



# Improved Real-Time Year Weather Data Services with Bureau of Meteorology Data

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# Weather and climate data services

- Weather and Energy Index (WEI) published monthly – all 8 capital cities.
- Real Time Meteorological Years (RTYs) generated monthly for sale to simulators seeking calibrated results for existing buildings and systems – all 8 capital cities.
- Full 32 year weather records for ~250 Australian locations including all 80 NatHERS climate zones adhering to time stamp conventions (1990 to 2021 inclusive).
- Reference Meteorological Years (RMYs) derived from those 32 year records based on 3 alternative weightings for solar irradiation in the Cumulative Difference Function (CFD) and including precipitation data.
- Ersatz Future Meteorological Years (EFMYs) for 2030 and 2050 scenarios.
- Extreme Meteorological Years (XMYs) for flat plate solar PV, water penetration and condensation (WPC) and building services (HVAC).
- [www.exemplary.com.au](http://www.exemplary.com.au)    blog    <https://exemplaryenergy.wordpress.com>

# Recent Weather Data

- Also known as Real Time Year (RTY) file, is a collection of historical real-time weather data acquired from the Bureau of Meteorology (BOM) or other sources.
- This data set includes weather elements like GHI, DNI, DIF, Humidity, Wind Speed, and Direction, Cloud Cover, Temperature and Pressure.
- We have the capability to provide this data set in Typical Metrological Year (TMY), Energy Plus Weather (EPW), and Australian Climate Data Bank (ACDB) formats for more than 200 locations.

# Applications of the RTY

- Simulation Model Calibration.
- Building or energy system monitoring which helps to identify underperformance and take early restorative actions.
- Renewable energy generator monitoring.
- Measuring actual output or consumption in the previous 12 months or month relative to RMYs.
- The Exemplary and Weather Energy (EWE) Index



# Applications: Exemplary Weather and Energy (EWE) Index

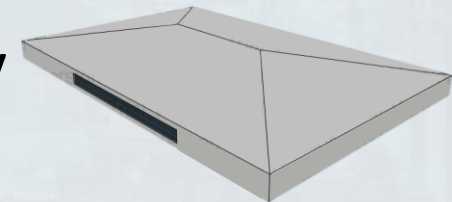
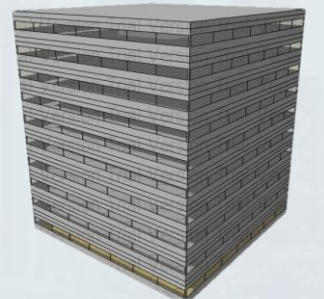
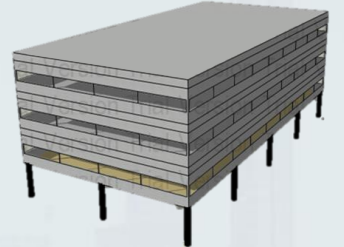


- The EWE Index is a monthly free public service provided to understand how the RTY weather compares with the long-term average (RMY) and, for energy simulations, also with the medium-term future (EFMY-2050) climates.
- It is published through the “Exemplary Advances” e-newsletter since November 2014 and on our blog since October 2021.  
See [exemplaryenergy.wordpress.com](https://www.exemplaryenergy.wordpress.com)
- This service benchmarks three archetype commercial buildings (3-Storey, 10-Storey and Supermarket) and a 5kW solar PV system against RMY conditions.

# EWE Index: Building and PV Performance



- The building performance is compared for 3-storey office building, 10-storey office building and a ground-level supermarket.
- The building services (primarily cooling and heating) energy consumptions are compared by simulating the 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: Building and PV Performance



- Current PV owners can monitor their system performance against our simulated benchmark to identify underperformance and take early corrective actions
- Prospective PV owners can get an idea of how much energy production they can expect. This can help them in making a better-informed decision.
- Similarly, Green Star, SmartScore, NatHERS and NABERS rated building owners can also compare their heating and cooling energy utilisations against our simulated benchmarks and conduct corrective actions if their building is underperforming.

# Recent Developments: A New Real-Time Solar Radiation Data Source



- Following the suspension of the dissemination of satellite solar data from BOM in August 2019, timely data was made available to us for Brisbane, Canberra, Perth, and Sydney by arrangements with QUT, CSIRO, Murdoch University and the NSW Department of Planning and Environment.
- While BOM launched a New Solar Radiation Data package via its Real Time Data Service in August 2021, several alternatives are available from commercial providers.
- We have subscribed to a solar observations service offered by Solcast which we are now integrating with our software.



# Recent Developments: A New Real-Time Solar Radiation Data Source



- Solcast's global solar database is produced using high-resolution (1-2km) imagery from a range of geostationary meteorological satellites.
- The gridded solar data is produced by their in-house radiation model which uses observations from the advanced imager onboard the Himawari-8 satellite.
- The resulting estimates are also bias-corrected against a network of terrestrial stations.

# Recent Developments: Incorporation into Exemplary's RTY data products



- We combine these solar observations with terrestrial observations of other weather elements (dry-bulb, humidity, windspeed, air pressure, ...) from the BOM's subscription service to produce our Real-Time Year (RTY) data product.
- RTY data is used in various applications including calibrated simulation for building commissioning, measurement and verification, and our own Exemplary Weather and Energy (EWE) Index.

# Recent Developments: Extensions to the EWE Index



- The new data is bolstering our ability to provide the latest weather data to our clients and allowed us to expand the EWE Index to all 8 Australian capital cities.
- In May 2022, we published for the first time the EWE Index for all the capital cities except Darwin, which is expected to be included in the coming months.

# EWE Index: Weather Elements Comparison with Climate



- Along with the EWE index, we also evaluate the deviation of the monthly means of minimum, average and maximum dry-bulb temperature and humidity from the long-term average (RMY) climate.

## Exemplary Weather and Energy (EWE) Index - May 2022

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

2022 May	Weather Index (monthly means) <sup>1</sup>						Weather and Energy Index (%)						
	Temperature (°C)			Rel. Humidity (%)			10-Storey		3-Storey		Supermarket		Solar PV
	Min	Avg	Max	Min	Avg	Max	Heat	Cool	Heat	Cool	Heat	Cool	
Adelaide	+5	-0.1	+1	+11	+0.3	+1	-23	—	-26	—	-22	-62	+6
Brisbane	+0.5	+0.6	+0.6	+19	+9	+1	—	+4	—	+6	—	+87	-37.5
Canberra	+0.4	+0.1	-0.6	+1	+7.6	+1	+19	-12	+13	-11	+17	—	-14.4
Hobart	-0.4	-0.3	+0.7	+25	+9.3	—	+10	-2	+12	-2	+8	—	-9.5
Melbourne	+0.1	-0.6	-0.9	+3	+5	+1	+50	-11	+42	-12	+34	—	-20.2
Perth	-0.6	+0.3	+0.9	-2	+0.2	-2	+24	-3	+33	-3	+47	+72	+1.6
Sydney	+0.5	+0.6	+0.6	—	+6.6	+2	-7	-3	-1	-1	-54	+217	-11.5

- See [exemplaryenergy.wordpress.com](http://exemplaryenergy.wordpress.com)



# EWE Index: Weather Elements Comparison with Climate



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	Min	Avg	Max	Min	Avg	Max	Heat	Cool	Heat	Cool	Heat	Cool	
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<b>Brisbane</b>	+0.5	+0.6	+0.6	+19	+9	+1	—	+4	—	+6	—	+87	-37.5

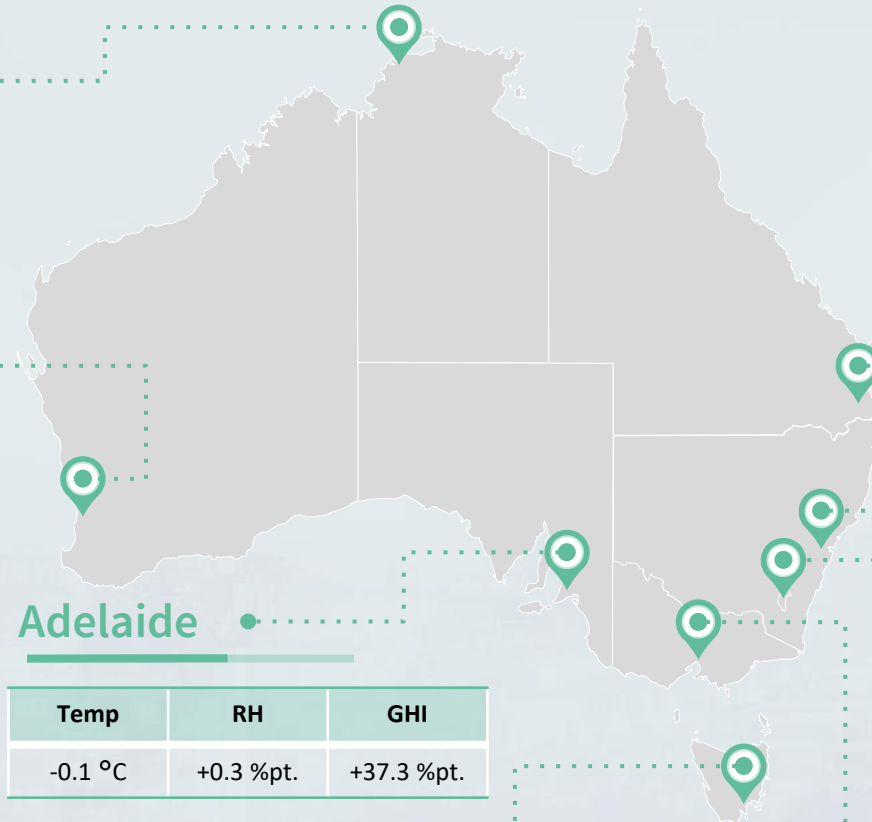
# Weather Index – May Monthly Means

## Darwin

Temp	RH	GHI
N.A.	N.A.	N.A.

## Perth

Temp	RH	GHI
+0.3 °C	+0.2 %pt.	+9.1 %pt.



## Brisbane

Temp	RH	GHI
+0.6 °C	+9 %pt.	-47.5 %pt.

## Sydney

Temp	RH	GHI
+0.6 °C	+6.6 %pt.	-12.8 %pt.

## Adelaide

Temp	RH	GHI
-0.1 °C	+0.3 %pt.	+37.3 %pt.

## Canberra

Temp	RH	GHI
+0.1 °C	+7.6 %pt.	-18.8 %pt.

## Hobart

Temp	RH	GHI
-0.3 °C	+8.3 %pt.	-6.2 %pt.

## Melbourne

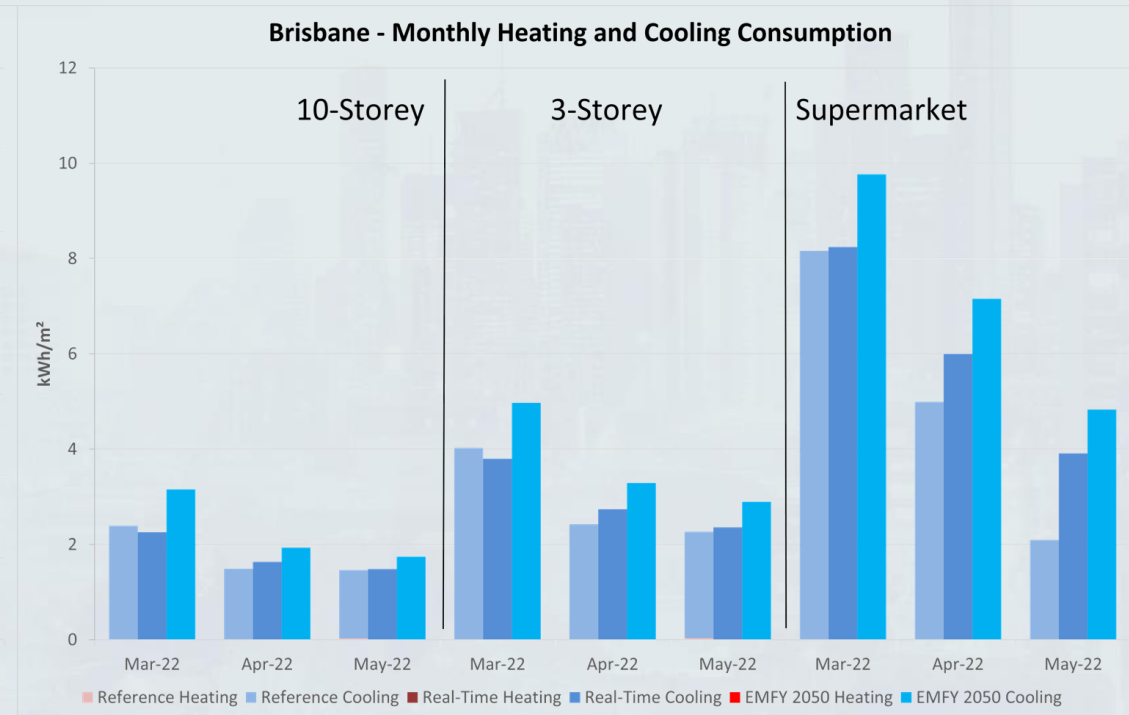
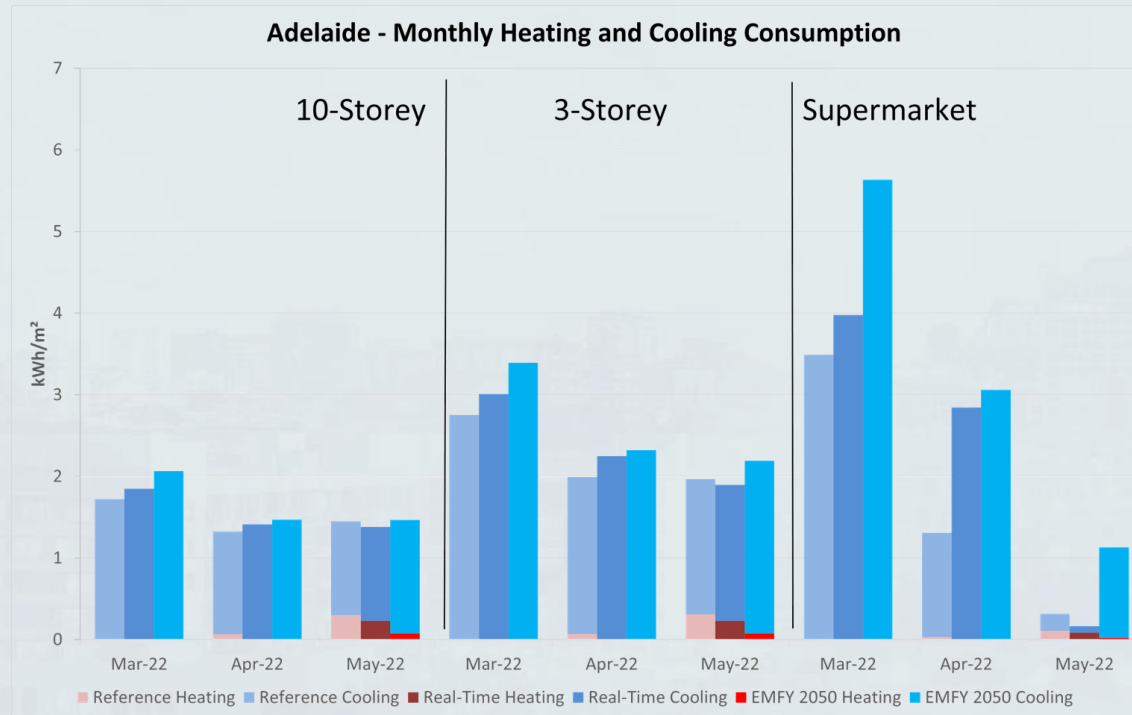
Temp	RH	GHI
-0.6 °C	+5 %pt.	-13.5 %pt.

# EWE Index: Building Performance



## Adelaide

## Brisbane

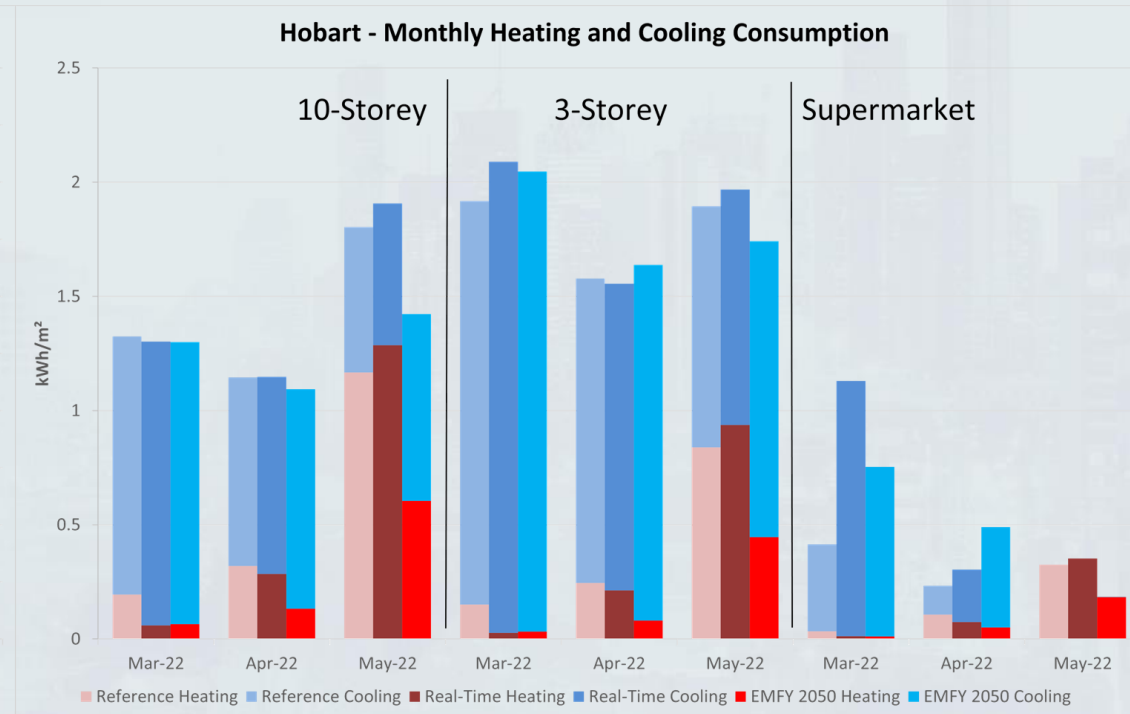
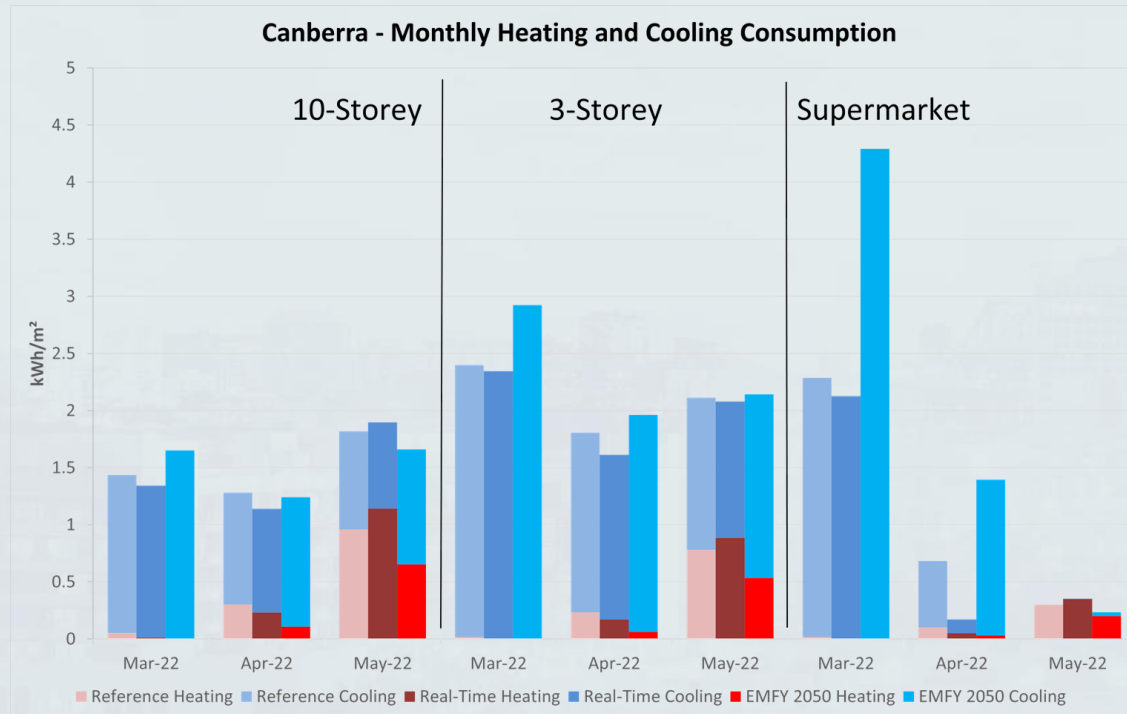


# EWE Index: Building Performance



## Canberra

## Hobart



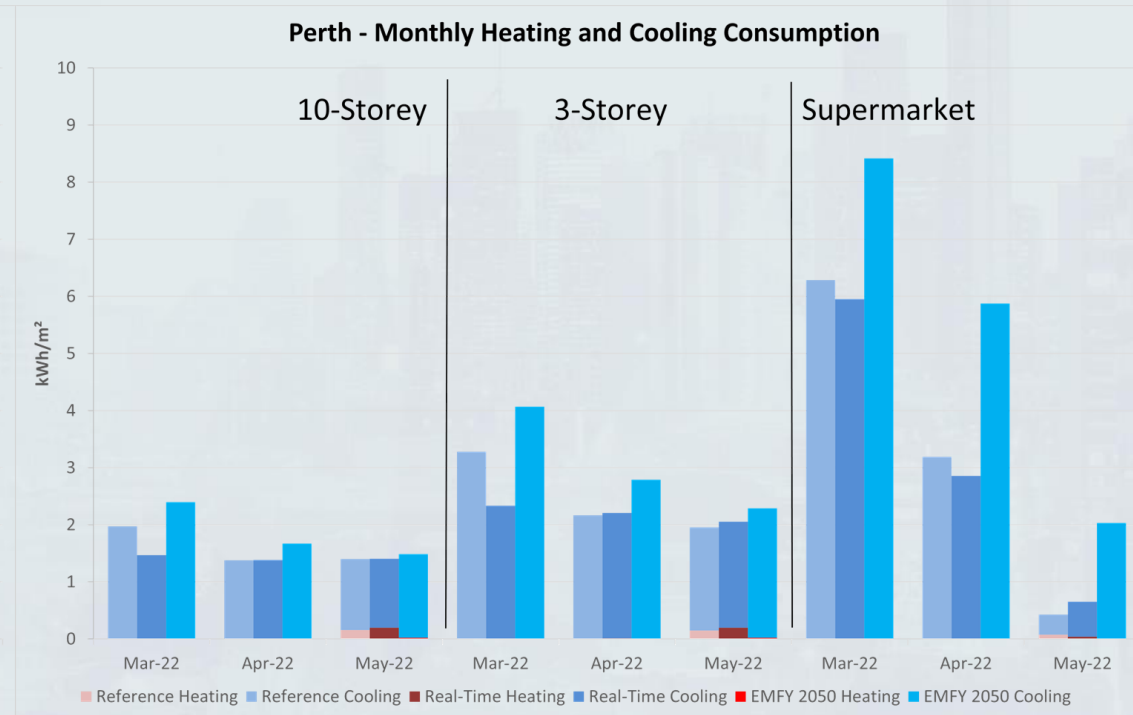
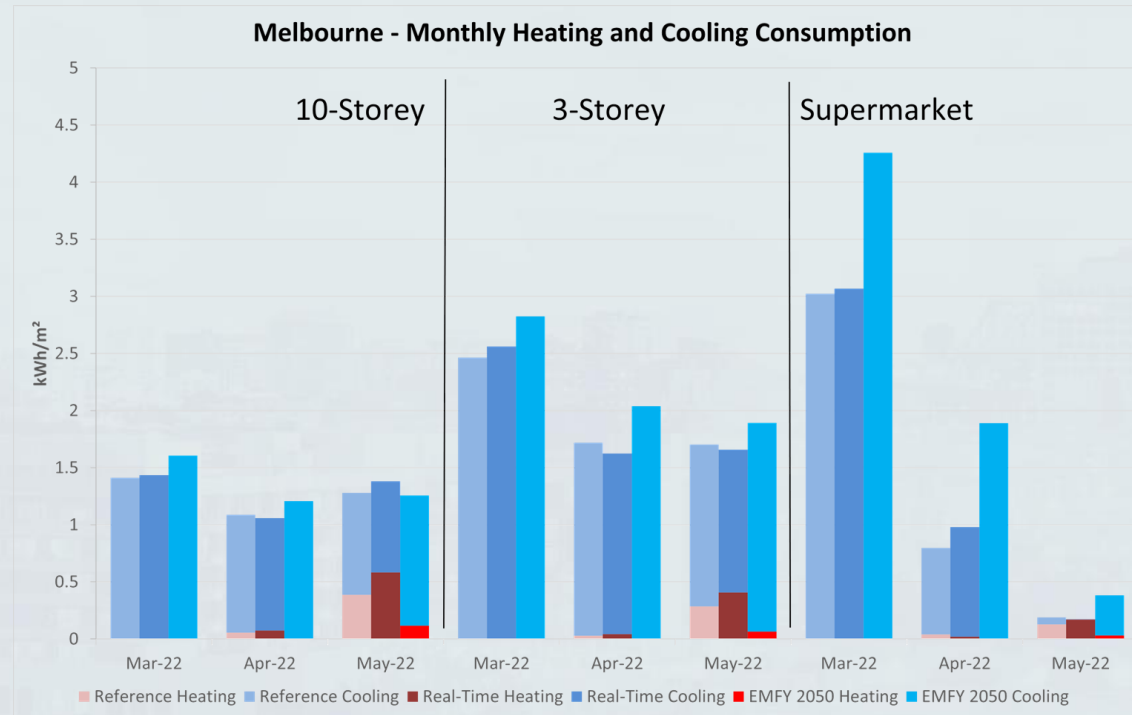


# EWE Index: Building Performance



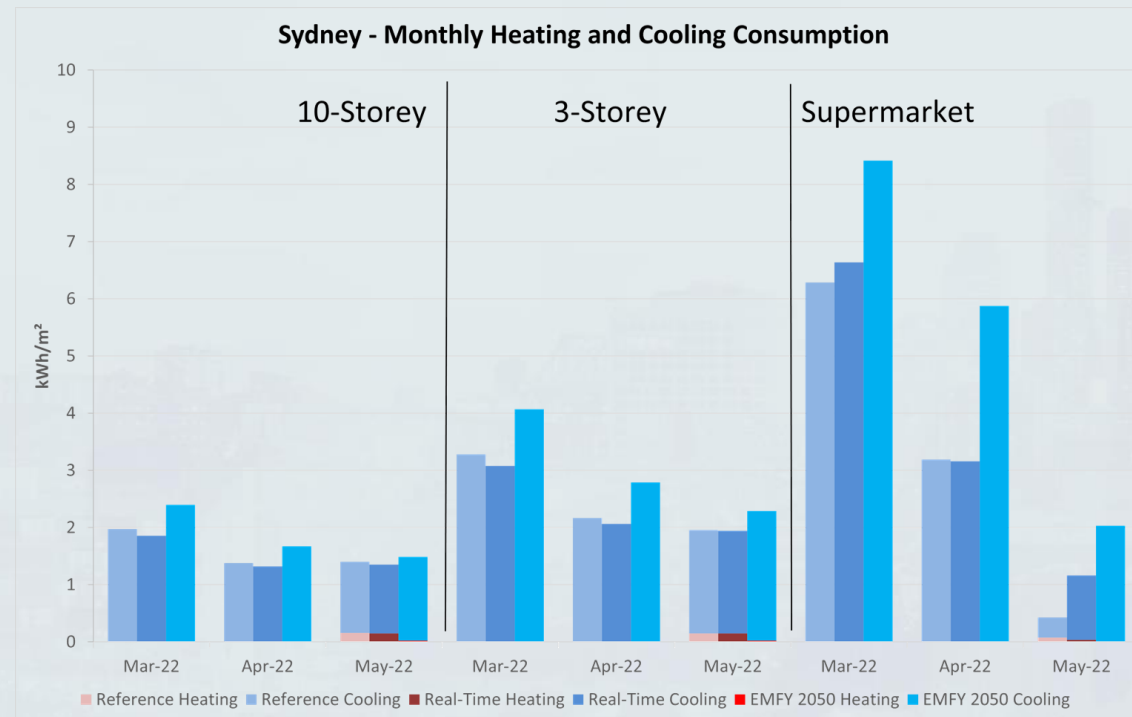
## Melbourne

## Perth

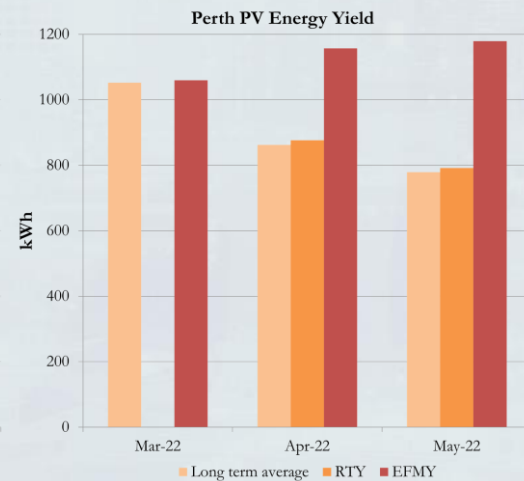
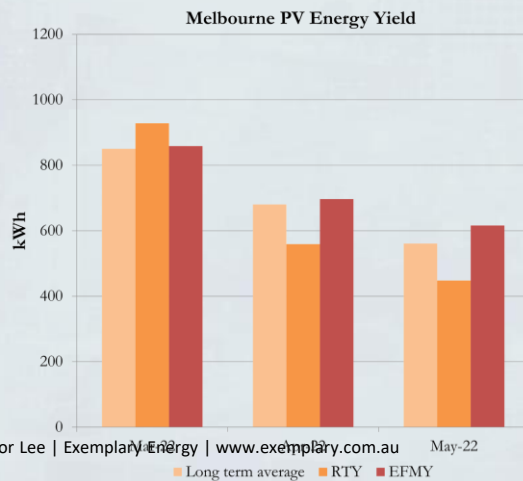
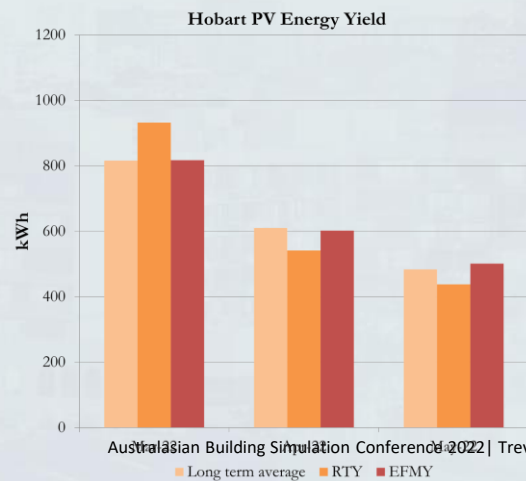
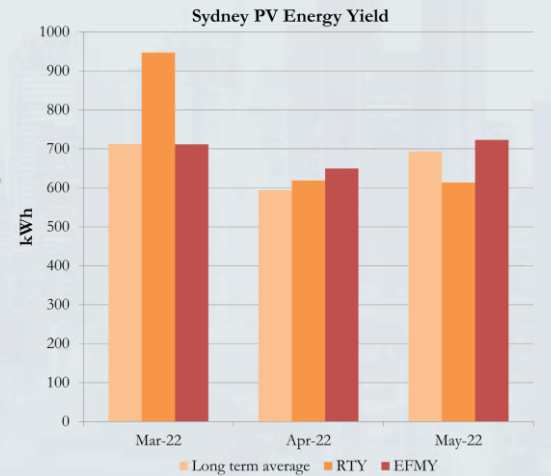
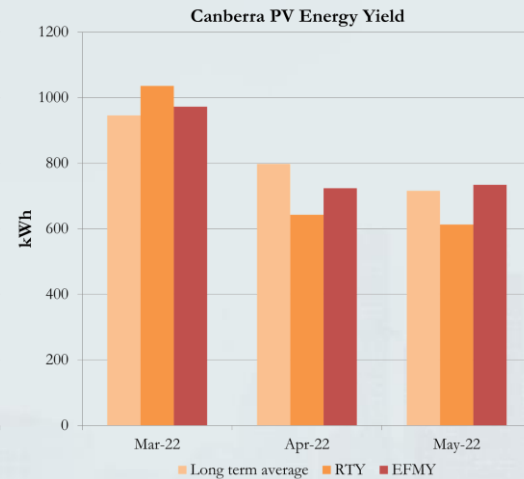
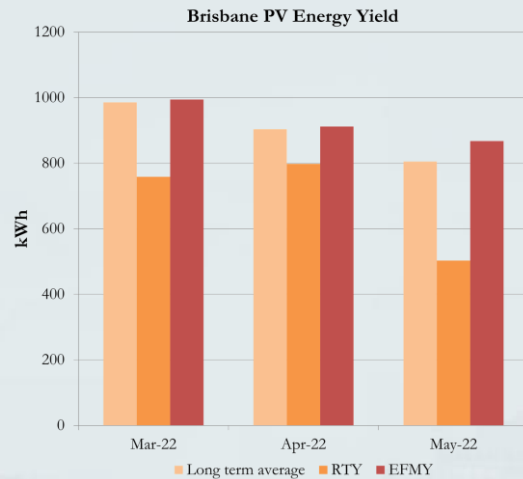
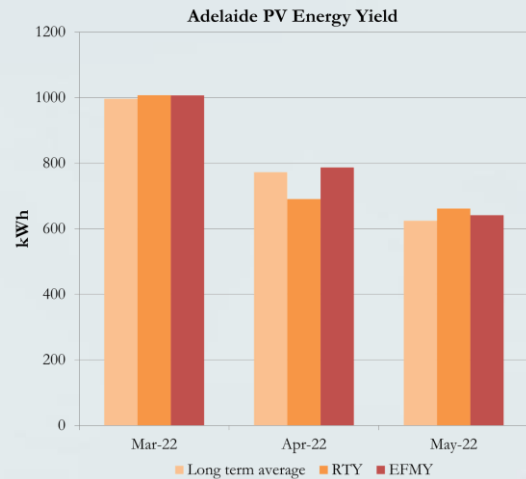


# EWE Index: Building Performance

## Sydney



# EWE Index: PV System Performance



# Conclusion

- The new source of real-time solar data will bolster our ability to provide our clients with the latest weather data.
- This is allowing us to expand our free public service the “EWE index” to include all 8 Australian capital cities.
- EWE index has a wide range of applications for PV system owners and building heating and cooling consumption monitoring.



# Future developments



- To model other non-residential building archetypes, extending the analysis to the whole range used in the ABCB regulatory statement.
- To enhance the way we present the results of the EWE index, including a database of historic results, to offer the possibility to look at a wide range of historic data for all the 8 capital cities.

# Q & A



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