Exemplary Advances

2018 November ***"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.

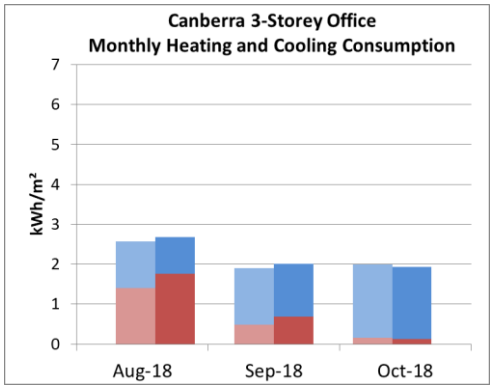
Past editions of ***"Exemplary Advances"*** are available on our website.

Exemplary Weather and Energy (EWE) Index[i] - October 2018

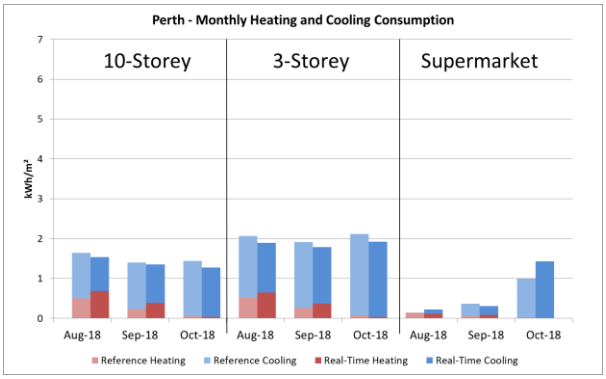
Monthly tabulation and commentary relative to the climatic norm – the Reference Meteorological Years

2018 October	Canberra		Perth		Sydney	
	Heat	Cool	Heat	Cool	Heat	Cool
10-Storey	-6%	-9%	N.A.	-11%	-	-
3-Storey	-14%	-3%	N.A.	-8%	-	-
Supermarket	-23%	85%	N.A.	47%	-	-
Solar PV	-6.8%		-31.7%			

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 a warmer than average weather in October. Although the mean maximum temperature was 2.1°C lower, the mean minimum and average temperatures were higher by 0.3°C and 1.2°C respectively. The two office building models had cooling consumptions lower than the averages despite the warmer air temperatures because it was cloudier. Heating consumption was also lower but the actual values are insignificant. The 10-storey office South facing zones had cooling consumption close to 20% excess to the norm due primarily to the warmer air temperatures. The supermarket model had higher than average cooling consumption than the two office building models due to its longer operating hours. The solar PV array efficiency was affected by this warm and cloudy weather and thus the energy yield was 6.8% lower.



Perth had a warmer than average weather in October. The mean minimum and mean daily average temperatures were higher by 2.4°C and 1.3°C respectively. Only the mean maximum was lower than the climatic norm by 1.9°C. The two office building models had cooling consumptions lower than the norm despite the overall warmer air temperatures. It is due to the cloudier weather, and, during the office operating hours the air temperatures were only slightly higher than the averages. During the night and early morning, the air temperatures were higher than the averages, and also warmer than daytime, and thus the supermarket model had a higher cooling consumption than the norm due to its longer operating hour. The solar PV array efficiency was affected by this warm and cloudy weather and thus the energy yield was 31.7% lower.

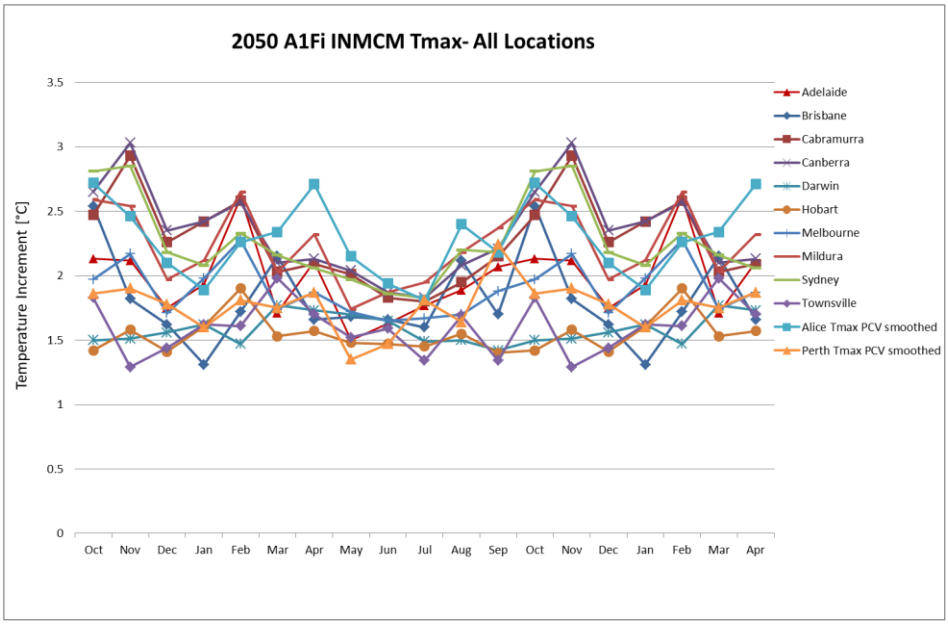
Real Time Weather Data for Sydney

In August the Macquarie University AWS went off line due to a datalogger failure and in September the responsible person, Dr Grant Edwards, died suddenly of a heart attack. Accordingly, the Sydney data is again unavailable this month. We will seek to make arrangements with his successors and/or other weather data sources. A likely alternative is the AWS operated by the solar energy research team at the University of NSW (UNSW). Their data, graciously provided, comes in a different format requiring our in-house software ClimateCypher to be modified to accept it. This will also allow us to patch the data for the preceding months to create a continuous data record.

Ersatz Future Climate Data for comparisons

In collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Exemplary Energy has produced Ersatz Future Meteorological Years (EFMYs). Applying the CSIRO's monthly Projected Change Values (PCVs) as published for this purpose.

The use of these climate files is primarily intended for evaluating future building design based on the probable lifetime of buildings that will be designed and built in the near future. As a result two "eras" are adopted, 2030 and 2050 (i.e. the three-decade eras centred on those years). For 12 key locations, the CSIRO provided six sets of Projected Change Values (PCVs) for four climate elements (temperature (e.g. see graph at right), humidity, wind and solar radiation) in two future eras for three different emissions scenarios (A1B, B1 and A1Fi). Those PCVs were then smoothed in 36 cases, converted to monthly equivalents where they were supplied as seasonal PCVs and then applied to the current climate data, generating EFMYs for sale and use in evaluating building designs over their expected life times rather than just the current climate in which they were designed.



Two possible methodologies for generating those EFMYs were analysed in detail. The originally preferred one was called "realistic" as it involved selecting 12 real months from the climate record of that location to best fit the projected climates. This proved unworkable due to the historical correlations between the four weather elements not fitting the four PCVs for those same elements. The implemented one was called "synthetic" as it involved hour-by-hour adjustments of the four weather elements by the application of the relevant PCVs to the values in the Reference Meteorological Year (RMY).

[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.