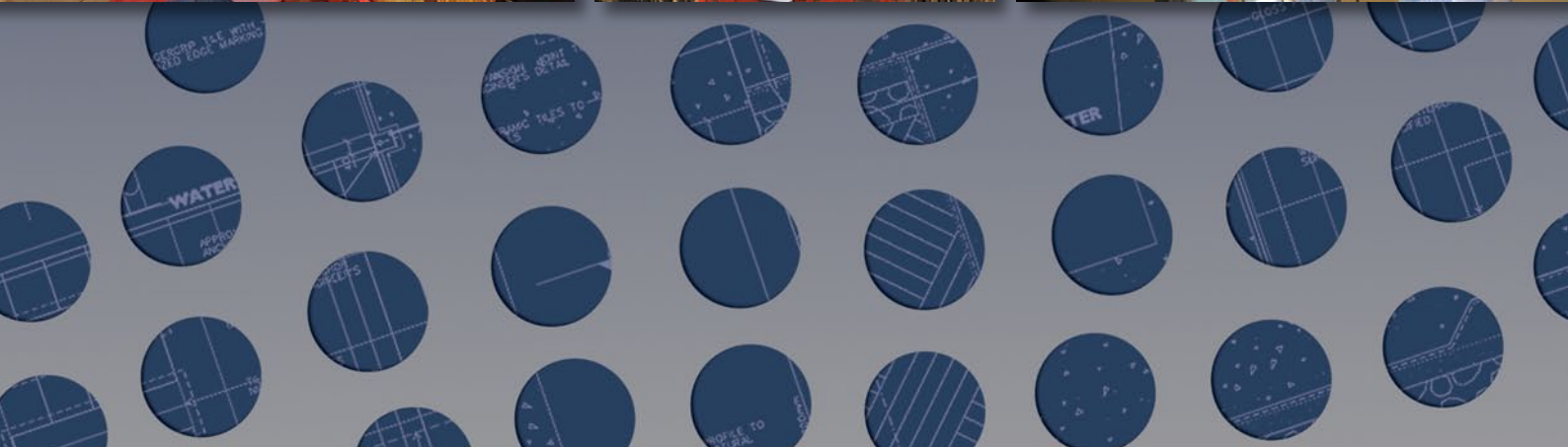




BUSHLIGHT INDIA PROJECT

Collaborative Development and Demonstration
of an Optimised Model for Remote Village
Electrification using Renewable Energy

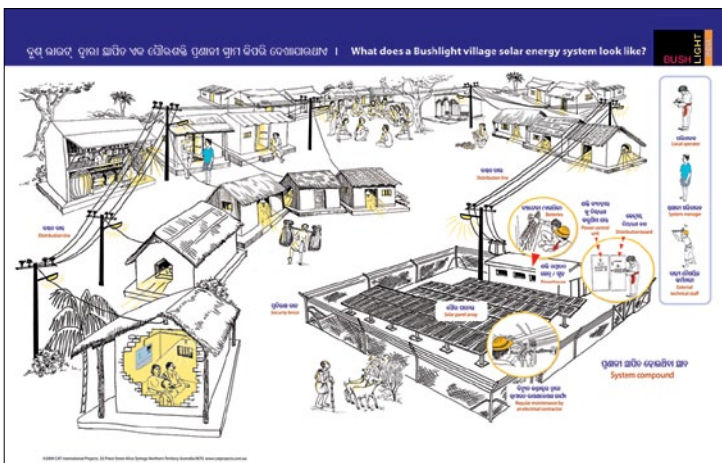
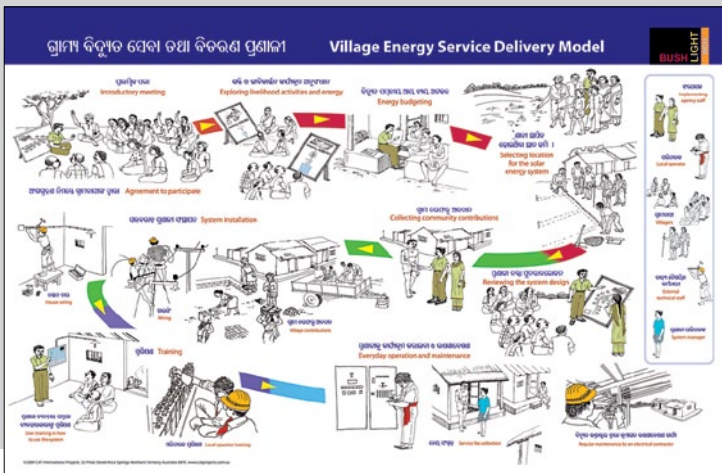


Lack of reliable, affordable energy is a major factor inhibiting the development of local economies in many rural areas. In India today many thousands of villages are without access to electricity and are too remote for grid electricity to be considered a technically or economically feasible option. For these villages to be electrified, the only solution is a standalone (distributed generation) power system. In this context, renewable energy technologies offer remote communities the opportunity to generate their own energy without the prohibitive ongoing costs and access difficulties associated with fossil fuels.

The Bushlight India Project is funded by the Australian Government and approved by the Government of India, under the Asia Pacific Partnership on Clean Development and Climate, Renewable Energy & Distributed Generation Taskforce. It is managed by CAT Projects, an Australian organisation with direct links to the highly successful 'Bushlight' project which, since 2002, has been providing remote Indigenous communities in Australia with access to reliable renewable energy services within the context of a comprehensive community engagement and energy planning framework (www.bushlight.org.au). This framework – the 'Bushlight model' – aims to understand communities' energy needs from a livelihoods perspective and use this understanding to design and install robust renewable energy systems that respond to communities' livelihood and economic aspirations and constraints and enhance their sustainability. A key aspect of this involves demand side management (DSM) and energy efficiency education and training, supported by hardware that provides communities with tools to effectively manage a limited daily energy supply.

Through the Bushlight India Project, CAT Projects is working with a network of Indian community organisations and RE industry participants, including the Government of India, to develop an optimised Village Energy Service Delivery Model (VESDM) based on the successful Bushlight model and to demonstrate this in a number of remote villages in India. Project partners include Gram Vikas, a grassroots NGO from the state of Orissa, Tata BP Solar India, the West

Bengal Renewable Energy Development Agency (WBREDA, a Government of West Bengal organisation), the World Wildlife Foundation (WWF - India), and Greentech Knowledge Solutions, a private consultancy firm based in Delhi specialising in renewable and clean energy technologies and rural energy solutions. The VESDM has been successfully implemented in two remote villages: one in western Orissa and one in the Sundarbans region of West Bengal, with one demonstration system operational (Orissa) and the other under construction with commissioning scheduled for Dec 2010.



The VESDM

The VESDM is a process for planning and establishing technically and financially sustainable, centralised renewable energy based village energy systems. Intended for use by project developers of all types, it is a comprehensively documented and resourced set of processes covering everything from initial village selection and financial modelling, through to community energy planning, system design, and post-installation system support.

The VESDM is premised on a service philosophy of providing a predetermined, assured amount of energy

Large format banners used during the Village Energy Planning process. Top: VESDM Process Poster. Above: System Overview Poster. (Oriya versions)

to all consumers, every day and providing people with the information and tools to use this energy to complement and build their livelihoods as they need and choose on a day to day basis.

The village selection component of the VESDM uses a set of criteria that compare villages according to the type and level of resources they have access to, the aim being to ensure that Bushlight India energy systems are only established in villages with the requisite level of resources and capacity to support, maintain and productively utilise the energy from the system. It also includes customised financial modelling and life cycle cost comparison tools which allow for the capital and recurrent costs associated with a solar PV based system to be estimated and compared with other potential supply solutions.

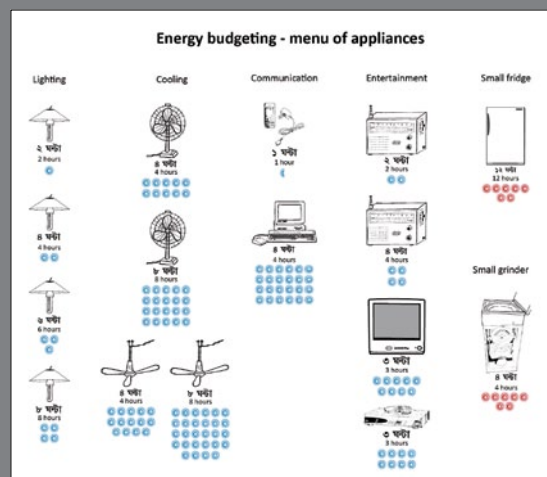
Once a village is selected Village Energy Planning (VEP) can begin. This involves a set of community level meetings and smaller group workshops and planning sessions that explore, identify, map and quantify the community's and individual households' energy needs and financial capacities using a documented, standardised process. The VEP is described in detail in a comprehensive Facilitators Manual and supported by a range of intuitive and easy to use image based media resources (currently in English, Oriya, Bengali, and Hindi).

The information collected during the VEP then informs a system design process that uses a standardised system design tool based on international best practice. The system design is then reviewed by all parties including representatives of the village before being finalised for inclusion in the supply and installation tender documentation.

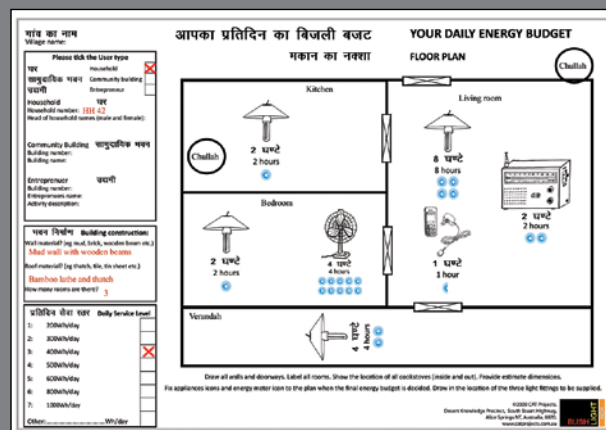
Appropriate technology

The VESDM has been developed to support the implementation of a centralised solar PV based energy system supplying electricity for domestic, community and commercial loads through a standard 230V distribution system. Its most unique aspect compared to existing models of remote village electrification in India is the use of the Urja Bandhu, an energy management unit that makes a fixed, agreed amount of electrical energy available every 24 hours to each consumer. Engineered and manufactured in India, this key piece of technology is installed in every connected building and can be programmed to provide "daily energy budgets" from 0 - 10,000 watt-hours/day.

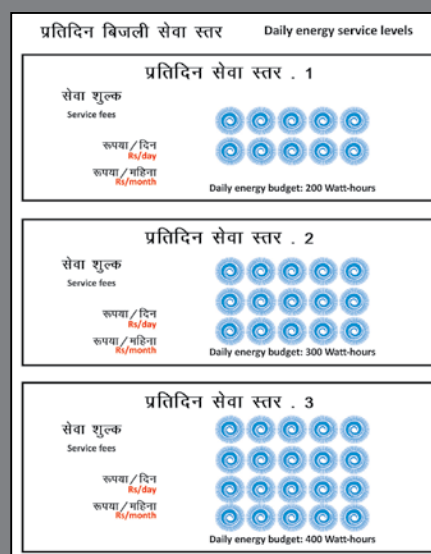
Energy Budgeting resources:



Appliance menu showing the energy consumption of different appliances (1 blue star = 20Wh) over different usage times. (Bengali version)



Example of completed household energy budget showing average planned appliance usage and the final Daily Energy Budget selected. (Hindi version)



Service level chart showing daily/monthly costs for different budgets; used by households for deciding which daily energy budget amount they want and can afford. (Hindi version)



Urja Bandhu with programming module. The five lights count down as energy is used and thereby indicate the amount of budget available.



Urja Bandhu installed on stand-alone mounting pole in a house in the village of Maligaon, Orissa.



System Control Board

Another unique feature of the Bushlight India VESDM is the specially designed System Control Board (SCB), a ‘smart’ central distribution board which segregates the different load types within the community into different lines. This allows a high degree of definition for monitoring power usage (including any power theft) and faults. Also engineered and manufactured in India, the SCB incorporates an automated load-shedding system whereby power is disconnected on a prioritised basis to the different load types during extended periods of low sunlight, avoiding the need for total system shutdown.

The Urja Bandhu and System Control Board are the major technical components of the demand side management strategy of the VESDM, which along with the information and education components of the VEP, and the user training delivered post-installation, work together to ensure that systems are protected from damaging overuse, while ensuring that people have reliable daily access to the amount of energy identified and planned for during the VEP.

Conclusion

When implemented as designed, the VESDM ensures systems are only installed in villages where they are the most appropriate technical and economic option; that consumers are provided with the necessary support, information and tools to use their energy to complement and build their livelihoods as they need and choose; and that systems incorporate fail-safe protection against damaging overuse, while also maintaining the quality, reliability and equity of supply to all consumers.

System cost is little more than standard centralized solar PV systems being installed in India today, however, the quality of the energy services delivered to consumers exceeds all existing models of service delivery using decentralized generation, while the use of Urja Bandhus allows simplified tariff structures to be adopted and a variety of institutional management structures to be employed.



Australian Government



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