NP1002

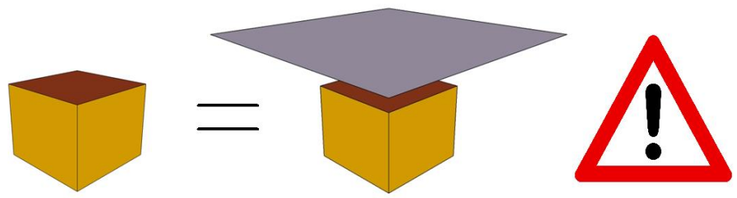
SIMULATION OF ROOFTOP PHOTOVOLTAIC SHADING OF AN ADELAIDIAN HOUSE

Research background

- One in four South Australian houses has a small-scale rooftop PV
- Rooftop PV blocks beam, sky-diffuse, and ground-reflected solar radiation from reaching the roof surface

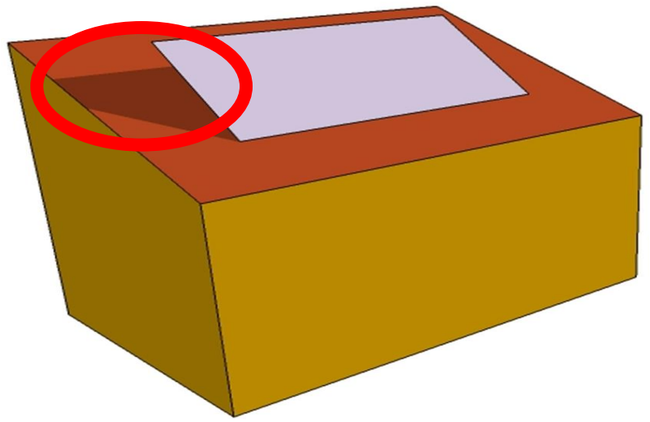
Shading problem

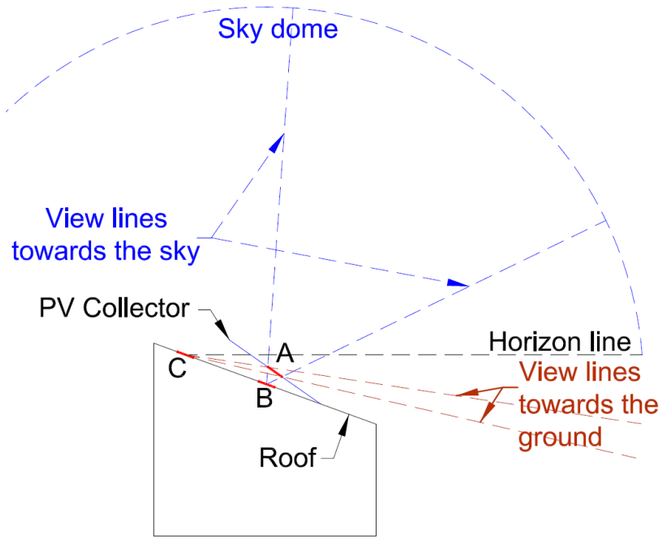
Transient System Simulation software (TRNSYS) does not consider the shading effect on opaque surfaces when calculating the energy used for space heating and cooling.



Methodology

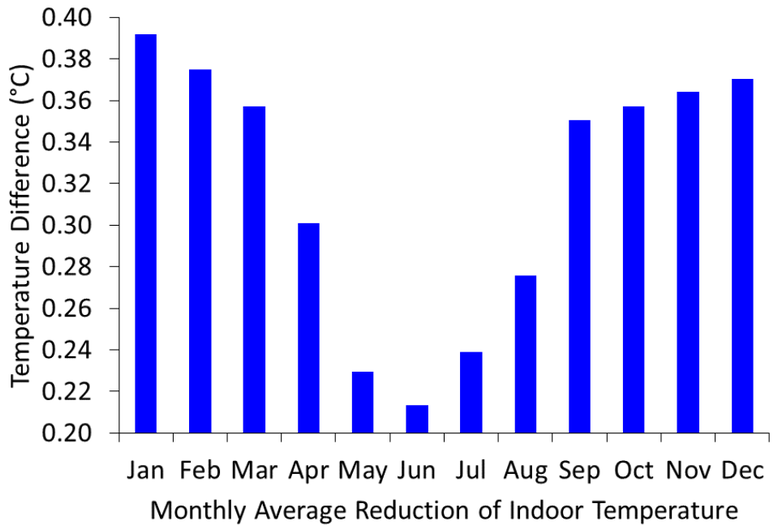
- Considering the collector obstruction, a model has been developed to calculate beam, sky-diffuse and ground-reflected solar radiation reaching the roof
- The model tracks the Sun position when calculating the collector shadow falling on the roof





- Sky and ground view factors are calculated numerically as part A of the collector blocks both the sky view for part B and the ground view for part C of the roof (see figure)

Results



Conclusions & anticipated impacts

- Lower indoor temperature throughout the year
- Overall increase of energy usage for maintaining indoor thermal comfort

Further information

This research is part of the Adelaide Research Node for Low Carbon Living. Additional information can be found on the CRC website: http://www.lowcarbonlivingcrc.com.au

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