Exemplary Advances

2019 October ***"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.

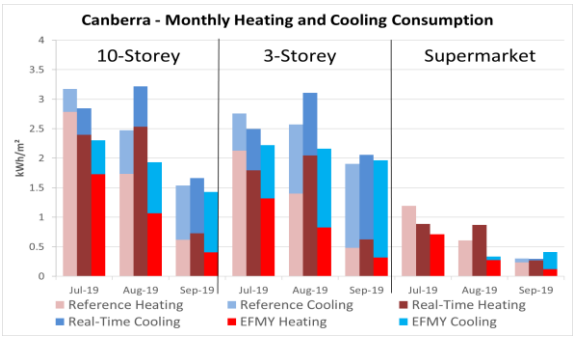
Past editions of ***"Exemplary Advances"*** are available on our website.

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

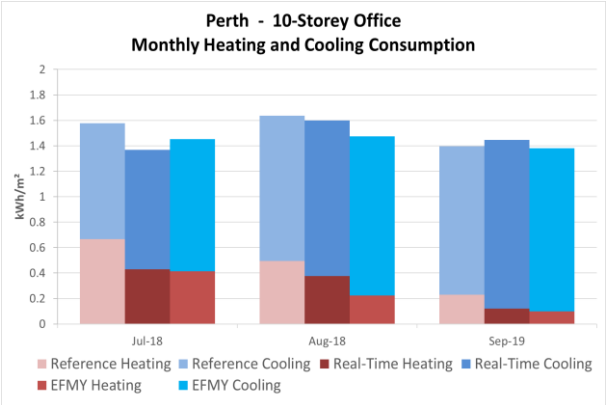
Monthly tabulation and commentary relative to the climatic norm – the Reference Meteorological Years

2019 September	Canberra		Perth		Sydney	
	Heat	Cool	Heat	Cool	Heat	Cool
10-Storey	18%	2%	-48%	14%	-38%	0%
3-Storey	30%	1%	-50%	22%	-35%	0%
Supermarket	15%	-63%	-58%	289%	-92%	5%
Solar PV	4.1%		11.6%		13.4%	

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 cooler than average weather in September in terms of mean average air temperature. The mean average and maximum temperature were lower by 0.5°C and 1.2°C respectively. Only the mean minimum was higher by 0.1°C. It was sunnier as well, therefore, the solar PV array had an energy yield of 4.1% higher. Heating consumptions of all the three commercial buildings were higher than the averages. Cooling consumptions of the 3-Storey and 10-Storey office were also higher – by relatively lesser amounts – due to the sunnier weather. However, the supermarket cooling consumption was lower by 63% due to the generally colder weather after sunset and early in the morning. The 10-Storey office East facing zone had close to 52% higher heating consumption than the norm due to the cooler air temperature. North and West facing zones also had around 27% higher heating consumption.



Perth had warmer than average weather in September. The mean average and minimum temperatures were higher by 1.8°C and 1.0°C respectively. All three commercial building models had heating consumptions lower than the averages and higher cooling consumptions. The 10-Storey office East facing zone had close to 65% higher cooling consumption than the norm. South facing zones also had cooling consumption close to 50% higher due primarily to the warmer air temperature. It was sunnier as well, therefore, the solar PV array had an energy yield of 11.6% higher in this weather.

Sydney had warmer than average weather in September. The mean average and minimum temperatures were higher by 0.8°C and 0.2°C respectively. Only the mean maximum was lower by

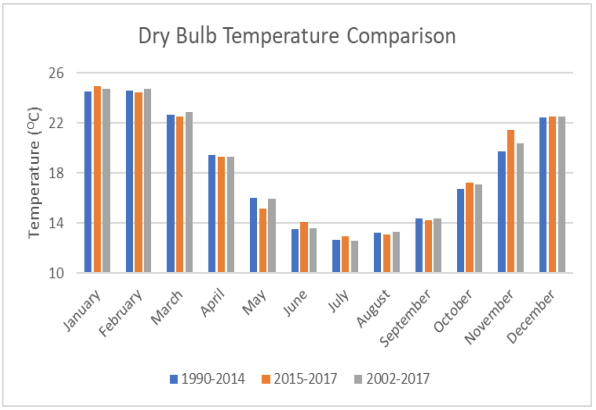
1.1°C. It was sunnier. The heating consumption of all three building models were lower than the norm. The heating consumption of the 10-storey office South facing zone was over 32% lower than the norm due primarily to the higher air temperatures. The East facing zone had over 106% higher in heating consumption due to the generally cooler and cloudier morning, however, the actual values are relatively minor when compared with the other perimeter zones. The solar PV array had an energy yield of 13.4% lower under this sunnier weather.

Temporal Analysis of Weather Data – Perth

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 NT (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 Perth.

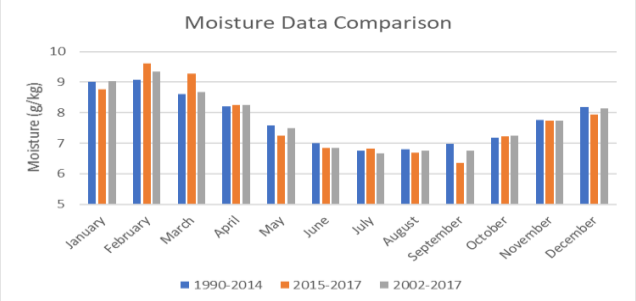
The new batch of processed data resulted in many changes to the RMY months. 14 of the months in the three RMY data was changed out of which 5 of which were to new months. P10 had 7 changes, with only November changing to a recent year from the 2015 to 2017 period; previously being 2013 and changed to 2017. P90 had 6 changes, with January and February changing from 2002 to 2017 and 2004 to 2015 respectively.

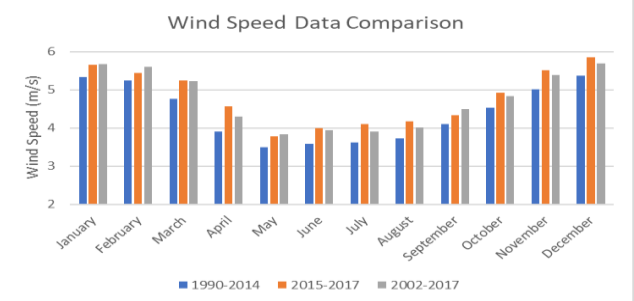


RMY-A had 5 changes, with two changes in months to recent years: May changing from 1993 to 2017 and December changing from 2004 to 2015. RMY-B and RMY-C had 5 and 4 changes respectively, with May for both changing to 2017. RMY-B had December change from 2004 to 2015, just as RMY-A did.

5 months have been changed in RMY-A data and all of them were changed to 2000s years. The processed data showed an increase to mean temperature by 0.55 degrees, moisture content increased by 0.95%, wind speeds increased by 8.75% while GHI and DNI decreased by 0.31% and 1.85% respectively.

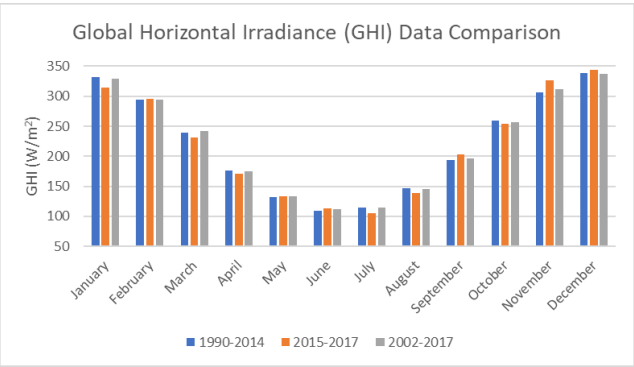
Comparing 1990-2014 data with the 2015-2017 data, an increase in mean temperature was observed by 0.16 degrees and the wind speeds increased by 9.3% as well. However, moisture levels decreased by

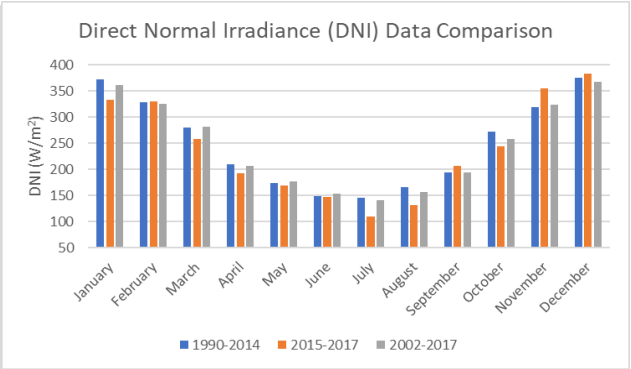




0.41%, so did GHI and DNI by 0.57% and 4.25% respectively.

Comparing 1990-2014 data with that of 2002-2017, resulted in an increase to mean temperature of 0.13 degrees and the increase to wind speed remained moderate at 8.01%. Moisture decreased by 0.25%, while GHI increased by 0.12% and DNI decreased by 1.29%.





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