Light and Life in the Bush

BUSH LIGHT

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Mingalkala

Mingalkala sits on a wide open valley floor with dolomite hills rising in the distance. As you drive in the first sign of the community is a large work shed. In May a small tractor was nearby shifting soil to make a new floor while a group of men looked on, leaning on shovels, arms crossed. The road goes over a grid and to the left the first of a line of transportables that serve as houses is perched at the foot of a low bluff. The bluff runs in line with the road with streetlight topped power-poles marching along with it. The road ends in a welcoming carpark at the northern end of the community in front of the community kitchen, from where you can look out over the windswept grassy plain to the distant hills beyond.

Mingalkala have now had a Bushlight Renewable Energy (RE) system for 16 months. Prior to this they relied on a large diesel generator to supply power to only two of the five transportables in the community. With this arrangement they were spending close to $25,000 a year for an average of around 14 hours of power a day.

Bushlight identified Mingalkala as a potential community to work with during its first round of regional energy planning in 2002-2003. This involved assessing its suitability against certain selection criteria agreed upon by the major project stakeholders. These criteria included minimum permanent population and secure land tenure, amongst others. Once the inclusion of Mingalkala in Bushlight's work program was confirmed, staff then set about implementing its Community Energy Planning (CEP) process with residents. Based on the information collected during the initial energy planning meetings, a system was then designed and installed. The Bushlight system was commissioned in late 2005.

In spite of a general appreciation for the Bushlight system, the people of Mingalkala have, since quite soon after the system was commissioned, expressed dissatisfaction both from a technical and design standpoint. They have also expressed a certain degree of dissatisfaction with the level of support provided by Bushlight. As such, it would appear that the project has failed to adequately achieve at least two of its key aims, these being: *Increased technical reliability of RE systems in remote communities*, and the *delivery of increased technical support for these systems*.

As to why people feel this way, the almost daily loss of discretionary power at Mingalkala presents itself as a major factor. As this Case Study will explain, this is happening due to a combination of poor energy management, higher than expected demand and a lower than expected generator contribution. This suggests that Bushlight has been unable to achieve its third key aim which is to *Improve the capacity and confidence of communities to choose and manage renewable energy services*. If this is not the case then the only other available explanation is that the system design is somehow faulty.

This case study will look at these issues in detail and attempt to identify where and why they have come about; what Bushlight has done to address them and what Bushlight has or should learn from the experience.

Bushlight's Community Energy Planning Model

Bushlight's objective is to improve livelihood choices for remote communities by increasing their access to reliable energy services. To do so, Bushlight works directly with community members to provide them with independent advice and information about choosing which energy services are best for them, and advice on demand side management, and energy conservation. Using a range of image-based resources, Bushlight invites communities to consider how they use energy and how much it costs them; and with them, look at what options are available for improving their access to reliable energy services.

Through workshops and community mapping exercises, Bushlight works with residents to prepare Community Energy Plans (CEPs). These plans detail the community's current energy needs as well as any future livelihood aspirations. The CEP documents an agreement between Bushlight and the community by setting out household energy budgets and the roles and responsibilities of the community in using and looking after their RE system. The responsibilities of Bushlight, the community's service agency, and the system installer are also laid out.

After the initial CEP meetings and completion of the system design, Bushlight coordinates the installation of the RE equipment. Following installation Bushlight provides education and training in system operation and maintenance over several visits during the course of the first year. Bushlight's approach elaborates on the typical RE industry process by involving the community in all key activities and decisions.

The setting:

Mingalkala is located in the Fitzroy Valley region of the central Kimberley, about a one hour drive east of Fitzroy Crossing. Established in 1995, the community sits a few kilometres north off the Great Northern Highway on approximately 7 ha of land excluded from the Mt Pierre Pastoral lease.

The Resource Agency for Mingalkala is Yungngora Council Incorporated, who is also the community's Community Development Employment Project (CDEP) umbrella organisation. The Centre for Appropriate Technology (CAT) meanwhile holds the service and maintenance contract for the community's power. Marra Worra Worra, another Resource Agency in the area, holds the municipal service provision contract for the Fitzroy Valley region and supplies the community with diesel.

When Bushlight began working with the community in 2004, the existing infrastructure consisted of five transportables; four were set up for housing while the fifth had a steel-framed bough shelter attached to it which the residents were intending to turn into a community kitchen/homemakers centre. Since then the community kitchen has been established and functions well, however, little else has changed in the status of the community's infrastructure beyond the establishment of the Bushlight system. A solar bore pump was installed in 2006 by Yungngora Council, however, the community reports that this stopped working soon after installation and remains unfixed. The transportables are all old, have not been well maintained and are in poor condition (Mingalkala recently split from Kurungal Council Inc., their previous Resource Agency). This is the biggest issue for Mingalkala at the moment and a great challenge to their long-term sustainability. Theoretically intended as an intermediate housing solution during what was termed the 'establishment' phase of an outstation under the Aboriginal and Torres Straight Island Commission (ATSIC), Mingalkala has so far failed to get new, proper houses built to replace these. In light of the most recent changes in State and Federal policy on Indigenous outstations, it appears unlikely that new houses will be built anytime in the near future.

The population of the community is made up of seven family groups and a total of 38 adults (most of who are on CDEP) and 39 children as of demographic information collected during the Regional Energy Planning process. The actual number of people living in the community, however, is somewhat contentious but appears to be much less than this figure. Information collected during the first CEP meetings with the community shows 2 families actually resided in the community on a permanent basis in Houses 2 and 3. The level of occupation for the Single Men's quarters was at this time quite high, however, as noted, this could be highly variable with a core population of around 4 to 6.

Bushlight began working with the community in 2004, with the first Community Energy Planning (CEP) meeting being held in February 2005. A second community meeting took place around two months subsequent to this while the system was installed in October and commissioned in early November 2005. The Bushlight RE system at Mingalkala is a 48Volt system with an average design load of a little less than 12kWh per day and a *minimum* required generator run-time of 4 hours/day between October and March (inclusive). Due to the poor condition of the community generator, genset battery charging

was estimated to be unreliable and so was not considered in the RE system design. The total project cost was $228,725 including system mobilisation and installation, two service visits in the first year and additional works including reticulation and demand side management equipment. The Western Australian Government Aboriginal Community Remote Area Power Supply Program provided a rebate of approximately $108,142. The system provides power to two transportables (living quarters), a communal kitchen and a transportable used as an office/living quarters. Generator Only power points have also been mounted at two other points in the community in expectation of future use.

First CEP meeting, Mingalkala, February 2005.

The 2002 - 2006 WA Regional Energy Plan (REP)

How Mingalkala became a part of the Kimberley REP is worthy of note in this review. At the time when the first REPs were being prepared, the process involved a process of consultation between Bushlight regional teams, the Department of Family and Community Services and Indigenous Affairs (FaCSIA - which was then FaCS), Regional Councils, ATSIC, and communities. It is the belief of the Bushlight regional team that local politics resulted in the community selection criteria not being optimally applied.

Presently, Bushlight is able to develop a program that is based on communities meeting the selection criteria laid out by FaCSIA and the Australian Greenhouse Office. This process plays a major role in determining the priority list within the REP. The result is that Bushlight as a whole has become more effective at producing far better outcomes. A look at the communities that were a part of this first round of work compared to those in the current round (2006-2008) shows that the REP process is now much more effective, with the more recent communities much more suitable than many of those first round.

Energy use in the community

Prior to Bushlight, the two activities that consumed the most energy in the community were air-conditioning and refrigeration. With ambient temperatures in summer at Mingalkala rising regularly above 40°C, combined with inappropriate housing, the demand for food and space cooling was (and remains) very high. There were six bar fridges and six air-conditioners alone in the Single Men's quarters, plus a total of two fridges and five air-conditioners in Houses 2 and 3. Most, if not all of these air-conditioners would have been left on during the hot summer months when the generator was running regardless of whether the rooms were being occupied or not, as would the fridges. The community were also regular users of toasters, electric urns and electric frypans all of which are not suitable for use on an RE system.

When running a generator, significant loading is necessary to maintain fuel efficiency and avoid excessive engine wear. As such, the high intensity of power use in Mingalkala prior to Bushlight can be readily explained by the fact that there was no real need for people to control their power consumption.

Mingalkala Energy budgets:

The energy budgets allocated for each of the three dwellings averaged around 2kWh/day. The budget allocated to the community kitchen (including the ablutions block) was 4.75kWh/day. The remainder was apportioned to the streetlights which were installed to run from dusk to dawn.

The highest load from the Energy Budgets was drawn by refrigeration and lighting. The washing machine–which Bushlight regards as a deferred load (best deferred until the middle of the day when there is plenty of power available) was designed to run one load per day.

Bushlight systems work by dividing a community's electrical loads into two categories: essential and non-essential, or discretionary. A certain amount of energy (an energy budget) is then allocated to each household each day at 12 noon. A proportion of the energy is set aside for loads on essential circuits (fridges and freezers, smoke alarms, security lights) and the rest of the energy budget is available for appliances on discretionary circuits (lights, fans, and TV's, etc).

If the allocated energy is used up before 12 noon the next day power will be lost to the discretionary circuit. Energy budgets are designed in such a way that essential circuits are much less likely to lose power.

This 'daily energy budget' approach protects the system from overuse, increasing its life, reducing system maintenance costs and improving overall system sustainability.

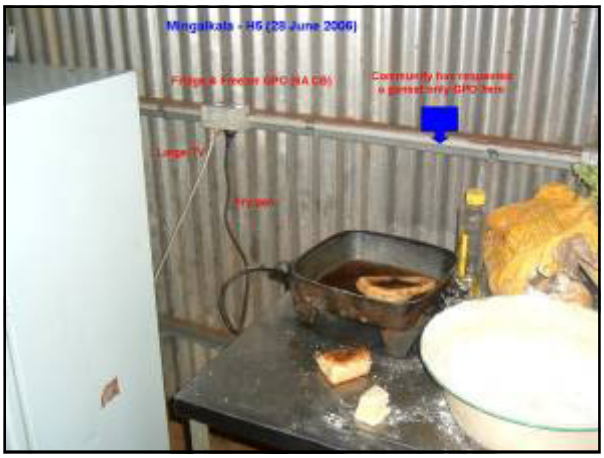
Observations made by regional staff and contractors during visits to the community since commissioning note that residents' energy consumption patterns have changed little. Electric toasters, kettles, urns and frypans have all been observed to be used. This is okay when the generator is running, however, they have often been observed plugged into essential circuit power points. Furthermore, the pattern of use of air-conditioners in the community does not appear to have changed. Given the small energy budgets, the use of air-conditioners would lead to a very quick loss of discretionary power.

A number of Bushlight site visit records demonstrate patterns of community energy use with the Bushlight system.

One record from the end of November 2005, not long after commissioning, records a call out due to a total loss of power in House 1. All six of the air-conditioners were connected to only two circuits, causing the circuit breakers to trip. Furthermore, it was observed that an electric frypan, a toaster and an electric kettle were also being used. Also notable is the Energy Management Unit (EMU) reading which recorded that 16% of the daily budget for the dwelling had been consumed in less than the first two hours since being reset. Given the average daily load pattern, this means that the energy budget would be fully consumed by 10pm or earlier (and not last through to midday next day). This scenario was repeated in House 2 and 3, complete with air-conditioners and electrical kitchen-ware and the consequent regular tripping of circuit breakers, and rapidly consumed household energy budgets. The use of electric kettles, frypans and air-conditioners with high generator use is acceptable, though not ideal. In the case of Mingalkala, the system design was such that a high level of generator run-time was expected and planned for. As such, the continued use of these types of appliances cannot really be criticised.

System data for this period shows that at this time the community had been using their generator for close to 11 hours a day. This is against the expected design of a minimum of four hours a day. Such high generator use would have ensured that discretionary household energy budgets were offset and thus unlikely to last until being reset at midday.

In total for the month following commissioning, the community ran the generator for an average of 7.5 hours every day. This is understandable due to the extreme weather of the area and is well within expectations of the system design. In the seven months subsequent to this period, however, (ie over *peak summer* months) the community ran the generator for a total of only 161 hours, or less than an hour a day on average. Even if, as might be expected, the community only had need to run the



Electric frypan plugged into the fridge essential circuit GPO, June 2006.

generator until the end of March (as per design), this still equates to only 1.3 hours a day average generator run-time. From the end of June 2006, through to November, the community ran the generator for an average of 1.5 hours a day average. Between November and the end of May (again, over summer) only minor generator use was recorded, the extent of which is difficult to determine as it appears the 'GEN Hours' meter on the system stopped working. During this time, the 'GEN AC kWh' meter recorded an increase of 149kWh. With extreme temperatures in the region and high rainfall making access impossible at times, it is expected that the community was not inhabited for the full twelve months of the year. That said, even if it were inhabited for only 9 months, the recorded generator run-time is still very, very low.

So after using the generator 'as planned' (if a little excessively for the first month or so), what then caused the sudden drop in generator run-time and its consequent minimal use? There are a number of potential explanations for this. Given that the primary purpose of the generator in the community is to run the air-conditioners that make the place liveable during summer, it is unlikely then that the 'average' run-times produced using the available data give an accurate depiction of how the generator was actually used as it is unlikely that residents would only want to use their air-conditioners for an hour (or less) a day. What is more probable is that, since December 2005, the generator has only been used intermittently, but intensively when it is. This potentially implies that large numbers of people are not residing in the community for much of the time, particularly in the Single Men's quarters, which has the highest Gen load profile. This strongly implies that only a small core of people are living there permanently (one or two families with some children in Houses 2 and 3) and that they are relying

solely on the RE system. The generator is only being run when large groups visit from town, most likely groups of CDEP workers. This would tally with the other system performance information, including the resident's own reportage of such. Stanley Till, Mingalkala's TO, reports that: *We usually run out of power sometime in the night or early morning, sometimes in the evening*. By loss of power he is referring generally to the loss of discretionary power, however, Stanley has also reported the loss of essential power as well (ie the complete use of the available energy budget prior to 12 noon the next day). The regular - almost daily - loss of power then is due to the use of high energy appliances and absence of any generator input.

Because of the absence of monitoring of daily energy budget use, it is difficult to say in which houses this loss of power is occurring, however, during the project review meetings, Stanley clearly said that it happened pretty much everyday in the community kitchen, *Sometimes the yellow light goes out too. Sometimes we have to run extension leads across from over there* (House 2 - unoccupied at the time of the review) *to here so we can watch TV at night*. During periods of high occupancy in the community, it is possible that Houses 2 and 3 may also use all of their available discretionary and even essential power, particularly if residents are using electric kitchenware and not running the generator.

Changes to energy budgets:

A review mid-way through the first year resulted in a decision to reduce the hours of streetlight operation as a way of freeing up energy for domestic use. EMU settings were then boosted for the community kitchen particularly. Despite this, residents still report a regular loss of discretionary power, particularly at the community kitchen. One reason residents identified for this is that the ablutions block is powered from the kitchen EMU and the washing machine was being used more than planned for.

Despite their difficulties with housing, Mingalkala has not remained completely unchanged since the Bushlight system was installed. The use of the community kitchen in particular appears to have changed a great deal from when Bushlight first began working with the community; namely its development into a functioning community kitchen and the supply of power to it. Where before there was no power at all, there are now lights, a chest freezer and fridge as well as a large TV. Of all the buildings in the community, the community kitchen has the largest energy budget, having been designed to also supply power for the ablutions block (which includes lights and a washing machine). As mentioned though, it has been noticed on several occasions that electric urns and frypans have been plugged into the fridge-only power point in this building. Being an essential circuit, this would be done once all of the discretionary power had been used up and is indicative of an intentional misuse of power. Given that such behaviour is present in this building, it is possible that it also occurs in Houses 2 and 3, both of which have essential fridge power points and a tendency to use electrical kitchenware. Given this behaviour, the small energy budgets of each house and an almost complete absence of generator run-time, it is not surprising that residents are regularly losing power.

CEP process

The first CEP meeting for Mingalkala was held at the start of February in 2005. Two sets of meetings were held with the community, led by two different Bushlight staff members.

Community Aspirations:

Aspirations identified during the CEP meetings indicated that the most pressing need for the people of Mingalkala was to get reliable 24-hour power for the community and to save money by not using the generator so much (maintenance costs as well as diesel). It was anticipated that this would help encourage other family members to come and live at Mingalkala.

Further to these aspirations, residents identified a desire to develop economic outcomes through "Arts and Craft" to provide additional income for community members and to develop the "Homemakers Centre" (community kitchen) to help the elderly, children and community workers.

The process of discussing community aspirations is used by Bushlight as a means of engaging the community in the planning process and for identifying probable future loads that may need to be built into the system design. In Mingalkala, it would appear that apart from one (fairly significant) deviation, the aspirations of the residents were clearly captured. The one point of contention is the reference to arts & crafts; Stanley said during the 12 month review that there were no artists or craftspeople in the community and what he wanted was to run cattle on the property and get a functioning cattle station up and running. What makes this a significant error is Stanley's subsequent plan to get a coolroom (or like) established on the property for storing killers. That said, it is possible that this is an idea that has developed subsequent to the installation of the system. How likely it is to happen is also unclear.

The principle aspirations of the community, however: 24-hour power, reduced diesel consumption and money savings, and encouraging other family members to live on the community, are all valid and remain so. These aspirations, when looked at in the

context of the eventual system design, perhaps give the greatest indication of why the community is dissatisfied with their Bushlight power system. In order to better understand this we need to look at both the system design and the issue of community population.

Population:

The population of the community (permanent) recoded during the first CEP meeting was:

- Single men's quarters - a core of 4 with up to 6 others as mobile residents
- House 2 - three adults and three children
- House 3 - two adults and three children

Only three individuals were associated as mobile residents of these two houses. Residents indicated that between January and March they tended to move to Fitzroy Crossing as the road became impassable.

A site visit a few weeks after commissioning (Nov 29, 2005) recorded the following population:

- Single men's quarters (H1) - at least 5 -6 men
- House 2 (H2) - occupied by a couple and three children
- House 3 (H3) - occupied by a couple and two children

At the time of the project review, which was held in May 2007, 16 months after the system was commissioned, Stanley Till counted the population as:

- Single men's quarters (H1) - 16 men at the time but highly variable as the come and go for CDEP work and don't live there permanently.
- House 2 - no-one living there currently, however, he stated that up to 19 could stay there.
- House 3 - occupied by nine people including children

Mingalakala residents, February 2005.

Solar energy requires careful use of limited power. In order to ensure sufficient power is available to meet peoples basic needs, it is important to work through what those needs are. This is a critical part of Bushlight's energy planning process and results in the development of specific household energy budgets. These energy budgets document the daily energy demands in a house on an appliance by appliance basis. House 7 (unconnected) - has six adults staying there. At the time of the review it was clear there were a lot of young men out from town to do CDEP work; in this case a supervisor from Halls Creek TAFE was there helping them floor the large workshed.

As also mentioned earlier, the total related population of the community is 38 adults and 39 kids. This helps put the numbers mentioned by Stanley into some context, however, the condition and size of the transportables also needs to be considered. As such the numbers Stanley is talking about are not actual permanent population. This does not mean though that a large permanent population is not desired; as indicated by the recorded aspirations.

System Design:

The Mingalkala system design is notable for its high level of required generator use and small energy budgets. Averaging around 2kWh/day for the residential transportables, this can find some explanation when viewed in the context of the poor state of the community's housing stock and perhaps even its small population at the time of the CEP meetings.

The Mingalkala RE system with 'Bus Shelter' housing for the Bushlight enclosure.

What these budgets (and so the overall size of the system) do not account for is any increase in demand that would inevitably come about with any significant increase in community population or establishment or permanent, proper housing. Given that an increase in the number of family members living on the community was a key aspiration identified during the CEP meetings, and that improved energy services was a means of achieving this, then it is an obvious flaw in the design process of the time that excess power supply was not allowed for. Furthermore, for any family household, a daily allowance of 2kWh is too small; a fact that Bushlight has since learnt well.

Further complicating matters has been the issue of the community's generator which, because of its age and condition has been unable to synchronise with the Bushlight system, thereby impeding the charging of the system batteries. With a new generator able to sync with the system, this would ensure the batteries received adequate charging when run. With regards to the system design, the inclusion of significant generator contribution was made on the expectation that the community would be running their generator heavily during these months anyway. This was a decision made by the community and communicated to Bushlight during the CEP meetings. Designing for a high level of generator use cannot, however, cover for the fact that household energy budgets (solar only) were too small.

Other issues of contention:

Technical problems experienced with the system and associated reticulation:

Community dissatisfaction with the system was first recorded 10 days after the system was installed during a regional team visit following-up on commissioning. The day before this visit took place the system had failed completely due to the DC circuit breaker tripping on the inverter. At this time, residents stated that they thought the system should have been designed to supply more power. Part of this feeling may have been due to the fact that the fridges in the Single Men's quarters, and Houses 2 and 3 had all been put on discretionary circuits. This could easily have led to them losing power during the day/night (given the small amount of energy available anyway), which residents would have quickly noticed.

Not long after this Bushlight were called out again for various reasons including EMU budgets not resetting, circuit breakers tripping and safety concerns with the wiring in some of the transportables. The cause of the EMUs failing to reset was not determined. The tripping of circuit breakers was readily accounted for by the use of high demand appliances either not intended for use on discretionary circuits (electric kettles and frypans etc.) or for which the design had not adequately accounted. An example of this is the fixing of 16 amp circuit breakers on gen-only GPO circuits. These were tripping due to the heavy use of air-conditioners. Yet the use of these air-conditioners had been designed and accounted for. As such, these circuits breakers and the associated wiring should have been designed to carry the higher currents expected of them, or more power points fitted. Numerous small details such as this have aggravated people's dissatisfaction with the system brought about by the small capacity of the system.

Other issues have involved faults in the system reticulation and EMUs, including one serious episode brought about by a lightning strike. Problems were also experienced with generator-only circuits which meant that residents have at times had trouble accessing generator power in their homes. This may also help explain the reduced use of the generator over time, although this could also be explained by other reasons such as the community's desire to save money and difficulty in transporting and supply.

The generator:

Prior to the Bushlight system being installed, electrical power for the community came from a 50kVA 3-phase generator. This is a very big machine. There were electrical connections to only two of the dwellings at the time.

When the Bushlight system was installed, this was reconfigured to single phase and downrated to ~25kVA. As mentioned, this generator is far from ideal and has been up for replacement almost from the beginning. Bushlight has applied for and been granted permission by FaCSIA to relocate a suitable generator from an unoccupied community elsewhere in the region. This move was, however, ultimately fell through. Applications for funding for a new generator have since been submitted for the coming financial year. If successful, this would be of great assistance to the community in securing high levels of power when they decide they need it. It will not, however, address the issues of limited RE power related to the Bushlight system.

Mingalkala's generator

Support and training - User (L1) Training

During the project review, the community stated that there was no formal training given to them once the system was installed; that the Bushlight staff member present at the installation spent most of their time with the electrician and when staff visited the community for both scheduled and unscheduled visits, most, if not all of their time was taken up with looking into the various technical issues that had arisen. During the review, Clare said: *Yes, we need more training*. The regional team report that 10 (permanent) residents attended the L1 training, of whom five still reside in the community. That there is a clear difference in this accounting would suggest that if anything, residents do not feel the training was sufficient to their needs.

That said, it is clear that the residents of Mingalkala understand how the system works enough to be able to utilise all of their daily energy budgets. This does not, however, give any indication that they are aware of how the system *should* be used and indeed tends to show that they *do not* know how the system should be used. It is perhaps indicative that no EMU user posters or appliance posters were present in the community kitchen or House 2 at the time of the project review as they should have been.

In terms of post-install support the regional team have stated that they have visited the community on around twelve occasions since installation and addressed demand side management issues with householders and the community leader as the opportunity arose. The level of support given to the community cannot, therefore, be questioned. It does appear though to need to be put in the context of the ongoing technical issues with the system and the necessary *technical* support required. In this regard, the level of organised system user training does appear to be wanting.

User training at Mingalkala, commissioning time, November 2005

Conclusions:

The most obvious conclusion Bushlight can draw from the review of the Mingalkala project is that the RE system is too small to meet the increases in demand experienced by the community during intermittent periods of increased population. The large amount of 'family members' registered during the CEP should have indicated that such increases, even if they were/are temporary, would occur. Furthermore, the system is not capable of meeting even minor increases in demand.

What is particularly difficult about the system though is the short-term nature of the design. One of the major issues faced by the regional team during the design process was whether to connect any of the dwellings at all due to their poor condition and questionable wiring. Housing is now the single biggest issue for the community and a major restraint on their growth and development. With bigger, better (and proper) houses, more people could comfortably live there. More people (and bigger houses) would require more power, particularly if ceiling fans were included. The Bushlight system, however, has been exclusively designed to run a few appliances in three small-roomed transportables, with significant generator run-time to run air-conditioners. This is not how Bushlight designs systems anymore. In fact, were the community to get larger houses, the system would be unable to meet the new demands. In hindsight, it would have been preferable not to work with the community at all until they had secured new housing. Failing that, a system capable of delivering a decent amount of energy to the residents should have been delivered with a lot more capacity building and training of residents in demand side management and the proper expected use of the system. Unfortunately, such support was sidelined by the technical issues experienced.

With regards to energy use in the community, the major conclusion that can be drawn is residents are actively and regularly using the power available from the system in a manner for which it was not designed. Why this is so can, *to a certain extent*, be traced to residents' unwillingness to change their ways, however, Bushlight as a project needs to take the principle responsibility for why this is happening. In the majority of communities Bushlight has worked with over the last four years, the project has managed to positively and successfully change people's attitudes towards - and understanding of - energy use management necessary when running on solar power. This has been achieved through a combination of reliable and trouble free operation and continued user training and support, neither of which has been achieved in Mingalkala.

One of the opinions passed about Bushlight's experience working with Mingalkala is that the CEP process failed here. The sheer range of contentious issues associated with both the system design and use would tend to discredit such a claim. What instead happened at Mingalkala was an unfortunate series of miscalculations, errors of omission, and ongoing technical issues which combined, have resulted in a system that is not suitable for the needs of the people, nor acceptable to them.

Lessons learnt:

Since the community consultation and design process for Mingalkala took place, a number of process changes have been instituted in the organisation by which it would be unlikely that such a design would be repeated. Primary of these would be the size of the energy budget, however, the quality testing of components and preassembled systems has also greatly improved, thereby significantly reducing the chance of so many technical issues arising after commissioning. Furthermore, Bushlight no longer designs in required daily generator run-time to meet energy budgets except in exceptional cases and large communities where diesel supply and use can be ensured and controlled.

Another major lesson learnt from the experience would be to delay any work in a community with sub-standard housing until such a time that the housing was brought up to scratch. Similar issues are being experienced by Bushlight during the 2006-08 work schedule and our approach has been to go slower.

The adequate training of community members also needs to be taken on board and although in general Bushlight performs this task well, Mingalkala provides a salient lesson for the organisation in skimping in this regard.

Recommendations:

It is recommended that Mingalkala be supported to secure a new, smaller, more efficient generator and to ensure that it is installed properly and synchronises well with the Bushlight system. The system should also have a battery charger installed.

There also needs to be a series of user training courses run with both core and mobile residents. Core residents need to be educated on the operation of the system, on how discretionary and essential budget allocations work and what impact it has on the long term sustainability of the system when the system is not used properly. All the Bushlight resources related to demand side management education and training should be deployed.

With regards to energy budgets, probably the best option would be to renegotiate supply with Stanley and disconnect House 3 from the system altogether and donate the energy to the community kitchen. Generator Only circuits should be left where they are. The Single Men's Quarters could also be disconnected, thereby freeing even more energy. In this way less households would be covered but it will be easier to explain and rationalise the capacity of the Bushlight system. One house well powered will make more sense than three poorly powered.

A new shade wall was added to the front and back of the original bus shelter to reduce the temperature inside which was rising to 50C and above over summer, with potentially harmful impacts on the life of the batteries

Livelihood aspirations in Mingalkala:

In the time since Bushlight first began working with the residents of Mingalkala, the community has made some significant headway in achieving their identified aspirations. The homemakers centre, or community kitchen has since been fully developed; a new ablutions block has been built; and rooves have been put up over a number of the transportables making them much more habitable.

Mingalkala, late 2004

New roofing was since installed to protect some of the transportables from the harsh summer sun.

Development of the community kitchen from a corrugated iron lean-to, to a steel-framed bough shelter has been one of the biggest developments in Mingalkala's building stock. The community now has plans to rebuild it, bigger and better.

The new ablutions block with all night lighting and power for a washing machine.

Contact Bushlight
Bushlight Administration
PO Box 8044, ALICE SPRINGS NT 0871
Tel (08) 8951 4344, Fax (08) 8951 4333
enquiries@bushlight.org.au