Light and Life in the Bush

BUSH LIGHT

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Putulki

Sculptor Day Day Frank works on a wooden boomerang.

The Setting

This case study looks at Putulki, a small Warramungu community north-east of Tennant Creek. At the time of Bushlight's first meeting with the community, the population consisted of up to 17 full-time residents and up to 18 visitors. The community have three houses and a shed.

The community run cattle and horses on their country and make artefacts which are sold at galleries in Tennant Creek and Ti Tree. They also have chickens and geese and a vegetable garden. They have plans to create more shade around the community, to build more fencing and to dig trenches to manage run off after heavy rains.

Bushlight's Approach

Bushlight has established a process that assists homeland communities plan and manage their energy services. This process is called the Community Energy Planning Model (CEPM).

Over several meetings, Bushlight regional staff discuss with residents the energy services available to the community and how those services could be best used.

These participatory meetings and discussions are an exchange where the community provide important information to Bushlight about their community so that Bushlight can provide relevant information to the community to raise their awareness and knowledge of energy. The community use this awareness and knowledge to make decisions and to plan sustainable – that is, affordable, consistent and reliable – energy services that will meet their current and future energy needs.

Existing Energy Services

During the initial meetings with Bushlight, it was established that the community had the following energy resources available:

- Wood

- Solar hot water heaters
- Solar bore pump
- Gas
- Diesel

Wood was plentiful around the community and used for warmth and outside cooking. All three houses were fitted with solar hot water heaters.

The community use rainwater for drinking and bore water for cleaning and other purposes. All three houses have rainwater tanks and these usually meet their potable water requirements during the wet summer season. Potable water has to be trucked into the community during very dry periods.

Putulki use firewood for cooking

LPG is available from Tennant Creek and although the houses have gas plumbing, the gas stoves in each house required maintenance. The community were also concerned that children could turn the gas on risking explosion.

The community generated electricity using a 10kVa diesel generator which they ran for about 14 hours a day at a cost to the community of more than $15,000 a year. The community was tired of the noise made by the generator and wanted to move the generator further from the houses.

Putulki's Generator

Energy Service Goals

Following discussions with Bushlight, the Putulki community thought that gaining access to RE power would free up money previously used to buy diesel. This money could be used to increase the number of horses and cattle, to plant trees for shade and to develop their vegetable garden. These plans would however depend on securing a good supply of quality bore water.

It was hoped that if RE could provide 24-hour power for everyday purposes, the generator could just be used to run air-conditioners and any large power tools needed to shape wooden artefacts.

It was important to the Putulki community that the outstation was a place where the next generation could continue to live and visit.

Energy Services Planning

As part of the CEPM process, Bushlight and the community looked at all the energy sources available to the community and discussed the community's energy needs. Other factors such as population, social structures, future plans and daily activities, that might affect energy use in the community were also discussed.

The CEPM process culminated with the community making decisions about the most appropriate forms of energy to use in the community and the development of a 'Community Energy Plan' or CEP. The CEP is a document that details all the decisions made throughout the CEPM process. This process is carried out in consultation with the community and their resource agency Julalikari Council Aboriginal Corporation (JCAC).

The Putulki community made a number of decisions regarding the use of energy in the community:

- RE would be used for refrigeration, lights, fans, washing machines and entertainment appliances
- The diesel generator would be used during cloudy periods when there is not sufficient excess power for the use of the washing machines, hot water boosters, small power tools and/or keyboard. When the community wishes to use electric kitchen appliances,

Bushlight RE System—Major System Component Specifications

RE system	PV array (kWp)	Battery bank (Ah @ 24V)	Inverter (kW @ 40°C)	Charge controllers (A @ 24 V DC)
House 1	2.4 (30 x 80W modules)	1400	1.5	100
House 2	2.56 (32 x 80W panels)	1750	1.5	120
House 3	1.92 (24 x 80W panels)	1400	1.5	100

larger power tools, air conditioners and/or an existing old 300L freezer in house 2

- Firewood would continue to be used for cooking although the community would also use gas

Putulki residents discuss the community's energy needs with Bushlight staff

During the Community Energy Planning process it was agreed with each household that some specific appliances would be treated as deferred loads. This means the appliances will only be used during those periods when the batteries are fully charged and excess power is being generated. In the case of the Putulki houses, it was agreed that the use of washing machines, small power tools and a keyboard would be deferred until excess power is available.

System Specifications

A Bushlight household renewable energy (RE) system was installed at each of the three houses at Putulki. The systems have been designed to provide a combined total of 18.9 kWh AC per day. There are no DC loads. At this time Bushlight had not developed its Community RE System. The equipment and battery enclosures were installed under the veranda of each house and the PV array installed on the roof. These systems were commissioned in October 2004. The central community generator was connected to each system as back-up and to supply 'generator only' loads at each house.

Each of the Bushlight RE systems provide power to non-critical appliances (eg. fans and TV) via "discretionary" circuits and to critical appliances (eg. fridge and lights) via "essential" circuits. If the battery bank charge falls below a predefined level, the power to any discretionary circuits is cut while maintaining a continuous power supply to critical appliances.

Costing Information

The total installed cost of the three Bushlight energy systems was $174,000. This includes two service visits in the first year and additional works such as changes to the wiring of each house and the installation of efficient lighting and energy management hardware. The Australian Greenhouse Office 'Remote Renewable Power Generation Program' (RRPGP) provided a rebate of approximately $73,000 on the total cost.

These Bushlight energy systems provide 24 hour power to the community and offsets the use of over 12,000L of diesel fuel and abatement of over 33 tonnes of greenhouse gases annually. The total diesel offset by the provision of 24 hour RE power to the community is equivalent to 12,000 litres per annum. This equates to an annual cost saving of approximately $17,000, and greenhouse gas abatement of 33 tonnes.

Photovoltaic panels were roof mounted

Day Day and Roy Frank with Bushlight Staff and the Bushlight Household RE System House 1

Community Service Agreement

The Community Service Agreement (CSA) is an agreement between the community, its support or resource agency, the agency funding maintenance of essential services and Bushlight where each party agrees to work together, in a spirit of cooperation, to

maintain and sustain the energy services. The CSA clearly articulates the roles and responsibilities of each party as well as describing maintenance and repair arrangements.

As of the 1 July 2006 Bushlight will be responsible for the maintenance and repairs of all Bushlight RE Systems. However the actual delivery mechanism will be determined by local circumstances. Existing CSAs will be renegotiated to include this new arrangement.

The CSA also covers the collection of user contributions to pay for future maintenance carried out by the Resource Agency. Although community members have agreed to make fortnightly contributions and JCAC has agreed to administer these payments, JCAC has determined that such contributions should be implemented across all 40 communities they service, not just at communities Bushlight works with. At present these administrative needs are still to be finalised.

Community User Training

Bushlight delivered user training directly after installation and commissioning of the RE systems. Training is delivered in three stages over a period of several months and covers operation and maintenance, basic troubleshooting and energy management.

The Putulki community told Bushlight they had adapted their previous energy use patterns by getting into the habit of turning off appliances that weren't being used. They are regularly checking battery voltage and demonstrated that training had enabled them to manage their energy needs and supply. This was confirmed with data from two of the household systems that showed energy use was being well managed.

For a few months, the third house was inhabited by new occupants who were not present throughout the CEPM process or the user training. This group had vacated the community again by the time of the CEP Review. The community indicated the new occupants numbered around 15 people and that the household was losing discretionary power frequently during the night. System data again confirmed the communities reports. It is uncertain as to whether these people will return to the community. If they do, Bushlight will endeavour to take them through the user training.

In June 2005 Bushlight delivered its Level II Training at JCAC premises. Key areas of training delivered include: basic electrical concepts; RE system components and what they do; basic maintenance tasks; common problems and how to fix them; managing energy use; working safely with RE equipment.

This course delivered to nine participants, with five attaining satisfactory completion. Although none of the Putulki residents were able to attend the training, Bushlight RE trainer conducted an on-site "troubleshooting crash-course" with Day Day, Irene and Caroline Frank from Putulki.

Level II participants learn about batteries and circuits

Maintenance Issues

As part of the CSA, it is the responsibility of the community to report any problems with the Bushlight RE systems to JCAC or directly to Bushlight. As there is no telephone in the community, this means either calling in to the JCAC office while in town or reporting it to JCAC staff when they visit the community.

While few problems were reported to Bushlight, a couple of issues were noted during maintenance visits during the first year.

One issue was a result of faulty existing household wiring that caused an RCD to trip when ceilings fans in one of the houses were used. Other issues resulted from the community using appliances which use too much power. For example, one household had been using an old, inefficient freezer and, as a result, lost discretionary power on several occasions. In this case, the household knew the source of the problem, as the use of that old freezer had been discussed during the CEPM process. The household needed to keep using the freezer, however, until they could save up for a new one. They have now removed the old freezer.

As there are no trained RE technicians in the Tennant Creek area, technicians currently travel from Alice Springs. As part of Bushlight's plan to develop a regional service provider network, Bushlight is working to increase the skills of JCAC staff and to assist local electrical contractors to gain

accreditation to install RE systems and to develop experience with servicing and repairs.

Bushlight staff train Resource Agency staff in system maintenance

Community Outcomes

> *":I reckon it's good (solar power); we just gotta always turn 'em off, not leave 'em all on."*
>
> *Day Day Frank, Putulki Resident*

Following the installation of the Bushlight RE systems, the community is making significant savings now only using diesel to operate large power tools and air-conditioners. The community previously spent more than $6000 a year on diesel, now they only buy diesel occasionally and spend far less. They were not sure how much, however Debbie Rankin of JCAC noted that Roy had previously been in every week for diesel, he now only came in occasionally. She said that local people who had Bushlight systems installed at their outstations were often commenting how much money they were saving on diesel.

When making artefacts, small power tools such as a planer and a polisher are operated from the RE system, while larger power tools such as an electric saw are operated from the diesel generator. Much of the work making artefacts is done using hand tools.

The community noted that they had noticeably more money to spend now, although they were planning to run the generator more often in summer during the hottest nights when they want to use air conditioners. The rest of the time, the fans that operate from the RE systems enabled people to sleep at any time of the day or night without the noise of the generator.

The generator is now used only occasionally.

As the community had anticipated, they also found that 24-hour power enabled them to operate refrigerators and freezers. Prior to the installation of the Bushlight RE systems, intermittent generator power meant more frequent trips to town for supplies and difficulty trying to keep food cold. Now with RE power, trips to town were less frequent as they have a greater capacity to store and preserve food.

The community have planted new trees, a small area of lawn and would still like to start a cattle business and plant more fruit trees. These plans are on hold however, as recent efforts to find more ground water of suitable quantity and quality proximate to community have not been successful. JCAC expect that further investigative drilling will be undertaken over the next year.

Richard James of JCAC told Bushlight "the systems were a "godsend" for the communities which had one. He thought Bushlight systems were more successful than other RE systems because they were appropriately sized and "user friendly", with "less things for people to break".

In Mid 2005 a fire at Day Day's destroyed both the house and Bushlight System. The family has been able to relocate to House 3 as the residents have moved to Tennant Creek to access medical services.

Contact Bushlight