

Light and Life in the Bush

BUSH LIGHT

Case Study 3

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At the launch of the Dingo Spring Bushlight RE system.

Dingo Spring

Introduction

This case study looks at Dingo Spring, a small community 45km east of Kununurra in Western Australia's Kimberley region.

Traditional owner Thelma Norman and her family returned to their homeland from Perth in 1994, at the request of tribal elders, to care for the country and re-establish the community of Dingo Spring. At that time the homeland had been unoccupied for several years and the old buildings, formerly used as an Aboriginal elderly people's facility, were run down.

The generator was stolen in 1997, and with no power the family was unable to permanently occupy the homeland. Since this time and due in part to essential services being in a poor state the community has only been occupied on a part-time basis.

This case study looks at the work Bushlight has carried out with the people of Dingo Spring, and how the installation of a Bushlight Household Renewable Energy (RE) System in October 2004 has impacted on the community.

Bushlight's Approach

Bushlight has established a process for use with homeland communities to plan and manage their energy services.

This process is called the Community Energy Planning Model (CEPM). Bushlight regional staff sit down with community residents and take them through this process.

The process helps residents to choose and manage energy services that are best for them and that will help them achieve their aspirations.

This is achieved in part by providing residents with technical and other information so they can choose sustainable, i.e. affordable, consistent and reliable, RE services that will meet their current and future energy needs.

In making decisions about energy services, residents take into account the technical and financial limitations that are associated with their various energy services options.

Energy Service Goals

During the initial stages of the CEPM process, Dingo Spring residents identified a number of benefits they hoped to gain with access to reliable, affordable electrical power:

- Continuous (24hr) power supply for domestic appliances.
- Reduced trips to town due to being able to store fresh food for longer and not relying so heavily on diesel.
- Freeing up finances by not needing to purchase large quantities of diesel.
- Increased access to computers, primarily for educational purposes.
- Provide a greater range of entertainment equipment for children. It was mentioned that this would help to keep children away from 'bad influences' in town.

Through gaining these benefits the community felt they would be making significant progress in reaching their primary aspiration of quiet enjoyment of their country. This would then allow the community to concentrate on other ideas to help make them more self sufficient including growing vegetables and fruit, keeping livestock and starting a bakery enterprise.



A picture drawn the children of Dingo Spring to show how they would like to see their community develop

Existing Energy Services

Before an assessment of appropriate energy services could be made, an understanding of existing energy services and associated issues was needed. Through discussion it was determined that the community used:

- Firewood
- Gas
- Petrol

Firewood was the main fuel source used for cooking, the main reason being the high cost of alternative fuels. Good quality firewood was readily available around the community and surrounding bush. However, sourcing dry firewood during the wet season was problematic.

One house used gas for cooking and there were plans to use gas in a second house. The community did not have any issues regarding safe use of gas and would on average have the one 45kg bottle filled twice a year, at a cost of \$120 per refill.

Due to the generator being stolen in 1997 the community survived without electrical power for several years. However in 2001, the year that Thelma's son and daughter-in-law returned to live at Dingo Spring, the community purchased a small portable petrol generator.



Honda 2.5kVA portable generator used for electrical power

The community and resource agency, Waringarri Aboriginal Corporation, had set up an arrangement whereby \$30 was deducted from each CDEP worker's fortnightly pay. This money was then used to buy fuel, which was delivered to the community on a weekly basis. At the time two adults were contributing to this scheme. However, the quantity of fuel this arrangement provided was found to be inadequate, and the people of Dingo Springs would purchase on average an additional \$15 of fuel each week.

The inadequate size of the generator and cost of fuel meant that there was not enough power for even basic domestic needs. There was only enough electricity to power the lights and fans in one of the houses for four hours a day.

Dingo Spring had previously used solar power for heating water and to pump water from the bore into the storage tank. However, when Bushlight visited the solar hot water heaters and solar bore pump were inoperable. The portable petrol generator was being used to fill the water storage tank.

Energy Services Planning

Bushlight provides electrical energy solutions for domestic requirements. Before Bushlight was able to justify working with the people of Dingo Spring the inadequate infrastructure for supplying potable water had to be addressed. Working closely with Waringarri Aboriginal Corporation, Bushlight helped facilitate the provision of a new solar bore pump, tank and water reticulation system, which was installed in August 2004.



New water tank and pipe work

The Energy Service Planning stage of the CEPM allows Bushlight an opportunity to investigate the community's energy needs and issues, social structures, mobility, household members and daily activities. During this process community members build up a greater understanding of issues associated with energy provision and use. This allows both parties to make informed decisions about appropriate energy services.

The end result of the process is the Community Energy Plan (CEP), a document that details the agreed use of available types of energy.

Due to the community's experience in using wood and gas, it was agreed that they would continue to rely on a combination of these for cooking. Plans to extend the use of gas into at least one of the other two houses were to be pursued by the community.

After assessing the condition of the solar hot water heaters and establishing that their refurbishment was cost effective, Bushlight encouraged Waringarri Aboriginal Corporation to fix the units. Hot water from these units was made available to the community in late 2004.

Dingo Spring was viewed as a high priority community due to the extremely limited availability of electrical power, and continual commitment of the people to live on their homelands.

The peak (design) load was determined as occurring during the wet season for three reasons:

- Refrigerators would draw a greater load in the hotter ambient temperatures.
- To make living in the humid climate more bearable fans would need to be used.
- During school holidays the occupancy rate was envisaged to increase significantly.

Of available options it was decided to provide a household RE system, but to reticulate power from the system to all three houses. It was understood that a household RE system would not be able to meet 100% of the domestic power needs during these peak load months. The community, Waringarri Aboriginal Corporation and Bushlight agreed that during peak load months additional power, if required, would be provided by the generator from sunset till bedtime.

Generator power was also identified as being required to run some of the larger appliances the community wished to sustain. This included musical instruments for the community's band, Mothers Inc, which sometimes practises at Dingo Spring. Bushlight catered for this activity when planning additional works at the community, by installing a new streetlight and generator only power outlets for the band's equipment.

In view of these limitations that could not be otherwise avoided the community stated that they would upgrade their existing small portable generator with a more appropriately sized unit to meet these energy demands.

This solution was understood to be stretching the capacity of the system and it was anticipated that an upgrade would be needed within three to five years, to meet future energy demands. This was detailed in the CEP and indicated as being achievable through either replacing the household RE system with a community RE system or by installing a second household RE system. It was predicted that these future works could be justified by the expected increased number of permanent occupants.

System Specifications

The household RE system was commissioned on 28th October 2004. It was decided that the most appropriate place to locate the system was adjacent to the house that was most consistently in use.

The system was mounted under an existing verandah, however a concrete slab had to be laid to support the system due to their being no existing flooring. The solar array had to be mounted on a free standing frame, as the roof was not orientated in the right way and there was heavy shade from a nearby Boab tree.



Preparing for installation

Power was reticulated from the system to the other two houses via centrally timed circuits. When power is needed at these two houses, the circuit timer has to be activated via the interface on the system enclosure. The duration of the timer was agreed to be set at 12hrs.

Additional works included upgrading the existing reticulation system, rewiring the main house to bring it up to standard and to accommodate the required circuit configuration and the installation of demand management fittings. Due to the CEP identifying that generator power would be required to provide the additional power during the peak load months, some work to the existing generator set up was also required. This included reticulation to the proposed generator site, and the adaptation of one end of an existing shed to house a new generator that the community was intending to purchase.

Bushlight systems power non-critical appliances via "discretionary" circuits and critical appliances via "essential" circuits. To ensure continuous power to critical appliances, power to discretionary circuits is cut when the battery charge drops below a predefined level.



The Bushlight household RE system at Dingo Spring

Major System Component Specifications

PV array	3.0kWp (40 x 75W)
Battery Bank	2400Ah @ 24V
Inverter	2.2kW @ 40°C
Charge controller	120A @ 24 VDC

Costing Information

The total cost of the system was \$141,761. This figure includes costs associated with two service visits in the first year and additional works, i.e. reticulation upgrade, house rewiring, demand management fittings, construction of the concrete slab and adaptation of the existing shed. The Western Australian Government RPPGP provided a rebate of approximately \$67,762 on the total cost.

The total diesel offset by the provision of equivalent 24 hour power to Dingo Spring is 7,884 litres per annum. This equates to an annual cost saving of approximately \$10,250, and a greenhouse gas abatement of 23 tonnes.

Service & Maintenance Agreement

The Service & Maintenance Agreement is a document required to gain pre-approval of the RPPGP rebate. This document is an agreement between the Dingo Spring community, Waringarri Aboriginal Corporation, Mamabulanjin Aboriginal Corporation (as the installer) and Bushlight, in which all parties agree to uphold their responsibilities to ensure the RE system is used appropriately, serviced and maintained.

During the CEP Review in April 2005 Bushlight observed and recorded that all parties have been meeting their obligations. The following was noted:

- Community members have been using the system in accordance with the training provided, monitoring and recording meter readings and keeping the solar panels and area around the system clean.
- Waringarri Aboriginal Corporation have been regularly checking the system, monitoring the community's energy use.
- Mamabulanjin Aboriginal Corporation had undertaken the 6 monthly service visit and tended items listed on the Defects Notice.
- Bushlight has overviewed service visits, undertaken quarterly inspections, monitored system operation and use and supported the community and Waringarri Aboriginal Corporation during the maintenance period.

In addition to the above Waringarri Aboriginal Corporation has continued to administer the fortnightly deduction from the community's CDEP wages to pay for fuel. As fuel usage was expected to reduce significantly it was agreed that the community would contribute this money towards post-warranty maintenance, repairs and battery replacement.

Post Installation Community Training

Community Training was delivered to Dingo Springs residents with the aid of a pictorial based User Manual and their solar RE systems. This training included system operation and maintenance, basic troubleshooting and energy use management. Bushlight training was designed to be broken into stages to allow time to experience system use and operation.

Bushlight provided logbooks to allow the community to keep track of the system gauges. During the first few months after installation, residents checked the gauges daily, and from then on only occasionally. During the CEP Review, residents told Bushlight that when little change was recorded from day to day they decided that they only needed to check levels when there was an increased demand for power.

"Dingo Spring residents are happy with the new Bushlight system and saving money now that diesel is not needed. The power levels are well managed by the people."

*Gary Elford, Waringarri Aboriginal Corporation
CEP Review April 2005*

Tanya Norman commented that the training provided was so straightforward that even the children listened in. Their understanding of how the system works is clearly shown, as they have initiated their own training for visitors to ensure their power is appropriate used and managed by everyone staying there.

The above shows that the training at Dingo Spring has been very successful. More impressive is the community's exceptional ability to manage the power available.

"That's the first thing we tell everyone who goes out there. We have a fridge and freezer that's always connected but we can't have people plugging in hair dryers, frying pans and all that. We give them the Bushlight manual to read."

*Tanya Norman, Dingo Spring resident
CEP Review April 2005*

Although the CEP specified additional generator power may be required during the wet season, the community successfully managed available RE

power without needing to access more power.

During this period the population swelled to 25 people, due to school holidays. This was the largest number of people that had resided at Dingo Spring for an extended period. The system was managed such that power to discretionary circuits was lost on only one occasion.

The community has also managed to use the available power to maximum benefit during the dry season. Without losing discretionary power the community band has been able to practise, using power from the RE system, by carefully monitoring the system gauges and timing their practice sessions appropriately.

Appreciating the importance of looking after the household RE system, as an essential service, the people of Dingo Spring nominated Thelma Norman's son Wayne Norman to be manager of the system. Over time Wayne has trained his younger brother Bevan Norman to the point where responsibility has now been handed over. This has allowed Wayne to spend more of his time to focus on land issues and other community responsibilities.

This is a significant step in the community's acceptance of the system as a fundamental part of their lives, and one that assists them in living on their country.

Maintenance Issues

Dingo Spring residents had regular support and contact from both Waringarri Aboriginal Corporation and Bushlight in the first half year after the system was installed. This was due in part to the community wanting to inform Bushlight that they still had continuous power and also to confirm that the readings on the system gauges were good. Waringarri Aboriginal Corporation was keen to support the community and make sure the system was used appropriately and well managed. In the first few months field officers undertook weekly checks of the system; now they check the system about once a month.

While the system has been well maintained and efficiently managed by the community, a couple of issues have arisen. Residents have proven a good knowledge of the system through their ability to diagnose and fix these issues by either troubleshooting the problem themselves or accessing telephone support from Bushlight.

Soon after installation a contractor was completing some additional wiring works, after completing the works he did not turn on all of the circuit breakers. The community realising they had no power to some appliances, tasked Wayne Norman as the system manager to check the system. He was able to use knowledge gained in the initial training along with information provided in the User Manual to identify an isolated circuit breaker and turn it on.

The first time the community lost discretionary power was in January 2005, in part due to an extended period of overcast weather. Tanya noticed that while discretionary power was unavailable in the main house the two outer houses still had power. She immediately called Bushlight to report the situation, and was advised to make sure no one used power in these two houses until the batteries had managed to charge up sufficiently to restore discretionary power. The fault was later identified as being due to the reticulated power to these two houses being wired up as essential loads, and was rectified. In the interim and to the community's credit they did not lose discretionary power again, so this problem did not become an issue again.

During pest control works in early 2005 a contractor opened the front door and sprayed insecticide powder over the system and into the vents. The residents were concerned that this may have had adverse effects on the system and contacted Bushlight immediately. While there have been no ill effects, Bushlight's researched the issue and established that mothballs were a more appropriate form of pest control for inside the RE system.

Waringarri Aboriginal Corporation is aware that there is a need for them to have a better understanding of the system, as they will be the primary support agency after the warranty period has lapsed. Two of their field officers have completed Bushlight's basic maintenance course for RE systems, and have in so doing improved their knowledge and understanding of RE systems.

Community Outcomes

There was a lot of excitement in the community when the installation of the Bushlight system was being planned. Community members initiated a celebratory launch to be held after the system had been commissioned, inviting government and community representatives and providing a meal for everyone.



People gathered at the community during the launch organised by the community

Since the provision of a reliable power supply, and the upgrade of the water supply system, there has been renewed enthusiasm for living on the homeland. For the first time since the community was established Dingo Spring was permanently occupied during a wet season.

"Going out there was real hard once upon a time. Now we just flick a switch and we've got power."

*Tanya Norman, Dingo Spring resident
CEP Review April 2005*

There are now eleven family members permanently occupying the three small houses, with others visiting for weekends and extended periods. The maximum number of occupants for any length of time has been twenty five.

Some of the permanent occupants commute to work and school in Kununurra; others work on their community through the Community Development Employment Program (CDEP). There are also a number of community members on CDEP who live in town but commute to the homelands during the day to carry out their work. Since the provision of reliable power and water the number of people working on CDEP has significantly increased, from two to thirteen.

This increased occupancy and use of the homelands has had a flow on effect, leading to further progress at the homeland in several ways. With an increased number of CDEP workers there is now access to a larger amount of finance to pay for recurrent and capital purchases associated with CDEP work. Improvements carried out by workers on CDEP include minor infrastructure repairs, rubbish disposal, redecorating houses and gardening.



House 3 after renovations (insert shows condition of house when Bushlight first visited the community)

While many improvements are underway the design of the houses is such that without major infrastructural work they will only offer limited protection from wind, rain and dust. With permanent

occupancy the community has been able to address this by applying for grants through the Western Australia Department of Housing and Works. An application has been submitted requesting these major renovations to the houses, including the provision of new solar hot water heaters to replace the inoperable ones.

“Full time occupancy of the community since the power, and water system, upgrade was completed has reinforced our view, that Thelma and her family have a very strong long term commitment to the Dingo Spring outstation.”

John Schmidt, Bushlight Regional Manager

The community has been conscious that the household RE system was deemed to be the first step in providing the required power for all three houses, and with the increased population they realised that the power demand would exceed what the system could provide. To ensure they do not over work the system they have purchased a new 6kVA diesel generator.

The intention is to use the generator when there are many visitors or when the power needs are high. However, as the occupancy rate increases there is a risk that the community will become more reliant on diesel fuel and the upgrade of the household RE system may be delayed.

Presently Waringarri Aboriginal Corporation collects deductions from the thirteen community members who work under CDEP. Therefore the money being contributed by the community towards the upkeep of the system and other energy services is considerable. Careful planning is required to ensure this money is not used to purchase diesel to continually supplement the need for additional power by running the generator; and instead is used to maintain the RE system with an aim of upgrading it as detailed in the CEP, hence in the long term freeing up more funds for other community activities.



Thelma and Tanya Norman provide feedback to Bushlight's Dave D'Antoine about the system

Now that the community has had time to settle into their improved surroundings they have had more time to dedicate to the establishment of economic activities. They have investigated the option of setting up a bakery and have decided that there is not sufficient market available to sustain the venture. An alternative has been researched and they are currently establishing a tourism business for women.

It is intended to invite women to the community for day trips to learn about Aboriginal women's culture. Thelma will run the tours with the support of other family members, taking tourists to places of interest, collecting bush food, cooking damper and "showing them what Aboriginal women do in their day". Tanya Norman has started a business course and is already sourcing assistance to develop a business plan.



With improved essential services living on the homelands is now considered as a viable option for family members

The rate of progress towards their primary aspiration of quiet enjoyment of their country has been considerable. There are reliable essential services, the houses are being improved, economic ventures are being started and more and more people want to come back to living on their homelands.

“Now everybody wants to move out there because we've got power there. I keep telling them, we've only got three houses.”

*Tanya Norman, Dingo Spring resident
CEP Review April 2005*

Although there are a variety of entertainment options now open to the children and younger generations, including the use of musical instruments, computers for education and games and television and stereos; they still need to travel to town to attend school. There is also the issue of trying to accommodate the many family members who would like to move back to their homelands. To overcome these issues the community is now investigating available avenues for getting a school and additional houses built.