

Tropical Energy Solutions

FORECAST: SUNNY >



Written by John Boley

It was intensely ironic that we should catch up with Frank Dallmeyer on a day when, outside his office, Townsville was cloudy and raining because his company, Tropical Energy Solutions (TES), is proving a highlight in an industry whose future is already bright.

TES provides turn-key solutions for on-grid and off-grid energy generation, energy saving and demand management applications. The business operates in three core areas: technical services for the engineering, project management and installation of innovative energy solutions including the complete development and installation of hybrid off-grid power systems for remote areas; energy management services for the development of energy management systems, energy auditing and demand management strategies for commercial operations and property developments; and educational services, training personnel in renewable energy generation and sustainable energy management techniques. ►►



"TES has performed many energy audits and designed and installed a host of disparate systems for commercial, industrial and government projects all over the north of the state."

- ▶ Frank lived for some time in Melbourne but identified that the prospects for the renewable energy industry were probably best within the tropics. He relocated to northern Queensland and has never looked back. Seven years on, TES has performed many energy audits and designed and installed a host of disparate systems for commercial, industrial and government projects all over the north of the state and, more recently, much further afield. The company concentrates on business to business solutions but is also prepared to take a look at the needs of the larger residential location.

Another irony is that as the mining and resources sectors scale back exploration and – at least apparently – enter consolidation mode, these industries are becoming substantially more focused on cost control and therefore extremely interested in better energy efficiency. “When the industry was booming we had very little chance to offer our services to them because all they were looking for were ways to maximise productivity of the machines and they were not so interested in efficiency,” Frank explains. “Now we come to the end of a mining boom and we see there is a growing market for our products and services. The cost of power and electricity is becoming a big issue for them.”

Now the miners are telling their engineers to look into areas of efficiency they had no time for previously. “We are optimistic

we can do more work for miners,” Frank says, and rely less on work for governments (such as the two major projects nearing completion for Townsville Council (see sidebars). It is, as one might say, the silver lining in the cloud.

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Not that TES relies solely on wind power for its solutions. Frank stresses that integration of various sources and systems is usually the best answer in any given situation. A combination of on-grid, solar and off-grid, solar and diesel, linked to efficient battery storage, tends to be the way to go.

In the realm of solar energy provision, TES has quite a surprise in the form of a patent: what Frank terms Virtual Tracking®, something he and his team developed specially for the challenges and opportunities presented by the tropical zones. Virtual tracking® combines most advantages associated with track- ▶



CURRENT STANDOUT PROJECTS:

1 The Tony Ireland Stadium Energy Storage system, for Townsville City Council, is the second stage development to a 40kW photovoltaic solar system at the same location as one that was supplied and installed by TES last year. It is an innovative adaptation of the SMA Solar Technology AC coupled inverter system that stores all PV solar power during the daytime and can release this power in a controlled fashion every evening into the public grid to mitigate peak load demand.

The 500 kWh battery bank uses maintenance free VRLA (valve-regulated lead-acid rechargeable) gel batteries and the entire system is built with an architect designed shelter to suit the public location and the tropical environment on site. It is partly funded by other organisations for its ability to operate in a second mode during disaster recovery situations. In this mode, the system would operate independently from the public grid and use the entire battery capacity, the solar PV capacity and transportable diesel power generation to provide reliable power to local disaster management forces. Completion is expected in late July.

2 A 10kW wind turbine is under construction for installation at the Rowes Bay Interpretive Centre operated by Townsville City Council. This site already operates three different style/size PV solar systems, all installed by TES, to demonstrate the options that suit the local environment in North Queensland.

The WIPO Winforce 10 turbine will be connected to the public grid via standard inverters that are certified to meet all legal requirements. A hinged pole with hydraulic ram is used to lower the entire turbine when cyclonic wind conditions are approaching its coastal location. The centre is used for public presentations and education programs. Installation is expected during July.





- ing systems with the simplicity, reliability and cost effectiveness of fixed systems. A few additional and unique benefits are achieved as side effects.

Based on the fact that the sun can only be in one position at any time, it is possible to install solar modules in such way that their combined output is always smaller than the sum of the nominal module output connected to a string or inverter. The most appropriate position is one in which some modules face east and others west (at present; in the future many angles could be combined to suit inverters with appropriate capabilities).

During the morning the east facing modules deliver the majority of supply, during noon time both sides are equally active and in the afternoon the west facing modules are most active. The total array delivers an output that maximises the capacity of the inverter system, with two supply curves which, combined, are much flatter than that from a fixed system array. The falling cost of photovoltaic (PV) solar modules makes it viable to install a larger module capacity even though the annual specific yield of the installed modules is lower than in a fixed system positioned for maximum annual yields. A typical installation yields an extra twelve per cent per year. In off-grid applications or diesel-grid support applications, the benefits from the broader load curve allow for smaller energy storage systems and/or



higher solar penetration rates in such hybrid power systems.

East-west facing roof spaces are often regarded as unsuitable for efficient PV solar systems. But virtual tracking can turn them into very efficient locations. In ground mounted, free standing

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systems the benefits are the greatest: conventional fixed solar arrays are installed on tilted frames with spaces between them to avoid shading effects while in a virtual tracking application the entire array is rotated by ninety degrees and the unused spaces between the rows are used for additional modules.

The optimum tilts for fixed solar modules get smaller as you approach the equator. A virtual tracking system needs higher tilts of up to thirty degrees and uses almost all of the available area, halving the space required per output despite the higher quantity of modules. All costs related to the size/footprint of an array are reduced (earthworks, fencing, security, lease, maintenance, etc.).

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Two welcome side effects are highly relevant to tropical regions. The wave-like installation of a virtual tracking system creates less wind resistance than an array of spaced rows with upper and lower edges, thus reducing the risk of damage from cyclones. The self-cleaning effect of the solar module surface relies on a suitably large tilt in order for rainwater to carry dust and debris away from the surface. The small tilts in tropical latitudes of conventional arrays provide only poor self-cleaning effects whereas the higher tilts in virtual tracking systems offer much improved cleaning. So far, TES has already installed more than forty of these virtual tracking systems, with a combined capacity in excess of 300kW. “We find it quite easy to convince new clients of the benefits, especially for our tropical latitudes,” says Frank with a measure of understatement.

Hardly surprising therefore that, with the help of the Australian Institute for Commercialisation and a good patent lawyer, TES was able to patent its thinking. Frank is keen to reassure householders who happen to have screwed their PV modules to the east and west of their roof that he is unlikely to take action; but in commercial applications, some licensing is going to be needed. Armed with the patent for virtual tracking, and with utilities becoming more interested in getting power ploughed

back into the grid, TES will be cutting an increasing swath through the regions between Cancer and Capricorn in the next few years – with hardly a cloud in sight. ■

