ASIA-PACIFIC
SOLAR RESEARCH CONFERENCE

Instructions to Abstract Authors

2018 Key Dates

Submission of Abstracts due:	**Monday, 16 July 2018**
Notification of abstract selection to authors:	**Monday, 13 August 2018**
Papers due for peer review:	**Monday, 15 October 2018**
Feedback from reviewers to authors:	**Monday, 12 November 2018**
Final paper submission due from authors:	**Monday, 26 November 2018**

Your contribution will not be formally accepted and scheduled, until you have registered your attendance at the conference.

Please indicate by ticking which stream/s best fits your abstract

STREAMS	
	Topics listed are a guideline only. Submissions in related areas are welcome
☐	**Photovoltaic Devices** *Silicon solar cells* *Inorganic, organic, dye sensitized and perovskites* *Tandem and other solar cells* *Characterisation and quality control* *Modules and manufacturing*
☐	**Deployment & Integration** *Renewables integration, policy and regulation* *Forecasting and Resource assessment* *Minigrids and Community owned Renewables* *Field experience, performance, yield and reliability* *Distributed Energy Resources, EVs and Low emissions transport*
☒	**Solar Heating and Cooling, Low Carbon Living** *Energy Efficiency and Demand Management* *Housing and appliances* *Solar heating and cooling including heat pumps* *Cities and Communities* *Competing with gas in the domestic & commercial market*
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☐	**Solar Fuels & Chemistry** *Storage* *Hybrids, complementary solutions and discrete applications* *Fuels and chemicals from electricity and heat* *Energy for heavy industry*
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The Impact of Changing Weather Data on Building Performance Simulation

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Amid growing concerns regarding global energy use and its impact upon the environment, the existing building stock represents a significant opportunity for energy reductions, contributing about 30% of global energy emissions (Ürge-Vorsatz et al, 2012). The introduction of low energy and zero energy building targets create a metric to encourage building owners and occupiers to improve their use of energy and reduce their ongoing energy costs. Building Performance Simulation (BPS) software provides a tool for quantitative assessment of energy conservation measure and their impact on the building's energy use, to inform the selection of retrofit measures. However, zero-energy building design and retrofit choice through BPS remains largely untested against future weather data sets. This research investigates the impact of changes in weather data input on the energy, peak demand and comfort performance results of BPS.

A template mid-sized office building was developed, based on available Australian building stock data from pitt@sherry (2012) and the 2016 NABERS Annual Report. This template building was tested in OpenStudio against different weather data inputs, representing both existing Typical Meteorological Year (TMY) data, historic weather data covering 1994-2015, and two different methodologies for estimating changes in future climate (Belcher et al, 2005; Chen et al, 2012) for Sydney.

The simulation results show little annual variance in heating and cooling loads across the tested weather data sets. Changes in summer cooling and winter heating tended to balance out over the course of the year (Figure 1). However, there was significant monthly variance over all tested data sets over Summer and Winter, suggesting warmer temperatures (increasing Summer cooling and reducing Winter heating) – only the selected coldest year and coldest months of available historic data reported positive Winter and negative Summer variance. Comfort simulation results (Figure 2) saw minimal changes, with the greatest variance seen for the lowest temperature range and moderate temperatures (around 25°C).

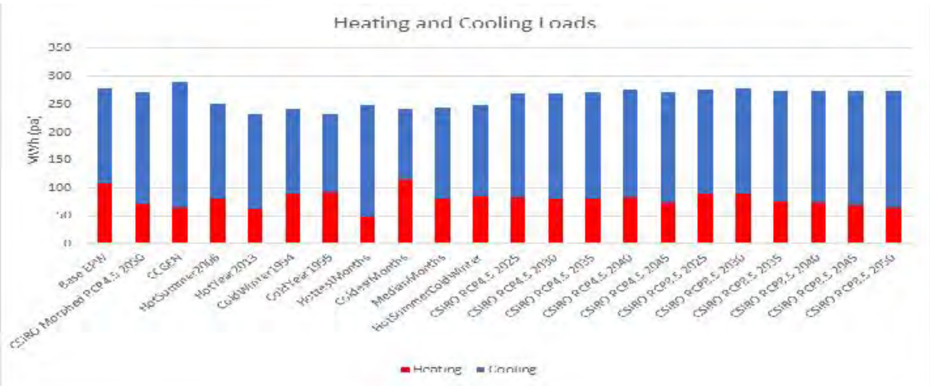

Figure 1. Changes in Annual Heating and Cooling Loads for different Weather Data Sets

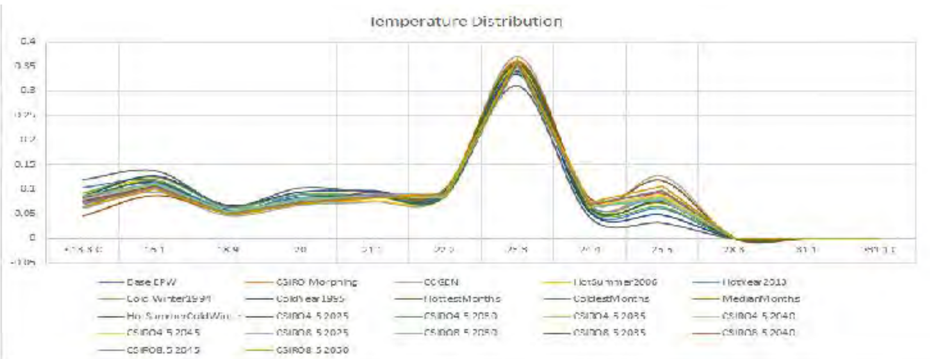

Figure 2. Temperature Distribution across tested Weather Data Sets

The most significant variance was seen in the electricity and gas peak demands (Figure 3), with 10-15% reductions in electricity peak demand for historic data sets when compared to the base TMY data file, while future data sets saw a 5-10% increase in peak demand. Conversely, gas peak demand saw significant increases (20-60%) across most of the tested historic weather data, while future weather predictions reported a steady decline in gas peak load.

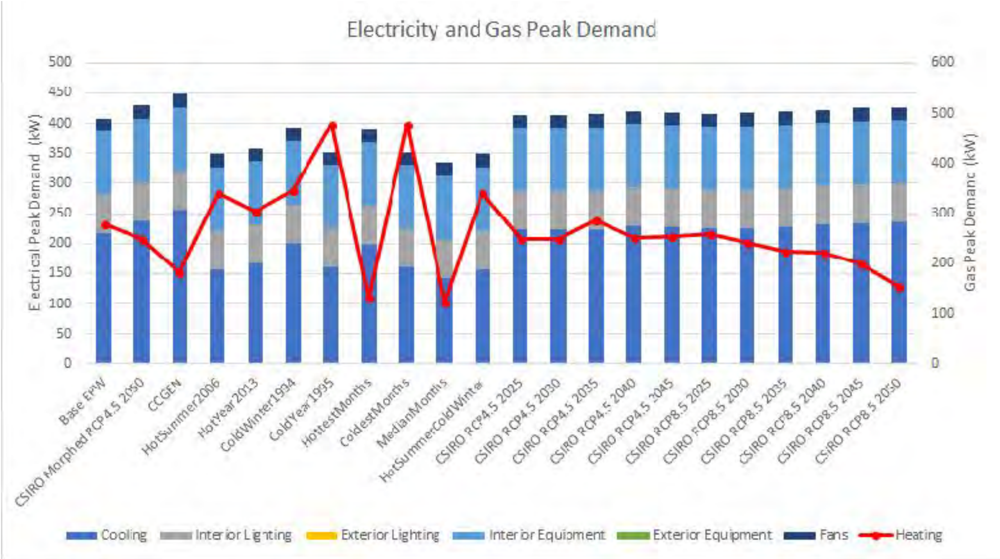

Figure 3. Electricity and Gas Peak Demands for different Weather Data Sets

These results show that while the energy and comfort performance results from the simulations do not see significant variance with respect to the weather data being used, the peak electricity and gas demand are very sensitive to differences in the weather data sets. The use of BPS to inform retrofit selection can therefore draw similar energy conclusions regardless of weather data input, but the demand implications, particularly the associated change in network demand charges, of any selected measures must undergo particular scrutiny because of this sensitivity. These results also highlight the importance of understanding the impact of changes in external climate upon the larger grid, particularly with the significant electricity peak demand changes observed.

References

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