CARNARVON – CARNARVON SOLAR FARM

The Carnarvon load was also compared to output from the Carnarvon Solar Farm 15.8kWp PV facility. This facility was established in Oct 2005 and consists of 144 x 110W fixed panels and three 4.6kVa inverters. There are plans to increase the system size to 45kWp. The 1st to the 17th July 2005 were missing from the dataset provided and so were taken from the Carnarvon simulated north-facing PV data. The peak output from the Carnarvon data used for this analysis was 15kW, or 95% of rated output. The Carnarvon data were directly scaled up by to simulate a 500kW facility for this analysis.

Annual PV profile

Figure 1 shows the scaled 500kW PV output for Carnarvon Solar Farm, which is more constant throughout the year than the Carnarvon simulated north-facing PV. Note also that the first 17 days, where the simulated PV was used, is much lower than the Carnarvon Solar Farm average, although this was also a low period for the simulated PV.

![Figure 1: Carnarvon Solar Farm PV Output (500kW)
July 2005 to June 2006](image)

Daily profiles

The main difference to the simulated north-facing PV is that the Carnarvon scaled PV output is a little higher and lasts about an hour later in the day in all seasons – see Figure 2 to Figure 6.
Figure 2: Daily Annual Average
Carnarvon Load, Carnarvon Solar Farm scaled PV (500kW) and Net Load after PV Offset
July 2005 to June 2006

Figure 3: Daily Winter Average
Carnarvon Load, Carnarvon Solar Farm scaled PV (500kW) and Net Load after PV Offset
June 2006 and July/Aug 2005
Figure 4: Daily Spring Average
Carnarvon Load, Carnarvon Solar Farm scaled PV (500kW) and Net Load after PV Offset
Sept 2005 to Nov 2005

Figure 5: Daily Summer Average
Carnarvon Load, Carnarvon Solar Farm scaled PV (500kW) and Net Load after PV Offset
Dec 2005 to Feb 2006

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**Times of peak demand**

The main differences to the simulated north-facing PV during the peak demand days assessed here are that the Carnarvon Solar Farm PV output was sometimes slightly lower but lasted about 1 hour later in the day.
Figure 8: Autumn peak days
20th – 21st March 2006
Carnarvon Load, Carnarvon Solar Farm scaled PV (500kW) and Net Load after PV Offset

Figure 9: Autumn peak days
6th to 8th March 2006
Carnarvon Load, Carnarvon Solar Farm scaled PV (500kW) and Net Load after PV Offset
Load duration curves

The effect of the scaled Carnarvon PV on the Carnarvon load duration curve was very similar to the simulated north-facing PV, the only notable difference being that the scaled Carnarvon PV did not reduce the top load points by quite as much.

The scaled Carnarvon 500kW PV resulted in the highest offset load period being 374kW lower than the highest original load period (compared to 396kW for the simulated north-facing PV), and resulted in the top 10 offset load periods being lower by an average of 338kW (compared to 364kW for the simulated north-facing PV) - see Figure 11.

On the load duration curve where the offset points now correspond to the load points directly above them on the chart (Figure 12), 75% of the scaled Carnarvon 500kW PV was contributing to reducing peak load, and on average during the 10 highest load periods, this was reduced to 73%.
Figure 11: Load Duration Curve - top 50 load periods
North, and West (25° and 45° inclinations)
Carnarvon Load and Carnarvon Net Load after PV Offset (500kW)
July 2005 to June 2006

Figure 12: Load Duration Curve - top 50 load periods (linked)
North, and West (25° and 45° inclinations)
Carnarvon Load and Carnarvon Net Load after PV Offset (500kW)
July 2005 to June 2006
**General correlation between PV Output and Load**

The scatterplot of scaled Carnarvon PV vs load was essentially identical to that of simulated north-facing PV vs load and so has not been included here.

**Correlation with temperature**

Similarly, the scatterplot of scaled Carnarvon PV vs temperature was essentially identical to that for simulated north-facing PV vs temperature and so has not been included here.