Beryl Solar Thermal Power Station

By Ian McAdam

Beryl is a small locality situated 5km west of Gulgong in NSW. There are a few small farms in the locality, as well as an area owned by Transgrid. The Cudgegong River courses past on the south-western corner of the locality, and the Wyaldra Creek borders the north of the area. The area is relatively flat with a gentle slope towards the west. It is relatively free of trees.

The locality can be accessed by turning left off the Castlereagh Highway 3km west of Gulgong, just before crossing the Wyaldra Creek bridge.

There is a major 132kV electricity sub-station central to the area, with lower voltage power lines exiting in all directions. It is this sub-station, the vicinity of the Cudgegong River, and the relatively flat cleared land that makes it ideal for a solar-thermal power station. The Google-Earth view below shows the layout.

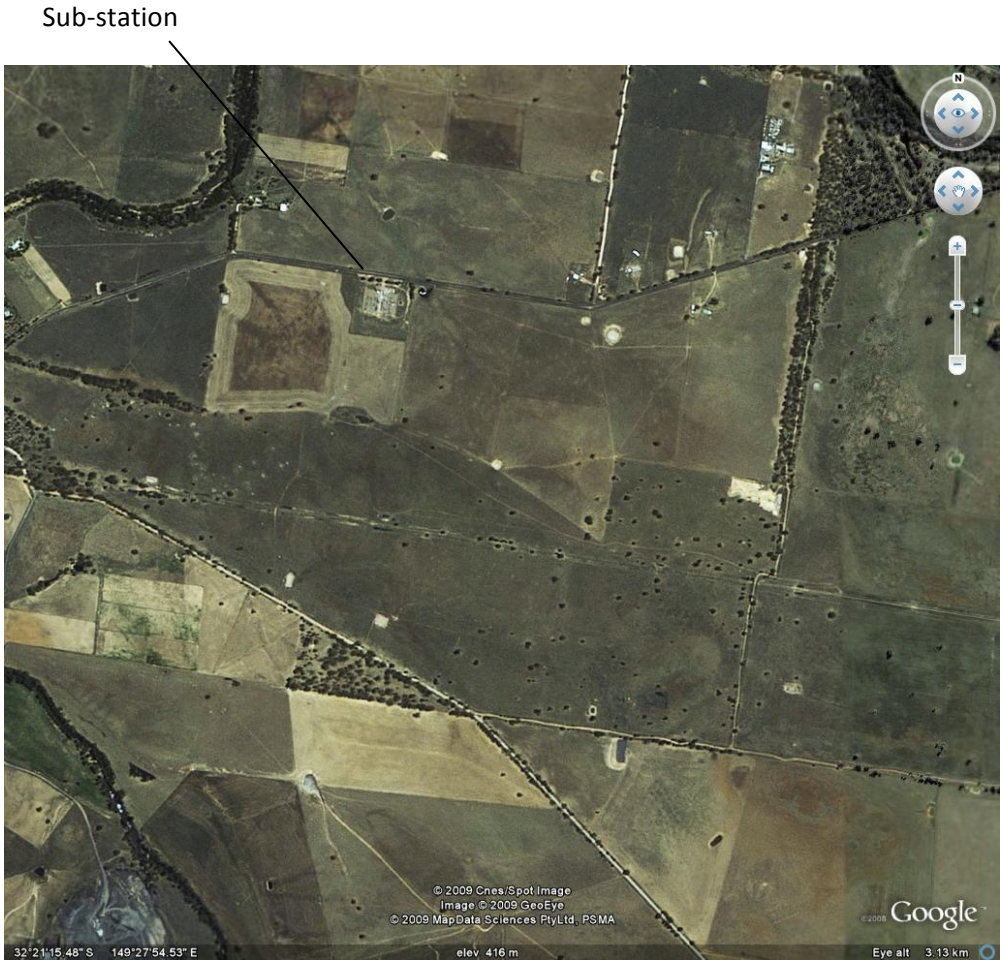

Figure 1 - Beryl Locality

Cugegong River can be seen in the lower left of the picture, with Wyaldra Creek in the upper left. Beryl Road can be seen traversing across the upper section of the picture. As can be seen it is relatively free of trees and ideal for a solar collection farm.

The photos below show the ground view of the area from Beryl Road.

Figure 2- View looking south-west

Figure 3 – View looking north

The sub-station at Beryl is part of the transgrid network in NSW. It is the distribution hub for electricity for the Mudgee region and the north-west of the state. The map below shows the location of the sub-station in the centre of the state.

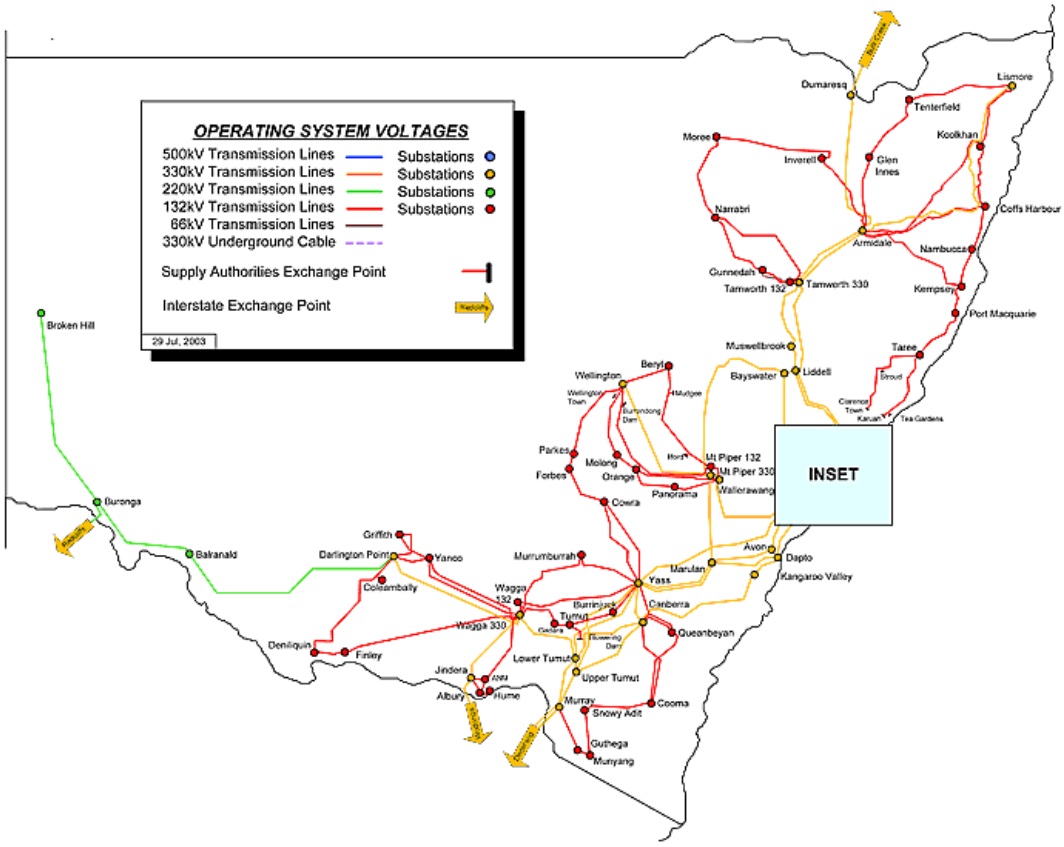

Figure 4 – NSW electricity grid, courtesy of Transgrid website

The proposal for a solar-thermal power has been assessed by Epuron, a renewable energy construction company, who have specified that a 50MW solar-thermal power station could be built here. 50MW is enough electricity to power approximately 30000 homes. They have estimated an annual solar radiation of 2160kWh per square metre per year, which is a higher radiation level than an equivalent solar-thermal power station operating in Spain. Their idea was for a solar trough collector, but any solar collection method could be used. Epuron have estimated the cost at around $300 million.

It is important that a very large solar-thermal power station not be built in one area, as localised cloud can cause a significant loss of power generation and place a large power surge on the electricity grid. By keeping the power stations to a modest size, say 50MW, this sudden change in generation can be minimised. Several smaller power stations would provide the most reliable method of generating power using the sun.

A strategically distributed solar-thermal power station network can also provide reduced load on the electricity grid, in that the power station can be located where the demand from the grid is higher, especially in regional areas. It would also help with local employment.

One other advantage of smaller generators is that it doesn't take as long to get them up to speed and synchronised to the grid. Therefore, they can be utilised during short demand peaks.

Solar thermal power stations have the advantage of delivering their peak energy when the energy is needed, during the day. By incorporating some form of heat storage bank, such as a molten salt tank, the supply from a solar-thermal power station can be extended past sundown.

The peak demand in NSW is in the evening, when residents are cooking their evening meal. This peak can sometimes exceed NSW generation capacity, causing expensive importation of energy from other states. Several solar-thermal power stations with even a few hours of energy storage can alleviate this demand peak, and save the massive spike in energy costs on the state.

The graph below shows the energy demand during a typical day in NSW that occurs in summer or winter. The green line is the energy demand in MW, and the red line is the cost to electricity retailers in electricity in $/MWh. The spike in cost not only happens in mid-winter, but mid-summer as well.

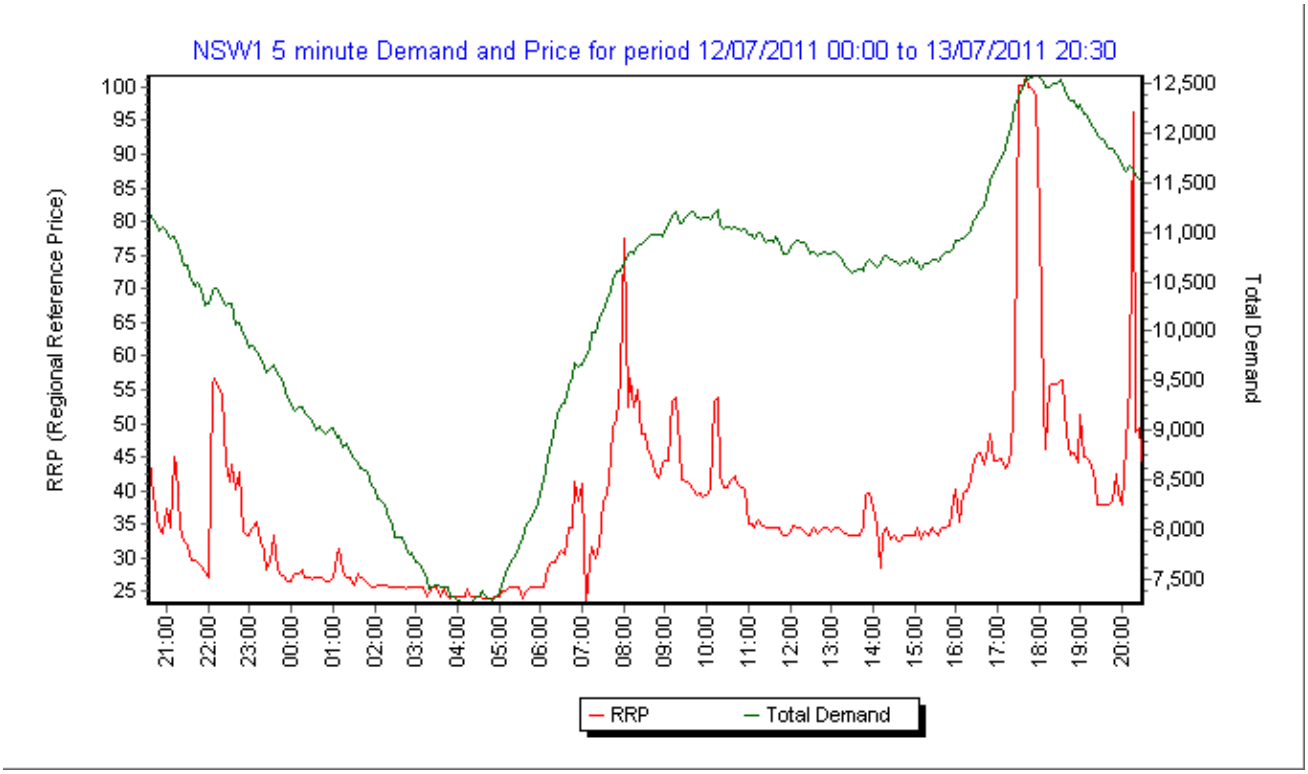

Figure 5 – Energy demand in NSW courtesy of AEMO website.

As can be seen from the above graph, the peak energy usage in NSW is between 5pm and 8pm. Another smaller peak occurs in the morning. A solar thermal power station that stored all its energy during the day as heat, and then releasing it during this evening peak would quickly pay for itself.

Mudgee District Environment Group has spent some time in making the Beryl locality known. It is an ideal solar-thermal power station site, and would provide a welcome alternative employment to the coal mines in the area. They are looking for someone to recognise the potential and to have the proposal developed.