Exemplary Advances

2019 June ***"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.

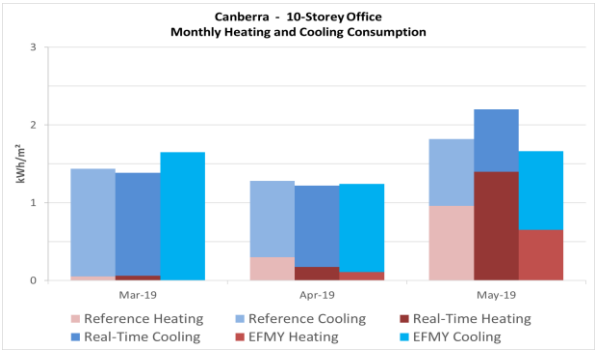
Exemplary Weather and Energy (EWE) Index[i] - May 2019

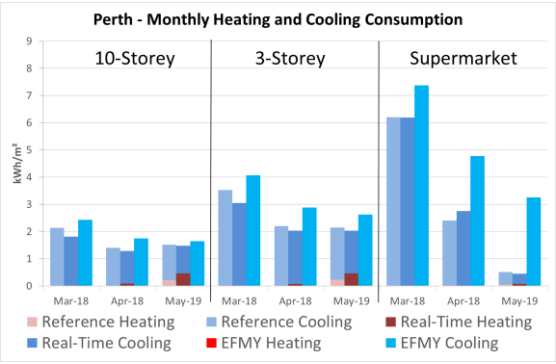
Monthly tabulation and commentary relative to the climatic norm – the Reference Meteorological Years

2019 May	Canberra		Perth		*Sydney*	
	Heat	Cool	Heat	Cool	*Heat*	*Cool*
10-Storey	46%	-7%	109%	-21%	*-34%*	*2%*
3-Storey	38%	-9%	96%	-18%	*-34%*	*4%*
Supermarket	63%	N.A.	44%	-18%	*-89%*	*63%*
Solar PV	6.9%		-26.6%		*-4.6%*	

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 cooler than average weather in May in terms of air temperature. Although the mean maximum temperature was higher by 3.6°C, the mean average and minimum temperatures were lower by 0.6°C and 2.5°C respectively. Therefore, the two office buildings and supermarket models had higher consumptions higher than the averages. The heating consumption of the 10-storey office East facing zones was over 95% above the norm after the cold night. North and West facing zones also had over 25-50% higher heating consumption. It was slightly less sunny than the average, however, the cooler air temperature was beneficial to the solar PV efficiency and therefore, the energy yield was 6.9% higher.





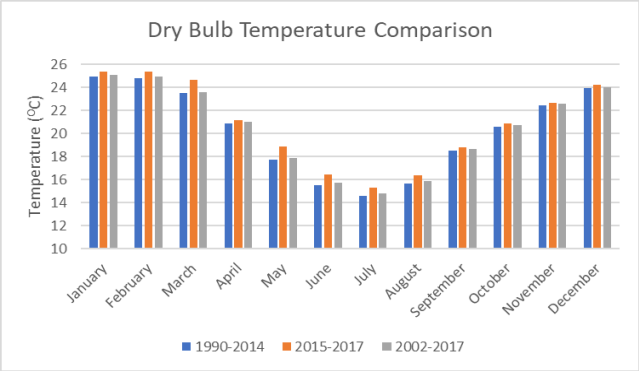
Perth had cooler than average weather in May. The mean average, maximum and minimum temperatures were lower by 0.3°C, 1.3°C and 0.3°C respectively. It was cloudier as well, therefore, all three commercial building models had cooling consumptions less than the norm. The cooling consumption of the 10-Storey office South facing zone was over 25% lower than the norm. The West facing zones also had cooling consumption 51% lower due to the cooler and cloudier weather during the day. The solar PV array had an energy yield of 26.6% lower.

Sydney had warmer than average weather in May. The mean average and maximum temperatures were both higher than the averages by 1.2°C. The mean minimum temperature was also higher by 1.5°C. All three commercial building models had heating consumption lower than the norm by 34% to 89%. The heating consumption of the 10-storey office East facing zone was higher by 10.3% due to the cooler air temperature in the morning, however, the west facing zone heating consumption was less

than the norm by close to 35% due to the higher air temperatures in the afternoon. The solar PV array had an energy yield of 4.6% lower due to the cloudier weather.

Temporal Analysis of Weather Data – Brisbane

Exemplary has prepared updates to its set of 201 Australian sites most recently published for the quarter century of 1990-2014. Especially in the context of a changing climate, we are routinely processing data from subsequent years and comparing this with the prior decades. Most recently, this has been done for the three years 2015-2017 and the change analysed through the increments over time of the five key weather elements. For completeness, we have also compared the potential new climate data season of 2002-2017 (the most recent available 15-year data sets – long enough to smooth out the perturbations of the ~11-year Sunspot Cycle).

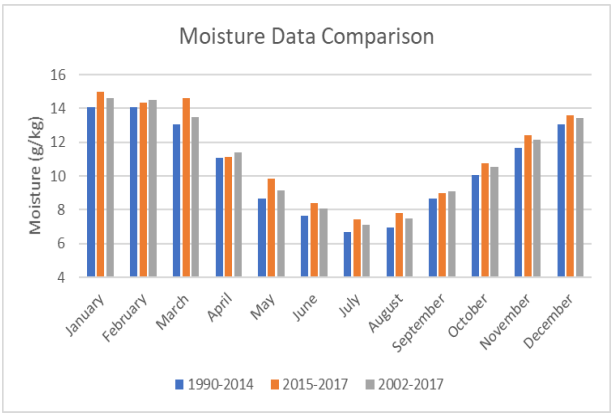


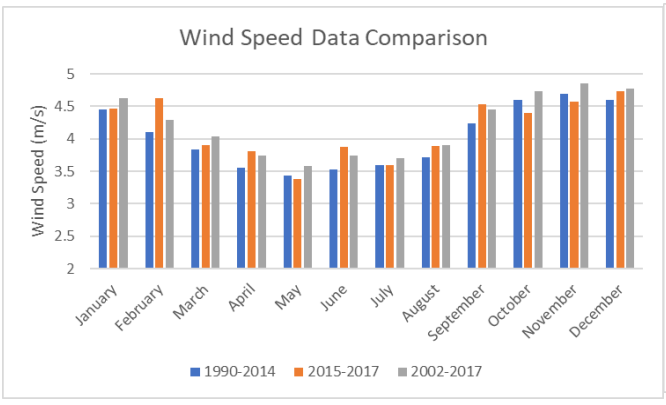
The Temporal Analysis has been carried out for the eight capital cities plus Alice Springs (Arid) and Cabramurra NSW (Alpine) so as to cover the gamut of the Climate Zones in the Building Code of Australia (BCA) - now part of the National Construction Code (NCC). This issue of Exemplary Advances brings to you the Temporal Analysis for the city of Brisbane.

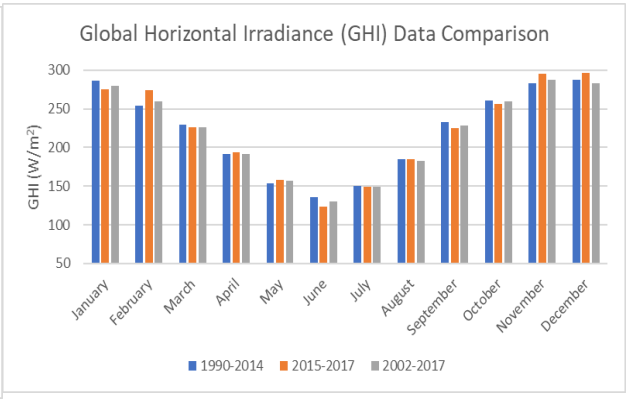
The new batch of processed data had many changes in the RMY months, with P10 and P90 having 9 and 8 changes respectively. P10 and P90 data modification saw months from the 2015-2017 period only in one case each: P10 had September change from 2000 to the new month of 2017, while P90 had May change from 2009 to 2017 and October change from 1995 to 2015.

RMY-A had only two months change, none of which were to the recent months. B and C however had 4 and 5 changes respectively, with August for both sets changing to the new month of 2015. Interestingly, all RMY months for both sets of data are from the 2000's or 2010's.

The two changes discussed above to RMY-A brought about a mean temperature increase of 0.028 degrees, and decreases to moisture by 0.8%, wind speed 4.16%, GHI 0.32% and DNI 4.38%.

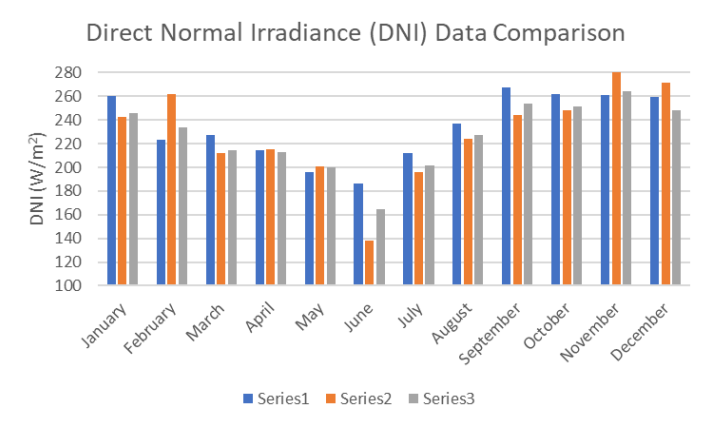






Comparing 1990-2014 with 2015-2017 showed a large increase in mean temperature of 0.58 degrees, an increase to moisture of 6.92% and an increase in wind speed of 2.87%. GHI had a small increase of 0.21%, while DNI had a decrease of 2.62%.

Comparing 1990-2014 with 2002-2017 resulted in a less significant increase to temperature of 0.146%. Moisture and wind speed increased by 4.25% and 4.27% respectively, while GHI and DNI decreased by 0.58% and 3.3%



Further to this temporal analysis of weather data for **Brisbane** between the widely-used current set of data (1990-2014) with the recently developed new batch of weather data (1990-2017), each issue of ***"Exemplary Advances"*** will see a similar comparison for each of the other nine sites around our country to assist readers to consider the need to update the weather and climate data they use for their simulations and other analyses. Look out for them in past and future editions of ***"Exemplary Advances"***.

[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.