



# Medium Scale Trough Developments in Australia

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**CSIRO  
National Solar Energy  
Centre**



**Google Earth PACES  
2009**



arPACES  
2009



## Current and Future Research Areas

- ORC Power Generation
  - Freepower
  - CSIRO
- Solar cooling
  - Absorption single and double
  - Desiccant wheel



ACES  
009



# Research Activates ORC



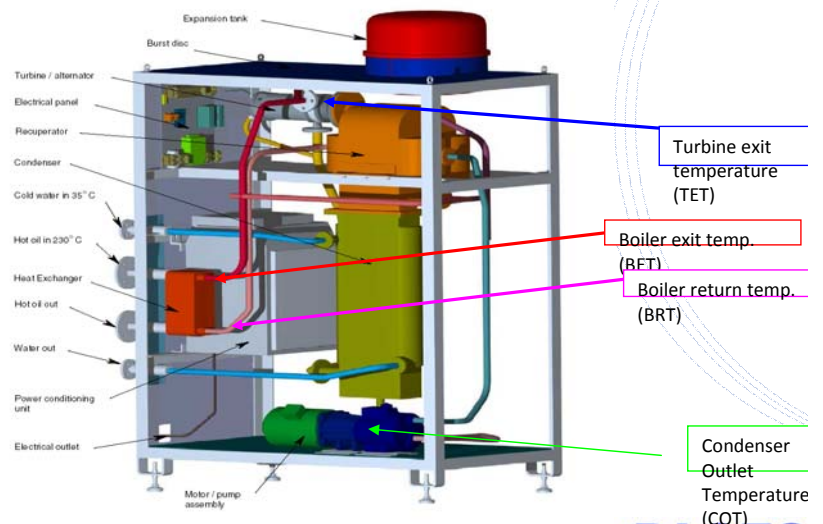
- ORC
  - Project began in 2005
  - Trough Technology in conjunction with ANU
    - *Glass on metal laminate (GOML) collector.*
    - *80kWt*
  - ORC
    - *Freepower*
    - *Custom*



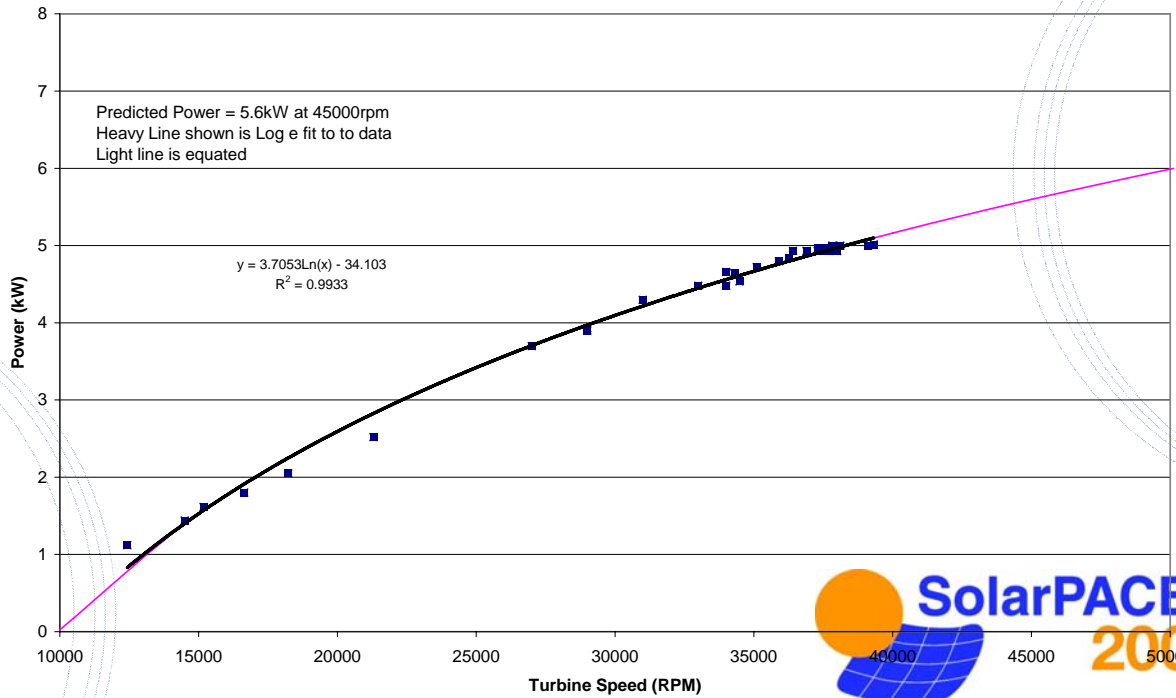
# Freepower FP6



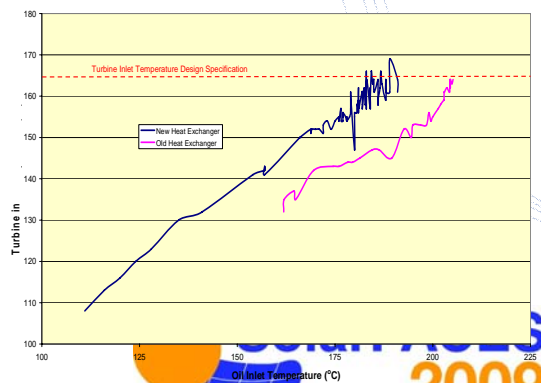
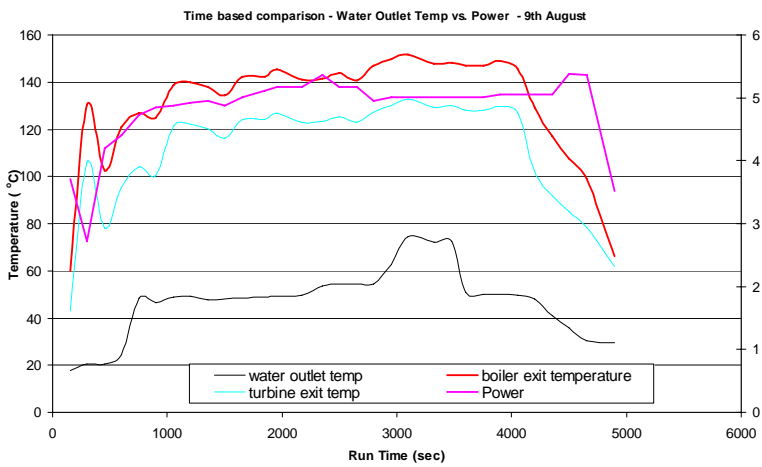
- Working Fluid
  - HFE 7100
- Design TIT
  - 160 C
- Net output 6kWe



# FreePower Results



# FP6 -



# CSIRO ORC Developments



- Expanders
  - Rotary Vane
  - Duel lobe.
  - Scroll
- Working Fluids
  - Screening process
    - *Refprop*
    - *HYSYS*
      - Blend Modeling
- Parasitic analysis
  - Condensers
  - Pumps



# Solar cooling technologies



Solar Heat

Thermal Cooling Process

Cold Delivery & Building Integration

## Solar Collectors

- Air collectors
- Flat plate collectors
- Evacuated tube collectors
- Tracking collectors

## Thermal Coolers

- Absorption chillers
  - One stage
  - Two stage
- Adsorption chillers
- Desiccant cooling

## Backup & Heat Rejection

- Electric chiller
- Gas heater
- Thermal storage
- Cooling tower



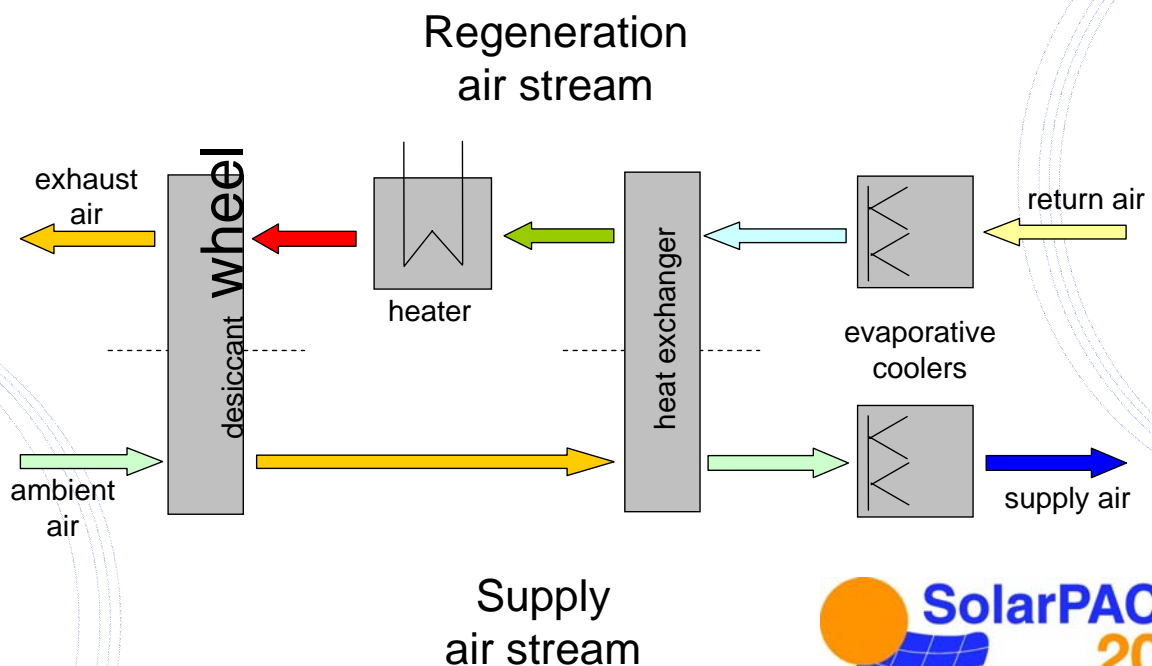
# Solar cooling



- Collaboration With NEP Solar
  - Demonstration of absorption chiller systems
  - Shopping centre
- CSIRO
  - Site testing
  - Cost effective heat transfer in receivers
- NEP
  - Trough System
  - Commercial Chiller identification



# Solar Cooling – Desiccant systems



# Solar Cooling – Desiccant systems



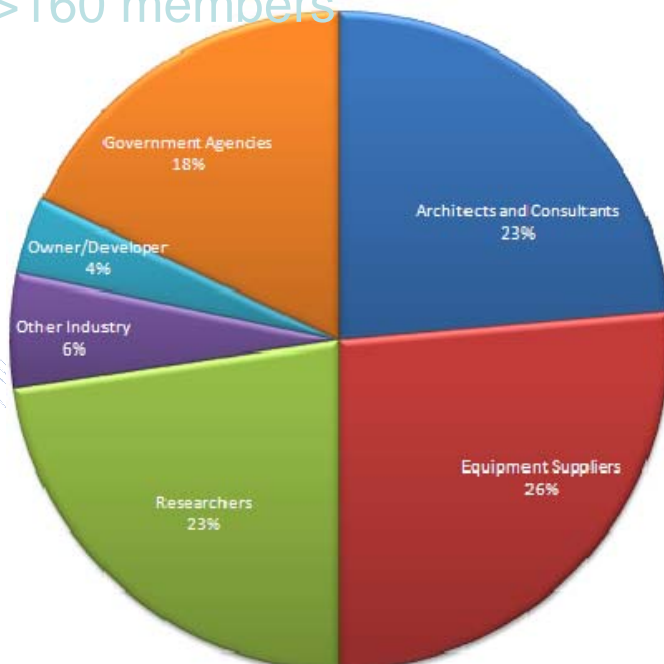
- Current Activates
  - Operational Waste Heat Demo
    - *Based On Microturbine*
    - *Library Installation in Sydney*
  - Assessment laboratory
  - System Modelling
  - Heat and Mass transfer modelling
  - Solar desiccant development



# Australian Solar Cooling Interest Group (ausSCIG)



>160 members



## Work-groups

- Barriers and industry roadmap
- Education, training and communication
- Research funding and demonstration
- Standards development

[www.ausSCIG.org](http://www.ausSCIG.org)

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- Future ASI Based
- Troughs
  - Receiver design
  - Thermal fluids and storage
  - Development of transient system models and validation.
  - Standards development
- Solar Cooling
  - Continued development of desiccant systems



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# Thank you



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