Exemplary Advances

2018 January ***"Exemplary Advances"*** is the newsletter for Exemplary Energy Partners, Canberra. Feel free to forward it to friends and colleagues. Click here to subscribe or unsubscribe. Feedback is most welcome.

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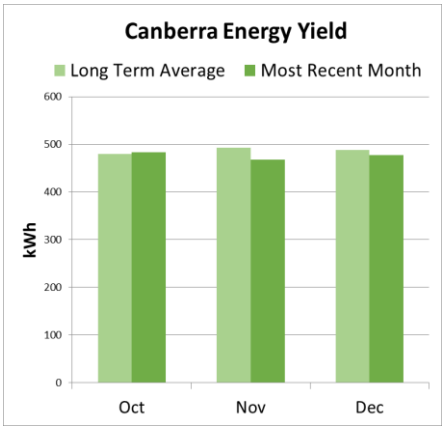
Exemplary Weather and Energy (EWE) Index[i] - December 2017

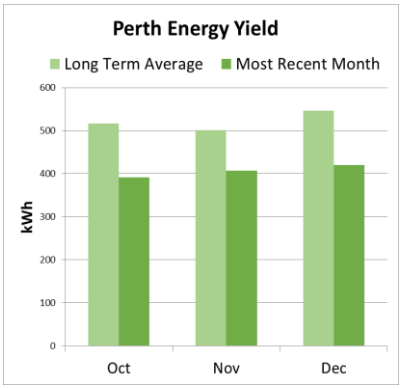
Monthly tabulation and commentary relative to the climatic norm – the Reference Meteorological Years

2017 December	Canberra		Perth		Sydney	
	Heat	Cool	Heat	Cool	Heat	Cool
10-Storey	N/A	9%	N/A	-19%	N/A	-2%
3-Storey	N/A	11%	N/A	-17%	N/A	-2%
Supermarket	-73%	50%	N/A	-3%	N/A	15%
Solar PV	-2.2%		-23.1%		-7.8%	

Canberra had warmer than average weather in December. The mean maximum and average temperatures were higher by 4.4°C and 2.1°C respectively. Only the mean minimum temperature was lower by 1.7°C. All the commercial building models had higher than average cooling consumptions. The 10-storey office South facing zones had over 20% more cooling than the norm due primarily to the higher air temperatures.



The cooling consumption in the North facing zones were also more than the average by over 18%. The supermarket cooling consumption was almost 50% more due to its long operating hours and the warmer than average air temperature continues through evening and night. It was cloudier than the average, which reduced the solar PV system efficiency and hence the energy yield was 2.2% lower.

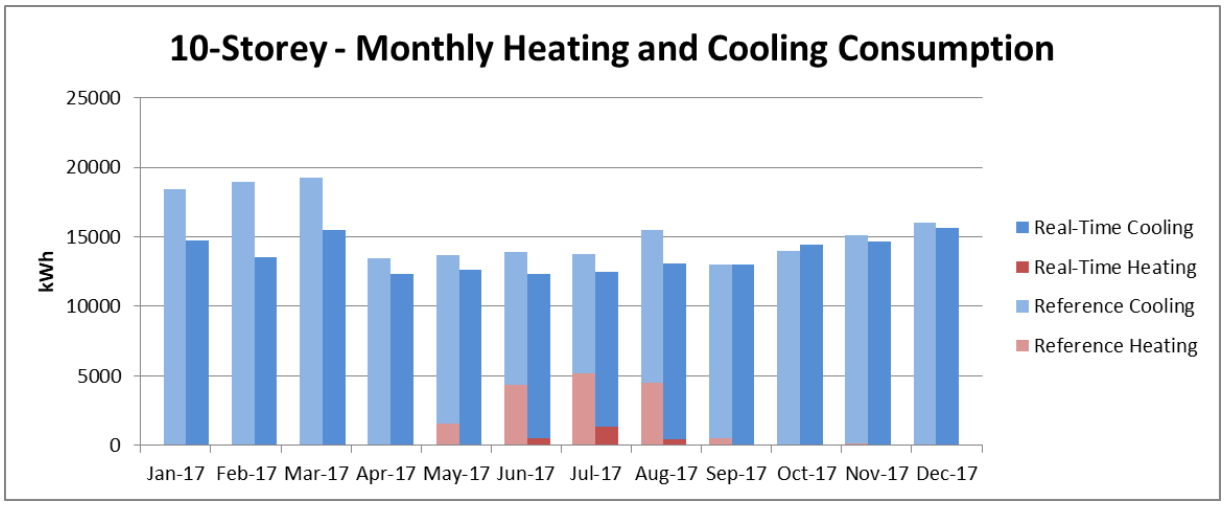


Perth had cooler and cloudier than average weather in December. The mean maximum, minimum and average temperatures were lower by 3.0°C, 0.3°C and 0.7°C respectively. All the commercial building models had lower than average cooling consumptions as a result.

The 10-storey office West facing zones had cooling consumption less than the average by almost 38% due to the lower air temperature and less solar heat during the late afternoon. The South facing zone also had around 22% less cooling consumption. The solar PV array had an energy yield that was 23% less than a normal December in this weather.

Sydney had slightly cooler than average weather in December. The mean maximum, minimum and average temperatures were lower by 0.3°C, 0.6°C and 0.2°C respectively. The cooling consumptions of our 10-storey and 3-storey office building models were only 2% lower than the average. Only the supermarket had 15.0% more cooling consumption than the average as a result of the warmer air temperature after sunset. It was cloudier than the average as well.

The North and East facing zones of our 10-storey office model consumed around 9% less cooling energy than the average. The South facing zones also had around 10% less cooling consumption due to the cooler air temperature. The solar PV system energy yield was 7.8% less in this weather.



SEER - Seasonal Energy Efficiency Rating

While Autumn and Spring highlight the importance of part load efficiency, in reality virtually all air conditioning equipment operates at loads less than its MEPS rated load for more than 90 percent of the time. Accordingly, the bi-national Energy Rating organisation has announced that from April next year a standardised method of calculating the Seasonal Energy Efficiency Ratio (SEER) will come into play. Energy Rating, which is a joint initiative of Australian, State and Territory and New Zealand Governments has based the SEER on *AS/NZS 3823.4:2014 Amendment 1 Air-cooled air conditioners and air-to-air heat pumps – Testing and calculating methods for seasonal performance factors* to provide a realistic model of the energy consumption of an air conditioning unit over a full year.

The SEER calculation takes into account geographic location and seasonal load. Australasia is split into three Climate Zones: **Hot Zone** – which includes Brisbane, Darwin and the Pacific Islands, **Mixed Zone** - which includes Sydney , Adelaide and Perth and **Cold Zone** - which includes Melbourne, Canberra, Hobart and all of New Zealand.

The SEER calculation model includes multiple points of part load for each geographic location. Put simply, when the outdoor temperature varies, so too does the energy efficiency of an air conditioner. This means a unit operating in the tropics has a different annual energy efficiency to the identical unit operating in Tasmania or New Zealand.

An example of the how this will play out it is with the Temperzone OSA 184 Eco ULTRA, an 18 kW light commercial, Inverter Ducted unit with a MEPS efficiency rating AEER Cooling of 3.10 and ACOP Heating of 3.27. However, when part load efficiency is taken into account in the SEER calculation, it is claimed to end up with a commercial SEER in the Mixed Zone of 3.93 and in the Cold Zone of 4.5.

Mandatory Home Energy Rating in the ACT for 225 Months

Mandatory rating and disclosure of the energy efficiency of existing homes at the time of sale has been law in the ACT since April 1999 and we have tracked the $/star value correlation since then. Recently, we have disaggregated the data by housing type and will be publishing those results soon.

[i] Exemplary publishes the EWE for three archetypical buildings and a residential solar PV system each month; applying the RTYs to EnergyPlus models developed using DesignBuilder for a 10-storey office, a 3-storey office and a single level supermarket as well as an SAM model of a typical 3 kW_{peak} solar PV system designed by GSES. All values are % increase/decrease of energy demand/output relative to climatically typical weather. Especially during the mild seasons, large % changes can occur from small absolute differences.