

# Solar Airconditioning in Australia

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ENERGY FLAGSHIP

[www.csiro.au](http://www.csiro.au)



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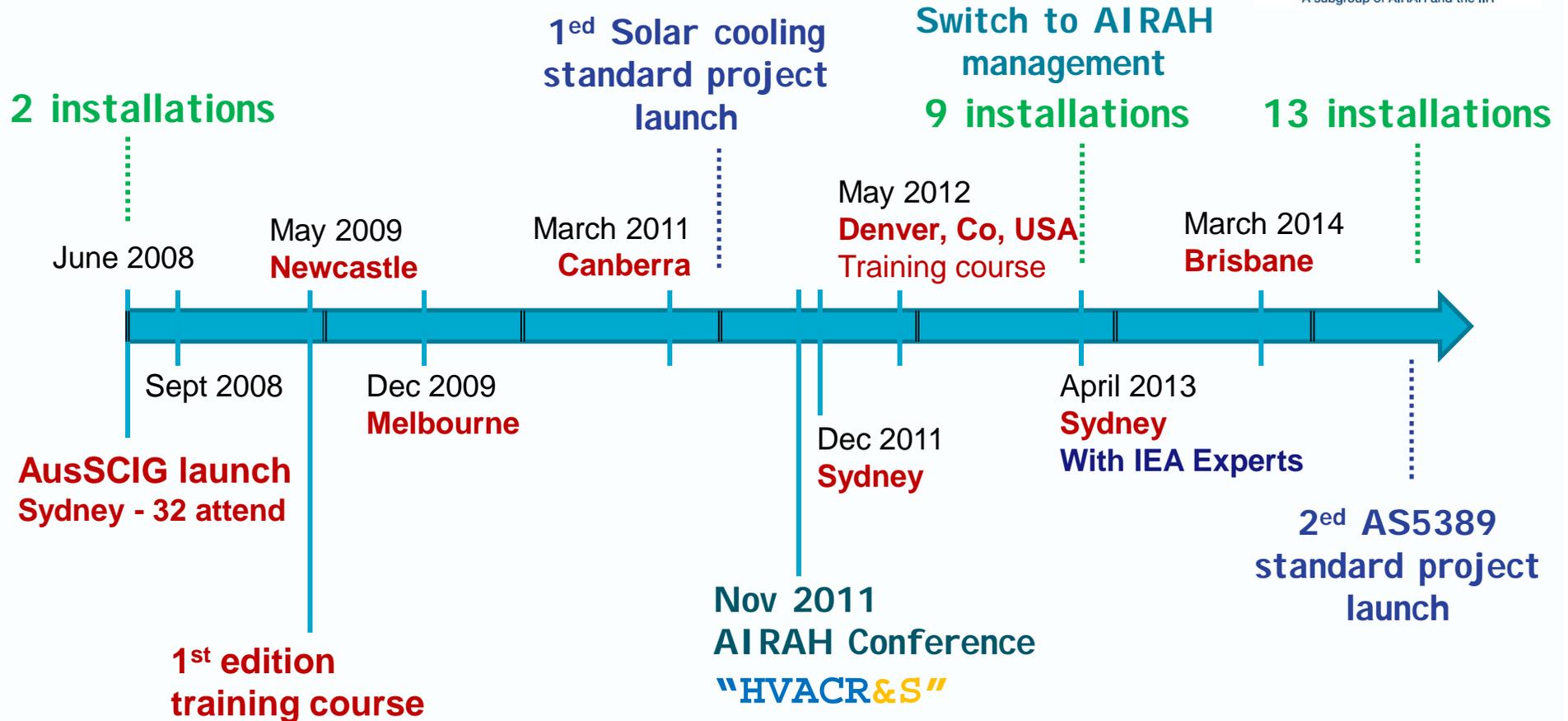
- Whistle stop tour of solar heating and cooling in Australia
- The AS5389 Solar Cooling Standard



# Short history of Solar Cooling in Australia



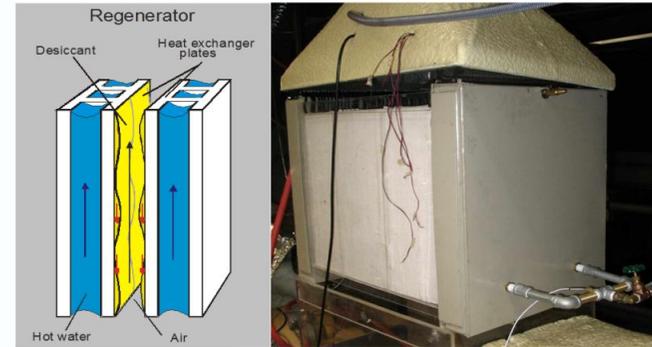
AUSTRALIAN SOLAR COOLING INTEREST GROUP  
A subgroup of AIRAH and the IIR



# Some commercial products



# Numerous product developments



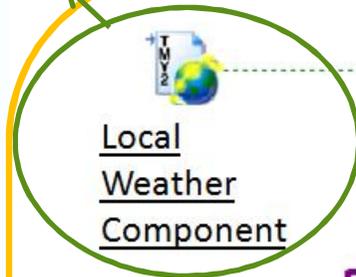
# What do we want ?

- An accepted method for estimating average lifetime carbon savings
  - Basis for being paid for abatement at point of sale
  - Validate manufacturer's energy savings claim in the market
- Realistic and scientifically valid
  - Laboratory tested under controlled conditions
  - Expected (simulated) usage
- Flexible to use for multiple technologies
- Easy to use for consumers at point of sale
  - Passing any complexity to the actor(s) that have most engagement (manufacturers)



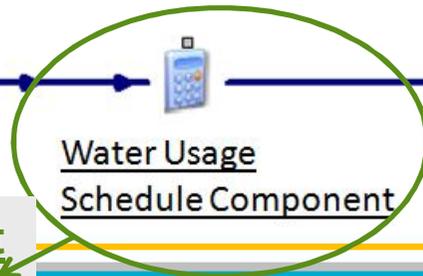
# The CTSS method (hot water example)

Climate File



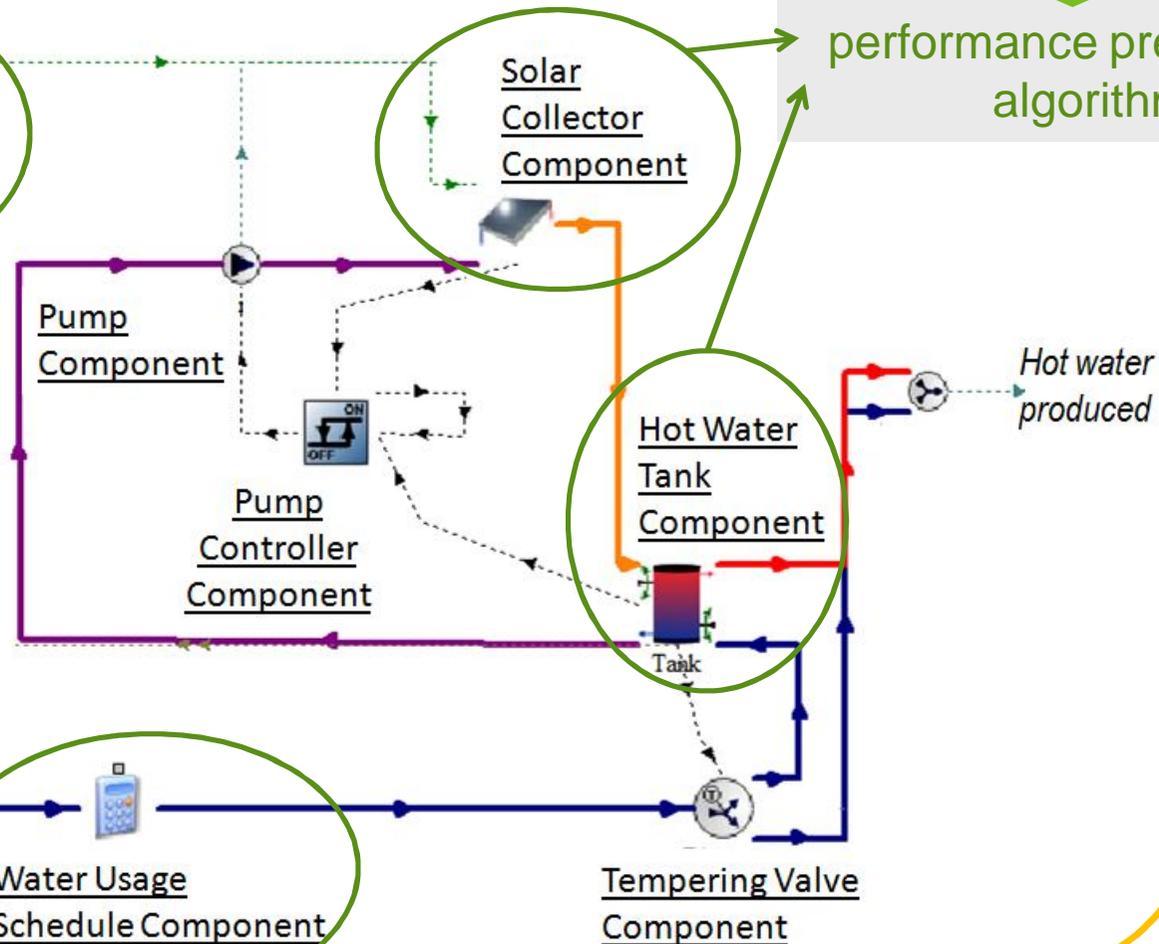
**“Components”  
combined into an  
annual hr by hr  
“System” model  
in TRNSYS**

Cold  
water  
supply



Load Component

- Standard daily usage profile



Major “Components”

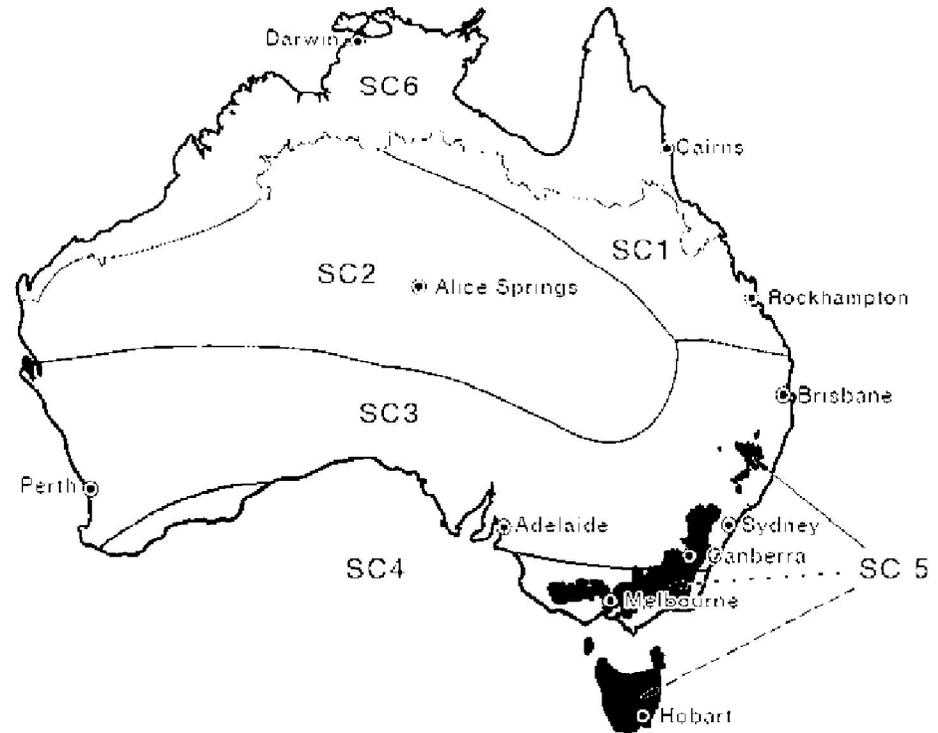
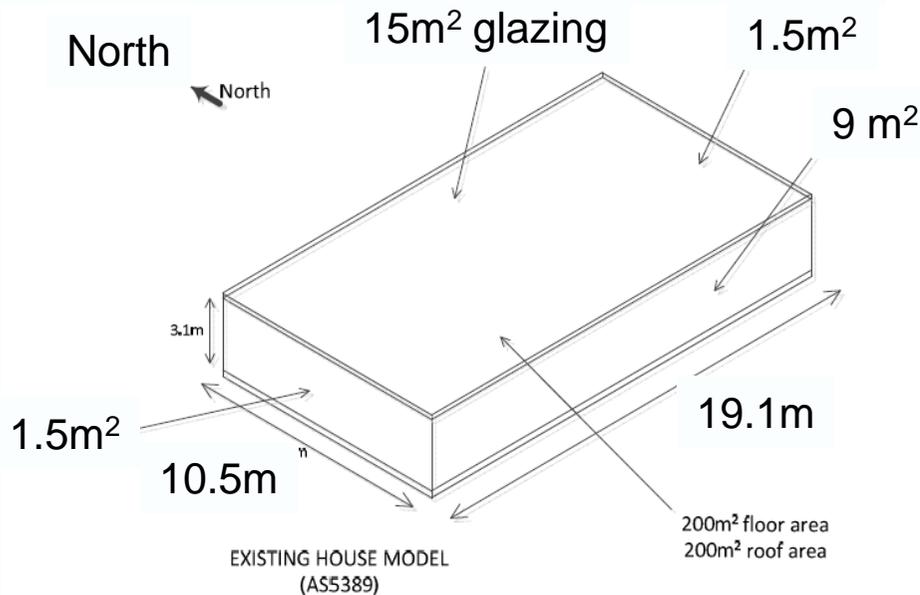
- tested in the laboratory
- results correlated



performance prediction  
algorithm

# Defining the heating and cooling loads

(noting that if there is no load the solar is likely to be lost)



- ? Climate
- ? Orientation
- ? Occupancy
- ? Building construction

One average house **or** weighted average of multiple houses ?

# Lifetime energy savings calculation

- For a system with backup airconditioner

Savings =  $10 * (\text{Annual energy consumption of the reference system} - \text{Annual parasitic energy consumption of solar system} - \text{Annual energy consumption of the backup})$

- *For the target comfort*

- For a solar autonomous system ???

Savings =  $10 * (\text{Annual energy consumption of the reference system to achieve the same level of comfort} - \text{Annual parasitic energy consumption of solar system})$

- *Comfort to be determined by the simulation*

# Using the standard for product incentives

- Manufacturer submits a one-off claim for the lifetime energy savings of their product(s) (based on their own laboratory testing and simulations following the AS5389 Standard)
- Scheme administrator assesses their claim. If approved their product is placed in the register
- At point of sale, the manufacturer provides a rebate

$$\text{Rebate} = (\text{Savings}) * (\text{Unit Price})$$

Market price of the day

From the register

Register of : High Efficiency Heating and Cooling Appliances								
SWH Models with...								
Version 4 - 17 December 2008								
Item	Brand	Model	Eligible from:	Eligible to:	Number of certificates for an installation in Zone:			
					1	2	3	4
4221	4210	C	15 Jul 2008	31 Dec 2020	32	32	32	27
4222	4211	C	15 Jul 2008	31 Dec 2020	42	42	42	35
4223	4212	C	29 Aug 2007	31 Dec 2020	24	22	24	22
4224	4213	C	29 Aug 2007	31 Dec 2020	23	21	23	22
4225	4214	C	29 Aug 2007	31 Dec 2020	31	30	31	30
4226	4215	D	15 Mar 2005	31 Dec 2020	36	38	36	31
4227	4216	D	15 Mar 2005	31 Dec 2020	36	38	36	31
4228	4217	D	15 Mar 2005	31 Dec 2020	22	25	22	16
4229	4218	D	15 Mar 2005	31 Dec 2020	36	38	36	31
4230	4219	D	15 Mar 2005	31 Dec 2020	36	38	36	31
4231	4220	D	15 Mar 2005	31 Dec 2020	21	25	21	14
4232	4221	D	20 Jun 2006	31 Dec 2020	14	15	14	10
4233	4222	D	20 Jun 2006	31 Dec 2020	17	18	17	13
4234	4223	D	20 Jun 2006	31 Dec 2020	13	14	13	9

ABC Inc Solar Swell 528  
Cool Air Hype Dog T7XY  
etc

# Conclusions

- Australia has been innovating (particularly in high temperature concentrating solar systems and desiccant systems)
- A world first energy calculation standard for solar heating and cooling has been developed
- AS5389 is now being updated and expanded!
  - Standard AS 5389.1 — **High efficiency space conditioning systems** — Calculation of energy consumption - Part 1 General
  - Standard AS 5389.2 — Solar based desiccant cooling systems
  - Standard AS 5389.3 — Solar heating systems
  - Standard AS 5389.4 — Ventilator systems
  - Standard AS 5389.5 — Evaporative cooling systems

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# Thank You

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