The
Bushlight
India
Model

Reducing the structural impediments to remote village energy service provision at scale

Michael Tuckwell
What it is not:

• Lighting programme
• Technology deployment programme
• Specifically a GHG mitigation programme
• A one size fits all solution
• Supply side driven
What it is:

A highly replicable model for the delivery of electricity services in remote un-electrified villages that are:

- Reliable
- Equitable
- Of known amount determined by the consumers
- Of known (planned) cost
Background

• Collaboratively developed with grassroots NGOs, RE industry representatives, rural energy experts and government agencies

• Adapted from the highly successful Bushlight indigenous community renewable energy program in Australia (140 communities since 2002)

• Only appropriate for villages with the human and economic resources and capacities to manage, pay for and productively utilise the energy produced from the system

• Readily adaptable to other energy supply technologies
Outcomes

• Residents’ expectations and capacity to pay for energy services are successfully understood

• Energy budgeting ensures people are able to match their livelihood needs to their financial capacities and aspirations

• Energy systems have the capacity to meet agreed expectations

• Consumers given the tools to choose how and when they use their ‘daily energy budget’

• Residents become consumers of energy (as opposed to owners/operators of power systems)

• Training & support for local governance structures & operators
Structural barriers to remote village electrification

- Finance
- Operation & Maintenance
- Technology & design
- Community Planning
- Governance
- Supply chain
The Bushlight Model

A comprehensively documented and resourced, stage-wise process involving:

• Village Selection
• Village Energy Planning (VEP)
  • Education & Information
  • Energy budgeting
• System design
  • Technical
  • Financial modelling
  • Comparative life cycle cost assessment
• Establishment of institutional management & support structures
• Training and support program
Urja Bandhu

- Designed and developed by CAT Projects
- Manufactured in India.
- Individually programmed to limit the total daily amount of energy used by each consumer to the daily energy budget selected during the VEP.
- Initial cost: ~Rs 3500 including switchboard and mounting plate.
- Intuitive display links in with the energy budgeting process.
System Control Board

- Designed and developed by CAT Projects
- Manufactured in India.
- ‘Smart’ central distribution board with 4 individually monitored & controlled outgoing feeder lines.
- Automated battery voltage based stage-wise load shedding system.
- Intuitive interface allows operators to easily monitor system performance and identify faults.
What does a Bushlight village solar energy system look like?

Village Activity cards

Energy Budgeting Resources
YOUR ENERGY BUDGET

FLOOR PLAN

Living Room

1. Kitchen
2. Living Room

4 hours

1 hour

Other Rooms

Various other sections and diagrams are present on the sheet, but the main focus is on the energy budget and floor plan.
Demonstration systems

Demonstration of effectiveness of model.

Centralised solar PV based energy systems supplying power for domestic, community and commercial loads through a 230V AC distribution system.

Implemented by local partners Gram Vikas (Kalahandi, Orissa) and WWF-India (Sundarbans).
Challenges for a scale roll-out

• Capacity building of in-country implementing partners; and technical, ‘quality control’ partners

• Development of effective supply chain strategies

• Development of cost trajectories that optimise economies of scale

• Identification of key mechanisms for enabling development of local livelihoods and economies to maximise the impacts of electrification
Service Expectation & Demand Growth

- Whr/Day
- Stage of Development
- Area of relevance for Bushlight Model
- Average Urban Household
- Average Maligaon Household Budget
- Solar Lantern
Optimisation Required for Scale Up

$/kWh (LCOE) vs. $/connection vs. time/communities electrified