

BUSHLIGHT'S APPROACH TO UNSCHEDULED MAINTENANCE, continued from page 3

In 2005, residents of Galawdjapin in the Top End, reported an infestation of Singapore ants in the system enclosure. This was logged as an OI on the database and work instructions are now issued for every scheduled maintenance run to clean the system and reapply naphthalene. Community residents have also been provided with naphthalene which they apply around the enclosure when necessary.



Evidence of Singapore ants in the Bushlight enclosure at Galawdjapin

3 — Overuse leading to the loss of power to some circuits.

Bushlight systems are designed to provide each household in a community with a daily 'energy budget', which is a fixed amount of energy agreed upon by residents during the CEP process. A full 'budget' is delivered to households each day at 12 midday, through Energy Management Units (EMUs), small boxes mounted inside each house which displays the amount of energy available in their daily budget. The EMU also allows residents to manage their power use through individual circuit timers. If a household exceeds its daily energy budget within a 24 hour period before 12 noon, essential circuits (for refrigeration, medical equipment and a light for safety) remain powered, but all other circuits become inaccessible. This helps protect the system from overuse and ensures both equity in power consumption between houses and long term system sustainability. Bushlight trains residents and provides them with the information necessary to manage their energy to avoid power loss. This can be complicated by visitors who are not familiar with the limitations of RE. The community of Geboowama in the eastern Kimberley region of Western Australia provides a case in point. Not long after commissioning, some houses in the community began to report regular loss of power, including at least one instance of complete power loss. Each of these events was recorded as an OI and troubleshooting was carried out over the phone to no result. When Bushlight visited the community soon after, the cause of the problem was discovered to be related to energy management practices. Residents were using energy intensive appliances such as spotlights which resulted in their non-essential daily energy budgets being expended well before 12 midday. On many occasions when this occurred the community had reverted to running their generator to access power, thereby limiting the cost savings the Bushlight RE system was intended to help them achieve. Once this was identified as the key issue, the Bushlight regional team carried out further training with the residents to help them better understand and manage their power. Additional educational resources were also developed and provided to the community.

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The Bushlight solar array at Geboowama

UN VISITS BUSHLIGHT

In early April this year, Bushlight hosted Mr Paulo Dasilva, an intern from the United Nations Department of Economic and Social Affairs. Paulo is a mechanical engineer based in Dili who works with solar power installations in East Timor. He visited Bushlight to gain a better understanding of the Renewable Energy (RE) industry in Australia, to see how rural/remote communities manage their RE technology, and how communities are leveraging their access to reliable energy to pursue livelihood activities.

Paulo participated in several field trips to Bushlight installations, where he assisted with maintenance and learned about Bushlight's approach to training community residents. The opportunity was also taken to visit the Solar Systems concentrator power station at Hermannsburg.

Following his time in Central Australia, Paulo visited the Alternative Technology Association (ATA) in Melbourne before flying up to Darwin to spend time with the Bushlight Top End regional team. During his time in the Top End he participated in a trip to commission a Bushlight community system at Yedikba on Groote Eylandt in the Gulf of Carpentaria.

Bushlight staff enjoyed the opportunity to host Paulo and to foster a cross-sectoral partnership with the United Nations Department of Economic and Social Affairs. Such partnerships provide Bushlight with important opportunities to share our experience and build our knowledge base.



UN DESA intern Paulo Dasilva with a display Bushlight system in Alice Springs

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CHANGING OF THE GUARD: FAREWELL TO GRANT BEHRENDORFF

Grant Behrendorff has been Bushlight's Group Manager since the project's inception in 2002. After six years with Bushlight Grant has now moved into a new position within the Centre for Appropriate Technology (CAT) as Group Manager, Business Development, based in Cairns.

Tig Armstrong will be taking over from Grant as Bushlight Group Manager. Tig has held various positions in the project since 2002, first as Regional Manager for the Central region, and for the past two years as Bushlight's Operations Manager.



Outgoing Group Manager, Grant Behrendorff



Tig Armstrong, Bushlight's new Group Manager

GROWING COMMUNITIES: HANDLING SYSTEM UPGRADES

Population growth in homeland communities can be caused by a myriad of factors, one of which is improved access to energy services. The ease of living and decreased financial burden associated with having access to reliable, affordable energy services often leads to additional family members choosing to live in the homeland. This has occurred in several Bushlight communities and in many of these situations, it is not only the permanent population that grows but also visitor numbers. An increasing population often leads to an increased demand for new or improved infrastructure, including energy supply.

Bushlight's design philosophy is to build systems with the capacity to meet both the current and anticipated future energy needs of communities. This is reflected in Bushlight's Community Energy Planning (CEP) process, a key component of which involves discussing with residents their future aspirations and plans, exploring the likelihood of future population growth, and the community's current and future access to resources and external support networks.

In some cases, however, a community's population may grow much more than expected after the installation of a Bushlight system, so that the system may no longer provide sufficient energy to meet the community's needs. In this situation a system upgrade may be considered. This too is part of Bushlight's initial design process, as all systems are designed to allow for future expansion both in array and battery bank capacity.

Because Bushlight is not usually in a position to fund the expansion of established systems, the first step in the process is for the community or service provider to secure appropriate funding. Once funding is secured Bushlight can then manage the system design and the associated contractual arrangements, including managing the tender process, installation and warranty period. If new community service infrastructure is involved—such as houses, clinics, ablution blocks, etc—Bushlight will work with the associated project developers to ensure the infrastructure meets the electrical specifications required to accommodate a Bushlight system.

As outlined below, to date one Bushlight system has been upgraded to better meet the needs of residents, while another two upgrades are expected to be completed this year.



The above image shows one of the initial household energy budgets agreed on by residents at Wandigalla which lies west of Borroloola in the Top End of the Northern Territory. A Bushlight system was installed at one of the two houses at Wandigalla in June 2007. As the existing RE system on the second house was not meeting the energy needs of the community, it was decided to connect this house to an enlarged Bushlight system. This work will commence in April.

In October 2004 this Bushlight household system was installed at **Dingo Spring** in the eastern Kimberley region of Western Australia. In mid 2006 each of the three dwellings were renovated and converted into two bedroom houses. In addition to this, the Traditional Owner of Dingo Spring has indicated to Bushlight that she'd like to establish a School of the Air in this community to cater for the educational needs of the growing family. Dingo Spring is scheduled to receive an upgraded system in mid-2008.



The community of **Gurrumurru** in north east Arnhem land has gone from strength to strength in recent years. A Bushlight community system was installed in September 2005, and subsequently upgraded in February 2007. The upgrade was prompted by the local resource agency Laynhapuy Homelands securing funding for a new clinic in the community. Rather than retaining the small stand-alone RE system that came as part of the funding package, it was decided to upgrade the existing Bushlight system to meet the energy needs of the clinic, and to accommodate an increasing population.



BUSHLIGHT'S APPROACH TO UNSCHEDULED MAINTENANCE

One of the major issues many remote communities face is securing prompt, reliable support when problems arise relating to their infrastructure and essential services, including energy service infrastructure. In order to address this need a key component of the Bushlight project has been the development of a strong and reliable integrated technical support network to service communities with RE systems.

This support network is comprised of three tiers: community residents, their support agency/service provider, and qualified electrical contractors, with Bushlight providing a facilitation and coordination role. At the community level, Bushlight provides in-depth training to residents at the time of system installation and on a regular basis over the following year; the three main components of user-training being operation and maintenance, demand-side management and troubleshooting. The troubleshooting component teaches residents the steps they should take if there is a problem with the system. Given this, when an issue does arise, residents are expected to be able to do some basic fault finding with the aid of the Bushlight produced User Manual. If residents are unable to solve the problem by this avenue, they call their Resource Agency who then attempt to solve the problem.



Bushlight's Michael Tuckwell carrying out Level 1 training with Mount Dennison residents Rosalyn & Harry Jones

When Bushlight is made aware of a problem, either by residents, RA staff or maintenance contractors, it becomes an 'Operational Issue' (OI) and is logged on Bushlight's centralised database, with relevant information recorded as a means of tracking the resolution process. If the problem cannot be solved over the phone, or by service provider staff on-site, the OI is then delegated to the Bushlight maintenance team who will assess the cause, talk to those involved and develop a plan of action. This usually involves a visit either by qualified Bushlight staff or electrical contractors who carry with them detailed work instructions and any relevant spare parts. This work is done under the maintenance contracts now established for all Bushlight systems. All Bushlight systems have been designed and built to operate reliably across the range of extreme environments in which they have been installed. However, issues do still occasionally arise. The causes of operational issues relating to Bushlight systems can range from component faults and system damage, through to poor demand side management (DSM). Bushlight's maintenance program aims to support communities so that any such issues are rectified as quickly as possible.

The following are examples of the OI types logged and addressed by Bushlight:

1 — Part recall or swap out.

All components used in Bushlight enclosures are standardised and tracked. If a manufacturer issues a recall, then Bushlight can immediately identify the sites in which this product was used and organise to get them swapped out either at the next scheduled maintenance visit or more urgently if there is a safety issue.

2 — Component failure.

Components sometimes fail despite the best protection measures in place. Bushlight strives to continually improve the reliability of its systems and components. All of our key components are tested at RE Systems Test Centre (RESlab) to ensure they meet exacting requirements and all relevant Australian Standards. Enclosures and other components are designed to be dust, vermin and insect proof. Sometimes however, insects do find a way in to the system and cause damage.



Robert Gulberti of Gully's Electrical testing PV string voltages on an array in the Kimberley, WA