



DESI Power

EmPower Partnership[©] (Employment and Power Partnership) Programme for Village Development

Experience of Decentralised Energy Systems India Pvt. Ltd. (DESI Power)

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Independent Rural Power Producers (IRPPs)
Biomass gasification
Rural employment generation
Rural micro-enterprises
Rural energy services
Agro processing



A EmPP[©] project implemented with BOVS, a village job-creation industrial co-operative in Baharbari, Bihar

The Goal

Since the land and agriculture based village economy in Indian (and many other Third World countries) is able to provide only intermittent income to the villagers, the endemic rural poverty is the direct result of the lack of employment and earnings. This situation can be improved by creating new jobs in small scale industries for traditional agro-processing and in micro-enterprises for local value addition but they are rare in rural areas largely because of the lack of electricity and other infrastructure there. Modern energy services for cooking, lighting and water supply can further improve the living conditions of the villagers, especially of women and girls, but they are also largely absent.

DesiPower's goal of building Independent Rural Power Producers (IRPPs) is therefore to provide electricity and energy services to the villages on a sustainable basis: sustainable from the points of view of local involvement and management, energy supply, financial returns, and environmental and climate change issues. The concept of the EmPower Partnership enables the simultaneous planning and implementation of the electricity supply and energy services by DesiPower and of the local small industries and businesses by the village organisation.

The Framework of Village EmPower Partnership[®] Projects

DESI Power	Village Partner Organisation(s)	Investors, Banks, Grants, Subsidies. Selling CO2 emissions saving
Employment and Power Partnership [EmPower Partnership[®]] for Village Development		
Independent Rural Power Producer: Provide Electricity and Energy Services	Village Enterprises: Water Supply, Agro Processing, Small Industries, Fuel Supply and Processing, Agro-Forestry, Workshop.	Cluster Centre: Organisation and Project Development, Training, Extension Services and Refresher Courses.
Economic, Social and Financial Results		
<p>The Village Regular employment (especially for women), Higher farm output. Better produce prices. Better women's health. Profitable businesses. Capacity to undertake local social initiatives.</p>		
<p>IRPPs: decentralised power plants Assured electric load and biomass supply. Profitable power plant and energy services. Extension fees to run the cluster centres.</p>		
<p>Investors and banks Reliable local borrowers. Reduced risks. Acceptable ROI. Meets social and ethical responsibilities.</p>		
<p>The Government A replicable model for small scale (25 – 100 kWe) decentralised (off-grid) power supply and energy services systems for remote areas. Reduced power and financial losses in rural power grids. Less budgetary support for rural power supply. Increased rural productivity. Lower migration to cities.</p>		
<p>The Environment Lower local pollution. Lower CO₂ emission. Lower energy losses. Saving of non-renewable energy resources. Use of waste products.</p>		
<p>Increased Sustainability: Local and Global</p>		

The Business Model

DesiPower has been working on a program for providing electricity and energy services in villages jointly with local partners who establish local small scale industries, businesses and agro-forestry for value addition and job creation. In order to ensure that both the enterprises become self-reliant and profitable within a reasonable time, the "Business Plans" of the Independent Rural Power Producer (IRPP) and the village organisation (which may be the village Panchayat, a company, a co-operative, or a NGO) are evolved jointly and simultaneously. For commercial success, the power plant has to sell as much electricity as it can generate and the villagers have to produce and sell their products profitably. The IRPP ensures the reliable and affordable supply of electricity and energy services based on locally available renewable energy resources such as agricultural residues and other biomass. The local partner organisation, on its part, ensures the supply of the biomass and the purchase of adequate amounts of electricity at agreed prices. A women's group is encouraged and supported to take charge of the energy service activities such as cooking and lighting for households.

A mutually beneficial partnership is thus created under which reliable power supply and energy services ensure local job creation and income generation, while the assured off-take of power and energy services ensures a profitable operation of the IRPPs.

Cluster Centres

The ultimate target is to install IRPPs in neighbouring villages with a total capacity of about 1 MW. The IRPPs and the village industries pay a small extension service fee to the Cluster Centre and, once all the villages are operational, make it self-supporting. DesiPower has been working on the concept of a "Cluster Centre" which is one of the cornerstones of its decentralised rural development strategy for supporting the managerial and technical sustainability of this programme. The Cluster Centre is active right from the start by working closely with the villagers to promote the local activities.

Once the site is selected, DesiPower develops and builds the IRPP package on the basis of the local conditions and helps the villagers develop the local organisation and micro industries. Subsequently the Cluster Centre takes the responsibility to provide a comprehensive set of "Extension Services" which include technical and managerial training, performance audit of the plants on a continuous basis and refresher courses.

Field Experience

DesiPower has either built or is building 11 biomass gasification based power stations as IRPPs for villages and plantations, and as captive power plants for industries and technical universities. The experience of the technical and financial performance of the gasification based power plants, the problems of packaging IRPPs and the even more complex problems of packaging IRPPs with local enterprises have been analysed and evaluated.

The management of DesiPower undertakes the following tasks:

- Power project development
- Interaction with, and the development of, the village partners
- Plant design, construction, operation and maintenance
- Financial planning and control
- Development of training packages
- Training of own and partners' staff
- Documentation and Reporting Systems.
- Supporting the village partner in technical, financial and management areas.

DesiPower's experience has shown that the organisation, staffing and management structures of the IRPP as well as the village enterprises need to be adapted to the decentralised nature of the programme. Solutions should take into account the range of technologies and activities which have to be covered, the extreme differences which exist between the backgrounds and experience of the participating groups and persons, and the poor or unavailable infrastructure in most of the villages. Management structures should combine the delegation of authority to the local organisation to the maximum extent while ensuring that adequate transparency, accountability and control are maintained. Training has to be given to ensure the quality of the management and the site activities including the timely execution of the projects. The key to success lies, of course, in suitable staffing, especially at the top levels, and the continuing internal training and refresher courses at all levels.



Baharbari Power plant - drying paddy / Rice huller / Irrigation water for selling / Rechargeable battery lantern



Baharbari gasifier / Baharbari dual fuel engine

Financial, Social and Ecological Performance

EmPower Partnership Projects have now been implemented in three villages. The results in one of the villages where the project is most advanced clearly show that the combination of energy supply and value addition / employment generation within one integrated program brings the expected financial, social and ecological results. A two year development and consolidation program is underway with support from the Shell Foundation to quantify these results and make them available for large scale replication of EmPower Partnership model in many more villages.

A Typical "Triple Bottom Line" Performance of an EmPower Partnership Project (with a 50 kWe biomass gasification power plant)

Machines and Equipment	Economic Performance		Social Performance				Ecological Performance		
	Investment in Rs. (Lacs)	ROI % (Profit as % of Investment)	Total Direct Jobs	Investment per job Lacs / Job	Jobs for Women	Other Impacts (e.g. Health)	Reduction of Local Pollution	Reduction of CO2 Emissions	Much Lower Cost of Saving CO2 Emissions
Grants received for investments is given to the project as a loan which is paid back to a Revolving Fund and used for new projects.					These figures are quantified in the Project Feasibility and Packaging Report				
Briquetting Machine 125 Kg	4.5	6.0	2.1	2.1	Yes	Yes	Yes	Yes	Yes
Four Nos. Additional New Pumps with power lines	4.0	17.0	1.1	3.6	Yes		Yes	Yes	Yes
Old Pumps	0.5	51.0	1	0.5	Yes		Yes	Yes	Yes
Paddy Processing	15.0	8.0	5.5	2.7	Yes	Yes	Yes	Yes	Yes
Fishery	1.5	15.0	1	1.5					
Tree Planting	2.5	3.5	1.5	1.7	Yes		Yes	Yes	Yes
Power Plant	30.0	10.0	5	6.0			Yes	Yes	Yes
Other Small Energy Service Units	5.0	10.0	2	2.5	Yes	Yes	Yes	Yes	Yes
Total EmPower Partnership Project	63.0	9.8	19	3.3					

**List of Biomass Gasification Based Power Plants
Commissioned 2002**

No.	Project Name	Location	Year of Installation	Capacity
1	DESI Power Orchha	Orchha, MP	1996	80 kWe
2	Baradhara	Baradhara, Orissa	2000	100 kWe
3	BOVS, Baharbari	Baharbari, Bihar	2001	50 kWe
4	MVIT Phase I	Yelahanka, Bangalore	2002	120 kWe
5	MVIT Phase II	Yelahanka, Bangalore	2002	120 kWe
6	G.B. Engg Enterprises	Trichy, Tamil Nadu	2002	120 kWe
7	WSD, Varlakonda	Kolar, Karnataka	2002	50 kWe
8	G.B Food Oils	Trichy, Tamil Nadu	2002	120 kWe
9	VIT	Vellore	2002	120 kWe
10	WERE / FRENDA	Assembo Bay, Kenya	Shipped 2002	50 kWe

Benefits of DesiPower

Local benefits

- Cheaper and cleaner than diesel generation.
- Cheaper than industrial and commercial tariffs in many states.
- More reliable and of better quality than grid supplies.
- Cleaner than fossil fuel fired plants.
- Smokeless cooking energy.
- Cheaper and cleaner process energy from waste heat.
- Nearly eliminates the consumption of diesel oil in generator sets and substantially reduces the cost of electricity generated by them.
- Local value addition of local resources accelerates the village development process
- Income from local renewable energy resources, including unwanted weeds and agro-residues.
- Promotes sustainable local livelihoods (operation of the power plant, jobs in new local micro-enterprises and small-scale industries).
- Higher agricultural production with adequate and timely water supply.

National and global benefits

- Makes reliable and clean electricity available in rural areas which would otherwise continue to subsist without economic and social progress.
- Contributes to the reduction of migration to cities.
- Reduces the share of fossil fuels in the national energy balance.
- Reduces the share of coal-based electricity supply, the consequent pollution and the resulting over-stretching of the inadequate infrastructure.
- Reduces diesel consumption and air pollution, and the outflow of foreign exchange.
- In short, promotes national sustainable development.
- Helps reduce the risks of climate change by supporting directly the national and global efforts to stabilise the level of CO₂ in the biosphere.

Future Plans

The experience of the first phase is being used to define and formulate the next phase of implementation of DesiPower's rural "EmPower Partnership[®]" Programme. A project to fine tune the business plan is underway in three cluster centres under a grant from Shell Foundation, London. The progress of new investments and training is being continuously monitored and evaluated in the three villages for defining the conditions for a large scale replication of the programme. Discussions on the financing of new projects in other villages in these clusters and in new locations are also underway. In this context, the recent decision of the Government

of India to electrify 18000 remote villages with renewable energy provides an ideal opportunity for integrating the MNES program with those of other ministries dealing with rural development and rural jobs under an EmPower Partnership model.

DesiPower expects that very soon there will a large enough number of villages with successful EmPower Partnership[®] Programmes to make these rather unique projects attractive for private and institutional investors. A part of the investments can also be raised through the integration of these projects in the CDM and Joint Implementation mechanisms of the Climate Change Convention. A beginning has been made through the selling of voluntary CO₂ emission certificates from these projects. It is expected that the equity contribution of the local partner can be raised by the advance selling of the savings of CO₂ emissions for a number of years.



DESI Power plant at Orchha supplies power to a hand made paper factory