

# Remote Village Electrification through the Biofuels Route

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## The Project

Winrock International India (WII) has taken up electrification of three villages through the biofuel route in the state of Chhattisgarh. The objective of this initiative is to demonstrate the technical and financial viability of running diesel generation sets using vegetable oil as fuel in place of conventional diesel to provide electricity in remote villages. The initiative aims to build upon an existing initiative of WII/MNRE in one of the lesser-developed states in India by designing and implementing a replicable model of remote village electrification through the bio-fuel route. The initiative is complimentary to the actions already initiated by WII along with the Chhattisgarh Renewable Energy Development Agency (CREDA) and MNRE in exploring the use of Jatropha oil for electrification of remote villages in the state.

## Project area & Demography

The project village called Ranidehra comes under Panchayat Bairakh of Bodla block in Kabirdham district. Ranidehra is located deep inside a valley surrounded by forested hills on three sides. The village is not electrified and the grid is about 15 km from the village. The village comprises of 110 households with a total population of about 600. It is fully tribal comprising of Gonds and Baigas. Baigas are primitive and their primary livelihoods depend on the forests and are yet to undertake agriculture. Regarding education, about 37% of the population is literate. The level of education is lower in the case of females at 26%. There are two graduates in the village. 46% percent of the population practice agriculture as their primary source of livelihood. The phenomenon on working on other fields is low, as observed in other tribal areas. In terms of assets, there are two tractors in the village. There are no households having LPG connection for cooking, and they depend on the forest for firewood. There are however one household owning a colour television.

## Activities undertaken

Several activities have been undertaken under the project by using a bottom-up participatory approach with a strong emphasis on ownership of the initiative. Various stakeholders have been engaged for designing intervention, which has ensured ownership of the initiative by the local community and sustenance of efforts beyond the period of project intervention. Given below are the details of the activities undertaken.

### *System design*

Initially a Detailed Project Report (DPR) was prepared taking into account all the logistics and system requirements. The DPR also outlined various capacity building needs and initiatives to be undertaken.

### *Community mobilization and capacity building*

Extensive community mobilization, which is a very crucial aspect in ensuring long term sustainability of the project, has been carried out for management of facilities, including the tariff setting, bill collection etc. A number of training programs for the Village Energy Committee (VEC) and operators of the power plant have been carried out. The operators were also trained at the Field Marshal factory in Rajkot in maintenance of the engines and alternators.

### *Plantation of Jatropha saplings*

In this village, after a long drawn process of securing the buy-in of the villagers, more than 25,000 Jatropha saplings were



planted. WII only contributed the cost of saplings and the villagers undertook pit digging and plantation through voluntary labour contribution or Shramdaan. In order to avoid conflict with food security in the future, plantation has been carried out on farm boundaries and roadsides and not on farm lands. There are little waste lands in the village and after discussion with the villagers; some plantation was also carried out in these lands.

### ***Installation and commissioning***

After the construction of the power plant building, the equipment including gensets, oil expeller, filter press and boiler were installed. At the power plant adequate space has been created for storing seeds and oil. The power plant was commissioned on April 9, 2007, and has been in continuous operation since then. Table 2 provides some selected technical details of the power plant and associated infrastructure.

*Selected technical details of power plant and associated infrastructure*

Generation capacity power	3 x 3.5 KVA gensets
Back-up generation capacity	7.5 kVA
Oil expeller	35 kg/hour
Oil expeller prime mover	10 HP engine
Inverter capacity	1 kW
Hours of supply (households) *	6 p.m. to 9:30 p.m.
Hours of supply (street lights)	7 p.m. to midnight
Total households covered	107
Households with single light points	31
Households with two light points	76
Households with sockets	65
Streetlights and other light points	30
Poles	97
Luminaries at power plant	12

\* this depends on the requirements expressed by the villagers. The VEC takes a decision on this.

### ***Formation of VEC***

A VEC consisting of members from the village community has been constituted to govern the operation and management of this facility. Apart from this, the responsibility of the VEC is to collect the user charges every month. The formation of the VEC has been undertaken as per the guidelines of MNRE under VESP.



### ***Additional interventions***

Recognising the linkages between access to energy and demand of water for irrigation, WII has implemented a complementary project focused on augmenting the water resources in the area and promoting decentralised irrigation infrastructure based on straight Jatropha oil. Simultaneously, the capacity of the farmers has been built to take up improved agricultural practices. This project is being supported by Sir Dorabji Tata Trust, Mumbai.

## **Sustainability of the project**

Sustainability of any project rests on four pillars: (a) technical sustainability; (b) social sustainability; (c) financial sustainability and (d) institutional sustainability. The project is well on its course in attaining all the above.

### ***Technical sustainability***

The technical sustainability of the project can be gauged from the fact that till date the operation of the power plant has been totally reliable – there has not been even one day of downtime in last 10 months of running. The power plant is being managed by three operators, who are trained-both on site, as well as in the factory of the DG set manufacturer. The operators are confident of handling the day to day operation of the power plant, including small repair/maintenance work. However, it would still take some time for them to independently handle dismantling/cleaning /reassembly of the engines. Efforts are currently underway in building their capacity regarding the same.

### ***Social sustainability***

The level of interest and the feeling of ownership have been increasing steadily not only among the VEC members, but also among the community. The power plant is presently run for 3.5 hours in the evening (till 9:30 pm). The battery back up ensures that the street lights are on till midnight. Although the project has been set up and is running well for last seven and a half months, there is a strong expressed need from the community to provide them with hand holding support (and technical backstopping), till such time that they are capable and confident of managing the facilities entirely on their own.

### ***Financial sustainability***

From May 2007 onwards, the villagers are paying for the electricity services. The agreed tariff is Rs 20 per light point/month. The number of light points per household varies from 1 to 3. In addition to the light points, around 65 households were also provided with sockets (based on a survey and willingness of a household to have a socket). The tariff for the socket has now been agreed upon, and from December onwards, the households using the sockets (mainly for entertainment) will also pay at the rate of Rs 30/socket/month. The money collected from villagers is being deposited in the VEC bank account. The collection provides enough money to meet the expenses towards paying the salary of power plant operators/small miscellaneous maintenance expenses and is also generating some surplus for any possible major maintenance work that may be needed in future. The project is also working parallelly on briquetting of the jatropha press cake and its possible sale to the eateries in nearby towns which would open up another revenue stream for the VEC, and may help to drive down the electricity tariff further. Efforts are also underway to establish small business plans for the VEC/local SHG groups that have been set up in the village.

### ***Institutional sustainability***

The VEC is becoming more and more active in every aspect of the power plant operation, including motivating the villagers. Every month they collect the electricity charges from the community and follow up diligently on the late payers. The committee is also actively considering other income generating activities (as mentioned above) to improve their financial situation.

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