Exemplary Advances

2019 March ***"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.

Past editions of ***"Exemplary Advances"*** are available on our website.

Exemplary Weather and Energy (EWE) Index[i] - February 2019

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

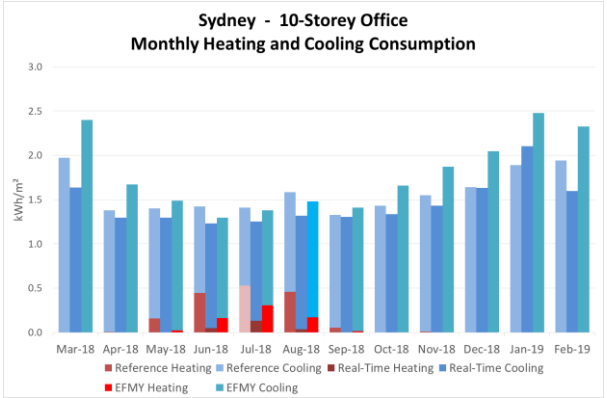
2019 February	Canberra		Perth		Sydney	
	Heat	Cool	Heat	Cool	Heat	Cool
10-Storey	N.A.	9%	N.A.	-3%	N.A.	-18%
3-Storey	N.A.	11%	N.A.	-2%	N.A.	-20%
Supermarket	-37%	14%	N.A.	-6%	N.A.	-3%
Solar PV	11.2%		0.1%		3.9%	

The Exemplary Real Time Year weather files (RTYs) used for these monthly simulations are available for purchase to allow clients to simulate their own designs for energy budgeting and monitoring rather than rely on analogy with the performance of these archetypical buildings and systems.

Canberra had warmer than average weather in February in terms of air temperature. Although the mean maximum temperature was lower by 0.9°C, the mean average and minimum temperatures were higher by 1.0°C and 6.6°C respectively, therefore, the two office buildings and supermarket models had cooling consumptions higher than the averages. The cooling consumption of the 10-storey office North and South facing zones were close to 20% above the norm. East and West facing zones were had over 15% higher cooling consumption because it was sunnier than the average. The solar PV array had an energy yield of 11.2% higher under this sunnier and warmer weather.

Perth had cooler than average weather in February. The mean average, maximum and minimum temperatures were lower by 1.6°C, 5.4°C and 0.2°C respectively. All the three commercial building models had cooling consumptions lower than the norm due to the cooler air temperatures. The cooling consumption of the 10-Storey office South facing zone was over 5% lower than the norm. The North and West facing zones also had cooling consumption close to 3% lower. Only the East facing zone had 1% higher cooling consumption due to the sunnier morning. Overall it was just slightly sunnier than the average, therefore, the solar PV array had an energy yield of 0.1% higher.

Sydney had cooler than average weather in February. The mean average and maximum temperatures were lower by 1.5°C and 1.6°C respectively. Only the mean minimum was 0.7°C higher. The cooling consumption of all three commercial building models were lower than the norm. 10-storey office South facing zone was close to 27% less than the norm due primarily to the lower air temperatures. The East facing zone had over 31% lower cooling consumption due to the cooler and cloudier morning. The other 2 zones also had cooling consumption around 20% less. It was overall sunnier hence the solar PV energy yield was 3.9% higher.



Climate files updated to include 3 extra years

Exemplary's weather data files and the climate data files based upon them have been updated from the 25 years to 2014 to now incorporate 28 years from 1990 to 2017. These are now available for purchase through ACADS-BSG with no increase in price. These include the full 28 year weather record, the Reference Meteorological Years (RMYs) A, B and C and the extreme years P10 (12 calendar months each chosen as having marginally less solar radiation than 90% of years) and P90 (12 calendar months each chosen as having marginally more solar radiation than 90% of years). These are all available in ACDB, TMY2 and EPW formats.

The three RMYs are selected with varying weighting given to the various weather elements. RMY-A is selected with a 10/20 weighting for solar radiation. RMY-B has a 5/15 solar weighting while RMY-C has a 2/12 solar weighting.

Melbourne Comparison – 1990-2014 with 1990-2017

- The new batch of processed data resulted in many changes to the RMY months. P10 and P90 had many changes, while the 3 RMYs only had a few changes. None of the RMYs included a month from one of the three new years. Only P90 had 4 months (Feb, July, Oct, Dec) from the new years.

- Comparing the new months for RMY-A, the data doesn't appear to be significantly different from the months of the previous RMY set. It is observed that the new mean Dry Bulb temperature (DB), Absolute Moisture Content (AMC), Global Horizontal and Direct Normal solar Irradiation (GHI and DNI) for each of the 12 individual months to be within ± 5% range of previous data set with the exception of Wind Speed where mean speed showed a 66% increase in May 1993 (new month) in comparison to May 2009 (old month) and a 27% decrease in September 2005 (old month) in comparison to September 1990 (old month). Because mean wind speed has only a 5% weighting in the cumulative difference function (CDF) used to select the 12 typical months, these are likely to be almost random outcomes in the selected typical months.

- Comparing 1990-2014 with 2015-2017 (the latest three years) showed a negligible increase in mean temperature of 0.0064°C, an increase in moisture of 6.54%, a decrease in wind speed of 7.66%, and a decrease to GHI and DNI of 1.2% and 7.93% respectively.

- Comparing 1990-2014 with 2002-2017 (i.e. the most recent 15 years, the minimum record length to define climate) resulted in more comparable numbers, with an increase in mean temperature of 0.24°C, an increase in moisture of 1.15%, a decrease in wind speed of 8.04%, and a decrease to GHI and DNI of 0.9% and 0.13% respectively. Therefore, the largest difference remains in the wind speed, while humidity and solar were comparable.

Key Site Comparisons – 1990-2014 with 1990-2017

Exemplary Energy Partners will publish equivalent comparisons for the other seven capital cities and Alice Springs to represent arid Australia and Thredbo or Cabramurra to represent alpine Australia in future editions of "Exemplary Advances".

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[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. RTYs are available for purchase for your own simulations.