

# Extending Real-Time Year and other Weather Data Services with Bureau of Meteorology Data

*APSRC Sydney*

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# Background: Our Weather and Climate Data Services

- Reference Meteorological Years (RMY)
- Typical Meteorological Years (TMY)
- Real-time (Meteorological) Years (RTY)
- The Exemplary Weather and Energy (EWE) index

Temperature (°C)		
Min	Avg	Max
-3.3	-0.9	1.2

Relative Humidity (%pt)		
Min	Avg	Max
+56.0	+19.8	+2.0

<i>Energy Index (%)</i>					
10-Storey		3-Storey		Supermarket	
Heat	Cool	Heat	Cool	Heat	Cool
-	-14.5	-	-18.8	-	-87.1

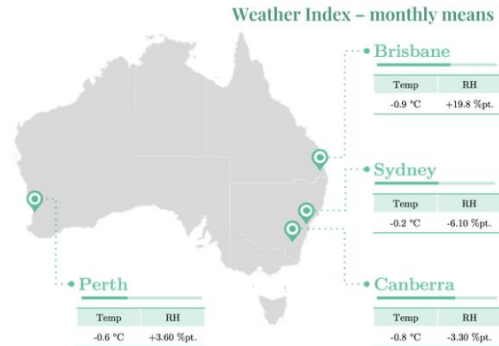
Solar PV
-14.6

- eXtreme Meteorological Years (XMY)
- Ersatz Future Meteorological Years (EFMY)



# Background: Our Weather and Climate Data Services

## Exemplary Weather and Energy (EWE) Index October 2021



The Exemplary Real Time Year weather files (ERTYs), current Reference Meteorological Year files (RMYS) and Enzaz Future Meteorological Years (EFMY) 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 [architectural](#) buildings and systems.



BRISBANE



CANBERRA



PERTH



SYDNEY



# Weather and Climate Data Services: challenges and opportunities

- Timely sourcing and dissemination of weather data
- Validity of the archetype models for the EWE Index
- Meaningful updates to the typical/reference climate data sets
- Defining “extremes” in the XMY
- Sourcing other weather elements: e.g. precipitation



# Real-Time Year (RTY): A Weather Data Set

- This data set includes Global Horizontal Irradiation (GHI), Direct Normal Irradiation (DNI), Diffuse Horizontal Irradiation (DIF), Humidity, Wind Speed, and Direction, Cloud Cover, Temperature and Pressure.
- Potentially soon to include precipitation!
- For consistency, data for all weather elements is ideally acquired from the Australian Bureau of Meteorology (BOM).
- The data is published in various formats: Typical Meteorological Year (TMY), Energy Plus Weather (EPW), and Australian Climate Data Bank (ACDB).



# New Real Time Solar Radiation Data Source

- From August 2019, there has been a suspension of dissemination of satellite solar data from BOM due to some internal setbacks.
- However, data for Brisbane, Canberra, Perth, and Sydney was made available by arrangements with QUT, CSIRO, Murdoch University and the NSW Department of Planning, Industry and Environment (using their station at Macquarie University).
- In recent months, BOM launched a new Solar Radiation Data package via its Real Time Data Service, improving accuracy and allowing us to expand our service to any location in Australia.



# The Exemplary Weather and Energy (EWE) Index

- The Exemplary Weather and Energy (EWE) Index is a free monthly service to industry helping users understand how recent (RTY) weather compares with the long-term average (RMY).
- Since November 2014 it has been published monthly through the “Exemplary Advances” e-newsletter, and now on the Exemplary Energy Blog.
- This service provides benchmarking for low- medium- and high-rise buildings by comparing the energy performance of a simulated Supermarket, 3-Storey, 10-Storey commercial building and a solar PV system under RMY and RTY weather conditions.



# Weather Elements Comparison with Climate

- In the first component – the Weather Index – we evaluate the deviation of the monthly means of minimum, average and maximum recorded data for dry-bulb temperature, solar insolation, wind speeds and humidity against the long-term average (RMY).

Temperature (°C)		
Min	Avg	Max
-3.3	-0.9	1.2

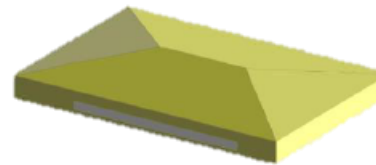
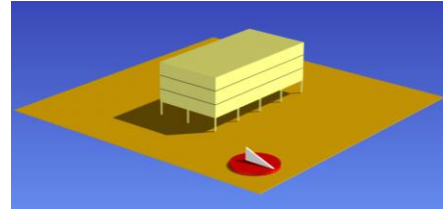
Relative Humidity (%pt)		
Min	Avg	Max
+56.0	+19.8	+2.0





# EWE Index - Building Performance

- The building performance is compared for 3 storey office building, 10 storey office building and ground-level supermarket.
- The building services (primarily cooling and heating) energy consumptions are compared by simulating the NCC compliant building models in EnergyPlus.
- EnergyPlus is a software developed by the US Department of Energy (DOE) and the US National Renewable Energy Laboratories (NREL).



# EWE Index – Solar PV System Performance

- We use System Advisor Model (SAM) which is a software created by US National Renewable Energy Laboratories (NREL) to conduct the PV simulation.
- Historically, the index was based on a 3 kW PV system.
- However, according to our partner Global Sustainable Energy Solutions (GSES), many residential customers are connected to a single-phase power supply and a more representative system would be a 6.6 kW<sub>DC</sub> array paired with a 5 kW<sub>AC</sub> inverter.
- Thus, we are increasing the simulated system size from 3 kW to 5 kW to better reflect the market trend.



# Energy Index - Brisbane

## *Energy Index (%)*

10-Storey		3-Storey		Supermarket	
Heat	Cool	Heat	Cool	Heat	Cool
-	-14.5	-	-18.8	-	-87.1

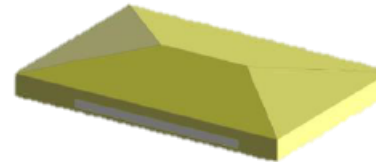
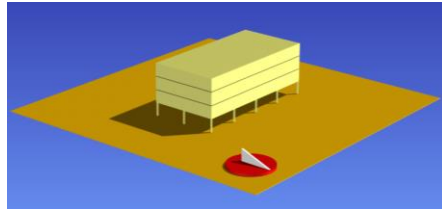
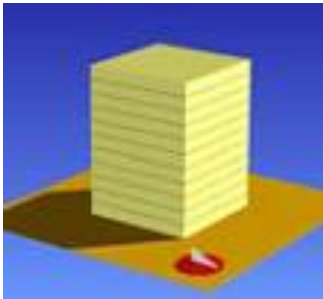
Solar PV
-14.6

## *Weather Index (monthly means)*

Temperature (°C)		
Min	Avg	Max
-3.3	-0.9	1.2

Relative Humidity (%pt)		
Min	Avg	Max
+56.0	+19.8	+2.0



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# EWE Index – The Exemplary Blog

## CANBERRA



### *Weather Index (monthly means)*

Temperature (°C)		
Min	Avg	Max
-0.2	-0.8	-0.5

Relative Humidity (%pt)		
Min	Avg	Max
0.0	-3.3	-2.2

Canberra experienced cooler and less humid weather than average in October. The solar insolation was mostly comparable to the long term average.

### *Energy Index (%)*

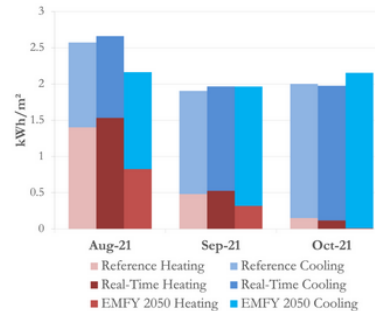
10-Storey		3-Storey		Supermarket	
Heat	Cool	Heat	Cool	Heat	Cool
+2.2	+0.5	-23.2	+0.7	+6.6	-36.9

Solar PV	
+0.4	

The solar PV simulation output showed a 0.4% increase compared to the average. Both the office building archetypes had slightly higher than average cooling consumption while supermarket had lower than average cooling requirements.

Canberra - 3-Storey Office  
Monthly Heating and Cooling Consumption



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# Applications of the EWE Index

- Owners and facilities managers can monitor their buildings and systems' performance against our simulated benchmark. This will enable them to identify underperformance and take early restorative actions.
- Prospective owners can get an idea of their expected energy consumption/generation profile to make better-informed decisions.
- Similarly, GreenStar, Smart, NatHERS and NABERS rated building owners can also compare their heating and cooling energy utilizations against our simulated benchmarks and conduct corrective actions if their building is underperforming.
- The Index also offers a normalization benchmark for stakeholders using the Certified Measurement and Verification Protocols for projects under the NSW, Victorian and SA energy efficiency programs.



Thank You!

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