

From darkness to light

Village Dageriya



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The conventional grid-based electricity has not been able to reach many remote rural areas and small settlements. The Planning Commission has identified over 80 000 villages in the country, which are yet to be electrified. Of these, about 18 000 villages are unlikely to be ever electrified through grid-based system due to remoteness or low energy demand. The SEBs (state electricity boards) often consider such locations financially not viable due to the high cost of laying transmission lines coupled with low power demand resulting in low returns. In this scenario, SPV (solar photovoltaic) power generation system has emerged as the most feasible and economical solution for electrification in such locations. Electrification through SPV system is also favoured to wind power, which is restricted to coastal areas and few other pockets. A good amount of solar

energy is available at almost all places in the country for most of the days in a year. Moreover, the economic viability of a stand-alone PV system in comparison to the most likely conventional alternative system, that is, a diesel-powered system, analysed for energy demand through sensitivity analysis, shows that the PV-powered systems are the lowest cost option at a daily energy demand of up to 15 kWh, even under unfavourable economic conditions. When the economic parameters are more favourable, PV-powered systems are competitive up to 68 kWh/day. With reducing cost of PV systems and continuous price hikes in fossil fuels, chances are on horizon to meet even higher energy demands.

The village

Prior to designing the system, feasibility of installing such systems in adverse geographic conditions, a reputed local NGO to help

people as immediate source of guidance, and so on were taken into account. Several unelectrified villages of Madhya Pradesh and Gujarat were surveyed. From the data, village Dageriya that falls in Dahod District in Gujarat was found suitable for such work. Inter-house distances vary from 50 feet to 300 feet in the village and it has a population of 1400, mostly comprising the Bhil community. The village has highly scattered clusters of houses with well-demarcated un-electrified segments, which has been developed into sustainable self-managed stand-alone SPV power units. The village owns about 200 animals in the cluster comprising of cows, buffaloes, bullocks, calves, and goats/sheep. Tribal people of the area depend on agriculture or employment as labourers for livelihood. The village has one primary school, two anganwadis, and a small milk cooperative society. Preliminary discussions with the

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Figure 1 The undulating terrain coupled with scattered houses pose a challenge to project implementation at Dageriya

villagers have been found optimistic and receptive, and their response to the work was very encouraging.

A reputed NGO called Sri N M Sadguru Water and Development Foundation is working for the last several years in this area. The Sadguru foundation is a professionally managed NGO with vast experi-

ence in rural development activities. It has been engaged in massive watershed management programmes, biogas plant installation, sustainable development activities for women, manpower training at various levels, and so on.

The power network

The power network in the village was divided into four individual units or power packs. These units were carefully designed considering geography of the cluster and its power re-

quirements. It comprised a suitable number of SPV panels, battery bank, inverters, and other monitoring and controlling devices, poles and cable, and so on. Each household was provided with two CFLs (compact fluorescent lamps) of 11 Wh, with estimated power consumption of 110 Wh per house at an average usage of 5 hours a day. Apart from this, 12 houses, which were distantly located, were provided with individual home lighting systems. Taking the power requirement of the village into account, a 3 kW system was suggested. The schematic plan below will further help in understanding the power distribution in the village.



Figure 2 & 3 A typical cluster of Dageriya and an isolated house

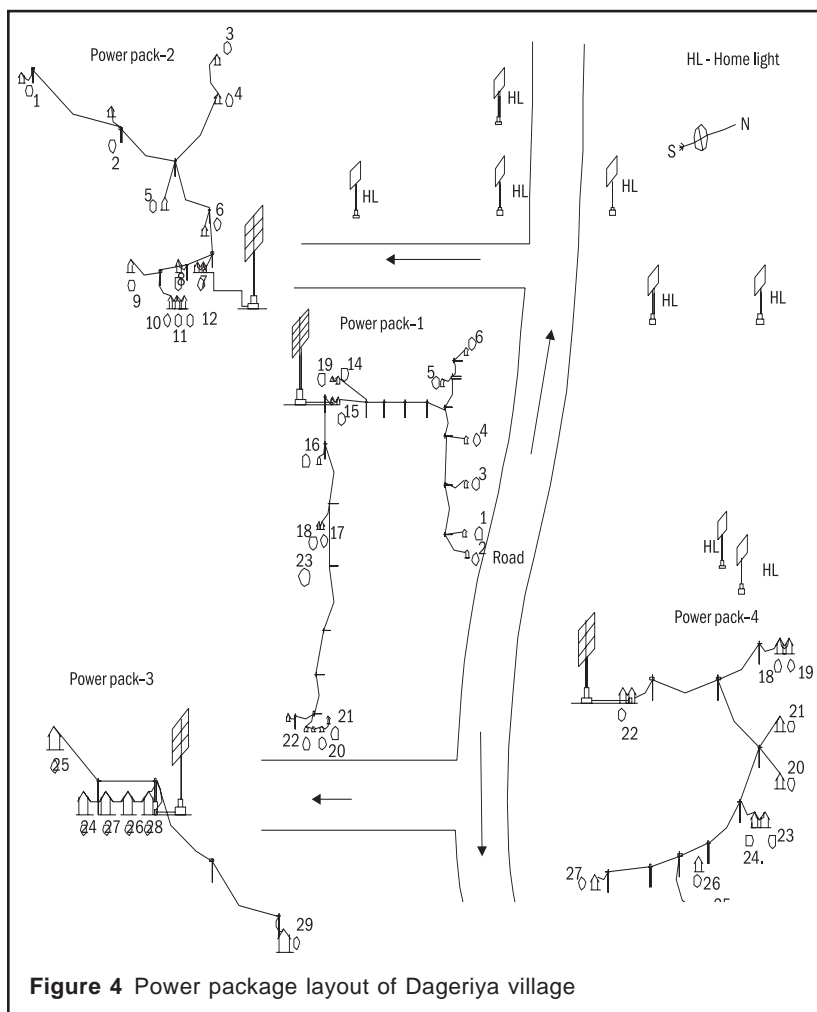


Figure 4 Power package layout of Dageriya village



Figure 5 Pole-cable network in a cluster



Figure 6 Home light system in an isolated house



Figure 7 Dr M Shyam, PC (RES) AICRP, ICAR observing the work at Dageria



Figure 8 Trained villagers maintaining the system

Saur Urja Samiti: a unique example of power management by rural people

Empowering the tribal people with the management responsibility of a modern power sharing system is a huge task. For those who had been used to the lifestyle of getting some subsidized benefits from the government, to take up the responsibility of sharing and managing a modern benefit like SPV power system and more importantly make it sustainable is a great challenge in their life. In contrast, people of Dageriya vil-

lage, have organized themselves into a *Saur Urja Samiti* for coordinating with SPRERI and Sadguru Foundation for proper operation and maintenance of the system. The Samiti has successfully resolved key issues like undertaking the responsibilities of system management and maintenance. It has deputed a cluster coordinator in each cluster to take care of the costly equipment like inverters, battery banks, and to look after proper functioning of the system. One operator is also appointed from the village itself for the maintenance of the whole system, for data collection and to keep in

touch with the concerned person at SPRERI. He is paid a monthly amount of Rs 500 towards his service. To meet such operational and other maintenance expenditures the Samiti collects Rs 30 per household per month as electricity charges, amounting to about Rs 20 000 per year. This fund is insufficient to meet the replacement cost of components like batteries or inverters. Hence, the Samiti is trying to raise funds through other means such as providing the community hall on rent for organizing events like marriage ceremonies and public meetings.



Figure 9 Newly opened shop with telephone

Life after electricity

The stand-alone SPV system at Dageriya has not only brought some definite changes in the life-style of the villagers but has also widened their vision about the village and their role in its development. This is evident from their overwhelming response. Though it is a new experience for the residents of Dageriya, people are warmly welcoming the new air of development in the village. Ms Seetaben Dangji (Cluster I), a resident of Dageriya, was impressed by the impact of the SPV light on the education of her children. According to her, the children are motivated to study till late night due to the new lighting system. It was a great change for them, from studying under the dull kerosene lamp with the smell of the fumes to the clean and bright solar light. According to Motibhai Bhuria (cluster II), the new light had cut down the cost on kerosene and children could read comfortably. Manguben (cluster III) is delighted as doing the household chores in the night has become easy with the new CFLs. Shakjibhai (cluster IV)

felt that the solar light had changed the overall environment in the house during the night. In early morning during the winter season, it helped in attending the cattle and milking.

Moreover, Sri Mukheshbhai Dangji (cluster I), one of the enthusiastic youngsters of the village, was inspired to start a small shop in his house. He runs this shop till late night and supplies daily requirements to the villagers. Subsequently, he has installed a TATA telephone outlet in his shop. It has not only helped in communicating with the people outside the village, but has also put the village on the globe. It has helped improve his earnings and also eased the monitoring post project situation considerably.

At last...

The stand-alone SPV project at Dageria has brought some definite changes in the life style of the villagers and has helped in improving their economics to certain extent. It is evident that providing light alone is not sufficient to raise the living standards of the rural people in such areas. Their economic status also needs to be strengthened through intense income generation activities, as the root cause of rural backwardness is energy scarcity. Hence, wherever found feasible, installation of hybrid energy system based on agro wastes and solar energy should be considered.

Moreover, the concept of users owning the responsibility for managing both aspects of the system that is, generation and marketing is totally new for the simple village users. Hence, all such work requires adequate external monitoring, and appropriate guidance and support, without which many a times the system can fail to meet the planned objectives. In the light of above facts, it is advisable to all future aspirants that a thorough study of the technical, economical, and social aspects of a typical decentralized village should be made. This will yield very useful outcome for designing and installing a suitable system. The data and experience generated out of such an attempt with proper long-term planning could become the basis for future activities. ☀



Figure 10 Cooking in the night time is no more a tedious job for these women



Figure 11 'S' for Solar: Children studying under SPV light