Exemplary Advances

2019 July ***"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.

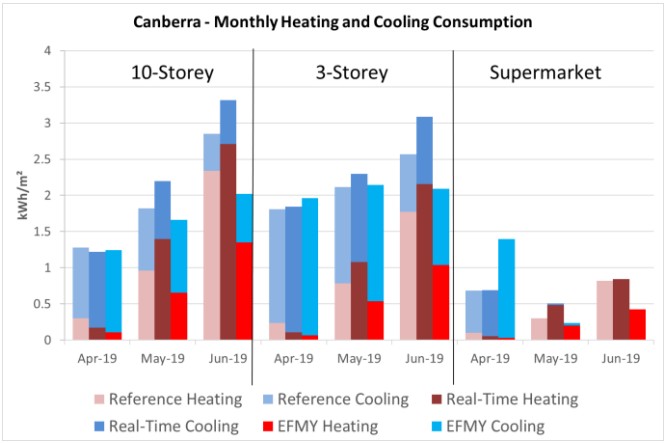
Past editions of ***"Exemplary Advances"*** are available on our website.

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

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

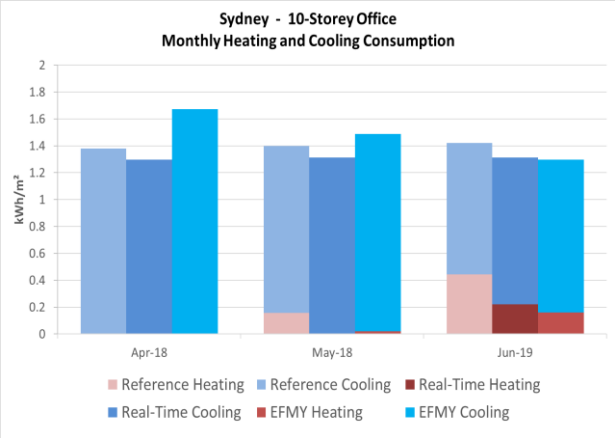
2019 June	Canberra		Perth		Sydney	
	Heat	Cool	Heat	Cool	Heat	Cool
10-Storey	16%	19%	-30%	9%	-50%	12%
3-Storey	21%	27%	-32%	13%	-47%	11%
Supermarket	3%	N.A.	-11%	49%	-68%	N.A.
Solar PV	10.9%		-15.4%		12.2%	

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 slightly cooler than average weather in June in terms of the mean average air temperature. The mean minimum temperature was higher by 0.6°C. The mean average and maximum temperatures were lower by 0.6°C and 2.8°C respectively. However, both heating and cooling consumptions of the two office buildings were higher than the averages (there was no cooling consumption in the Supermarket). Further analysis shows that this is due to a generally cooler and sunnier morning, and, warmer and cloudier afternoon. In the morning, the heating consumption of East facing zones was lower than the averages due to the sunnier weather, but all other zones had higher heating consumption due to the cooler air temperature. During the warmer and cloudier afternoon, the heating consumption of the west facing zones was higher than the averages due to the cloudier weather, but all other zones had lower heating consumption due to the warmer air temperature. Therefore, both heating and cooling consumption were higher than the averages. The solar PV array had an energy yield of 10.9% higher.

Perth had warmer than average weather in June. Although the mean maximum was lower by 0.7°C, the mean average and minimum were higher by 1.1° and 0.6°C respectively. All three commercial building models had cooling consumptions higher than the norm. The 10-Storey office East facing zone had over 26% higher cooling consumption than the norm. The South facing zones also had cooing consumption 11.7% higher due to the warmer air temperature. However, it was generally cloudier in the late afternoon and therefore, the West facing zones had cooling consumption 8.2% lower due to the cloudier weather. The solar PV array had an energy yield of 15.4% lower.

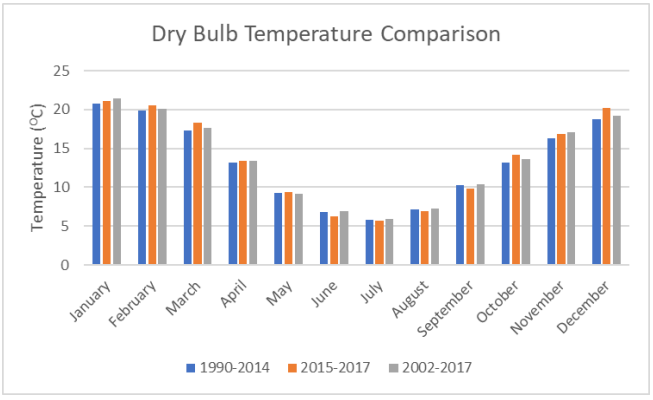


Sydney also had warmer than average weather in June. The mean average, maximum and minimum temperatures were higher than the averages by 1.4°C, 2.2°C and 2.5°C. All three commercial building models had heating consumption lower than the norm by 47% to 68%. The heating consumption of the 10-storey office North and East facing zone were lower by over 51%. Southern perimeter zones also had heating lower than the norm by over 46% due primarily to the warmer air temperature. It was also sunnier, therefore the solar PV array had an energy yield of 12.2% higher.

Temporal Analysis of Weather Data – Canberra

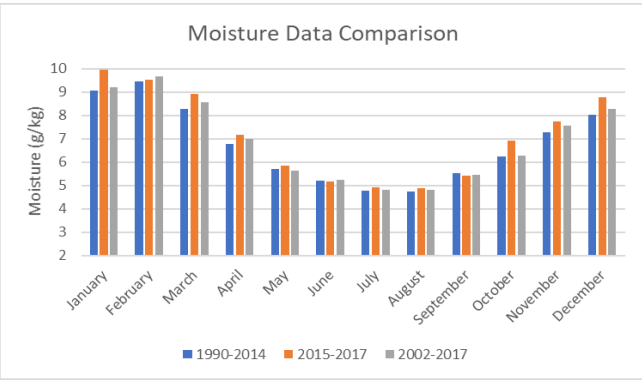
Exemplary has prepared updates to its set of 201 Australian sites most recently published for the quarter century of 1990-2014. Especially in the context of a changing climate, we are routinely processing data from subsequent years and comparing this with the prior decades. Most recently, this has been 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).

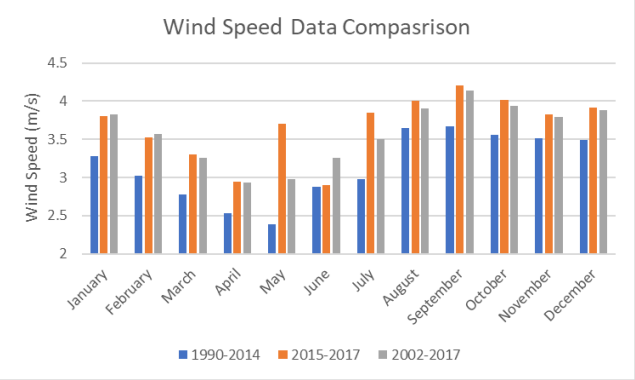
The Temporal Analysis has been carried out for the eight capital cities plus Alice Springs (Arid) and Cabramurra NSW (Alpine) so as to cover the gamut of the Climate Zones in the Building Code of Australia (BCA) - now part of the National Construction Code (NCC). This issue of Exemplary Advances brings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



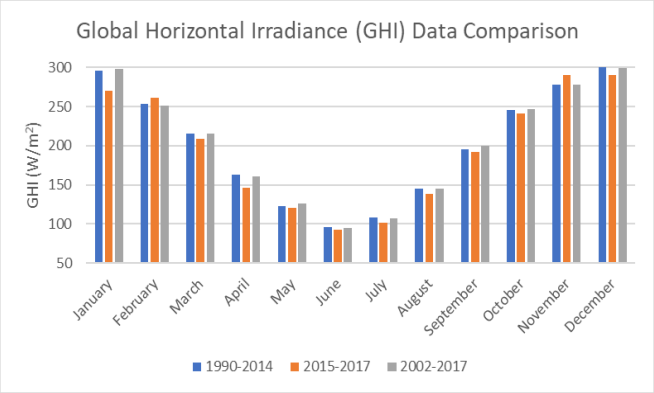
The new batch of processed data resulted in many changes to the RMY months. P10 and P90 had many changes, while the 3 RMYs only had a few changes. Only RMY-B included a month from one of the recent years (2015-2017), which was November 2017, while P10 and P90 had a couple of months from the recent years.

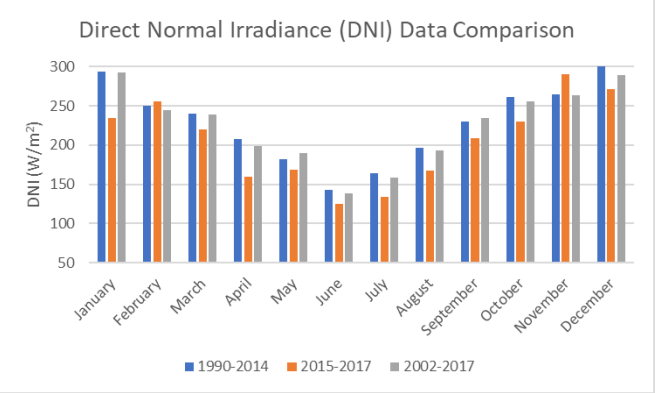
Comparing the updated months for RMY-A, the new months tended to be from earlier years, where 75% of new months were from the 90's, despite the previous batch having them all from 2000's. The four new months for RMY-A had a decrease to mean temperature of 0.025 degrees, an increase to moisture of 1.16%, a decrease to wind speed of 11.25%, an increase to GHI of 0.5% and a decrease to DNI by 7.48%.





The data pertaining to 1990-2014 on comparison with that of 2015-2017 showed an increase in mean temperature of 0.34 degrees, an increase in moisture of 5.24%, an increase in wind speed of 16.67%, and a decrease to GHI and DNI of 2.94% and 10.03% respectively.





Comparing 1990-2014 with 2002-2017 resulted in more comparable numbers, with an increase in mean temperature of 0.27 degrees, an increase in moisture of 1.62%, an increase in wind speed of 13.86%, and a decrease to GHI and DNI of 0.03% and -1.35% respectively. Therefore, the significant difference that can be noticed remains in the wind speed, while humidity and solar were comparable. A general increase in temperature is seen as well.

Further to this temporal analysis of weather data for **Canberra** 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.