) as quarantine centres where those returning could be quarantined and tested. This approach was adopted to limit the spread of the infection to remote rural areas.

Reliable electricity is a critical input for building resilience

Quarantine centres need continuous supply of electricity and resources to run smoothly. It powers basic facilities at these centres including the provision of running water, lighting, fans, and charging for mobile phones. With erratic power supply, water tankers had to be arranged as back up to ensure availability of water. Diesel-powered generators were the only available option at short notice. However, as this instance has shown us, there is a need to invest in reliable non-polluting electricity to help local authorities to respond to disasters and emergencies, such as the COVID-19 pandemic in a timely, economical and effective manner. Since these schools, anganwadis, colleges and polytechnic facilities are often the first to be repurposed as shelters in emergencies, it is important for these facilities to be made more resilient with clean and reliable electricity options.

Reliance on alternate energy sources to power distant and digital education during the pandemic

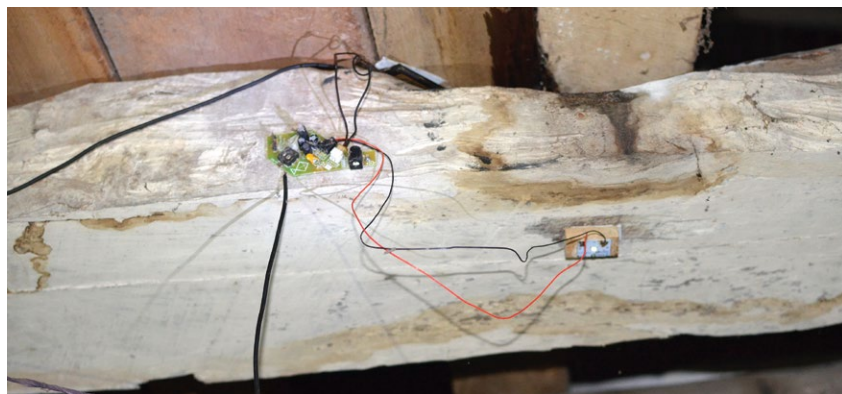


A student entrepreneur waiting for 3 days for electricity supply to resume

Image courtesy: Ashok Kumar/ TRIF/ Nawagarh, Angara Block, Jharkhand/ 2020

Inconsistent electricity supply has forced communities to turn to alternative sources of electricity such as inverters and solar PV systems. These are shared among multiple families in times of power cuts that last for several days.

In addition to charging devices, electricity is needed for basic lighting purposes. To reduce costs, some students sought and shared innovative appliances such as upcycled solar-powered lamps to help with their studies. An enterprising Pahantola resident and Class 10 student, Rakesh assembled a solar PV lamp out of junk solar parts and a cell phone battery to operate an LED light in his room. He learned to do this via a YouTube video, has used this to continue his studies. Students can't cope with the demands of online classes, especially when electricity supply is absent or of poor quality. More efforts are required by national and state agencies to provide the schools, teachers and students with the necessary electricity and equipment to minimise disruption of their education has to be considered as the education sector prepares to work on the objectives set out in the National Education Policy 2020.



The LED light developed by Rakesh

Image courtesy: Ashok Kumar/ TRIF/ Jharkhand/ 2020

Powering women's livelihoods and building a community's resilience to the pandemic with solar energy

The LEADS Resource Centre in Perka village, Khunti, Jharkhand, supported and established by Jharkhand Renewable Energy Development Agency (JREDA), The United Nations Development Programme (UNDP), and ICCO, is a rooftop solar-powered facility providing women with livelihood in these uncertain times.



Women stitching masks and reusable sanitary napkins at the LEADS Resource Centre in Khunti district

Image courtesy: LEADS Perka Resource Centre

COVID-19 has placed acute stress on India's rural infrastructure, including the livelihood sector for women in rural India. Self-Help Group (SHG) led livelihood security and menstrual hygiene issues were pushed further back in several parts of the country.

However, the Life Education and Development Support (LEADS) Resource Centre in Perka village, Khunti District, Jharkhand managed to overcome the above challenges and equip women with necessary support to ensure menstrual sanitation while providing a livelihood option to earn income during the lockdown period due to COVID-19 and even beyond.

A 5 kW solar PV system was established at the LEADS Resource Centre in Perka, Khunti District. Home to the solar powered mask and sanitary napkins manufacturing unit.

Image courtesy: LEADS/ 2020/ Jharkhand



The LEADS resource centre training centre in Perka in Jharkhand's Khunti District installed a 5 kW solar system installed on its premises, in March 2019. The resource centre includes a manufacturing unit where reusable sanitary pads and face masks are made. The manufacturing unit was promptly established to create employment opportunities for women in the nearby areas. 30 women from the village are well trained in stitching and operating the 10 solar-powered sewing machines installed at the centre.

During the COVID-19 lockdown, the women earned an average of Rs. 8,000 per month, manufacturing reusable sanitary napkins, face masks and other clothing apparel. As of August 2020, the team has manufactured 25,000 face masks.

The women have also been traveling across the region to make other girls and women aware of the importance of menstrual and physical hygiene along with the affordable handmade solutions to minimize transmission of the COVID-19 virus.

Watch how this effort created impact:

<https://www.youtube.com/watch?v=OmXU7v0hNX8&feature=youtu.be>

The RACE (Rural Access to Clean Energy) to deliver sustainable energy for all

Swachh Urja is about the promotion and adoption of solar/clean energy solutions in Jharkhand



The 5 kW system installed at LEADS Resource Centre in Perka, Khunti District

Image courtesy: LEADS/ 2020/ Perka, Khunti District, Jharkhand

Rural Access to Clean Energy (RACE) educates the communities on the ill effects of using high smoke emitting fuel for everyday needs. Most of the time, they are unaware of the various government-run alternate energy solutions available to them.

Sudur is a one of the villages that has adopted the use of clean energy. Students now study under solar lamps, irrigation and water for everyday use is sourced via solar pumps and water tanks, and cooking is done on solar- or LPG-gas-powered stoves. Similarly, the LEADS Resource Centre in Perka explores various livelihoods options such as reusable mask and sanitary napkin making and ragi processing through the 5 kW solar PV system installed at the centre in March 2019.

Awareness campaigns and workshops are held in local schools. Demonstrations of solar-powered cooking devices, home systems, lamps, water tanks and pumps inform the villagers about this alternate energy source. A constant effort is made to mobilize the community and spread the benefits of clear energy far and wide across the state.

To know about this initiative, watch this video:

<https://youtu.be/7HKHvJCuYyo> or visit: <http://racejharkhand.org/>

Value-addition to harvested crop through a women-led electricity access initiative

The LEADS ragi processing unit in Perka, Khunti, has empowered women to grow their earnings with the help of solar-run machinery.



Women entrepreneurs who process ragi, next to the solar installation that powers their facility.

Image courtesy: LEADS Resource Centre/ Perka, Khunti District, Jharkhand/ 2020

A low maintenance crop, finger millet, or ragi, as it is commonly known in India, grows without fuss in the plains of Jharkhand. Mandua (ragi) is processed here and usually harvested between November and January. Earlier, farmers would store it unprocessed for a long time. They eventually discovered that by processing ragi, they could sell it fresh in the markets and also increase the value of their produce.

The ragi processing unit in Perka has a 5 kW machine powered by solar energy as part of the Rural Access to Clean Energy (RACE) initiative. It aids in the grinding of the raw crop. Another device installed at the unit helps in the sealing of the filled packets of produce. Every village has a producer group comprising farmers. The women at LEAD's ragi processing centre in Perka buy harvested mandua from these producer groups.

The processing unit is run by a women's self-help group that was started with 15 women workers in 2019. Today, close to 35 women work at this unit. They process and package the cereal with solar-powered machines. They earn an average of Rs 7000 per month.

They have the potential to earn extra as a producer or labourer at the unit too.

To know more about the LEADS ragi processing unit in Perka, Khunti, watch this video:

<https://youtu.be/fdtepECTv4E>

Powering rain-dependent farmer community with reliable solar irrigation

Syngenta Foundation (SFI) and Transforming Rural India Foundation (TRIF) mobilized a rain-reliant community of small-holder farmers with a perennial solar irrigation solution in Chokerbeda, Jharkhand



Solar panels that power irrigation in Chokerbeda

Image courtesy: Ashok Kumar/ TRIF/ Jharkhand/ 2020

Chokerbeda is a village located 8 km from the Gola block headquarters in Ramgarh district, Jharkhand. 450 households, mostly belonging to the indigenous Bediya tribe, comprise this settlement. Their main livelihood is rain-fed agriculture. Given the lack of irrigation infrastructure in the village, farmers have been looking for various options to water their fields, when rain water isn't available.

Reeling in the sunshine

There is a perennial rivulet passing near the village, but the water is in a deep ravine and thus, difficult to access. Diesel-fuelled pumps are not an attractive option, given their high costs. Discussions between TRIF and a group of farmers, led to the identification of a 5 kW solar powered water pumping device and subsurface PVC pipes to carry water to the 16 acres of fields belonging to 33 farmers, as a possible solution. Farmers were offered training and guidance to enable them to be active stakeholders in the project. In the summer of 2019, the installation of this solar powered-irrigation system was completed.

Financing the irrigation solution

Syngenta Foundation India (SFI) and TRIF developed a financing model for the farmers, where farmers contributed 25% of the project cost upfront. To motivate the farmers to invest in this asset, awareness of the project benefits and training were organized. The financial resources available with SHGs and village organizations helped the farmers to access finances when required. The rest of the investment came from Corporate Social Responsibility (CSR) funds.

A bountiful solution

This new solar-powered irrigation system supported the timely planting of paddy, despite the monsoon arriving late in 2019. Farmers were able to harvest their crop on time and prepare for a second crop. Since the absence of water did not allow for a second crop previously, the crop of potatoes harvested later were unprecedented. With increased productivity at the farm, none of the 33 farmers are looking to migrate to the cities for supplementary jobs to sustain them. This solar-powered irrigation solution has been successful in building their resilience and significantly adding to farmer incomes.

Community-managed micro-irrigation systems: public investment for energy access

For a state with high out-migration rates, Jharkhand is ripe with potential to empower farmers with sustainable energy resources.



The grid electricity-based lift irrigation system installed by BHALCO

*Image courtesy: Ashok Kumar and Amjad Khan/
2020/ Jharkhand*

Soso village is located on the banks of the perennial Subarnarekha River in Ranchi district. But lifting its. Despite their proximity to the river, farmers have not been able to utilize the river water to irrigate their fields because their farms are at a significant height from the river.

During the 1990s, agriculture in Soso transformed owing to grid electricity-based lift irrigation systems installed by Bihar Hill Areas Lift Irrigation Corporation (BHALCO). It positively impacted the cultivation patterns in the village. But the path was thorny – since electricity supply was erratic and most of it arrived in the night.

Farming changed once again for these villagers after 2018. A solar-power irrigation system was installed with support from the Jharkhand State Livelihoods Promotion Society (JSLPS). This 5-HP solar powered irrigation system caters to 16 farmers with fields across 52 acres.

This has been life changing for farmers. Farming is now done across seasons, including during the dry summer months. Reliable electricity supply and irrigation facilities have made farmers confident and led to higher farmer incomes.

TRIF worked closely with the Government of Jharkhand to mobilize financial resources for this solution. The active involvement of water user groups and the partnership with the State Rural Livelihood Mission proved crucial to the success of this effort. The user groups manage the operations, maintenance and security of the entire irrigation system.

Building on this effort, TRIF has setup a dedicated State Irrigation Execution Cell (SIEC) within the government for efficient and smooth execution of irrigation systems across 6 blocks in the state. In just 2 years, roughly 550 solar power irrigation systems have been installed and made operational in the 6 blocks. By the end of 2020, it is estimated that over 700 such small irrigation systems running on clean energy will be active in the state.

Solar based irrigation system at
Pahantoli, Angara Block.

*Image courtesy: Ashok Kumar and Amjad Khan/
2020/Jharkhand*



A portable solar-powered solution to irrigate fields

This pump ensures energy access and water control to enable all-year farming



A portable solar powered pump

Image courtesy: Shantanu, TRIF/ 2020/ Jharkhand

Currently, farmers are forced to rely on expensive diesel pumps or electric pumps whose performance is erratic owing to unreliable electricity supply. Solar powered water pumps can be considered an alternative with relative lesser issues of reliability, access (does not face the same challenges with respect to acquiring diesel) and timeliness (the electricity is produced during the day).

In the districts of Gumla and Khunti, Khethworks solar powered water pumps that deliver high efficiency with less energy are being tested. The entire pump-set weighs around 6 kilograms and can be carried on a bicycle. Its low weight also makes it suitable to share this technology and pump between members of the community. The light-weight solar powered water pumps are cheaper than diesel powered pumps and more reliable than grid-supplied electricity. However, despite its lower costs, there is still a need for easy access to finance and funding, to cover initial costs.

The immediate focus is now to establish local distribution networks and development of financial products supported by financial institutions such as banks, SHGs and micro-finance institutions. This will allow farmers to easily access the technology and provide economic safety to their families.

Khethworks was developed by MIT alumni with support from the Tata MIT Centre. The proprietary technology was developed at MIT for 2.5 years before it was brought to India.



Photo by Ayush Manik/Climate change, agriculture and food security/flickr



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