

BUSHLIGHT

Bushlight's Community Energy Planning Model





Bushlight's Community Energy Planning Model
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Desert Peoples Centre, South Stuart Highway,
Alice Springs, Northern Territory, Australia



Background

The planning and delivery of services and infrastructure in remote communities can be a complex and costly exercise. If service delivery is carefully tailored to meet the needs of residents, these costs and complexities can be reduced and a better outcome for clients is achieved.

The Centre for Appropriate Technology (CAT) has been working with residents of remote Indigenous communities for over 30 years. During this time CAT has developed a deep understanding of the importance of meaningful community engagement and the design of services and technology that meet the needs of the user.

Bushlight is the part of CAT focussed on improving community energy services. Since 2002 we have worked directly with more than 120 communities to design, build, commission and maintain 140 small and large-scale solar systems. In addition we manage a maintenance program for over 120 'non-Bushlight' renewable energy systems applying the same principles of engagement and design retrospectively as well as an energy efficiency program aimed at reducing household power costs. In total, Bushlight formally works with over 260 communities across remote Central and Northern Australia.

Bushlight believes that there is a strong link between having access to reliable and affordable energy services and being able to pursue development opportunities.

This publication introduces Bushlight's Community Energy Planning Model (CEP Model). It outlines the major parts of the process and highlights those elements of the Model that involve community engagement.



Contents

- 1. What is the Community Energy Planning Model? 6
- 2. Community Energy Planning with residents 8
- 3. The role of resources 10
- 4. Preliminary stage 14
- 5. Community Energy Planning stage 16
- 6. Design stage 20
- 7. Capital Works stage 22
- 8. Installation stage 24
- 9. Maintenance stage 28

What is the Community Energy Planning Model?

The Community Energy Planning Model describes Bushlight's process of working with community residents, other support agencies and electrical contractors to improve a community's energy services. This process typically results in the installation of a Bushlight renewable energy system. The Model describes the entire process from preliminary preparation and planning, through to ongoing system monitoring and community support in the years following system installation. Each team within Bushlight fulfils a crucial role in the process; and each stream of our work - community engagement, system design, and the capital works and maintenance programs - is tightly interdependent.

By setting out the series of steps in our approach, the CEP Model allows Bushlight to be confident in the quality of our process and allows us to replicate this process across our national program.

Despite its structure, the Model also allows for a degree of flexibility in its implementation. This is important because of the great diversity of circumstances that exist in the communities we work with. Communities in Western Australia's Kimberley region can differ greatly to those in the Top End of the Northern Territory and Queensland as well as those in the desert Centre. The CEP Model can be tailored to the needs and circumstances of each different community.



Ultimately, the implementation of the CEP Model ensures several key factors are in play:

- residents actively contribute to the planning process and are equipped to make informed decisions about their energy services and energy use
- system design is based on the actual needs of the community and takes into account possibilities for future growth
- residents and service providers have access to ongoing support and training
- the renewable energy systems are serviced and maintained regularly to ensure system performance and reliability.

The following pages provide an overview of some of the activities carried out during the various stages of Community Energy Planning.

Community Energy Planning with residents

The first steps in the CEP process are focused on engaging with community residents through our Community Energy Planning meetings. During these meetings Bushlight staff encourage maximum resident participation and a two-way exchange of information. In this way a profile of the community is built up, existing energy use is assessed and future energy requirements and sources are reviewed. Information is provided on the range of energy options available and the benefits and limitations of renewable energy.

Bushlight works with residents to develop a Community Energy Plan which provides a record of all key information discussed during meetings including details of each household's current 'energy budget' (set daily energy allocation tailored to the needs of each dwelling). The Community Energy Plan is accompanied by a Community Service Agreement which sets out the roles and responsibilities of each party in using and looking after the renewable energy system – residents, the service provider and Bushlight.

With this intensive approach to training and engagement, by the time the hardware is installed residents have a strong sense of ownership over the system and are confident in its operation.



The role of resources

Bushlight's CEP Model relies on a suite of image-based and hands-on resources using plain English and minimal text to convey technical and non-technical concepts. These include booklets, posters, whiteboard activities and solar demonstration kits. Because the subject matter is reasonably technical and because low levels of English literacy may be a factor in some communities, using images and offering practical activities helps to establish mutual understanding around energy concepts. The graphic components are used consistently throughout the planning and training processes.

Maintaining communication is critical to the success of our work with communities. Image-based newsletters are sent to communities to provide an overview of what was discussed at the previous meeting and to let residents know what to expect next. Because of the sometimes lengthy timeframes involved in the design and installation of a renewable energy system, it is important for us to stay in touch with residents and service providers throughout the planning stage to keep both parties up to date with any developments.

In addition to the Community Energy Plan, at the time of system commissioning user manuals and appliance posters are used to support the training process. The user manuals are an important resource to help residents explain the system to visitors and also to refer to for troubleshooting advice if there is a problem with the system.



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Bushlight Hybrid System Users Manual

This book is for families who live in a community with a Bushlight Hybrid System.

It has information about how the System works and how to use it.



Controls at your house - EMU

When in power card mode:

- You will not use up your Daily Energy Budget.
- Power will last until you run out of credit or until 12 midday when the Daily Energy Budget is reset.
- Check your card meter to see available credit.



Power card operation of your Bushlight EMU



Press this button to power all circuits with power card power. The light will come ON. You must have credit. This is useful if you have run out of Daily Energy Budget power.

Adding credit to the card meter

The amount of credit you have will be shown here.



To add credit, insert a new power card here.

39

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Daily Energy Budget Appliances

These appliances are good to run on daily energy budget power.

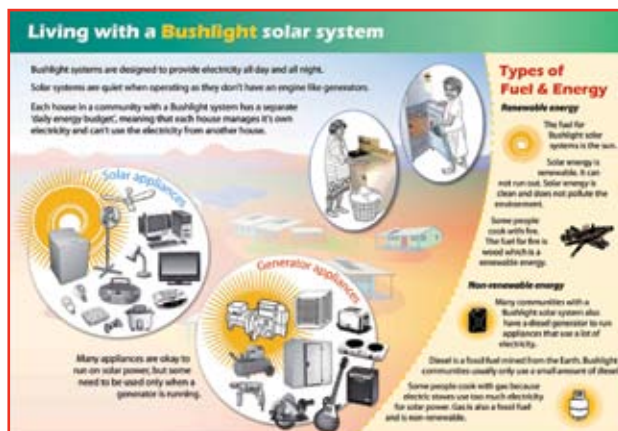
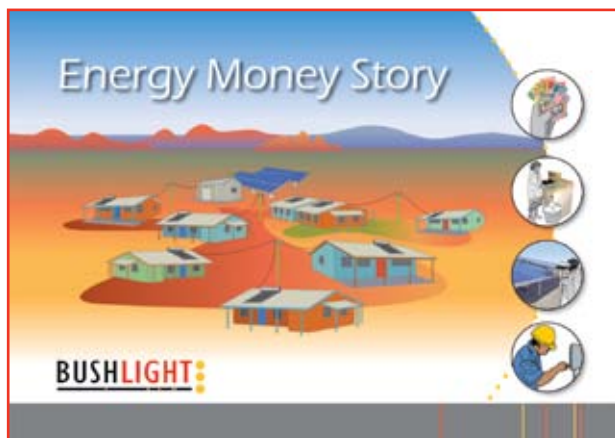
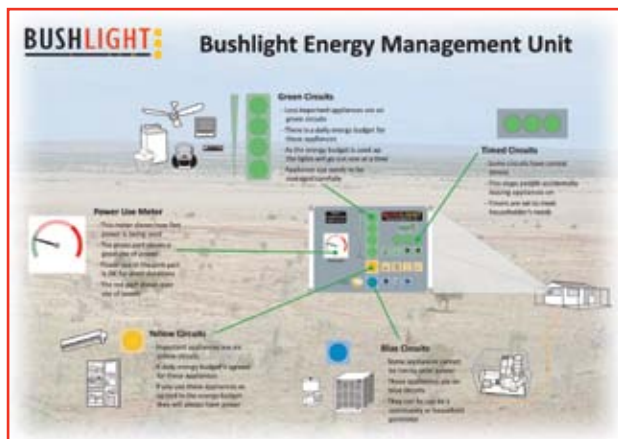


Best to use your washing machine in the morning when the lights are still plenty of power. You can also run your washing machine using power card power.

Power Card Appliances

These appliances use lots of power - run them using power card power.





Preliminary stage

- First contact with community residents and service provider
- Community eligibility verified
- Traditional owners contacted and supportive
- Land tenure documents verified



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Community Energy Planning at Maparu



Bushlight would like to invite interested staff of **Marthakal** to attend the **Community Energy Planning** meeting at **Maparu** Community.



Nina Brown and **Murray Schneider** from Bushlight will be talking to residents about how Bushlight can help to improve their energy services through the provision of Renewable Energy solutions.

Bushlight aims to actively involve community residents in the planning process and in formulating the RE system design requirements. As service providers to Maparu, your valuable input will also be incorporated in to the design.

Who: Interested staff of Marthakal

Where: Maparu community

When: 10-12th August

For more information contact **Nina Brown** from Bushlight on **(08) 8941 2510**

Community Energy Planning stage

- Introducing Bushlight and the CEP process
- Mapping activity - community layout and families
- Different types of energy and how energy can be measured
- Costs associated with different types of energy and fuel
- Current community circumstances and aspirations for the future
- Household energy budgets
- Mapping household floor plans and auditing current energy use
- Solar array location
- System design requirements documented (collation of above information)





WASHING CLOTHES DEPENDS ON BATTERIES	ENTERTAINMENT 2 hours 10 hours 3 hours 3 hours	COOKING gas burner 	HAIR CLIPPERS 20 minutes per day HEATING NEBULISER 30 minutes per day
COOLING HOUSE Bedroom 1: 8 hours Bedroom 2: 8 hours Bedroom 3: 8 hours Pulchri fan on veranda: 4 hours	FOOD COOL 	LIGHTS Bedroom: 3 x 1 hour Veranda: 1 x 2 hour / 1 x 2 hour Kitchen: 1 x 12 hour / 1 x 2 hour Hobby room: 2 x 6 hour Toilet bathroom: 2 x 20 minutes	CHRISTMAS LIGHTS 1 hr + house per day KEY BOARD 1 hour per day SEWING MACHINE 20 minutes per day POWER TOOLS

Jackie M house		
What	How many	Hours
	1	24 hours
	1	8 hours
	1	5 hours
	1	3 hours
	1	1 hour (ea)
	1	5 hours
	1	2 hours
	1	3 hours
	1	1 wash

Daily energy budget for Family House/House 2



Family house/house 2 has

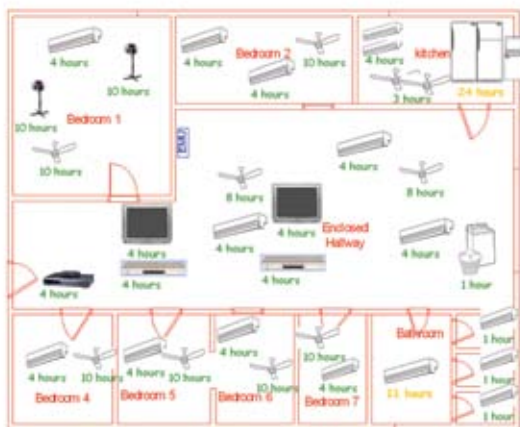


13.47 kWh's of energy available in summer

and



12.27 kWh's of energy available in winter



Daily energy budget for Lak Lak's House



Lak Lak's house has

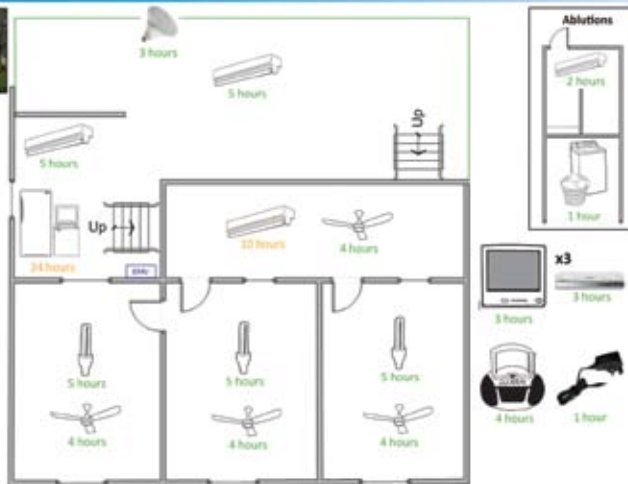


6.3 kWh's of energy available in the wet season

and



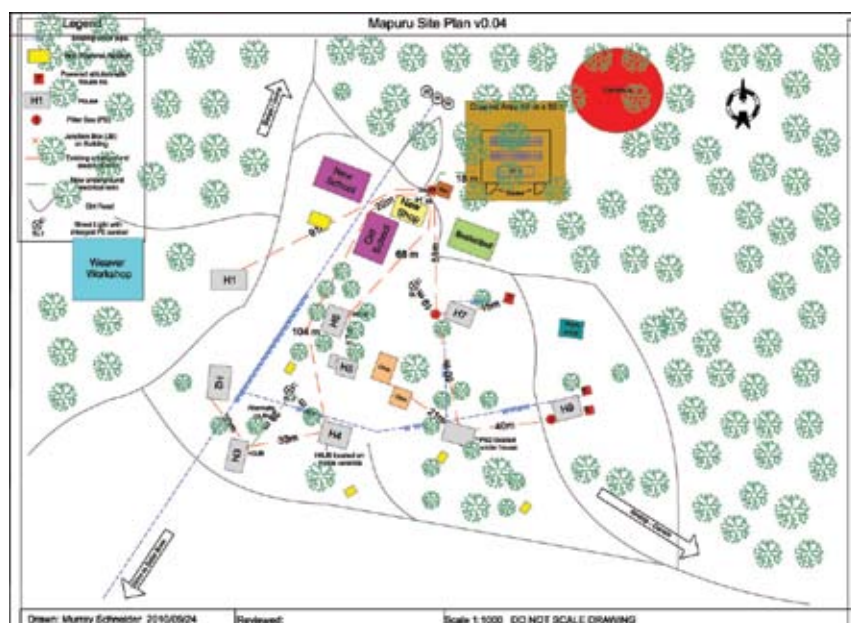
7.4 kWh's of energy available in the dry season

Dry Season Fan times
8 hours**BUSHLIGHT**

Design stage

- Preliminary design completed (including reticulation mapping, other works instructions & all site drawings)
- System cost estimate and life cycle costing completed
- Peer review of preliminary design completed
- Draft system design reviewed by community residents
- Changes and additions made to design and associated documents
- Peer review of draft system design
- Site clearances obtained
- Final system design produced





Microfrost Excel - Aurora System Design Tool V9.5.xls						
File Edit View Insert Format Tools Data Window Help 100%						
A1 = TLM/Load/Sum/NOB HDD						
A	B	C	D	E	F	G
System Name		Major		Latitude		D
System Identifier		System 1		Longitude		H
						12.731 DegE
						136.4376 DegE
System Design Information						
System Load Demand						
AC Load Demand						
Annual Average		60.0 kWh/day				
Summer/Winter		62.0 kWh/day				
Essential		29.0				
Discretionary		32.0				
Demand only		0.0				
Winter/Day		54.0 kWh/day				
Essential		27.0				
Discretionary		27.0				
Demand only		0.0				
AC Load Demand						
Annual Average		0.0 kWh/day				
Summer/Winter		0.0 kWh/day				
Winter/Day		0.0 kWh/day				
Peak Month AC Demand		62.0 kWh/day				
Max Month AC Demand		62.7 kWh/day				
Max Month Essential AC Load		30.0 kWh/day				
Peak Load		11.5 kW				
Surge Load		12.0 kVA				
Solar Resource						
Average - Plane of Array - Summer/Winter		5.3 FSH				
Average - Plane of Array - Winter/Day		5.5 FSH				
Cable Sizes						
Average Distance - PV string to Marshalling Box		5 m				
Cable Size - PV string to Marshalling Box		4 mm ²				
Average Distance - Marshalling Box to Enclosure		30 m				
Cable Size - Marshalling Box to Enclosure		35 mm ²				
Recommended System Configuration						
System Voltage						
						120 VDC
PV array						
Array Voltage						120 VDC
Minimum Array Capacity						26.40 kW at 2"
Orientation						0.0 °E of N at 2"
Tilt angle (from Horizontal)						10.0 ° ± 1"
Minimum Array to Load Ratio (A/LI)						1.30
Average Gross DC Array Output - Summer						103.0 kWh/day
Average Gross DC Array Output - Winter						110.7 kWh/day
PV Charge Controller(s)						
Total Design Current						106.0 A
Capacity Selected						100 A
Number of Charge Controllers						3
Number of Marshalling Boxes Required						3
Battery						
Battery Capacity Required						2000 Ah @ 20°C
Average Daily DCO						2.0 Days
						21%
Inverter						
Inverter Continuous Capacity						16.0 kW @ 40°C
Battery Charger						
Battery Charger Continuous Capacity						0.0 A @ 40°C

Capital Works stage

- Tender documents produced based on final system design
- Tender documents released to contractors
- Tender bids returned and analysed
- CAT Board approval for procurement and tender contract is awarded
- Bushlight supplied equipment ordered for delivery to contractor
- Installation date confirmed with community and contractors





Photo courtesy of Glen Parker from Gully's Electrical



Photo courtesy of Glen Parker from Gully's Electrical

Installation stage

- Contractors mobilised
- Contractors introduced to residents by Bushlight staff
- Contractors complete system installation to tender specification
- System commissioned with Bushlight staff
- Residents provided with Community Energy Planning book and training resources
- Residents trained in system operation, maintenance and troubleshooting









Maintenance stage

- Regular visits to community within 12 months post installation for follow-up training and support
- Monitoring and evaluation carried out with residents and service provider staff
- Two service visits in first 12 months by electrical contractor
- Annual support visits by Bushlight staff after first 12 months
- Annual maintenance by an electrical contractor after first 12 months
- Unscheduled maintenance when requested by community/service provider for urgent repairs



Photo courtesy of Glen Parker from Gully's Electrical







Bushlight

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