



# Manymak Energy Efficiency Project

Indigenous Essential Services Pty Ltd, on behalf of the  
Manymak Energy Efficiency Project consortium

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Summary Report

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# A message from the Consortium



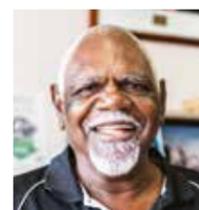
**Len Griffiths**  
General Manager Remote and Regions – Power and Water Corporation

The Manymak Energy Efficiency Project has been a success for Power and Water, and its subsidiary, Indigenous Essential Services, with the trial creating direct benefits for customers and a rationale for future energy efficiency programs in remote communities. The relationships formed through the Project consortium, the industry and with Power and Water customers in East Arnhem Land has created a best practice model for energy efficiency engagement in remote communities, which delivers broad and long-lasting benefits to the wider community.



**Dr Steve Rogers**  
Chief Executive Officer – Centre for Appropriate Technology (CAT)

CAT was heavily involved throughout the Project providing technology and community engagement staff. The Project also confirmed CATs previous experiences that community ambassadors are a critical component of successful technology and infrastructure adoption and service delivery programs in remote Indigenous communities. CAT has developed valuable relationships both within the communities and with other consortium members and is looking forward to continuing this work.



**Banambi Wunungmurra**  
President – East Arnhem Regional Council

East Arnhem Regional Council is proud to have been involved in the Low Income Energy Efficiency Project. This Project saw us in a unique situation where our contribution was both as a member of the management consortium and also as the host employer of the Indigenous ambassadors in four of the six communities.

Perhaps the most rewarding aspect of this Project was seeing the empowerment of our people. The Yolŋu driven approach to this Project saw the teams take ownership of the story and confidently spread the word from household to household independently.



**Jason Randall**  
Director – Arnhem Region Service Delivery (North), Department of Housing

This Project has enabled Housing to work with a diverse range of Consortium members, and has generated findings of benefit to future housing policy. The Project has addressed a real issue in remote communities and set a benchmark for future energy efficiency and community engagement Projects within not only East Arnhem but all remote communities across the Territory.



**Professor Andrew Campbell**  
Director – Research Institute for the Environment and Livelihoods (RIEL)

The evaluation component of the Project has generated a wealth of material that underlines the complex linkages between the Project’s ambition to improve the understanding of and management of energy use within remote Indigenous communities, and the social, cultural and historical backdrop. By conventional measures, I believe this has been a very successful Project and the findings should inform Indigenous housing investment and management.

What comes out of our evaluation work however, is that even the best-designed energy efficiency Project can at best make an incremental improvement within the constraints of a three-year government grant program focused on a single issue. More fundamental changes to reverse the drivers of poverty and social disadvantage within Indigenous communities are needed, over longer timeframes and across multiple sectors and issues, to consolidate such gains and make durable improvements.

## Acknowledgements

The Project consortium and team thank the Yolŋu people of east Arnhem Land, the Yolŋu Energy Efficiency Workers (YEEWs) and the researchers for their openness, generosity, humour, enthusiastic participation, and frank and valuable feedback.

We also thank the many professional contractors who partnered with us on the Project.

## Disclaimer

The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein.



# Manymak Energy Efficiency Project

The \$12.5m Manymak Energy Efficiency Project trialled energy saving measures in six remote Indigenous communities in the East Arnhem Land region of the Northern Territory from May 2013 to December 2015.

The Project was one of 20 around Australia rolled out under the Australian Government's Low Income Energy Efficiency Program (LIEEP). LIEEP was launched nationally in 2012 seeking consortia to trial approaches to assist low income households to become more energy efficient and capture data to inform future policies and programs.

A consortium led by the Power and Water Corporation (through its wholly owned subsidiary Indigenous Essential Services) delivered the Manymak Energy Efficiency Project. The other members of the consortium were the Centre for Appropriate Technology, Charles Darwin University, the Northern Territory Department of Housing and the East Arnhem Regional Council.

The Project's trials took place in eligible households in Milingimbi, Galiwin'ku, Yirrkala, Gunyangara, Gapuwiyak and Ramingining. All six communities are on the traditional lands of the Yolŋu—the Indigenous people of east Arnhem Land.

Tailored community engagement was central to the Project's design and its later success. The Project approach was framed by Yolŋu cultural protocols, and Yolŋu Energy Efficiency Workers (YEEWs) were recruited to engage with and educate residents in ways that were culturally appropriate, respectful and productive.

The Project aimed to:

- define the unique barriers remote Indigenous communities face around household energy efficiency
- encourage participation from up to 80 per cent of households in each community
- form active partnerships with 500 remote Indigenous households
- design and trial technology that is culturally appropriate and suitable for harsh climates
- design an incentive scheme to encourage households to improve their energy efficiency

- rigorously evaluate the Project and develop a replicable engagement model for other governments and agencies to adopt.

The Project's four main activities were:

- energy efficiency education delivered to residents by Yolŋu people
- energy efficiency retrofits and upgrades in homes, such as stove timers, ceiling insulation, hot water system upgrades and new light globes
- installation of the innovative 'Bushlight Energy Efficiency Box' (BEEBox), a device that measures and displays the household daily energy use in real time
- qualitative and quantitative data capture, including employment of local Project evaluation researchers in each community and the capture of hourly household power demand.

The Project also included delivery of water efficiency education.



Communities involved in the Project

# Project Snapshot

Remote community households informed and empowered to manage energy spend and make energy efficient choices

<b>6</b> COMMUNITIES IN EAST ARNHAM LAND	<b>85%</b> INDIGENOUS	 <b>633</b> COMMUNITY HOUSES, <b>5760</b> OCCUPANTS
<b>81</b> YOLŊU ENERGY EFFICIENCY WORKERS	 <b>25,000</b> HOURS EMPLOYMENT	 <b>84%</b> OF HOUSEHOLDS PARTICIPATED
<b>589</b> HOUSEHOLDS RECEIVED SOME FORM OF ENERGY EDUCATION	<b>2772</b> HOUSE VISITS	
 <b>252</b> 'BEEBOX' IN-HOUSE DISPLAYS	<b>\$3.1M</b> CONSORTIUM IN-KIND	
<b>\$9.4M</b> LIEEP FUNDING	<b>209</b> STOVE TIMERS	 <b>114</b> SOLAR HOT WATER SYSTEMS
	<b>87</b> HEAT PUMP HOT WATER SYSTEMS	<b>47</b> CEILING INSULATION INSTALLS
<b>693</b> SURVEYS AND <b>129</b> RESEARCH INTERVIEWS CONDUCTED BY YOLŊU		
<b>456</b> MWh PER ANNUM PROJECTED ENERGY SAVINGS		

# Project Timeline

<b>2012</b>	<p><b>2012 Funding Application</b></p> <ul style="list-style-type: none"> <li><b>Feb 2012</b> LIEEP launches</li> <li><b>Dec 2012</b> Manymak Energy Efficiency Project proposal accepted</li> </ul> 
<b>2013</b>	<p><b>2013 Project Commenced</b></p> <ul style="list-style-type: none"> <li><b>May 2013</b> Project established</li> <li>Project detailed design commences</li> <li>Initial community engagement</li> <li>Community and housing surveys</li> </ul> 
<b>2014</b>	<p><b>2014 Trials Commence</b></p> <ul style="list-style-type: none"> <li>Data loggers installed</li> <li>Milingimbi and Galiwin'ku YEEWs commences</li> <li>BEEBox installs commences</li> <li>Stove timer developed and installs commences</li> <li>Hot water upgrades and ceiling insulation installs commences</li> </ul> 
<b>2015</b>	<p><b>2015 Full Rollout</b></p> <ul style="list-style-type: none"> <li>Gunyangara, Yirrkala, Gapuwiyak and Ramingining YEEWs commences</li> <li><b>Feb 2015</b> Cyclones Lam and Nathan sweep through East Arnhem</li> <li>Teams operating in all six communities</li> <li><b>Oct 2015</b> Forum at Gulkula brings workers together from all communities</li> <li>All Project targets met</li> <li>Household interviews completed</li> </ul> 
<b>2016</b>	<p><b>2016 Completion</b></p> <ul style="list-style-type: none"> <li>Project evaluation and final reporting</li> <li>Installation of gifts to communities</li> <li><b>June 2016</b> Project concludes</li> </ul> 

# Employment and training

The employment of Yolŋu Energy Efficiency Workers (YEEWs) from each community was at the core of this project. The YEEWs played a key role in shaping and delivering energy efficiency education to residents.

It was identified early that Yolŋu people are more likely to accept a new project and take on new information when delivered by other Yolŋu. This knowledge informed the whole engagement approach, which was framed by Yolŋu cultural protocols and focused on Yolŋu to Yolŋu education and engagement.

Ninety-one YEEWs were recruited to deliver the community engagement, education and research across the six communities. Each community had a team of four to ten part time workers which provided flexibility and coverage of different kinship groups within each community.

The Yolŋu Energy Efficiency Workers were extensively trained in using energy and water efficiently in their homes.

This training was delivered in language -Yolŋu Matha - by both Indigenous and non-Indigenous trainers fluent in Yolŋu culture and language. This proved crucial to the program's effectiveness given English is the third, fourth or even fifth language for people in the trial areas.

The training approach was designed to translate the 'story' of energy efficiency into one that would be 'felt' by Yolŋu people. A visual poster kit was developed, with posters explaining how power is generated, electrical safety,

and then moving into explaining how different appliances use power and how to use them efficiently.

Although Yolŋu residents use power for activities such as cooking, lighting and cooling, a clear message was that electricity is a *Balanda* (non-Aboriginal people) thing, not connected to the cultural rules that govern Yolŋu life. The YEEWs were crucial in communicating energy and water efficiency messages that would resonate with other Yolŋu.

The YEEWs visited participating households up to five times and delivered a staged education program. Their role was to:

- promote the Project in the community
- invite households to voluntarily participate in the Project
- conduct an initial appliance survey and have the privacy notice signed by participating households
- deliver energy efficiency and water saving education to households
- offer households optional energy efficiency upgrades like the stove timer, and the BEEBox technology
- revisit houses when necessary to give additional education and support
- support contractors installing data collection devices and retrofits.



“ Power is a balanda thing. It's something that got introduced here. We never knew it was coming; no one explained it. We don't know how it's made or where it comes from. We don't care about it.

Participating resident

“ How they went about the training, teaching us, was really clear ... the trainers ... They talked to us in language.

YEEW

“ English likes to use abstract nouns, but Yolŋu Matha focusses more on the action. When Balanda think about aiming for a target, Yolŋu think about aiming for a fish or a wallaby. So we need to understand what the target is and talk about that rather than talking about targets in a general sense. I use an example of hunting to help explain so everyone understands.

YEEW, Galiwin'ku

“ I never used to think about how much power I was using. Everything was on. It made me realise how much power and water I was going through. Now I make sure I don't use so much power.

Participating resident



## Household visits

In total, the Yolŋu Energy Efficiency Workers (YEEWs) conducted 2772 visits across the six communities to seek household participation in the program and deliver energy and water efficiency education.

The Project's participation goal was achieved, with 84 per cent of all eligible houses choosing to participate. Every participating household was visited at least twice, with an average of 4.4 community engagement visits per house. Additional visits were usually for those houses receiving technology retrofits such as the BEEBox, an upgraded hot water system, stove timer or ceiling insulation.

The YEEWs themselves drove the high level of household engagement in the program. As local people, they were able to approach and engage households through correct relationships and in language. They helped residents understand the aim of the Project and provided education for making good energy efficiency and water conservation choices.

### HOUSE VISIT FACTS

<b>2772</b> household visits by YEEWs	<b>4.4</b> the average number of times a household was visited
<b>533</b> appliance surveys conducted	<b>463</b> households received a water education visit
<b>89%</b> the percentage of eligible households that were approached	<b>100%</b> household participation in Gapuwiyak
<b>589</b> households received some level of energy education	<b>95%</b> of households who were approached chose to participate

- “Have Yolŋu lead the program in the communities, I think that's a big key to educating Yolŋu people.”  
YEEW
- “When YEEWs came around, when they were bringing all the information—that really went into my brain. It penetrated. It was so inspiring and exciting to me.”  
Participating resident
- “...we took their word and we started to act on it. We started turning off the lights and the water in the bathroom, the stove and the fan and other electrical appliances that we were using.”  
Participating resident



# Bushlight Energy Efficiency Box

The Bushlight Energy Efficiency Box (or BEEBox) is a device that measures and displays household energy use. It has a controller in the meter box and a robust display inside the home that work together to display how fast power is being used, how much has been consumed for the day, and how much it has cost.

It works on the concept of a 'daily energy budget', which is tailored and set for each household. The device displays at a glance how much power is being used and the dollars spent for the day.

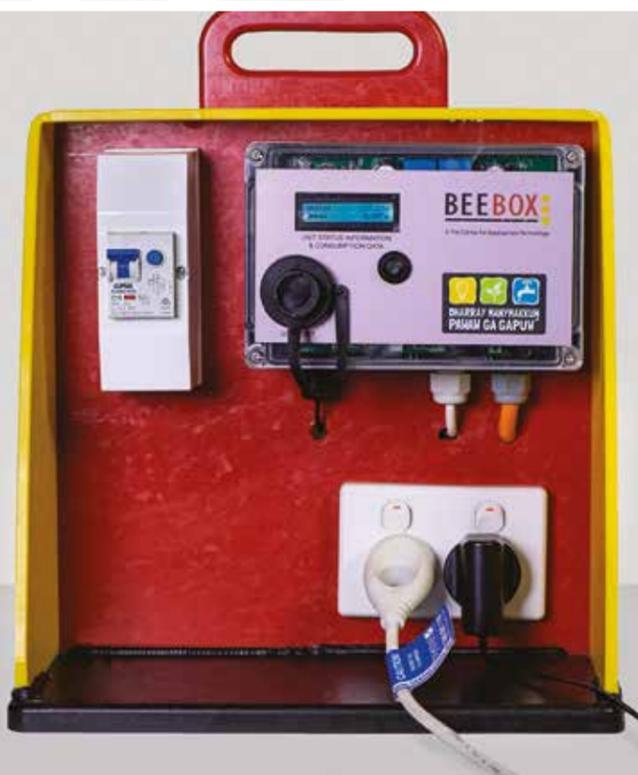
The BEEBox's simple system of coloured lights quickly shows residents whether their current power use is on track for their energy budget (green lights), if they're at risk of exceeding it (orange lights), or if they are going to exceed their nominated budget (red lights).

A total of 252 houses were fitted with a BEEBox during the Project.

The BEEBox was used as an effective discussion tool by YEEWS to explain household power consumption to residents. Many Yolŋu who received the BEEBox reported that they found it beneficial. It helped them use power wisely, prompted or reminded them to turn off lights and appliances, and was a great tool to understand how different appliances use energy.

An analysis of energy consumption data showed that on average, the BEEBox appeared to assist households to make a small reduction in their power consumption, and also to reduce how much time they were without power due to running out of credit.

*It helped householders use power wisely, prompted or reminded them to turn off lights and appliances, and was a great tool to understand how different appliances use energy.*



“The display tells us three stories. One is the speedo—like a car—telling us how fast the power is being used. The next two tell us how much power has been used that day: one tells us in money and the other tells us with lights.”

Participating resident

“I need the BEEBox. Because sometimes I put the TV on, the fans, the lights—I don't know how much power I am using.”

Participating resident

“Then the BEEBox came and we realised just by looking at it as the indicator changed that means it was using too much power. We started turning all the switches off and then the indicator light turned green.”

Participating resident



## Retrofits

Energy efficiency upgrades were a big part of the Manymak Energy Efficiency Project trials. A total of 448 houses across the six communities were retrofitted with 498 separate energy efficient solutions.

A total of 201 households received major retrofits, such as new solar or heat pump hot water systems or bulk ceiling insulation. Minor retrofits were installed for 297 houses and included stove timers, light globes and air conditioner thermostats.

There were some substantial energy savings as a result of the upgrades.

The new stove timers resulted in the most significant energy savings of the trials, with an average saving of 3.1 kWh per day – over \$300 per year. This device

was custom built for the Project as a direct result of community input during the Project. Residents who had a stove timer installed said it was a good way to monitor their power and also to remind them to turn off the stove.

The solar hot water and heat pump hot water system upgrades achieved average household energy savings of 1.7 kWh and 2.8 kWh per day respectively.

Overall, the retrofit program showed that energy efficiency improvements can be made using simple user friendly technology approaches, but they must be suited to local conditions and maintenance and repair needs must be taken into account.

**Minor retrofits were installed for 297 houses and included stove timers, light globes and air conditioner thermostats**

**The solar hot water and heat pump hot water system upgrades achieved overall household energy consumption reductions of 8.5 and 11 per cent of total household consumption respectively.**

“That one (electric hot water system) is being controlled by the electricity and the other one (solar hot water system) is free. They’re both used to make the water hot. The Solarhart is free because it’s getting energy from the sun.”

Participating resident

“I really like the stove timer because when I’m cooking something and I’m busy with other things, it tells me when the cooking is finished. If I’m doing washing or I’ll go shopping, the stove timer tells me when the cooking’s done. It automatically stops.”

Participating resident





## Water Education

Alongside energy consumption, water use and sustainability are critical issues for many remote communities. The majority of the Northern Territory's remote Indigenous communities rely on limited groundwater sources and many are water stressed. As a result, water conservation was included in the Project's education approach. To deliver the Project's water education messages, YEEWs completed three to four days of water training in Yolŋu Matha, which included a tour of infrastructure in the community such as the power station, water bores and storage tanks.

The training gave the YEEWs an overview of how the community infrastructure delivers healthy drinking water and manages wastewater.

The key water saving messages YEEWs delivered to households were:

- report water leaks
- turn off running taps and showers
- ask children not to play under hoses and fire hydrants
- water the garden for a short period and only in the evenings.

The YEEWs also developed key messages tailored for each community and their specific water issues, such as the limited freshwater source on the island of Milingimbi.

The water training and water education house visits were successful, with 666 household water education visits across all communities and an average six per cent saving of total community water consumption.

*The YEEWs developed key messages tailored for each community and their specific water issues.*

## Data loggers and additional data capture



Collecting detailed, accurate data on households' electricity consumption was essential for the team to evaluate the Project.

The pre-payment token meters in place in remote communities across the NT provide limited consumption data and rely on irregular manual reads. Prior to the Project, little information was available about the level of disconnections experienced by households due to running out of credit.

Electricity data loggers were installed on every participating house in 2014 as part of the Project, providing almost two full years of power use data at the Project's end.

A total of 663 data loggers were installed.

The YEEWs first assisted households who chose to participate to complete a privacy notice in line with Australian Government requirements.

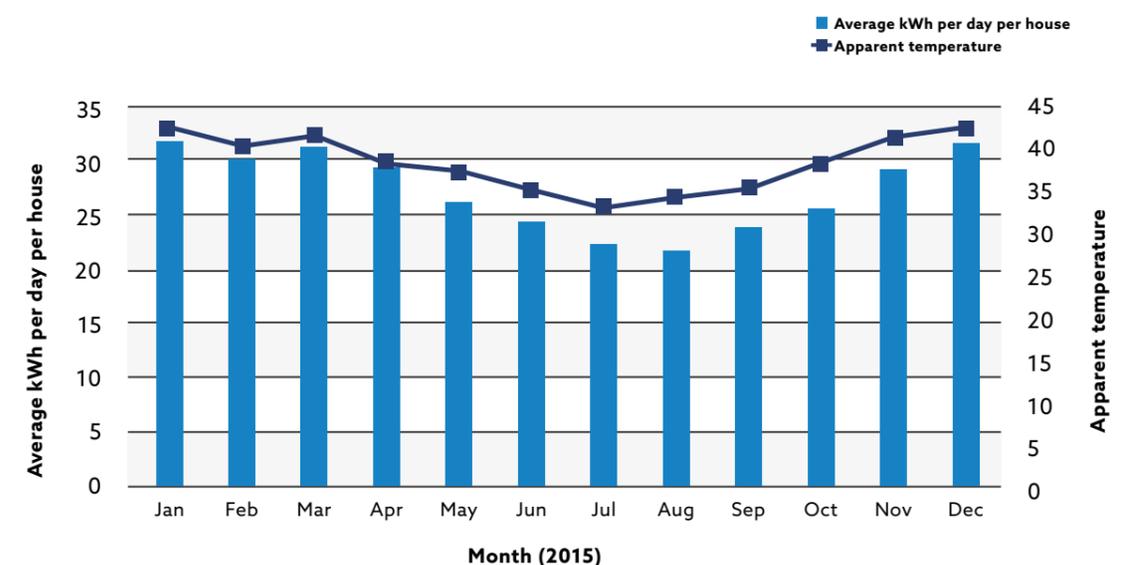
The YEEWs then collected household data via house visit forms, such as the number of people staying in the home and the different electrical appliances in place. This information was later entered into a central database.

Analysis of the data collected found that:

- Households use about the same power per house as Darwin – 26.8 kWh per day, but have an average of nine occupants compared to less than three typical in urban areas.
- Household occupancy is high even in two bedroom houses (average eight people per 2 bedroom house and eleven people per 3 bedroom house). The problem of high occupancy was a clear theme in the household interviews.
- Household energy consumption is closely linked to climatic variables, with the wet season seeing higher consumption.

- Unsurprisingly, energy consumption increases with higher numbers of occupants.
- Appliance ownership is lower than in urban areas, with many houses not owning a fridge, TV or washing machine.
- Average of 1 air-conditioner per house, but 40% have ceiling fans only.
- Air-conditioning is a significant user of power, along with fans, hot water and the stove.
- Retrofitting ceiling insulation resulted in savings of around 2kWh per day, but generally the number of appliances was a more important influence on energy consumption than building design features.

All Communities - average daily power use per house in 2015



*The pre-Project interviews were led by participants and explored Yolŋu stories of power and water linking to traditional stories of water and fire.*



*Overall residents viewed the Project as useful in addressing a real need in a culturally appropriate and respectful way.*

## Qualitative research interviews

In line with the Project's approach of delivery by Yolŋu, qualitative research to evaluate the Project's trials was jointly conducted by Yolŋu co-researchers recruited within each community.

The co-researchers collected qualitative data— people's perceptions, interpretations and actions/interactions—via semi-structured interviews, one-on-one or in small groups.

Participants were sampled across all six communities, including:

- Yolŋu households
- Yolŋu Energy Efficiency Workers (YEEWs)
- Yolŋu co-researchers
- Non-Indigenous people living in communities, working with Yolŋu, or providing services to Yolŋu

The Project's goal was to interview participants before household engagement commenced in each community (42 completed), followed by interviews with YEEWs and householders towards the end of the Project (87 completed, plus 24 non-indigenous interviews).

Many YEEWs were recruited into the post-Project interview teams so their knowledge of the Project could help steer the interviews.

The pre-Project interviews were led by participants and explored Yolŋu stories of power and water linking to traditional stories of water and fire. In addition, interviews brought up stories of the complexity of communities making the transition into mission- and government-supplied services, the difficulties of overcrowding in houses, and the tension between traditional values and ways of life with those more contemporary.

In the interviews Yolŋu explained that they found it stressful having the power disconnected and obtaining more credit when the pre-payment meter ran out credit, however still preferred the pre-payment meter over a billing system as found in urban areas.

Post-Project interviews sought to evaluate the Project's trials. They found:

- YEEWs valued the training and its delivery in Yolŋu Matha and saw the work as important and meaningful in helping their communities. They expressed regret that the work ended with the Project.
- Overall, residents viewed the Project as useful in addressing a real need in a culturally appropriate and respectful way.
- Householders appreciated the employment of local people and having the Project and its technologies explained in language.
- Yolŋu knowledge and understanding of power and water was improved as a result of the household education.
- The BEEBox improved householder understanding of appliance consumption and ability to manage periods of high energy use.



## Conclusion/Summary

The Manymak Energy Efficiency Project was the first energy efficiency trial of this scale to be delivered in remote Indigenous communities, and addressed a real community need in ways that were culturally appropriate, respectful and responsive.

This was achieved through Yolŋu driving the project's engagement model from the outset.

Highlights of the Project include:

- The Project exceeded targets for all key performance measures (KPIs), including employing and training more ambassadors (YEEWs) and approaching more households than originally anticipated
- Measurable energy savings achieved for households despite the low per-person consumption, with 456 MWh of projected annual energy savings from the project's trials
- 1.5 percent community-wide energy saving for the participating communities for 2015 compared to 2014
- The project employed more than 80 Yolŋu household engagement and research workers that now have improved knowledge of energy and budgeting, which can be passed onto the community. Many employees have gone on to secure new employment in other roles.
- The approach to education and engagement, its content and delivery was fundamentally owned and shaped by Yolŋu.
- The project successfully trialled and evaluated innovative energy efficiency technologies suitable for remote Indigenous households.
- Households are benefiting from technology energy savings and a better understanding of their power and water.
- Consortium partners gained valuable knowledge on effective community engagement, flexible effective

employment for household engagement and research, and improved understanding of how to support households to maximise their efficient use of power and water.

- The project provided meaningful employment, increased community knowledge and capacity for making informed choices of power (and water) use, and resulted in measurable energy savings embedded in the community.

A lasting legacy of the project is the learnings and relationships built for the consortium and Government from effective engagement with the participating communities.

For more information about the Project, visit [www.powerwater.com.au/lieep](http://www.powerwater.com.au/lieep)

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