

# Pre-Payment Meters and Energy Efficiency in Indigenous Households

Marteena McKenzie

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This project helps Bushlight spell-out some of the challenges facing Indigenous residents with pre-payment electricity meters. Ultimately, we hope that this work helps inform debate and decision-making by utilities and governments working in essential service delivery in Indigenous communities.

**Marteena McKenzie**

Energy Research and Policy Adviser

Bushlight  
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## Executive Summary

Rising household electricity costs are an important issue in Australia. There is now growing concern about how rising costs and consumption affects households and the environment. Concerns particularly surround those who are low income or otherwise marginalised. This report focuses on the issues of energy consumption in remote Indigenous homes. It discusses the range of socio-cultural and structural challenges that Indigenous people face in addressing high energy costs, and proposes a way forward to addressing these concerns.

Use of pre-payment meters for residential electricity is widespread in the Northern Territory. The purpose of this project is to examine the relationship between pre-payment meter use and energy efficiency outcomes in Indigenous households. Findings from this research help illustrate the unique challenges facing Indigenous households in the Northern Territory in relation to home energy consumption, costs and energy efficiency.

Research for this report included a review of current literature on pre-payment electricity meter use, energy efficiency in low-income homes, reliability of supply, the role of feedback in addressing high energy use, energy equity and energy efficiency. The literature review was complemented by interviews with Indigenous residents of town camps in Alice Springs, who offered their opinions and lived experiences of the challenges and benefits of using pre-payment meters on a daily basis. During the interviews, participants were also provided with targeted educational resources to help address high energy costs and details on current hardship and rebate programs available.

This project helps contextualise the challenges of achieving energy efficiency in Indigenous homes within the broader context of other low income settings. It also uncovered some unexpected findings, which are grouped around several themes and include:

### Pre-payment Meters

- There are very high rates of electricity disconnection in terms of both frequency and duration in pre-payment meter homes
- Household management styles have adapted to frequent disconnections, with most residents not purchasing fresh food in any quantity, but relying on local convenience stores on a meal-by-meal basis
- Despite this, there was a high degree of user satisfaction with pre-payment meters and preference for them over conventional billing processes

### Powercards and Energy Consumption

- There are some problems with access to powercards after hours, especially for residents with mobility challenges (eg- elderly people, mothers with young children and no vehicle)
- Local convenience stores often sell-out of the required type of card and preferred denomination
- Household overcrowding increases average electricity costs, especially during times of frequent and extended family visits

- Family visits also lead to disputes over 'chuck-in' arrangements for powercards
- There was a very high reported average weekly spend on electricity (\$61 - \$80 per week), particularly when considering the low income of most respondents

## Energy Efficiency

- All residents reported noticing more electricity use at certain times, which included during family visits and hotter summer months
- There is a high rate of high energy use fixed appliances in town camp homes, including electric stoves and heaters
- Some houses that have recently been refurbished have had low cost cooling methods removed (ceiling fans) and replaced with higher cost alternatives (evaporative air conditioners), reducing choice for residents and pushing up power costs
- There was a surprisingly low rate of other household appliance use including fridges and televisions. Most respondents also reported having efficient cathode-ray televisions rather than high-use flat screens
- Participants demonstrated limited understanding of energy efficiency measures to help address high costs, reinforcing the need for more targeted energy education

## Hardship and Rebate Programs

- Several electricity concessions and rebates are currently available to people in receipt of government payments. However, they are administered by an array of agencies and the application process is sometimes onerous
- There is a very low uptake of the concessions available to residents, and tenancy support agencies do not appear to encourage residents to apply for them

## The Role of Feedback

- Few residents have a formal method of tracking of household electricity consumption over time
- Close tracking of electricity consumption is made difficult by the prevalence of multi-family homes and visits by extended family and informal 'chuck-in' arrangements
- Despite evidence suggesting that informational feedback has an important role to play in helping households track and reduce consumption, respondents were ambivalent about feedback in their own homes. This may be explained by the fact that few residents had ever received bills (therefore feedback) and that they had limited awareness that energy efficiency measures could assist in reducing power costs

## Key Recommendations of this study:

- Better tracking of frequency and duration of self-disconnection in pre-payment meter customers is necessary. This will help provide evidence of the extent of this problem and allow governments, utilities and support agencies to address it
- Improve access to powercards. Increasing opening hours of retailers, improving the range of denominations and type of cards available and installing card vending machines are options



- Implement targeted energy efficiency education programs in Indigenous communities. This will help address some of the behavioural contributors to high energy costs
- Housing stock and refurbishment programs in Indigenous communities. As a longer-term strategy, new housing stock should be designed and orientated with energy efficiency principles in mind. Refurbishment programs should also address energy efficiency issues by focusing on the retrofit of efficient appliances (eg solar hot water systems with one-shot boosters), avoiding removal of low-cost cooling options (ceiling fans) and avoiding installation of high-use fixed appliances (eg electric heaters)
- Agencies administering rebate and concession programs should undertake better marketing in Indigenous communities, and offer support to eligible residents to apply for the programs. Tenancy support agencies should also have full awareness of these programs and actively promote them to eligible residents
- When smart meters are rolled-out, appropriate direct and indirect feedback methods should be implemented. This needs to be a focus of governments and utilities in the planning phases of the roll-out to ensure that some of the benefits of smart meters accrue to Indigenous residents as well as retailers
- Further research is required in this field to help improve our understanding of these issues

## Introduction

Electricity is an essential service that all of us rely on for good health and comfort. The cost of household electricity in Australia is rising as a result of both increasing tariffs and growing consumption. Electricity price rises frequently make media headlines, and the recent announcement of a 30% price increase for electricity in the Northern Territory raised alarm bells nationally (ABC, 2012).

High electricity costs put pressure on household budgets and result in further stresses for those on low incomes. It is well understood that Indigenous people currently experience disadvantage across a range of social and economic indicators including health, housing, income and education. Indigenous households in regional and remote areas also encounter a range of structural and socio-cultural factors that result in higher energy costs than other comparable homes. Indigenous people living in these communities are at particular risk of the negative health and social effects of high energy costs and poor reliability of supply caused by frequent disconnections.

Bushlight is the energy division of the Centre for Appropriate Technology, which is Australia's peak not-for-profit Indigenous science and technology organisation. Bushlight was established in 2002 and provides energy related technical advice and services to Indigenous communities throughout regional and remote Australia. Bushlight works with Indigenous people and their support agencies to deliver reliable and sustainable renewable energy systems. We also provide training and education in household energy efficiency to reduce power bills, and support for local enterprise and activity development in remote communities. Over the past decade, Bushlight has learnt many lessons about remote household energy consumption behaviours and technologies.

Pre-payment meters are almost universally used in large Indigenous communities and town camps throughout the Northern Territory, Queensland and Western Australia. In these households, electricity prepayment occurs via magnetic card meters. Magnetic cards are single use cardboard cards with a magnetic strip which are purchased by customers at their local store. Card values vary between \$5 and \$50. The card is loaded into the meter and electricity can be used up to the value of that card and if the credit runs out the meter discontinues supply. Most pre-payment meters also include a small emergency credit buffer of around \$5 to \$10, which is repaid next time the meter is credited. Currently there are over 8500 pre-payment meters in the Northern Territory, mostly in Indigenous communities, town camps and public housing residences where tenants have expressly requested them. International manufacturers have recently ceased production of the conventional pre-payment meters used in Australia, and smart meters<sup>1</sup> will eventually take their place.

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<sup>1</sup> An electrical meter that records consumption of electric energy in intervals of an hour or less and communicates that information at least daily back to the utility for monitoring and billing purposes

There is very little current research on how residents interact with pre-payment meters and powercards, the energy efficiency and equity issues encountered by Indigenous Australians or the possible role and effectiveness of feedback in these homes. With the rising energy prices, the roll-out of smart meters planned in the next three to 5 years and significant infrastructure investment decisions being made around electricity services in Indigenous communities, this project begins to provide an evidence base for policy relating to this relatively poorly understood area.

This project helps build our understanding of these topics. We hope that the findings of this report assist utilities, policy-makers and support agencies to understand some of the challenges facing Indigenous people using pre-payment meters. This research may also inform government actions on energy-related housing and infrastructure projects and help tailor metering approaches to meet the needs and aspirations of Indigenous communities. The report also raises questions and provides recommendations for future research and investment

This research articulates the latest understandings around the following issues:

- How Indigenous people interact with pre-payment meters in their homes
- How powercard and pre-payment meter use affects household energy consumption
- The range of specific socio-cultural and structural issues that contribute to higher than average energy consumption in Indigenous households
- The role that informational feedback may play in helping reduce household energy costs



## Background

Rising household electricity costs are an important issue in Australia. Rising tariffs and increasing household consumption are resulting in financial stress for many households, particularly those on low incomes. The social service sector now recognises energy costs as a key challenge for households and undertakes a range of research and advocacy programs to assist low income households address high energy costs.

Household energy efficiency programs are now commonplace in cities and towns throughout Australia. They are a popular approach for utilities and governments to assist householders to manage and reduce electricity consumption. Energy efficiency programs usually encourage a combination of behavioural and technological changes, combined with informational feedback for residents about consumption changes. Despite the prevalence and known effectiveness of energy efficiency programs over the past 15 years (Arimura *et al.*, 2011), access to them remains extremely limited in remote Indigenous contexts.

Literacy, numeracy, 'technacy' and language challenges present obstacles to the transfer of mainstream energy efficiency programs into Indigenous settings. Program delivery is also made difficult by limited availability of internet and other physical resources. The remote locations of major Indigenous communities also mean that many are inaccessible during the lengthy wet season in Northern Australia. Energy efficiency education materials also need to be targeted and culturally appropriate, which presents challenges for agencies used to working with 'mainstream' audiences.

For over ten years, Bushlight has been working with household energy demand and renewable energy in small Indigenous communities throughout Northern and Central Australia. Through this work it has become apparent that Indigenous residents in town camps and remote communities face a particular set of challenges in relation to household energy management and costs. They also encounter obstacles to improving home energy efficiency. In combination, these challenges mean that Indigenous households stand to benefit greatly from reduced home energy costs and an improved understanding of energy efficiency.

### Electricity Costs in Indigenous Homes

Electricity costs are higher in most Indigenous households than in comparable homes in Australia. There are a number of causes and explanations for this, and they may be classified as either structural or socio-cultural.

### Structural Factors Affecting High Energy Costs

Indigenous people in the Northern Territory face higher power costs than non-Indigenous people in urban homes. Although electricity tariffs are government-regulated and standardised whether customers are located in remote or urban areas, a range of structural factors put pressure on these homes.

### ***Extreme Weather***

Most large Indigenous communities are located in Northern and Central Australia. In the Northern Territory, Indigenous communities in the Top End experience very hot and very humid conditions during summer. In the Centre, long hot summers are coupled with freezing desert winters. In these communities, the need to cool and heat a home is essential and not a luxury, especially for the elderly, disabled or families with young children.

### ***High Cost of Goods and Services***

Most discrete Indigenous communities in Australia are located in remote or very remote areas. This means that access to a range of goods and services including quality housing, health and education are limited (ABS, 2008). It also means that the cost of basic goods and services are higher than average including food, fuel and appliances. Remoteness has an impact on energy costs because it is difficult for residents to seek out and purchase energy efficient appliances, and even if they are available then a lack of competition means their prices are inflated.

The generally high cost of living in remote communities combined with low incomes, results in less available income to put towards energy efficient appliances. The trade in second-hand (third or fourth hand) appliances, especially whitegoods, is commonplace in Indigenous communities, meaning that old, inefficient appliances in poor condition are common in many homes.

### ***Poor Quality Housing***

Most housing in town camps and remote communities is provided by Indigenous Housing Organisations (IHO), and 93% of residents living in these remote communities reside in IHO homes. The housing stock is generally poor and was not designed, orientated or built using energy efficient principles.

There is a high rate of disrepair reported in IHO homes, with 33% either requiring major repairs or replacement (ABS, 2008). Home disrepair has a direct impact on the thermal efficiency of the home, and leads to increased heating and cooling costs.

### ***Fixed High Energy Use Appliances***

Public housing (IHO) homes in remote communities also have high rates of permanently fixed high energy use appliances including electric hot water systems and electric stoves (NIIG, 2010). Electric hot water systems alone can contribute up to 30% of a household's electricity costs. Public housing residents have little control over fixed appliances in their homes, and this contributes to higher than average energy costs and a negative attitude towards the usefulness of energy efficient behaviours (Cayla *et al.*, 2011, Langevin *et al.*, 2012).

### **Socio-cultural Factors of Affecting High Energy Costs**

Several socio-cultural factors also contribute to pressures around household energy costs in Indigenous communities.

### ***Family Structure, Mobility and Household Management***

Traditional Indigenous family structures are significantly different to the Western view of a family unit. Whereas many non-Indigenous people live within a nuclear family unit, Aboriginal people value an extended family system, which often includes quite distant relatives. This means that one home often incorporates several nuclear family units or generations of the one family, with numerous resident children. It also means that residents welcome extended family from other locations, who may stay as house guests for extended periods.

Large numbers of residents naturally drives up electricity costs, which may or may not be fairly shared between permanent resident adults and visitors. A high proportion of children and teenagers living in the home can also mean that the burden of electricity costs fall disproportionately onto the smaller number of income-earning adults.

### ***Overcrowding***

Because of both family structure and long-term underinvestment in housing stocks in Indigenous communities, overcrowding is rife. 32% of homes in remote or very remote communities are reported to experience overcrowding (ABS, 2008; ABS, 2010).

Overcrowding leads to a range of poor social and health outcomes, and can also lead to disputes over sharing of electricity costs.

### ***Low Household Incomes***

While low household incomes do not cause high energy consumption, they do make it more difficult to cope with costs. Many Indigenous people in remote and very remote areas are in receipt of Commonwealth income support payments and are considered to be low income. For individuals in these communities, average median incomes ranged between \$209 and \$237 per week (ABS, 2010). It is understood that people on low and fixed incomes spend a greater proportion of their income on essential services when compared to higher income households (KPMG *et al.*, 2008).

People in receipt of Commonwealth income support payments also tend to spend more time at home during the day, which also drives up relative energy costs (Urmee *et al.*, 2012). Low income and high energy use increases the likelihood of utility stress in Indigenous households.

At the time of interviewing households for this project, the recently-elected Northern Territory Government had also announced imminent rises in residential household electricity tariffs.

*'...The increases announced today and which take effect from January 1<sup>st</sup> [2013], will see a one-off 30% increase in the price of power, 40% increase in water and 25% increase in sewerage charges.'*

(NTG, 2012)

For Indigenous residents using pre-payment electricity meters in the Northern Territory, this change will result in significant rises in their already significant household electricity costs. Since the price increase, the cost for electricity using pre-payment meters has risen from 23.78 cents per kilowatt hour to 30.49 cents (Power and Water, 2012 [a]). For low to medium use households, this represents an increase of around \$12 per week, and for high use households it may be \$20 or more per week extra. See table one below for a breakdown of estimated price rises for pre-payment meter customers.

**Table 1 – Estimated 2013 Electricity Price Rise for Pre-Payment Meter Customers in the NT**

	Cost Per Week 2012	Cost Per Week From 1 January 2013	Price Rise/Week
Average energy use home*	\$41.62	\$53.34	\$11.62
High energy use home**	\$74.91	\$96.04	\$21.13

\* EG - 25 kilowatt hours per day x 7 days

\*\* EG - 45 kilowatt hours per day x 7 days

These price rises for electricity are likely to cause further hardship for households already struggling with high electricity cost for a number of structural and socio-cultural reasons. The range and nature of the structural and socio-cultural factors discussed above mean that electricity costs are usually higher in Indigenous home *and* residents have a reduced capacity to manage these costs.

### Pre-payment Meters

In Australia electricity is typically paid for after consumption following receipt of a bill from the power utility that provides the electricity. However, in some circumstances prepayment of electricity occurs with specific client groups. Electricity prepayment operates via the use of pre-payment meters, which are around the size of a standard electricity meter and are located on, or near, the household meter. Pre-payment meter technology varies, but they generally display a range of information including tariff information and how much credit is remaining (TasCOSS, 2006).

Use of prepayment meters is fairly limited in mainstream urban Australia. However these meters are deployed almost universally in Indigenous communities and in some other low-income communities. Pre-payment meters are currently in use in the Northern Territory, Western Australia, South Australia, Queensland and Tasmania and are most common in remote off grid areas. Tasmania is a notable exception, with pre-payment meters in use across all Tasmanian communities and numbering around 40, 000 homes, or 20% of the Tasmanian market (TACG, 2009). There is also some evidence that other states are considering the use of prepayment meters outside of remote Indigenous communities (TACG, 2009; TasCOSS, 2006).

Pre-payment meters have been used in the Northern Territory since the mid 1990's, primarily in Indigenous households. In 2008 there were around 8500 prepayment meters in

use which represented 15 per cent of the total residential customer base of around 55,000 (PWC 2008a cited in TACG, 2009). Northern Territory residential electricity customers can choose to be supplied through a prepayment meter instead of a standard credit meter, but prepayment meters are always used in the following situations (PWC 2008a cited in TACG, 2009);

- All residential customers in remote Aboriginal communities
- All residential customers in town camps within urban areas
- Where customers have had their electricity supply disconnected due to an outstanding debt to the energy retailer, supply may be reconnected provided the customer enters into a payment arrangement with the energy retailer and agrees to be supplied electricity via a prepayment meter.

For Indigenous people living in remote outstations which are not connected to grid power, electricity is usually sourced from diesel generators or solar power systems. There is an array of service and cost-recovery arrangements in outstation communities, depending on the local support agency or council.

The regulatory frameworks governing the use of pre-payment meters vary between different states and territories throughout Australia. The technologies used also vary, but the basic mechanics of how prepaid power works are fairly universal (DRET, 2012). In Indigenous communities in the Northern Territory, electricity prepayment occurs via magnetic card meters. Magnetic cards are single use cardboard cards with a magnetic strip which are purchased by customers at local supermarkets or service providers in Indigenous communities. Card values vary between \$5 and \$50 and the card is loaded into the meter and electricity can be used up to the value of that card. If the credit runs out the meter discontinues supply, which is often referred to as self-disconnection (Brutscher, 2012; O'Sullivan *et al.*, 2010). Supply is reconnected by purchasing a new card. There is usually a small amount (\$5 - \$10) of 'emergency credit' available to prevent power being disconnected immediately. Once a new card is purchased the amount of emergency credit that has been used is deducted. Meters normally display information about the value of credit available, but little additional information.

The social service sector has long raised concerns over equity issues surrounding pre-payment meter use (McLean, 2005; O'Sullivan *et al.*, 2010; Sharam, 2003; TasCOSS, 2011). Despite this, little focus has been made on this issue in the Indigenous setting (OCE, 2008). In pre-payment meter homes, self-disconnection is a major problem because households may disconnect many times per week or month and utilities and support agencies have no way of tracking these occurrences. In communities with conventional power billing, frequent disconnections are prevented or reduced through a variety of hardship programs and safety net payments, many of which are currently unavailable to pre-payment meter customers (TasCOSS, 2011). Other equity issues include limited access to credit when stores are closed or over weekends; difficulty accessing concession programs and an absence of consumer information including detailed billing figures (Ehrhardt-Martinez *et al.*, 2010; Sharam, 2003). Lack of information on historical or comparative energy consumption impacts on a household's ability to track and manage energy consumption.

## Electricity Hardship and Rebate Programs

There are various hardship and rebate programs available to utility customers in the Northern Territory. These are administered either through the Federal Government or the Northern Territory Government. A summary of hardship programs and rebates is included in table two, below.

**Table 2 – Electricity Hardship Programs and Rebates Available in the Northern Territory**

Name of Rebate/Program	Administering Agent/s	Available to	Amount Available	Other Details
Utilities Allowance <sup>2</sup>	Commonwealth Government (Department of Human Services)	Persons receiving either: <ul style="list-style-type: none"> <li>Disability Support</li> <li>Partner Allowance</li> <li>Widow Allowance</li> </ul>	\$564.00/year for singles; \$564.00/year for couples	Paid in four instalments each year (March, June, September and December), payment is automatic
Essential Medical Equipment Payment <sup>3</sup>	Commonwealth Government (Department of Human Services)	Persons who: <ul style="list-style-type: none"> <li>use qualifying medical equipment<sup>4</sup> or require heating/cooling due to a medical condition<sup>5</sup></li> <li>hold a relevant concession card,</li> <li>are an electricity account holder</li> </ul>	\$140/year regardless of the piece of equipment being operated.	Intended to cover the cost of running essential medical equipment and/or heating/cooling  Payment needs to be claimed through Centrelink each year, including medical certificate
Northern Territory Pensioner and Carer Concession Scheme (NTPCCS) – Electricity Concession	Northern Territory Department of Health	Pensioners of all ages, who are residents of the NT and hold a relevant Centrelink Pension Concession Card; <b>and</b> who are also members of the scheme	For PPM customers, \$1.68/day, or approximately \$615/year	Powercards are posted to members every 6 months  To become a member, download an application form and post it in with support documents
Stay Connected Program	Salvation Army St Vincent de Pauls CatholicCare NT Anglicare NT Somerville Community Services	Power and Water customers in financial stress apply directly to administering agencies	Varies- at the discretion of the agency, but ranges between \$10 - \$50 per client per referral/visit	Primarily intended for conventional meter customers with overdue accounts, but some agencies also provide limited support to PPM customers

<sup>2</sup> Details correct at time of writing. For the latest information on this allowance see <http://www.humanservices.gov.au/customer/services/centrelink/utilities-allowance>

<sup>3</sup> Details correct at time of writing. For the latest information on this payment see <http://www.humanservices.gov.au/spw/customer/forms/resources/ci016-1209en.pdf>

<sup>4</sup> Including, for example dialysis machine, insulin pump, ventilator, respirator, oxygen concentrator, nebuliser, or electric wheelchair

<sup>5</sup> Including, for example spinal cord injury, stroke, brain injury, a neurodegenerative disorder



There is an array of programs available in the Northern Territory and the onus is usually on the resident to seek out and apply for the concession. According to the support agencies involved, there is limited uptake of these programs for pre-payment meter customers. Indeed, some of the support agencies administering the 'Stay Connected' program do not offer relief payments to pre-payment meter customers at all, and others do so at their own discretion but offer only minimal support (\$10 - \$50 in powercards in the case of St Vincent de Paul) when compared with support offered to conventional customers with unpaid bills (up to \$500 per client in the case of Somerville Community Care).

Standard application processes and forms can also pose a problem for pre-payment meter customers as they do not receive paper bills or official account numbers. While pre-payment meter customers may not face the same financial hardship that large unpaid bills and arrears cause, this research suggests that they face high energy costs as a proportion of their income and very frequent disconnections when compared to conventional account customers. While unable to access some hardship programs, many pre-payment meter customers are likely to meet the circumstances of hardship as defined by Power and Water:

*'In the majority of cases, it is expected that the applicant's circumstances will be because of:*

- *a lack of, or decrease in income or significant, unavoidable expenses.*
- *Family circumstances such as death, desertion, accidental or natural disaster such as flood or drought, which can result in unexpected expenses.*

(Power and Water, 2012 [b])

Tangentyere Council is the major service delivery agency for the 18 Housing Associations known as 'town camps' in Alice Springs and began operations in the early 1970s. Most housing in town camps is effectively public housing, with tenancy services provided by the Central Australian Affordable Housing Company and/or Tangentyere Council<sup>6</sup>. Housing stock tends to be three to 4 bedroom and block-construction. Tenants pay rent for their homes but the absence of home ownership means those residents have little ability to make significant changes to the fabric of the building or fixed appliances to improve energy efficiency.

## **Smart Meters and the Role of Feedback in Energy Efficiency**

Energy efficiency education programs are a popular approach for governments and utilities attempting to curb rising household energy consumption. These programs normally include technical or informational feedback on patterns of energy consumption as a tool for assisting residents to understand and change energy use. There is a growing body of evidence to

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<sup>6</sup> In December 2009, 14 of the 15 Housing Associations that held perpetual head leases over their Town Camps signed 40 year subleases of their land to the Commonwealth Government in return for a commitment of \$100 million over 5 years to upgrade housing and essential infrastructure. For more information see [www.affordablehousingcompany.com.au](http://www.affordablehousingcompany.com.au)

suggest that feedback is an effective tool to assist in household energy reductions (Darby, 2001; Darby, 2006a; Darby 2006,b; Ehrhardt-Martinez *et al.*, 2010; Faruqui *et al.*, 2009; Fisher, 2009).

Feedback can take many forms but is usually classified as either direct or indirect. Direct feedback refers to feedback that is provided to the consumer in 'real time', as the energy consumption is occurring. Methods for direct feedback include technical devices such as in-home energy displays, indicating rate or cost of energy use for example. Indirect feedback is information provided to the consumer *after* energy has been used, and includes tools such as enhanced billing or household-specific feedback provided through internet applications (Ehrhardt-Martinez *et al.*, 2010). In a large analysis of 57 studies investigating the effectiveness of feedback on household energy consumption, the American Council for an Energy Efficient Economy (Ehrhardt-Martinez *et al.*, 2010) found that the annual percentage energy savings achieved through feedback ranged from around 4% to 12%. Direct feedback was found to result in higher household energy savings (9% - 12%), but was more expensive to implement than indirect methods.

As mentioned previously, pre-payment meter production has virtually ceased internationally, and these meters will likely be replaced by smart meters in the short to medium term. Smart meters operate in a similar manner to pre-payment meters, in that they still require advance payment by householders via store purchase, but with greatly enhanced functionality<sup>7</sup>. Smart meters are electricity meters that record consumption in intervals of an hour or less and communicate that information at least daily back to the utility for monitoring and billing purposes. It is estimated that the smart meter roll-out into Indigenous communities in Australia will occur in a broad-scale manner in the next three to five years (*pers comms*, IPSDV 2012). This will bring significant changes to how electricity is monitored and retailed in these communities, and also raises some important concerns around equity (McGann and Moss, 2010).

Smart meters have diverse functionality which includes advanced capability around user feedback on home energy consumption (Ehrhardt-Martinez *et al.*, 2010). However, benefits of receiving this feedback from smart meters will only accrue to customers if governments and utilities make this a priority during the planning and roll-out phase (Wilhite & Ling, 1995). Importantly, the design of feedback formats must be targeted to meet the specific needs and challenges of Indigenous households.

Improving household energy efficiency provides an avenue for reducing living cost pressures for residents in remote Indigenous communities. It also may provide co-benefits around improved thermal performance of homes and better household management and environmental health outcomes. Research which helps policy makers and utilities better

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<sup>7</sup> Pre-payment meters in Indigenous communities are usually only read by utilities once per year. Consequently, there is little data on detailed usage patterns and few avenues for utilities to provide feedback to residents on their consumption patterns; either historically or compared to others in their community (Ehrhardt-Martinez *et al.*, 2010).

understand pre-payment meter and powercard usage in Indigenous communities is timely because a solid evidence base will help inform debate and decision-making in the coming years.

## Methodology

This project was designed to establish a deeper understanding of issues relating to energy consumption and conservation in Indigenous households. Specifically, it addressed issues around pre-payment meters and energy efficiency and options for feedback tools that may address the high cost of energy for residents.

The methodological approach taken in this project is in accordance with the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) Guidelines for Ethical Research in Indigenous studies and was approved by the Central Australian Human Research Ethics Committee on 19 November 2012. Data collection for this project included a two staged approach: a literature review of relevant industry and academic sources, and interviews with Indigenous people living with pre-payment meters in town camps.

### Household Interviews

The research involved interviews with a total of 12 households living in town camps in Alice Springs. In some cases, interview participants were individuals (the 'house boss' or main tenant) but in most cases participants were two to five people representing one household (for example, couples or related adult householders such as sisters). While only 12 'households' were represented in interviews, it is estimated that well over 25 respondents were involved in the interviews.

As a social research project this report is based on a qualitative approach designed to capture the views of Indigenous residents using pre-payment meters for electricity. It is not necessarily a representative sample of Indigenous pre-payment meter customers in the Northern Territory, but does include the quotes and perspectives of a range of town camp residents in Alice Springs. This approach enabled researchers to work with fewer people, but delve more deeply into their individual opinions, experiences and views. Our hope was to generate a subjective understanding of *how* and *why* participants perceive, reflect, interpret, and interact with pre-payment meters in the ways that they report. This research strategy offers the possibility for generalisation, but in a different way than a statistically significant number of interviews would allow. The sample size of this project offered the advantage of understanding beyond a very small number of people while working within the time and resource restraints of the project scope. This qualitative data, when combined with desktop research shines a light on this poorly understood field and raises topics for future research directions.

Household interviews were undertaken by a Bushlight researcher (female, non-Aboriginal) and a research assistant from the Central Australian Affordable Housing<sup>8</sup> Company (male,

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<sup>8</sup> CAAH is a not-for-profit Indigenous housing organisation which provides a range of accommodation solutions for low income people and disadvantaged people. For more information see their website at [www.affordablehousingcompany.com.au](http://www.affordablehousingcompany.com.au)

Aboriginal). This helped achieve gender balance and cultural appropriateness, which aligns with best practice research in this context.

Interviews were undertaken in December 2012. This was an interesting time to interview about energy cost and energy efficiency as Alice Springs was experiencing the first hot weather of summer and rise in consumption of power for cooling. It also coincided with the announcement by the recently-elected Northern Territory Government of significant price increases for power and water tariffs for all residential and commercial clients. Though the 30% rise in power cost had not come into effect at time of the interviews, it is likely to be felt by households already struggling with high costs of living.

Semi-structured interview questions that focused on residents' lived experience of pre-payment meters and associated issues were developed in collaboration with the experienced staff of the Central Australian Affordable Housing Company. The interview questions are attached in appendix one. The semi-structured approach was chosen to accommodate various cultural protocols and language differences.

A questionnaire/discussion guide was used to elicit information on a range of issues surrounding household electricity consumption, conservation and pre-payment. As much as possible, the report quotes directly from interviews to allow respondents to speak for themselves.

Interview questions were developed to provide a range of information and opinions on:

- Pre-payment meter use
- Pre-payment meter functionality and reliability
- Power card use
- Power card access and convenience
- Household arrangements for sharing the cost of electricity
- Household energy consumption
- Energy efficiency awareness and activities
- Territory and Commonwealth government equity and hardship programs
- Feedback options and tools for tracking household energy consumption
- Demographic details of participants

The semi-structured interviews allowed for flexibility. During or following the interview, residents were provided with energy efficiency information and advice on hardship programs that they (or family) may have been eligible for. These educational resources have been developed for Indigenous people living in town camps, and are visually orientated and targeted at people with all levels of literacy and numeracy. A sample<sup>9</sup> of the educational resources provided to residents is included in appendix three.

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<sup>9</sup> For more examples of energy efficiency educational resources developed for Indigenous communities, see [www.bushlight.org.au](http://www.bushlight.org.au)

## Recruitment

Recruitment of participants focused on the availability of willing volunteers who would represent the diversity of Indigenous people living in town camps in Alice Springs. The Central Australian Affordable Housing Company was approached to assist in recruitment. Interviews were either undertaken at the home of the respondent/s (outside, on the veranda) or in communal areas such as bough shelters, art center's or community center's.

All participants were given a copy of the *Information Sheet* and also signed the informed consent document – see appendix two. The interviewees were advised that the information provided would not be attributed to named individuals and no one would be identifiable in the report. With the consent of participants, interview responses were recorded on paper by the researcher.

The following camps were involved in the project:

Town Camp Name	Local Language Name	Language Group of Residents/Visitors
Larapinta Valley	Yarrenty Altere	Arrente, Luritja, Pitjantjara, Pertame
Abbotts Camp	Mpwetyerre	Arrente, Luritja, Pitjantjara, Warlpiri, Waramungu/Warلمانpa

## Desktop Research and Literature Review

A comprehensive literature review of relevant industry sources, publicly available reports and academic literature was a key part of this project. As discussed, the field of energy consumption behaviours and technologies in the Indigenous domain is under-researched and there is little publicly available data or reports. However, there is burgeoning interest in energy consumption in low income and marginalised households, a body of work which has helped inform this report more generally. This evidence base provides context and lessons from other projects in related fields.

The literature review involved an interrogation of available published literature on issues surrounding pre-payment meter use and energy efficiency including:

- Equity issues around electricity use in low income and/or marginalised households
- Effects of pre-payment meter use on household energy consumption
- How the use of power cards may impact consumption patterns
- Technical and informational feedback options to assist in energy efficiency improvements
- Survey of existing research and supporting research on household electricity issues in Indigenous communities

The literature review helped investigate the use of pre-payment meters in the Indigenous household context and compares it to the experience of other pre-payment meter clients in Australia and internationally.



Combining the results of a thorough literature review of the latest relevant data with responses of interviewees, this project contextualises Indigenous peoples lived experiences of pre-payment meters and power cards and will help inform discussion and debate in this field.

## Results and Discussion

This section examines the results of the interviews undertaken with users of pre-payment meters in Alice Springs. It is divided into five sections, each reflecting a theme of the survey.

The interviews with residents revealed that most felt satisfied with pre-payment meters and powercards, and preferred them over alternative billing methods. However, it was also clear that there are some problems with access to power cards, high weekly costs, frequent disconnections, limited awareness of rebate programs available and a generally poor understanding of energy efficiency concepts or ability to make changes to manage household energy consumption.

Although residents appear satisfied with pre-payment meters, there is a long way to go for utilities, governments and support agencies to ensure better energy equity and improved reliability of service for this client group.

### Demographics and Housing Stock

Background demographics questions were asked during the interviews. Questions included population and living arrangements for the household, frequency of visitors, occupation of respondents and type of housing.

When asked about their living arrangements, most households reported a high number of related adults and children permanently residing there. The population of shared (multi-family) homes with children was high, with an average reported population of seven people. It is likely that most households (58%) fall within the formal Australian Bureau of Statistics classification for overcrowding<sup>10</sup>. A summary of population and living arrangements is included in table three, below.

**Table 3 – Population and Living Arrangements**

Arrangement	Number of Households	Percentage of Households	Average Number of Individuals
Two parents with children	0	0	
Single parent families	0	0	
Two person family	2	17%	
Shared housing with more than two adults and no children	3	25%	5
Shared housing with more than two adults plus children	7	58%	7

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<sup>10</sup> For more information on this topic, see 'Factsheet: Overcrowding' at [www.abs.gov.au](http://www.abs.gov.au)

When asked about occupation and income, most respondents (83%) were in receipt of Commonwealth income support payments of some type, as were other adults in the home. The remaining 17% of participants reported working either part or full time.

According to ABS data, respondents were somewhat representative of Indigenous people living in regional areas in terms of the high rate of unemployment and receipt of Commonwealth income support payments. According to the ABS, more than two in five (43%) Indigenous people aged 15-64 years are not in the labour force (ABS, 2006). The unemployment rate for Indigenous people tends to increase with increasing remoteness, and this is supported by the responses provided in this project.

It is well understood that people on low or fixed income incur the greatest energy cost when expressed as a proportion of weekly income when compared to higher income households (CSIRO, 2008; KPMG *et al.*, 2008). The demographic data supports this finding in the context of pre-payment meter customers in the Northern Territory. Many Indigenous people living in town camps or remote communities who use pre-payment meters are on low or fixed income, and reported relatively high costs for electricity.

Respondents were asked about the impact of house guests on energy costs. When asked about frequency of family visitors from remote communities, most (92%) respondents reported hosting visitors several times per year. Reported duration of family visits ranged from several days to several months. Researchers did not inquire as to the number of house guests, but given the usual living arrangements described then it is very likely that these visitors place additional stresses on homes and, if they weren't normally, then cause them to become overcrowded. The range of negative impacts stemming from household overcrowding include psychological stress, inability to pursue social relations, or have personal living space, or maintain privacy, nor have adequate access to kitchen facilities and a bathroom (ABS, 2012).

Questions were also asked about arrangements for bill-paying during extended family visits. Most reported that visitors did 'chuck in' for power, but stated that it was not enough and that frequency and duration of disconnections increased during these times. As well as the stresses associated with overcrowded housing, increased energy costs caused by extended family visits place additional financial burdens on residents.

## **Pre-payment Meters**

For participants in this research, pre-payment meters are the norm for purchase of household electricity. All respondents currently use pre-payment meters to pay for their electricity, and most had never participated in a post-pay system or received a power bill. The exception was two participants, one of which had previously lived in Northern Territory public housing in Alice Springs and after struggling with conventional power bills, nominated to have a standard power meter changed over to a pre-payment meter. Another participant had lived in other parts of the Northern Territory for work reasons and had received a standard power bill during this time.

All participants reported that they had ‘self-disconnected<sup>11</sup>’ or run out of power at their homes sometime in the last month. Frequency of reported self-disconnection was high, with half of respondents (50%) reporting that disconnection occurred one or more times per week and the other half reporting disconnection at least once per month.

Participants were also asked about the duration of power outages due to self-disconnection. Most respondents (58%) reported that outages lasted several hours, while 33% reported duration of around one day. A summary of reported duration of power outages is described in table four, below.

**Table 4 – Duration of Power Outage Caused by Self-Disconnection**

Duration of Power Outage	Several Hours	Around 1 Day	More Than 1 Day
Number of Households	7	4	1
Percentage of Respondents	58%	33%	9%

The consequences of frequent power outages are severe. The majority of households reported that they had had food spoil in the fridge due to self-disconnection episodes. One household recognised that they were fairly unique in this not being the case, stating ‘*we’re lucky we haven’t had our food go off because we both work and we have a car so we can always recharge when we need to*’.

Worryingly, many households reported that they did not purchase enough food for frequent electricity disconnections to cause a problem, instead purchasing meals from nearby stores as required. One household reported not having a fridge at all, relying completely on local convenience stores for food. These results are alarming in respect to the future health outcomes for residents. Most local convenience stores have a very limited range of fresh produce, and mostly stock take-away style foods that are high in fat and salt and low in nutrition. There are several reasons why householders may not purchase groceries regularly, but one resident indicated that frequent disconnections was the key reason for this habit;

**Larapinta Valley Camp resident**

*‘...we’ve had our food go off heaps of times. Now we don’t buy too much food in case the power goes out’*

When asked about strategies to prevent or reduce self-disconnection, most households (75%) stated that if family visitors ‘chucked in’ more, it would help the power stay on.

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<sup>11</sup> Self-disconnection is the situation in which electricity supply is stopped and a household has exhausted all the credit available to it, including its emergency credit allowance. (See Brutscher, 2012:14)

Several households reported issues with accessing power cards as a barrier to more reliable power.

### **Abbotts Camp Resident**

*'... Piggleys [the local store] closes early, and if we run out of credit we don't have a car to get to the BP [which is open 24 hours and sells power cards] to buy a new card'*

Despite the high rate of disconnections, all participants clearly expressed their satisfaction with the pre-payment meter method of paying for electricity. For those who had lived with other payment methods (conventional power bills), they had a stated preference for pre-payment meters.

Reliability of the meters themselves was also high, with residents reporting no problems with the operation of the meters. One respondent reported locking the meter box on his home to prevent vandalism, which had occurred to other homes in the area in recent months.

### **Powercards and Energy Consumption**

Residents were asked about their attitudes towards various aspects of power cards including accessibility, convenience and household management arrangements around purchasing them.

The two town camps surveyed in this project have ready access to outlets that sell powercards, less than one kilometer walk in both cases. However, the outlets are small convenience-style stores which have limited opening hours, particularly in the evenings and on weekends/public holidays. Most respondents reported that they were happy with the accessibility of the local stores but pointed out that early closing times had a negative impact on their ability to buy credit when needed. The same may not be said for town camps located on the outskirts of Alice Springs, where there is no access to local stores and residents must travel 5km or more to purchase powercards.

As mentioned above, local convenience stores are the main supplier of power cards for residents but when they are closed people travel further afield (up to 5km) to purchase them from service stations or other outlets that open extended/24 hours. These limited opening hours posed challenges for residents with mobility issues, either the elderly or for mothers with young children, as they reported difficulty in accessing alternative retailers when the local store was shut.

Another issue highlighted was that smaller stockists of power cards had problems with adequate stock of certain types of power card. There are two types of power cards used and sold in the Northern Territory. Depending on the age of the meter, residents purchase either 'big' or 'small' cards. 'Big' cards are used in newer meters and according to respondents, tend to sell out in smaller retailers.

## Larapinta Valley Camp Resident

*'BJs [local store] always sells out of big cards, so we have to go and get them from the 24 Hour Store or Coles. It happens all the time!'*

Participants were also asked about their preferences for the value of individual cards purchased, with cards available in denominations of \$5, \$10, \$20, and \$50. All respondents reported a strong preference for \$20 cards and expressed frustration that this denomination often sold out in local stores. Interestingly, a number of respondents mentioned that they do not like to purchase \$5 or \$10 cards because they *'run out quicker'*. This finding is supported in the literature, where misconceptions about use and value of low-denomination power cards have been investigated in other low-income household settings (Brutscher, 2011). These responses also suggest that financial literacy programs may assist residents to manage household power costs and reduce frequency of disconnections.

One feature of pre-payment meters is that utilities do not read them as frequently as conventionally-billed consumers. One consequence of this is that household consumption data is difficult to obtain and does not show details such as seasonal variations and number of disconnections. Average yearly household consumption data is usually collected by utilities, but was not accessed for the purposes of this research.

Nevertheless, respondents were asked about their average weekly power costs. Most households reported spending between \$61 and \$80 per week on power cards. For households with several related adult residents, all reported an informal 'chuck-in' arrangement, with adults purchasing powercards as required and when funds were available. These figures are significantly higher than average Alice Springs households, which spend around \$45<sup>12</sup> per week on electricity (ASS, 2012). According to the ABS, average income homes spend around 2.1% of their weekly incomes on electricity, gas and wood (ABS, 2011). Average weekly spend on powercards is reported in table five, below.

**Table 5 – Average Weekly Spend on Powercards**

Dollars per Week	\$20 or Less	\$21 – \$60	\$61 - \$80	Over \$81
Number of Respondents	2	4	5	1
Percentage of Respondents	17%	33%	42%	8%

The results indicate a high degree of utility stress in respondents, and support the findings from the literature review which state that low or fixed income people spend a higher proportion of their income on essential services than other households (see KPMG *et al.*, 2008, for example). As discussed above, all respondents reported being in receipt of some type of Commonwealth income support payment, with the amount varying according to individual circumstances. This research did not establish the income level of the

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<sup>12</sup> Average homes use around 23kWh per day, at a cost of around \$0.27/kWh



participating households, but the ABS provides an indication of income for Indigenous households<sup>13</sup> in remote<sup>14</sup> areas, estimated at \$433 per week (ABS, 2006). According to these figures, respondents spend an average of around 16% of their weekly household income on electricity. This is a significantly higher proportion than other low incomes households in Australia, which spends around 4.5% of their weekly income on energy (ABS, 2008).

Overall, the results from this research indicates that there are some issues with access to power card for some residents, particularly those with mobility challenges. There was also a very high weekly spend on electricity in these households, particularly in light of generally low incomes. It is unsurprising then, that participants in these town camps also experience frequent self-disconnections, and it is likely that similar circumstances occur in other pre-payment communities throughout the Northern Territory and pre-payment communities in Australia.

## Energy Efficiency

A key question in this project was if and how people using pre-payment meters track their power use. Given that there is no flow of information from the utility to the customers around household consumption, the onus is in the residents to keep track of the amount they spend on electricity.

When asked if they keep track of their powercard use (more than generally recalling their average spend), 83% (10 households) stated that they had no system in place for recording their power costs. The remaining households kept used powercards in the meter box as a form of tracking cards used.

Participants were also asked about variations in their power costs over time and whether there were any suspected reasons for the changes. Residents all reported noticing a rise in use at certain times and suggested a range of possible causes, with the most commonly suggested (50% of households) reason being hot weather in summer and increased use of cooling appliances.

Four households (33%) had recently moved back into their homes following extensive refurbishments through a Federal government program. These households reported that they spend more on power since the upgrades. In these homes, pre-existing ceiling fans had been removed and replaced with evaporative airconditioners. Additional fixed ceiling-mounted heaters had also been installed through the program. Table six, below, provides a list of householder explanations and frequency of responses for rising household energy costs.

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<sup>13</sup> While income is usually received by individuals, the total income for a household is often a more useful indicator of economic well being

<sup>14</sup> By the Australian Bureau of Statistics remoteness classification, the town of Alice Springs is defined as 'remote'

**Table 6 – Explanations for Power Costs Increasing**

Suggested Reason for Increasing Power Cost	Number of Households	Percentage of Households
More family or children visiting	5	42%
Hotter weather in summer	6	50%
New appliances	5	42%
Housing renovations or upgrades	4	33%
Other	1	8%

A key contributor to high domestic electricity costs can be certain high-use appliances that are hardwired or fixed in place in the home (eg- electric hot water systems, electric stoves). As mentioned above, all homes in town camps are effectively public housing and residents have little or no control over the type of appliances that are installed into their homes. In an effort to understand this element of the energy efficiency outcomes in participants' homes, questions were asked around several key appliances.

Virtually all households in the town camps have 'swampies', or evaporative airconditioners installed for cooling during summer. There is usually one per household and most residents (83%) reported running them 24 hours/day during summer, with the remaining using them only during the day. As discussed above, the removal or ceiling fans during recent home renovations meant that residents had no other fixed cooling option other than to use their 'swampies'.

Extensive use of bar heaters can drive up power costs during cold desert winters in Alice Springs. Residents were asked about the heating options available to them and how often they were used. Most households (75%) reported using electric bar heaters or oil heaters, with an average of two per home. A small number of households (15%) reported using no electric heating at all. Residents in one home had recently received renovations through a Federal Government program which included installation of a large number of fixed heaters on the ceilings. These respondents reported higher electricity costs this winter, and hypothesised that the new heaters were a contributing factor.

**Abbotts Camp Resident**

*'We got new heaters through that SIHIP money. They put them in all the bedrooms, the kitchen and two in the lounge. In winter we used them all night and sometimes daytime too. It cost us a lot in powercards'*

Fridges and televisions are key appliances that contribute to household energy costs, and can be problematic in multi-family homes with multiples of each appliance. Respondents were asked about the number and type of these appliances and results indicate quite low usage, given the large number of residents per home. 92% of households reported having one fridge, either in a common kitchen or locked in a bedroom. The remaining household reported not having a fridge at all, but purchasing all food daily from a local store. All respondents reported having at least one television in their home, with most respondents (83%) having two televisions. The highest number of televisions reported was three in one

home. When asked about the type of television used, results indicated that most residents still used the older-style 'box' television (cathode ray tube), which are far more energy efficient than most new flat-screen models. This is an interesting result as most of Bushlight's work with energy demand in outstation communities has shown that many households have shifted to use of flat-screen televisions.

Finally, participants were asked about perceived barriers to reducing household energy costs. As above, four households (33%) pointed to housing renovations that removed ceiling fans and replaced their function with evaporative cooling systems as a barrier to reducing energy consumption and costs. Six households (50%) stated that they did not know how to reduce power costs. This prompted a discussion with them around behaviour change options and provision of educational materials for future use. See Appendix 3 for samples of the educational materials provided to participants in this project.

Home energy efficiency programs are now a key government and utility approach for addressing rising costs and environmental concerns around energy use. Many of these programs combine messages of technical change with behavioural shifts that encourage householders to reduce consumption. Conversations with participants in this project made it clear that energy efficiency messages had not reached this group, and most respondents appeared to believe that there was nothing they could do to address excessive energy costs. Energy efficiency programs are commonplace in cities and other urban areas, but very few programs<sup>15</sup> have targeted the specific needs and circumstances of Indigenous communities. Indigenous people living in remote communities and town camps in Australia stand to benefit considerably from reduced household energy costs and improved reliability of supply, and this client group is in need of targeted programs to address their specific circumstances. As discussed, this project provided some targeted educational resources to residents and support agencies, but a much more comprehensive approach is required to address the lack of information currently available to pre-payment meter customers.

## Hardship Programs

Research participants displayed a low level of knowledge of electricity rebates and concessions. As mentioned previously, there is a vast array of rebates and concessions available but they are administered by numerous agencies and departments. Programs include:

- Utilities Allowance (\$564/year for single people)
- Essential Medical Equipment Allowance (\$140/year)
- Northern Territory Pensioner and Carers Concession Scheme (\$615/year)
- Stay Connected Program (various values up to around \$100/household)

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<sup>15</sup> The exception is two recent programs targeting Indigenous communities in Australia. *Powersavvy* is a successful energy demand reduction program that began in the Torres Strait in Far North Queensland (see [www.powersavvy.com.au](http://www.powersavvy.com.au)) and funding has recently been approved for a large trial project called *Manymak (Good) Power Use* in East Arnhem Land. Both of these are coordinated through relevant utilities with significant input from Bushlight around community engagement and education

In most cases, the onus is on the individual customer to identify and apply for the concessions. In the case of one concession program (the Northern Territory Pensioner and Carers Concession Scheme), application forms are only available online and must be printed off and posted in with supporting documentation in order to claim the concession. This poses obvious challenges for town camp residents with very limited access to internet and challenges with literacy and numeracy.

While most pre-payment meter customers are in receipt of government support payments and face high electricity costs, there is little financial support to offset these costs. There are currently three separate agencies providing support services ('life skills' programs and tenancy support, for example) to pre-payment meter customers. Electricity rebates and support to improve energy efficiency are not usually part of the curriculum of these programs, and the their uptake is very low in any case.

In this project, the 'Utilities Allowance' was the most broadly understood of the concessions available, with 75% of respondents being aware of it. Within this group, 50% claimed to be in receipt of the concession.

Part of this project aimed at assisting residents to access rebates and concessions that they may not have been previously aware of. As such, a summary of rebates and application forms (if applicable) was distributed to all respondents (plus spare copies if requested), and electronic copies also provided to relevant support agencies including Tangentyere Council, Central Australia Affordable Housing Company, Mission Australia and Anglicare.

## **Feedback**

This research sought to understand how feedback may assist pre-payment meter customers to track, manage and reduce their electricity costs. As discussed previously, there is an absence of information flow between utilities and pre-payment meter customers and as such no reliable method for them to track electricity costs over time (for example, seasonal variations) or compared to other households in their community.

Participants were asked about their current method for tracking electricity costs. As stated above, most households stated that they had no method for tracking power cards used and also said that it was difficult to keep track because numerous adults were 'chucking in' for electricity by purchasing powercards on their respective paydays.

Some informal tracking was reported, namely by stacking used cards inside the meter box. However, it is unclear how this method assists residents in tracking use over time unless there is also some kind of time-based marking system in place<sup>16</sup>.

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<sup>16</sup> One method of tracking power card use was reported in another Bushlight project in an Indigenous community in the Torres Strait, in Far North Queensland. In this case, the pre-payment meter customer kept

When asked whether additional information would be helpful in understanding household energy use, tracking and managing it, respondents did not indicate a strong interest in this option. The majority of participants (92%) were ambivalent about whether they would like to receive extra information about their energy use, and did not have suggestions for tools or devices that would help manage power costs. The notable exception to this trend was one respondent who had a keen interest in managing power better and trying to cut costs.

### **Larapinta Valley Camp Resident**

*'..we need something [a device] inside the house to tell us how much [power] we have used that day or week; that would be good. It could also remind you when the power is running out, so you don't have to go outside to the meter box to keep checking...'*

Although there was a low level of interest in energy efficiency education or feedback in research participants, there is a large body of evidence to suggest that these tools can effectively reduce home energy costs. For client groups outside of 'mainstream' settings (including low income, new immigrant, or Indigenous households for example) it is especially important that educational programs and feedback mechanisms are targeted to meet their specific needs.

With a tailored and thoughtful approach to feedback and engagement, households stand to benefit greatly from the opportunities that improved energy efficiency brings. In the case of the recent *powersavvy* program in Aboriginal and Torres Strait Islander households in Far North Queensland, carefully targeted energy education undertaken by local employees resulted in better understanding of energy efficiency and a 17% reduction in household energy use (Ergon Energy, 2011).

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used powercards in a stack in the meter box and marked the beginning of each month with a new rubber band. Using this method, she was able to compare month-to-month power costs.

## Conclusion and Recommendations

Electricity is an essential service which is needed for health, comfort and livelihood activities. The price of domestic electricity in Australia has been rising quickly over the past 5 years, and utility stress is beginning to affect many households, particularly those who are low income or otherwise disadvantaged.

Bushlight has been working in the field of energy demand reduction with remote Indigenous communities for over ten years. It has become evident that Indigenous households encounter several social and structural factors that result in higher than average energy costs and significant barriers to overcoming them. Energy efficiency programs are now commonplace in cities and towns and are a favored approach for governments and utilities to assist residents in tackling rising energy costs. Although their effectiveness is well understood, energy efficiency programs have rarely been adapted for use in Indigenous communities.

Almost all Indigenous households in town camps and remote communities have pre-payment meters installed for their electricity use. Because they are only read by utilities once or twice a year, there is little flow of information on consumption patterns for residents. There have been serious concerns raised over equity issues surrounding pre-payment meter use. Many of these concerns were brought to bear in the responses by interviewees.

There were very high rates of electricity disconnection in terms of both frequency and duration reported in this project. With the nature of pre-payment meters, there is little capacity to track these disconnections. Consequently, this is a little-understood problem that is yet to be addressed by government or utilities.

Among other factors, frequent disconnections have led to most residents not purchasing fresh food in any quantity, but relying on local convenience stores on a meal-by-meal basis. This has concerning implications for health outcomes, as local stores tend to stock little in the way of fresh produce and mostly stock take-away style foods. Despite the reported problems, there was a high degree of user satisfaction with pre-payment meters and preference for them over conventional billing processes.

This research uncovered some problems with access to powercards. Many residents rely on local convenience stores for powercard stocks, and these have limited opening hours, particularly in the evenings and on weekends. Local convenience stores were also reported to sell-out of the required type of card and preferred denominations.

The study also confirmed reports that Indigenous households spend a proportion of their weekly income on power, averaging \$60 to \$80 each week. There was a high degree of overcrowding in the participant homes, and residents also reported higher energy costs during times of extended family visits. Disputes over arrangements for 'chuck-in' for electricity by visitors were also reported.



Improvements in energy efficiency can help households curb high energy costs. As expected, participants in this study experienced a range of structural and socio-cultural barriers to improving efficiency and managing high energy costs. Given the lack of energy efficiency programs implemented in Indigenous communities, it is unsurprising then that participants demonstrated a limited understanding of energy efficiency measures to help address high costs, a finding that reinforced the need for more targeted energy education.

There are several rebate and hardship programs available for eligible residents in the Northern Territory. However, there appeared to be a limited awareness of these programs and very limited uptake. The programs are administered by a range of agencies and the application process is sometimes onerous.

There is a large body of literature to suggest that both direct (eg- 'real-time' data provided by in-home energy displays) or indirect (eg- informational billing) feedback is effective at helping residents achieve household energy reductions. For residents with pre-payment meters, there is little opportunity to track energy consumption and feedback from utilities is non-existent. In this study, few residents had any formal method of tracking of household electricity consumption over time. Close tracking of electricity consumption is also made difficult by the prevalence of multi-family homes and visits by extended family and informal 'chuck-in' arrangements.

Despite evidence suggesting that informational feedback has an important role to play in helping households track and reduce consumption, respondents were ambivalent about the role that feedback on energy consumption might play in their own homes. This may be explained by the fact that few residents had ever received bills (therefore feedback of any kind) and that they also had a limited awareness that energy efficiency measures could assist in reducing power costs at all.

## **Key Recommendations:**

- Better tracking of frequency and duration of self-disconnection in pre-payment meter customers is necessary. This will help provide evidence of the extent of this problem and allow governments, utilities and support agencies to address it
- Improve access to powercards. Increasing opening hours of retailers, improving the range of denominations and type of cards available and the installation of card vending machines are options
- Implement targeted energy efficiency education programs in Indigenous communities. This will help address some of the behavioural contributors to high energy costs
- Design housing stock and refurbishment programs in Indigenous communities within energy efficiency principles. As a longer-term strategy, new housing stock should be designed and orientated with energy efficiency principles in mind. Refurbishment programs should also tackle energy efficiency issues by focusing on the retrofit of efficient appliances (eg solar hot water systems with one-shot boosters), avoiding

removal of low-cost cooling options (ceiling fans) and avoiding installation of high-use fixed appliances (eg electric heaters)

- Agencies administering rebate and concession programs should undertake better marketing in Indigenous communities, and offer support to eligible residents to apply for the programs. Tenancy support agencies should also have full awareness of these programs and actively promote them to eligible residents
- When smart meters are rolled-out, appropriate direct and indirect feedback methods should be implemented. This needs to be a focus of governments and utilities in the planning phases of the roll-out to ensure that some of the benefits of smart meters accrue to Indigenous residents as well as retailers
- Further research is required in this field to help improve our understanding of these issues

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## Appendix 1: Interview Questions

Pre-payment Meters & Energy Efficiency in Indigenous Households: Survey tool			
Date of interview:			
Time of interview:			
Interviewer:			
Background			
What your name/s?			
Age, gender, occupation?			
Who is the main tenant/house boss?			
How long have you lived in this house?		Less than 1 year	1 - 5 years
Who else lives in this house? ( <i>number of adults &amp; children, relationship to main tenant</i> )			
Do you have many visitors? How long do they stay?			
Pre-payment Meters			
Have you always had a pre-payment meter at your place?		Yes	No- ( <i>when did you get it?</i> )
Do you find it is a good way to pay for power? (ie- better than getting a bill each quarter?)		Yes	No ( <i>Why not?</i> )
How often does the power run out at your house? Why?			
If it's out because of credit, how long is it normally out before you can buy another powercard?		Less than 1 hour	1 day
Have you ever had food go off in the fridge/freezer because of the power going out? How often does that happen?			
What would make it easier to make sure the power doesn't go out?		<i>If shops were open more</i>	
		<i>If power was cheaper/we used less power</i>	
		<i>If visitors chucked in</i>	
		<i>Other</i>	
Have you ever had a problem with your meter? If so, what happened? Who did you contact about the problem?			
If you could make changes to the way the PPM works, what would make it better?			
Power Cards			
Where do you buy your powercards from?			
It is convenient and open enough hours for you to buy them when you need them?			
How many power cards does your household use per week/fortnight?			
Who is mainly the one that buys the powercards?			
Which value powercards do you usually buy?		\$5	\$10
Do all the adults chuck-in for power cards when they are living here?		\$20	\$50
What happens when you have family visit for a long time?			
Energy Efficiency			
Do you keep track of how many powercards your house uses each week/fortnight?			
Have you noticed that the amount you spend on power has changed lately? If so, why do you think this has happened?		<i>More children/family visiting</i>	
		<i>Hotter weather in summer</i>	
		<i>New appliances</i>	
		<i>Housing upgrades</i>	
		<i>Other?</i>	



Can you tell us about a few appliances: <b>Airconditioners</b>	How many?	What type? (swampy/RC)	How often do you use them? (summer?)
<b>Heaters</b>	How many?	What type? (fixed/bar)	How often do you use them (winter)?
<b>Fridges</b>	How many?	Are they all inside?	
<b>TVs</b>	How many?	What type? (new flat screen, old one)	How often do you use them (winter)?
Do you notice that at certain times of the year your power costs go up more than others?	<i>More children/family visiting/ Hotter weather in summer/ New appliances/ Housing upgrades/ Other</i>		
Do you have a good idea of how much some things use compared to others?			
What are the main barriers to you being able to reduce the amount of money you spend on power? (eg- too many people, poor housing maintenance/design etc)			
Would some people in your house use power better if they knew more about how much power different appliances use?			
<b>Hardship Programs</b>			
Do you know that there are special rebates and help for certain people with their power bills?			
Are you receiving these rebates at the moment?	Yes	No	
Would you like more information on these rebates for yourself or a family member?	Yes	No	
<b>Feedback</b>			
Do you have any way of keeping track of your power use every week or fortnight?			
Would this sort of information be helpful to your household?			
People that get power bills have some extra info included on them. Do you think it would be useful if you got info like this too?			
What other information or tools would you find helpful to manage your home power costs better? (eg- in-home displays)			

## Appendix 2: Information Sheet and Informed Consent

**Project: Pre-payment Meters and Energy Efficiency in Indigenous Households**

### Information Sheet This is for you to keep

(To be read and/or handed to a potential participant)

My name is \_\_\_\_\_ and I am working for Bushlight, which is part of the Centre for Appropriate Technology.

We are working on a project called '**Pre-payment Meters and Energy Efficiency in Indigenous Households**'.

Almost everyone living in town camps and remote communities pays for their electricity with pre-payment meters. We want to find out how they work for your family, how you manage the costs of power cards and how you keep track of the power cards you buy etc.

What we learn from you will help the Northern Territory Government and Power and Water understand what it's like to live with PPMs and how they could make them better and more suitable for your needs.

This interview will take about 30 minutes or a bit more.

The information we collect will be put together into a report. No names will be used in that report. All information from the survey will be PRIVATE (Confidential). A copy of the report will be available to you if you ask for it.

The Centre for Appropriate Technology board and the Ethics Committee in Central Australia has approved this research.

Do you have any questions about what we are doing?

Do you have any worries about what we are doing?

**It is your choice to be part of this research. You can stop taking part any time.**

Can you help us by taking part in this interview?

For further information about the project contact:

Marteena McKenzie at Bushlight/Centre for Appropriate on 8959 6159, or Graeme Marshall on 8959 6134

## Consent Form

***Please circle Yes or No in the table below. This means you can say no.***  
***By answering 'Yes' you indicate that you:***

1. Understand what we are doing because it has been explained to you
2. Understand that you do not have to take part and can stop at any time.
3. Understand that we will not use your name unless you want us to and we will make sure you are ok with what we write

I agree to talk to the researcher	YES	NO
The researcher can record my answers on paper	YES	NO

Signed by participant or signed by researcher of behalf of participant once consent is given:

Signature of consent by participant \_\_\_\_\_

Signature of researcher \_\_\_\_\_

Date:

For further information about the project contact:

Marteena McKenzie at Bushlight/Centre for Appropriate on 8959 6159, or Graeme Marshall on 8959 6134

## Appendix 3: Sample of Educational Resources

