NT Solar PV Commercialisation Pilot Project

--- Information Package ---

Background – The 1/3rd Peak Lopping Principle

The Northern Territory Power and Water Authority (PAWA), as part of its investment assessment procedures, considers possibilities for renewable energy generation where commercially appropriate.

Figure 1: PAWA's Jilkminggan Hybrid Power Station (Photo courtesy Wolfgang Meike)

PAWA has been an industry leader in remote-area power developments, and its Jilkminggan demonstration site (Figure 1) for solar technology has confirmed that, by adding around 30 per cent of photovoltaic (PV) generation capacity, peak demand on a diesel system is reduced. The Northern Territory is in a unique situation, in that the peak power demand closely matches the availability of the solar power over the course of a day, with the peak occurring early afternoon (see Figure 2). Instead of running a large diesel set at low load (e.g. 40 per cent), a smaller diesel set can be run at optimal load (e.g. 75 to 90 per cent) as the solar provides the peak load. Battery storage is not required, since the diesel engines meet the gap between the actual demand and the power provided by the solar system. The economic and environmental savings from this arrangement are significant.

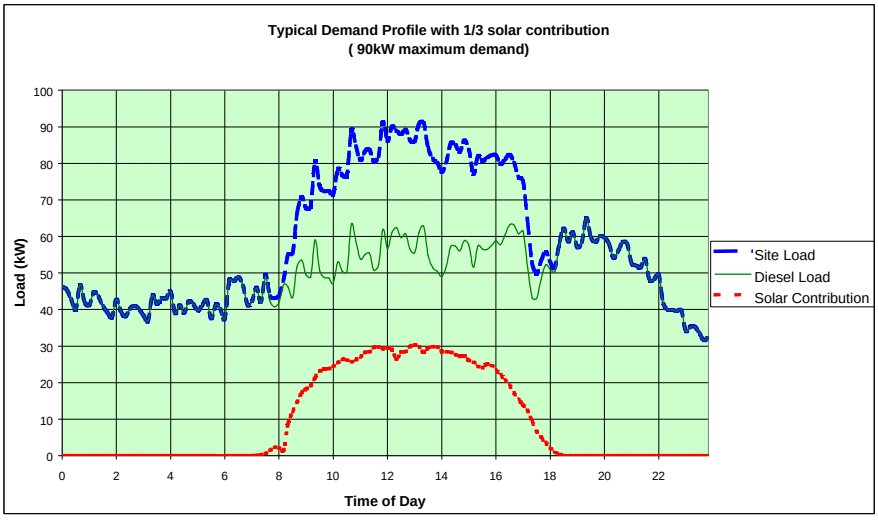


Figure 2: Typical load curve, with solar contribution

Savings

With the assistance of significant grants from the Australian Greenhouse Office and the Northern Territory Department of Mines & Energy (under the Renewable Energy Commercialisation Program and the Renewable Remote Power Generation Program), the NT solar PV project aims to demonstrate the commercial viability of peak lopping using an optimal mix of solar and diesel technology. The resultant hybrid system will reduce diesel fuel usage, reduce operation and maintenance costs and provide benefits by reducing greenhouse gas emissions.

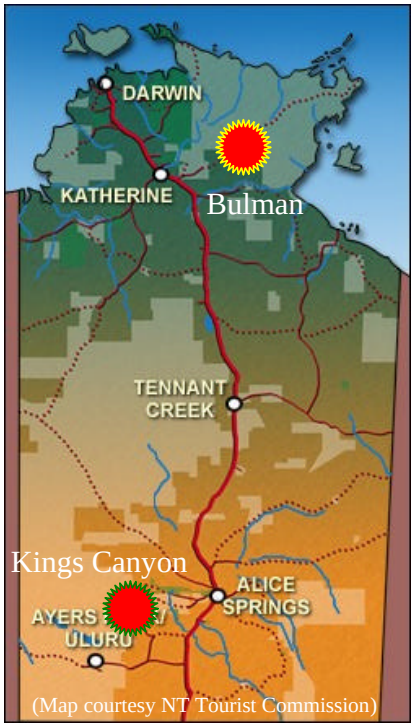
PAWA is proud to acknowledge the financial support of the Australian Greenhouse Office and the NT Department of Mines & Energy in the realisation of this project.

PAWA will seek to replicate the concept in other locations in the Northern Territory, including remote communities, Aboriginal outstations and some mining sites, and in isolated diesel-fuelled sites in South-East Asia. As an indication of the economic and environmental significance of the scheme, similar installations at all remote Territory diesel power stations could save $1.75 million in diesel fuel and over 7,100 tonnes in CO_2 emission annually (over 1 per cent of PAWA's annual emissions from electricity generation).

Locations

The most favourable locations for renewable energy are the diesel-fuelled power stations in remote communities of the Northern Territory. Accordingly, the Power And Water Authority has made a commitment to install PV systems in Bulman and Kings Canyon. These locations were selected because of their differences and also their similarities.

Bulman is a remote Aboriginal community (160 kW maximum demand) in the tropical zone, whereas Kings Canyon is a large resort in a national park (650 kW maximum demand) in the arid zone. These differences will demonstrate for future commercial projects the prospects for hybrid systems under different climatic and load profile conditions across the Territory. The Kings Canyon site will expose this innovative arid-zone technology to thousands of visitors to the national park every year, thereby helping promote sustainable energy principles to the wider community.



Northern Territory Centre for Energy Research (NTCER)


Wolfgang Meike ... the NT has a lot of 'reliable sunshine'

Figure 3: Wolfgang Meike from NTCER with flat-plate PV (courtesy NT News, 2 June 2001)

The project will be built, owned and operated by PAWA with the aid of Northern Territory contractors and, where economically feasible, Australian materials will be used. The Northern Territory Centre for Energy Research (NTCER) has developed the project concept, will carry out the majority of the design work and provide the technical management of the project. PAWA sponsored the establishment of the Centre to undertake research and development of appropriate energy technologies. The construction work will be let by tender, and the employment of local workers will be encouraged.

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To date, this has been the most cost-effective proposal for renewable energy in this location and has economic, technological and social benefits for PAWA and the Northern Territory. The NT solar PV project will provide employment and increase the knowledge base in the renewable energy industry.

Australia's largest PV project

The Northern Territory project with a total size of 280kW$_p$ (225kW$_p$ plus 55kW$_p$) will be Australia's biggest single PV project. Figure 4 is a photo of the 2 stages (each 200kW$_p$) that make up the solar farm installed by energy Australia in Singleton, NSW. The construction and appearance of the Northern Territory project will be similar to the Singleton project. The diesel/PV peak lopping principle employed in the Northern Territory project is believed to be the first such application in the world.

Figure 4: Singleton (NSW) solar farm
(Photo courtesy energy Australia)

Project Contacts

The following people can be contacted for further information about this project:

Project Contact:

Trevor Horman
Manager Strategic Planning
Power and Water Authority
18–20 Cavenagh Street
GPO Box 1921
Darwin, NT 0801

Phone: 08-8924 7093
Fax: 08-8924 7222
e-mail: Trevor.horman@nt.gov.au
Web: www.nt.gov.au/pawa/

Project Manager:

Barry Lake
Manager Major Projects
Power And Water Authority
18–20 Cavenagh Street
GPO Box 1921
Darwin, NT 0801

Phone: 08-8924 7437
Fax: 08-8924 7221
e-mail: barry.lake@nt.gov.au
Web: www.nt.gov.au/pawa/

Design, Technical Management:

Wolfgang Meike
Senior Systems Consultant
NT Centre for Energy Research
PO Box 366u
NT University, NT 0815

Phone: 08-8946 6884
Fax: 08-8946 6885
e-mail: wolfgang@meike.com
Web: www.meike.com

Regular updates of this information package and also of the project itself can be found at the following web site:

www.meike.com/projects/peak-lopping/

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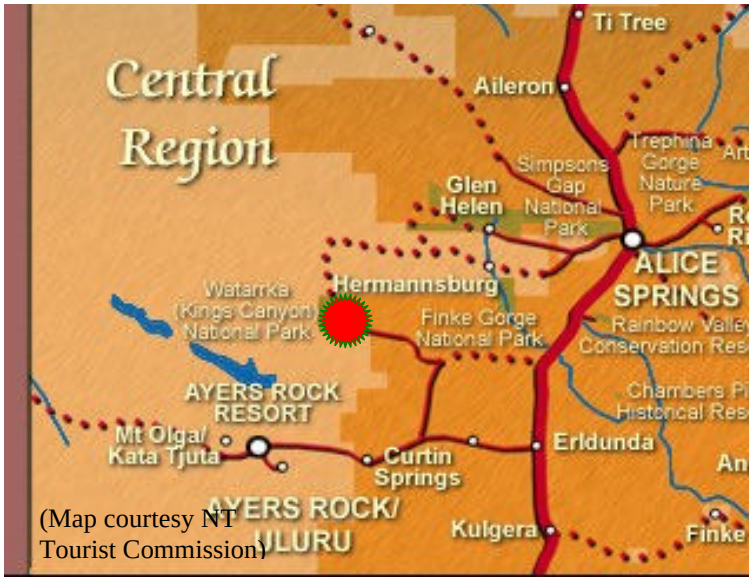
Individual Site Details: Kings Canyon



(Map courtesy NT Tourist Commission)

Location: Near the Kings Canyon tourist resort within the Watarrka (Kings Canyon) National Park, in the arid zone of the Northern Territory. Within four hours driving south west of Alice Springs.

Existing Power Station: 3 diesel sets with automatic control system. Installed capacity ~1MW, maximum demand ~650kW, feeds into a 22kV/415V distribution system. The existing power station does not need to be modified for this project.

PV System Details:

- Approximately 225kW$_p$ of solar panels (PV)
- Flat plate panels – type of technology yet to be decided
- Mounted on a steel substructure
- The PV field will require an area of around 70 x 70 m plus a fenced buffer zone
- Several inverters will be installed that convert the DC into AC and feed directly into the existing power grid
- The existing power station provides backup and additional capacity.

Other Issues:

Kings Canyon is a major tourist area. The solar system will be installed such that tourists can view it and obtain information, yet the system will not be visible or detract from Kings Canyon itself.


Kings Canyon (Photo courtesy Wolfgang Meike, NTCER)

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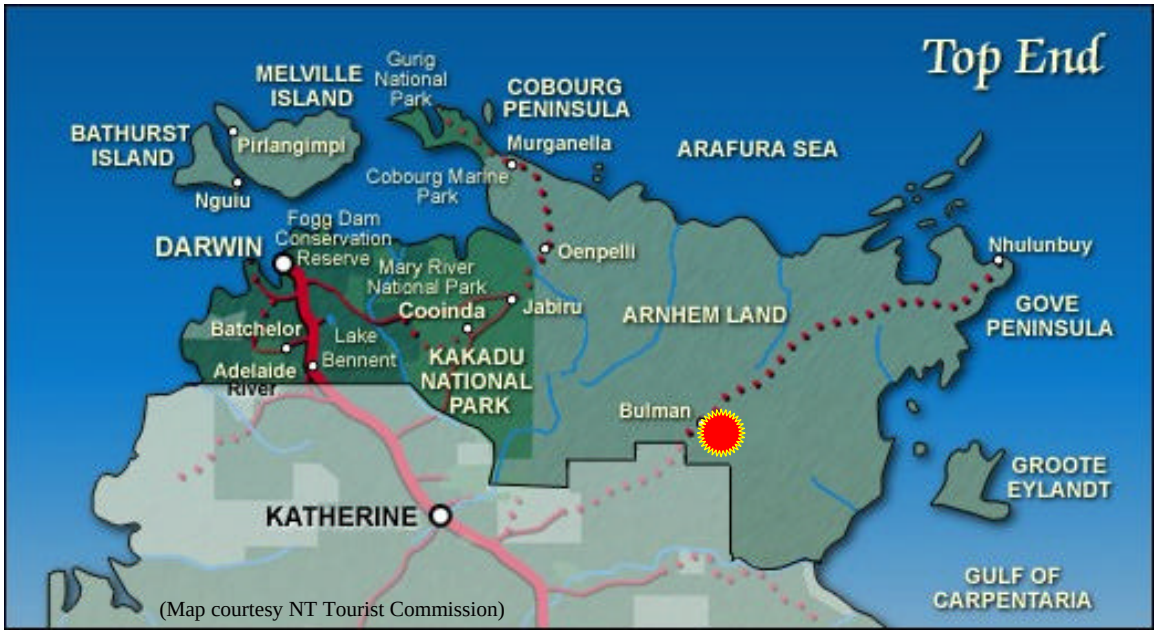
Individual Site Details: Bulman



Location:
Near the Bulman Aboriginal Community, on the road between Katherine and Nhulunbuy (Gove), at the southern edge of Arnhem Land, in the tropical zone of the Northern Territory. Within three hours driving east of Katherine.

Existing Power Station:
3 diesel sets with automatic control system. Installed capacity 380kW, maximum demand ~160kW, feeds into a 22kV/415V distribution system. The existing power station does not need to be modified for this project.

PV System Details:

- Approximately 55kW$_p$ of solar panels (PV)
- Flat plate panels – type of technology yet to be decided
- Mounted on a steel substructure
- The PV field will require an area of around 35 x 35 m plus a fenced buffer zone
- Several inverters will be installed that convert the DC into AC and feed directly into the existing power grid
- The existing power station provides backup and additional capacity

Other Issues:
Wet Season access to the location can be problematic. This solar power system will extend the use of the on-site fuel storage and thus increase the reliability and availability of the community's power supply.

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