



D.E.S.I. Power™

EmPowering Rural India

Who We Are

Decentralised Energy Systems India Pvt. Ltd. (D.E.S.I. Power™) is focused on creating an empowered rural India where green energy is a means to achieve economic development of the region. The mission of DESI Power is to promote the reduction of endemic rural poverty through local job creation driven by electricity generation from power plants based on local resources of renewable energy for local micro-enterprises, businesses and energy services for lighting, pumping for irrigation, modern biomass based cooking fuels, drinking water, cold storage, etc.



DESI Power was founded in 1996 by an outstanding technocrat Dr. H.N.Sharan, who is a world renowned energy expert, together with Dr. Ashok Khosla, Founder of Development Alternatives, New Delhi and an internationally reputed environmentalist. Dr. Sharan has been working in the Power and Energy Sectors in Switzerland and India at the highest management levels during the last 60 years. His experience covers fossil and renewable energy technologies (Biomass, PV, solar thermal power plants, financing and CDM), and energy systems in industrialised and developing countries. He is Chairperson of DESI Power.

What we do

DESI Power builds and operates decentralised electric power plants using renewable sources such as biomass, biogas, bio-fuel and solar. It also establishes the rural infrastructure for access to electricity and economic development around it. They include:

Power Plants for Electricity Generation:

1. Conduct site surveys including assessment of renewable energy sources, energy needs and load surveys, prepare DPRs for integrating supply and demand sides.
2. Set-up biomass gasification, biogas and PV power plants, either on their own or in an hybrid combination. Undertake erection, commissioning, and O&M of the power plant.



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3. Provide EPC and O&M services for power plants, mini-grids, energy services and micro-enterprises.
4. Provide consultation service for preparation of technical specification for biomass gasification and PV solar based power plants.
5. Provide consultation service on financial packaging of power plant.
6. Undertake Energy and technical audit of biomass gasification and PV Solar power plants
7. Provide consultation service on performance evaluation tests of power plants
8. Promote energy plantations and organise biomass management such as procurement, processing and preparation.
9. Provide training and capacity building as well as refresher courses for Power plant Technicians/Operators and Managers at its DESI MANTRA Centre.

Energy services including Micro/Mini Grids for Electricity Distribution:

1. Set-up mini- and micro-grids to deliver power to the customers, including telecom towers.
2. Electrical distribution system and management.
3. Supply of Power System Management Module (PSMM) for Decentralised Rural Power Generation and Supply Systems.
4. Provide consultation service on load management and power evacuation.
5. Provide suitable renewable energy solution to meet power need of the village.
6. Clean cooking energy solutions.
7. Drinking and irrigation water solutions to the farmers and villagers.
8. Sell lighting solution for households, vendors and shops.
9. Collect revenue in the villages for the power plant and MEs.



Training, Capacity Building, Developing Microenterprises:

1. Mobilisation and formation of village cooperative/society and SHGs to manage village programs.
2. Assistance in packaging (including information on subsidies, CERs, loans etc) of power plant and micro enterprises.

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3. Preparation of Project Development Document (PDD) for Carbon trading and CDM
4. Development of new micro enterprises in the villages
5. Training and capacity building – training the workforce not only to run its own operations but also to support other enterprises in the ecosystem.
6. Project management.



Thus, the solutions and services provided by DESI Power create an integrated solution for the economic development of the village.

Our Achievements:

The company has vast experience of over 18 years on operation and maintenance of biomass power plants and has operated biomass plants for many thousand hours with a wide variety of biomass under various conditions. DESI Power also has installed Solar PV plants of capacities ranging from 0.50 kWp to 30kWp and operating them. The Company is offering EPCOM (Engineering, Procurement, Construction, Operation & Maintenance) services to other ESCOs on biomass gasification and Solar PV field.

DESI Power offers an integrated village development solution: (DESI Power has demonstrated under its EmPP Program running in Araria, Bihar using RE technologies like biomass, solar)

Integration: Not only energy solution but Village development with total participation of local people, using local resources and retention of local benefits.

Renewable Energy Technologies: Adapting and adopting decentralised power plants, mini-grids and clean energy services capable of local management & O&M.

Innovation: Methods and means to increase efficiency and sustainability from available technology.

Economics / Job creation: A dynamic demand-supply linkage to ensure profitability for power plants, energy and water services and micro-enterprises and thus create local jobs and reduce dependency on diesel use.

Environment / Ecology: Reduction of local pollution and saving of GHG emissions.

Some of the significant milestones achieved by DESI Power over the past one and a half decade are:

1. **Formation of village organisation:** Establishing partnership models and organisational structures for undertaking full management responsibilities by villagers. DESI Power has worked closely with the villagers and formed cooperatives and societies in various villages who work as a local partners of DESI Power. Local partner role is very important as they take responsibility of

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organising biomass, helping in revenue collection etc.

2. **Setting up small biomass power plants and O&M of the plant:** DESI Power has worked over the years on the continuous development of biomass gasification systems to make them suitable for reliable operation and management by locally trained village staff. DESI Power has setup biomass power plants for a variety of biomass and operated them on a continuous basis, with dual fuel as well as pure gas engines. DESI Power has contributed in a big way to the techno- economical commercialisation of biomass power plant. A list of reference is provided at the end.



3. **Setting up and O&M of Solar PV power plants:** DESI Power is also operating Solar PV plants ranging from 0.50kWp to 30kWp capacity. DESI Power has developed a system called Tiny-Grids. "Tiny-Grids" are designed to provide power for the most basic domestic needs to the unserved people living outside the range of Micro-grids (e.g., lighting, mobile charging and running fans, mosquito repellers and maybe water pumps). Small hamlets of 20-50 houses / shops where power is not available are serviced by short overhead power cables of the Tiny-grid fed by dedicated PV solar plants with battery banks (up to about 1.5 kWp, AC or DC supply). It is a very innovative, technically advanced and financially profitable solution which has proved to be very reliable and consumer friendly. A reference list is provided in the table at the end.
4. **Electrical distribution (micro-grid) system:** DESI Power, at present is operating 7 power plants in Bihar. These plants are supplying power to the local micro enterprises, mobile towers, households and market lighting. DESI Power has laid underground cables for electricity supply to various consumers. The underground cable ensures more security and safety. In the mini-grid at Baharbari & BARA villages, all households are connected by underground cable and each house has a sealed box and MCB, which ensures to address any fault in the line. At the two new Solar sites, overhead cables are provided.

5. **Training and capacity building:** DESI Power has recognised from the very beginning that local management and control are essential elements for the success of village projects. Hence, it has always placed a strong emphasis on training and capacity building of local partners to enable them to carry out their responsibilities effectively. DESI Power runs a training center called DESI MANTRA which trains local people (men and women) on various topics including basic skills, O&M of power plants, biomass management, energy plantation, computer training etc. DESI MANTRA also provides training to other partners.



Class room training

DESI MANTRA trained women working with DESI Power

Village Plant Manager at work

On site technical training of trainees at Gaiyari site

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6. **Revenue collection:** DESI Power has different models for revenue collection. For example, for the mini-grid, it is a daily bill collection providing flexibility to the consumers; for certain MEs also, the collection is on a daily basis; for other MEs and Telecom tower – bill is collected on a monthly basis. This system is proving to be effective.
7. **“SPEED” Program supported by Rockefeller Foundation to Integrate Mobile Towers in Village Projects:** DESI Power is running 5 projects under SPEED and 20 more new projects are planned to be built in the next 1 to 2 years time. The aim is to connect maximum number of mobile towers to these power plants.
8. **Micro-enterprise and Job Creation:** Additional jobs have been created and the income of small farmers has increased by timely supply of irrigation water resulting in increased productivity and growing of energy plants. A large number of non-agricultural jobs have been created through traditional and new micro-enterprises by establishing profitable new local businesses for energy and water services, lighting, bio-businesses, etc.
9. **Energy Plantation:** DESI Power has started energy plantations to ensure security of biomass supply at fair prices. The first one has been set up in Baharbari village with fast growing trees like Bamboo, Ipomea, Kadam, Su-Babool and other local plants. DESI Power is well aware of the issue of food versus fuel which is taken into account by using mostly non-agriculture land for the energy plantation and suitable inter-cropping with vegetables and spices planted in between energy plants. Energy plantation will be extended to each village where biomass plants will be planned.
10. **Power System Management Module (PSMM):** DESI Power has developed the concept of PSMM, which monitors and control the load from the power plant. Installing Power System Management Module in every village with Intelligent controls and smart meters and remote monitoring to manage the demand side fluctuations and optimise generation costs with multiple generators.
11. **Irrigation service:** Agriculture forms the backbone of Indian economy as more than 70% of the population depends on agriculture. Timely availability of irrigation water is the key for agricultural productivity. Irrigation is the main power consuming sector in villages. Due to non-availability of grid power, the required power is being met with by use of diesel, the price of which is not only steeply increasing but also polluting the environment. Hence, the poor villagers are compelled to spend heavily for irrigation. Small farmers who cannot afford to own pumps hire them at hourly rates. Aim of DESI Power is not only to supply affordable irrigation water to the farmers but also eliminate use of diesel pump sets.



DESI Pani – A Boon for farmers and an alternative clean and cost effective solution for irrigation.

Some Unique Irrigation Solutions: offered by DESI Power:

- DESI AC Pump for flood irrigation, powered by decentralised hybrid power station through Biomass gasification and/or Solar PV power plants.
- DESI Solar Mobile PV Pump powered by PV Panels.

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- DESI AC Mobile Pump powered by battery and inverter.

Our Expansion Plans:

Banking on its vast experience of over 18 years, DESI power is on its way to develop solutions based on biomass gasification, biogas, solar PV and hybrid power plants optimised for local conditions:

1. **Lighting:** Starting a solar lighting business based on state-of-the-art LED lights. The LED lamps will be charged by an existing biomass power in the village or by PV charging stations set up in the village.
2. **Biogas plants:** Biogas plants are ideal sources providing clean energy and organic fertiliser for villages with an agrarian economy such as Bihar's. The feed stock - cow dung, water hyacinth and other green biomass are available in plenty and biogas plants can be promoted as rural enterprises either as a part of dairy farms or as separate entities for supplying clean cooking gas and/or electricity, process heat and cooling from Combined Cooling and Heating Plants (CCHP). The biogas plants will also produce high quality organic fertiliser which can be sold to the local farmers.
3. **Clean Cooking energy:** The aim of the project is to provide clean and affordable cooking energy solution in villages. A business unit (Clean Cooking Business Unit) has been be setup along with its village partners to produce pellets from locally available biomass residues and supply them for use in fuel efficient and smoke free Energy Efficient Stoves (EES).
4. **Cold storage and drying:** A total energy system is being developed jointly with equipment suppliers to optimise the utilisation of the waste heat from engines to run cold storage plants and dryers.
5. **Mobile Water pump:** DESI Power's goal is to optimise, commercialise and promote a range of small mobile pumps using a local renewable energy source which can replace the existing mobile diesel driven pumps being used for irrigating small plots with lift irrigation in villages in Araria district. DESI Power already using battery driven mobile pump for vegetable patches.

Awards and recognition:

- DESI Power was declared a winner at the World Bank Global Development Marketplace Competition 2006 in Washington with a prize money of US\$ 200,000.
- DESI Power was one of the global winners of The Tech Museum Award 2008 with a prize money of US\$ 50,000.
- DESI Power was declared a Winner in BIF 2 (Bihar Innovation Forum – a government of Bihar organisation) under Rural Energy category in 2014.

We consider these awards as recognition of the role that decentralised power supply and energy services are destined to play in removing poverty from the rural areas of the Third World and assist rural development in a sustained manner.

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Reference List – Power Plants of DESI Power:

A. Biomass Gasifier Power Plant:

Sl. No.	Location	Year of Installation	Gasifier Rating Kg/h	Engine Rating kWe	Remarks
1	DESI Power Orchha (P) Ltd, M.P.	1996 Gas engine 2004	120	1 x 50 DF 1 x 50 PG	First plant of DESI Power and operated more than 15 years.
2	DESI Power Mahanadi, Orissa	2001	120	36 DF	This plant was built for village water pumping in Orissa when free power became available. The plant was shifted to other location
3	DESI Power Baharbari, Bihar	2001 / 2009	65	1 x 24 DF 1 x 11 PG	First plant of Bihar, installed in an interior village of Araria. A mini-grid has been setup to supply power to all households in the village. Power plant supplies power to households, irrigation pumps and MEs.
4	M. Vishveswaraiah Institute of Technology (MVIT – I), Bangalore	2002	135	2 x 50 DF	These plants were operated in Dual fuel mode to supply un-interrupted power to the college for 3-1/2 years (over 21000 hours of operation). Due to rising diesel price generation was no longer economical and the plant has been shut down.
5	MVIT-II, Bangalore	2002	135	120 DF	
6	WSD / Datia, DA	2002 / 2006	65	50 DF	This plant is used for village application (water pumping and other MEs)
7	G. B. Engineering Enterprises, Tamil Nadu	2002	135	2 x 50 DF	These two plants were installed as pilots for Industrial application. Plants were tested and operated but due to low load demand the plants were not regularly operative. Both plants shifted to Gaiyari 1 & 2.
8	G. B Food Oils, Tamil Nadu	2002	135	120 DF	
9	Vellore Institute of Technology, Tamil Nadu	2002	135	112 DF	Another plant in an educational institution. It is in regular operation.
10	Assembo Bay Project, Kenya	2002	65	1 x 50 DF	This plant was sent to an NGO for a village in Kenya.

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11	Gaiyari 1, DESI Power, Bihar	2008	100	75 PG	Two plants installed at a village to supply power to existing micro industries. Telecom towers being connected to the plant.
12	Gaiyari 2, DESI Power, Bihar	2014	30	25 PG	
13	Bhebhra, DESI Power, Bihar	2009	50	32 PG	Plant supplying power to the near by enterprises and evening lighting.
14	DESI Power Baharbari, Bihar	2009	20	11 PG	Small gasification plant with PG engine for starting without diesel oil and for load management.
15	Bhebhra / Chakai, DESI Power, Bihar	2009 / 2015	20	11 PG	Small gasification plant with PG engine for starting without diesel oil and for load management.
16	BARA, DESI Power – Minda Partnership, Bihar	2012	50	32 PG	DESI Power and Minda NextGen jointly have setup 32kWe plant.
17	Chakai, Araria	2014	100	75 PG	Plant installed at Chakai village to provide power to irrigation pumps, which is needed throughout the year for vegetable growing.

DF = Dual fuel, PG = Pure gas

B. Solar PV based Power Plants:

No.	Name of the plant	Description	Capacity	Year of installation
1	Araria /PV	Roof top PV for office and household incl. pumping	2.5 kWp	2013
2	Araria /PV (Mongra Haat)	Lighting with Tiny-grid	0.5 kWp	2013
3	Araria /PV (Garhbanaili)	Lighting with Tiny-grid	0.5 kWp	2014
4	Araria /PV (Navratna Chowk)	Lighting with Tiny-grid	0.5 kWp	2014
5	Araria PV (Chakai Yadavpur)	Lighting with Tiny-grid	0.5 kWp	2014
6	Araria /PV (Paiktola Dhanuktola)	Lighting with Tiny-grid	0.5 kWp	2014
7	Araria /PV (Hridaypur)	Lighting with Tiny-grid	0.5 kWp	2014
8	Araria /PV (Balwa)	Lighting with Tiny-grid	1.5 kWp	2015
9	Baharbari / PV	Battery charging for lighting & Pump.	2.5 kWp	2014

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10	Laluabari / PV	Lighting with Tiny grid	0.6 kWp	2014
11	Lokharia / PV	Solar PV for lighting, MEs, Mobile Tower and Pumps	30 kWp	2015
12	Mahalgaon / PV	Solar PV for lighting, MEs, Mobile Tower and Pumps	30 kWp	2015

DESI Power Activity:



Biomass and Solar PV Based Power Plant



Irrigation business unit



Flour Mill



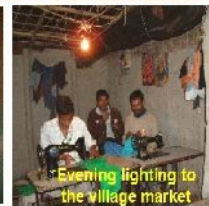
Mobile tower



Rice business unit



Pellet Machine



Evening lighting to the village market



Household Lighting

Micro Enterprises, Mobile Towers and Lighting



Running a training center in Araria



Energy Plantation with Inter-Cropping

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