

CSP RESEARCH INFRASTRUCTURE IN AUSTRALIA



SolarPACES 2010, Perpignan

Wes Stein





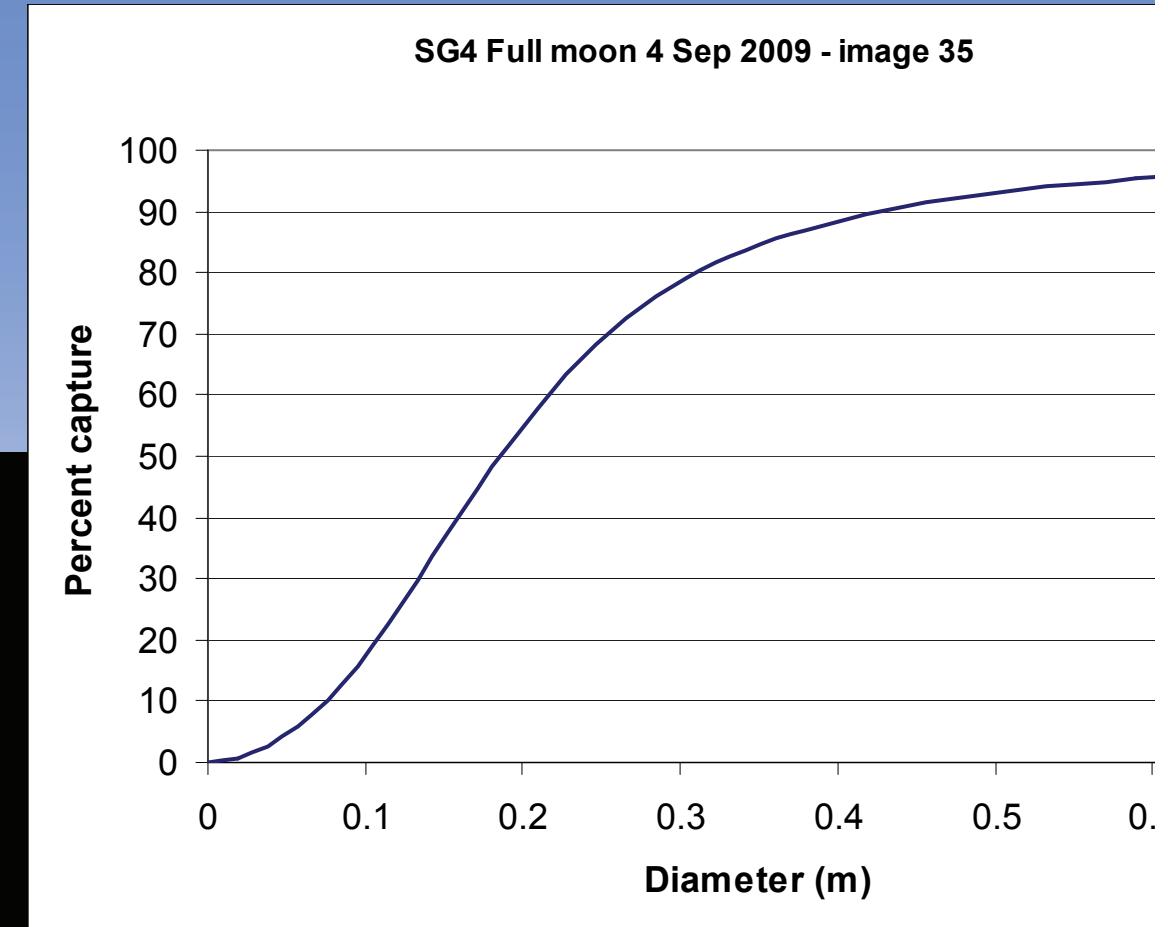
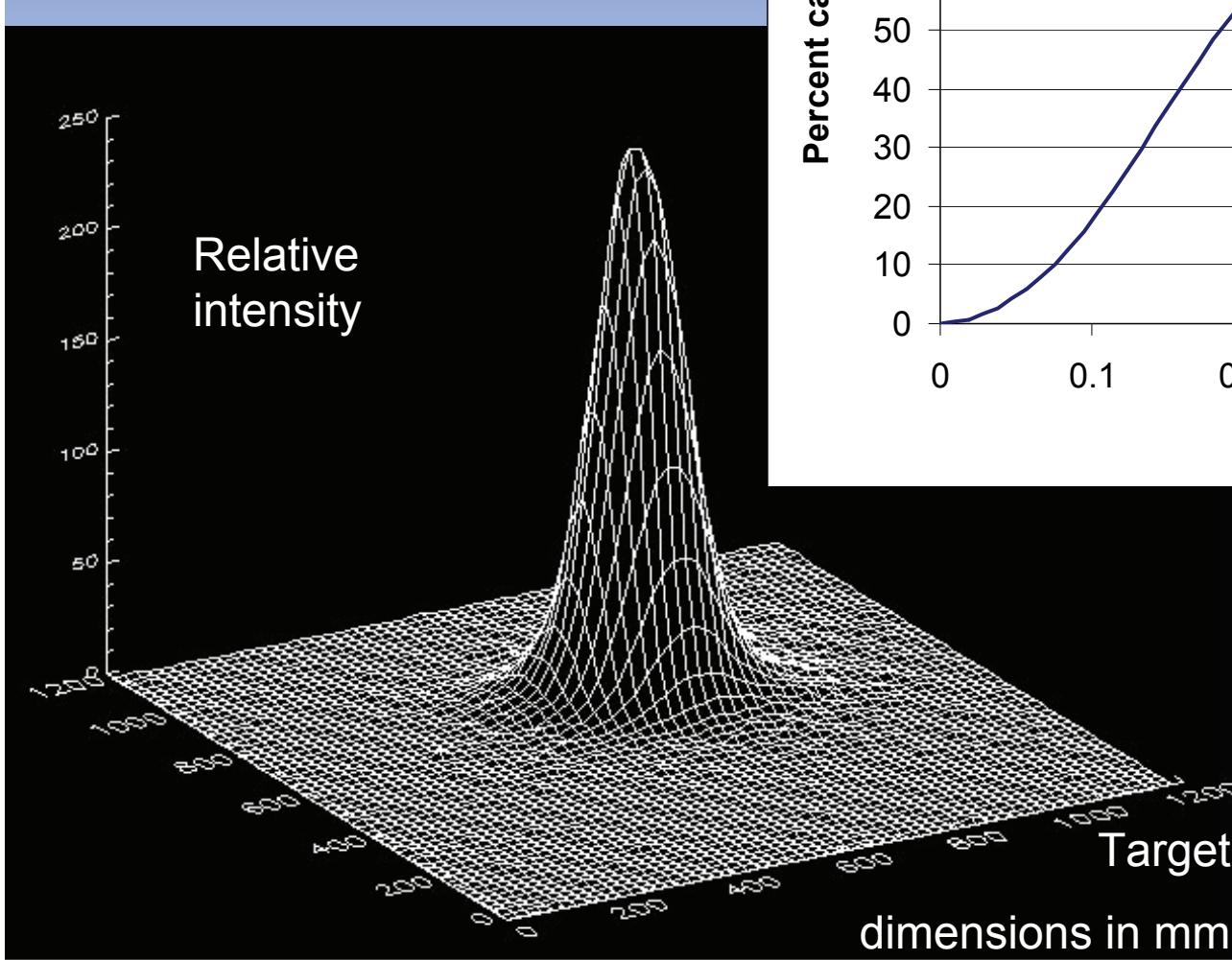
The Generation II Big Dish



- Project supported by Aus Federal gov. (AusIndustry)
- A large aperture, Altitude Azimuth tracking dish
- Re-engineered for mass production:
 - Identical spherical mirror panels
 - Formed on an accurate jig
 - Space-frame based on circular pipe with simple welded joins
- Specifications:
 - Aperture 494m² (489m² active mirror)
 - Focal length 13.4m
 - Average diameter 25m
 - Average rim angle 50.1°
 - Mirror reflectivity 93.5%
 - Number of mirrors 380
 - Mirror size 1165mm x 1165mm
 - Total mass of dish 19.1t
 - Total mass of base and supports 7.3t



Results

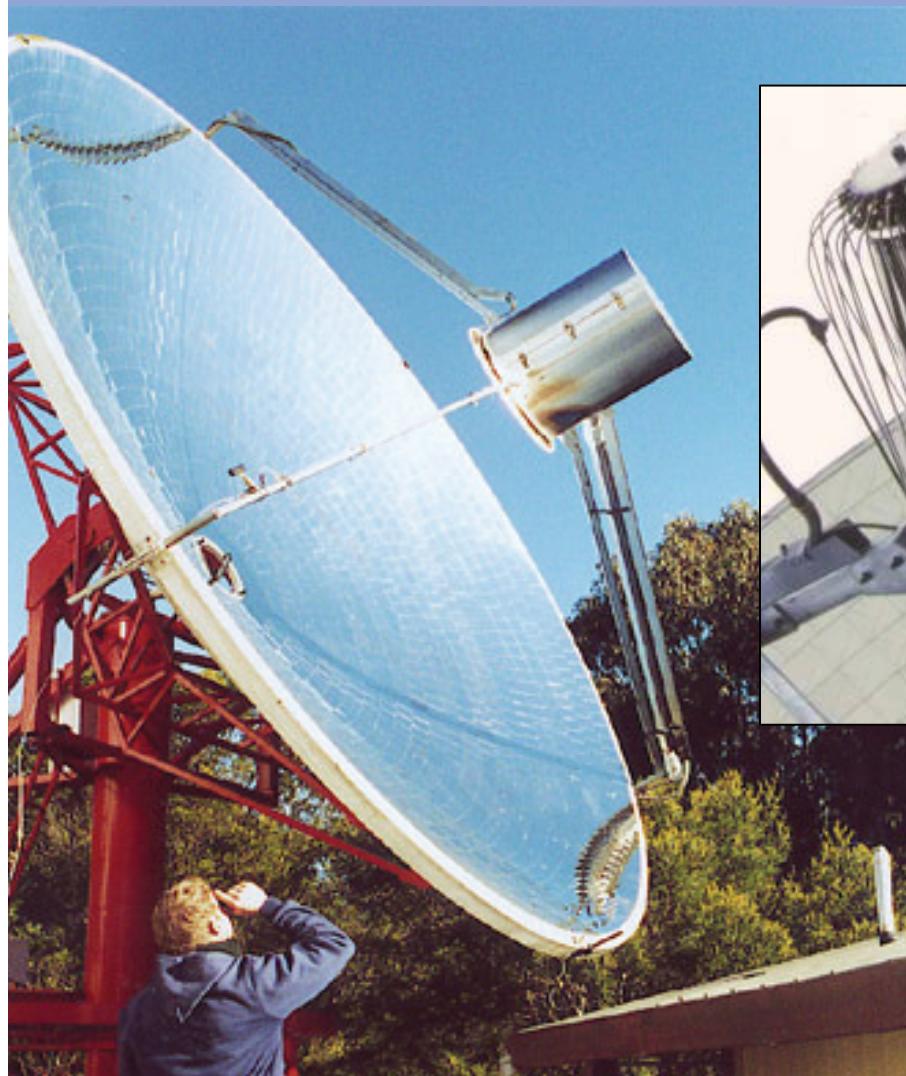


- >2,000 suns at 95% capture
- 14,000 suns at peak
- Old SG3 dish only peaked at 1,500 suns

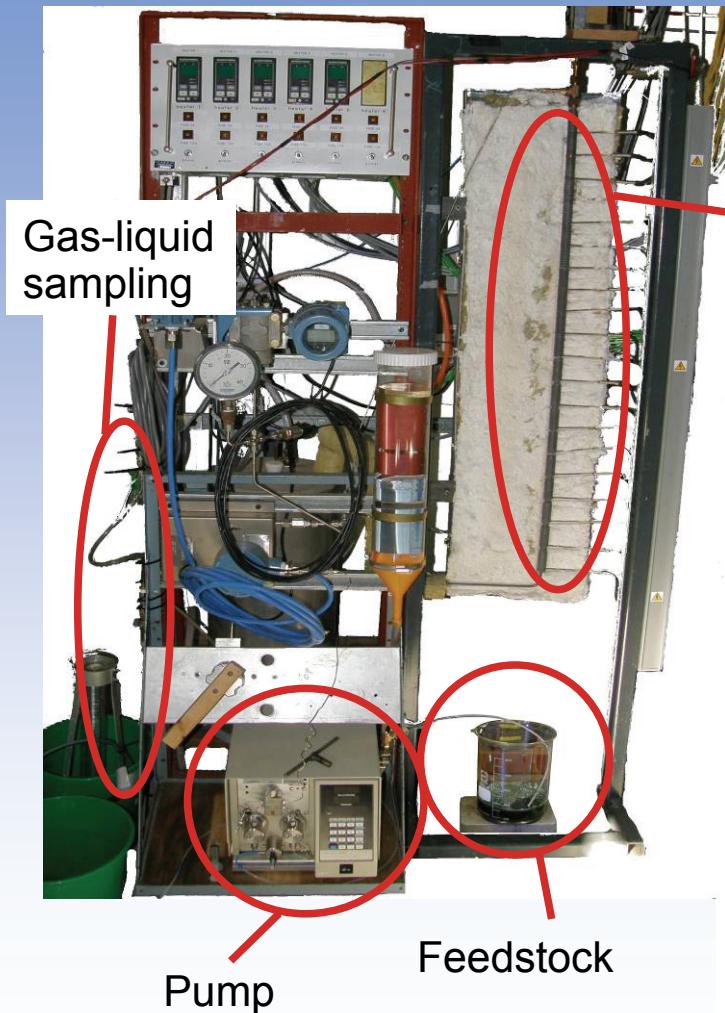


- Now testing monotube boiler steam receiver
- Initial results have receiver efficiency > 90%
- Operation to 500°C

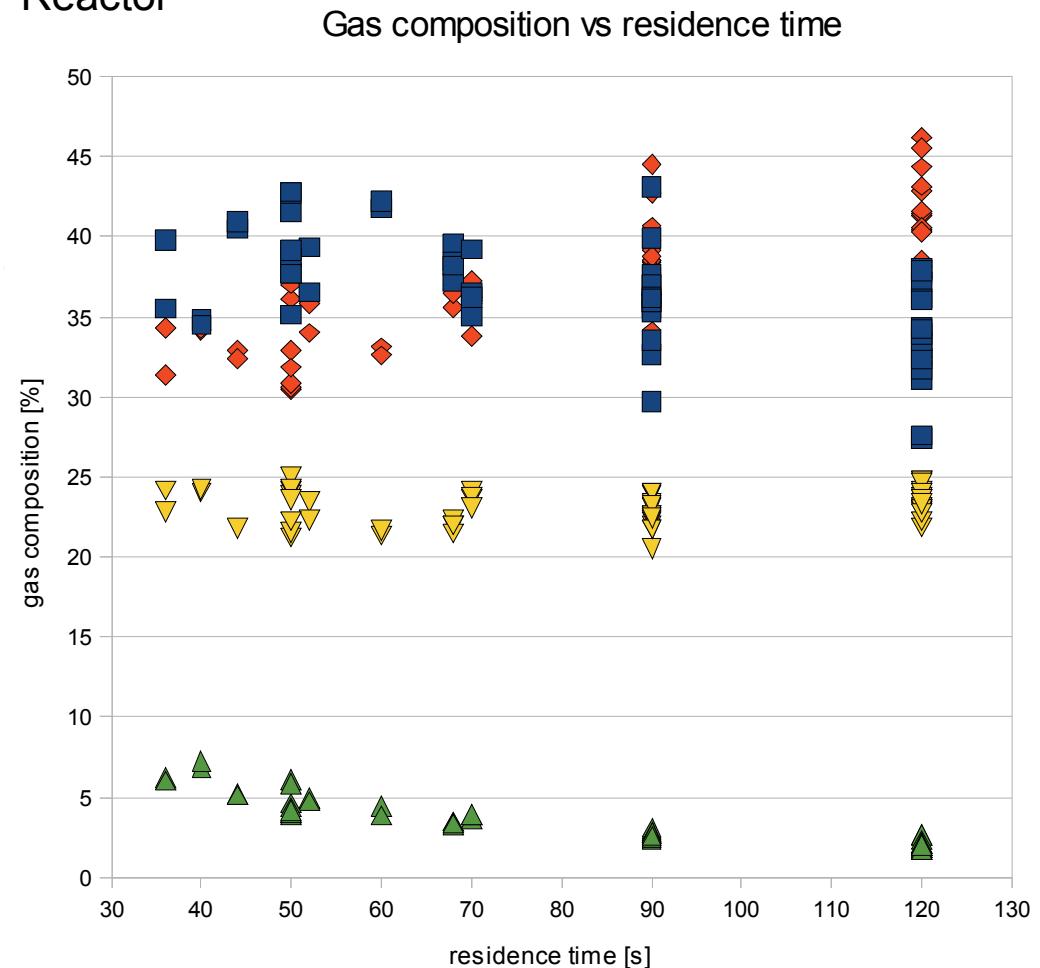
Receiver reactors to 30MPa, 700°C proven with ammonia dissociation



Labscale equipment for gasification in supercritical water



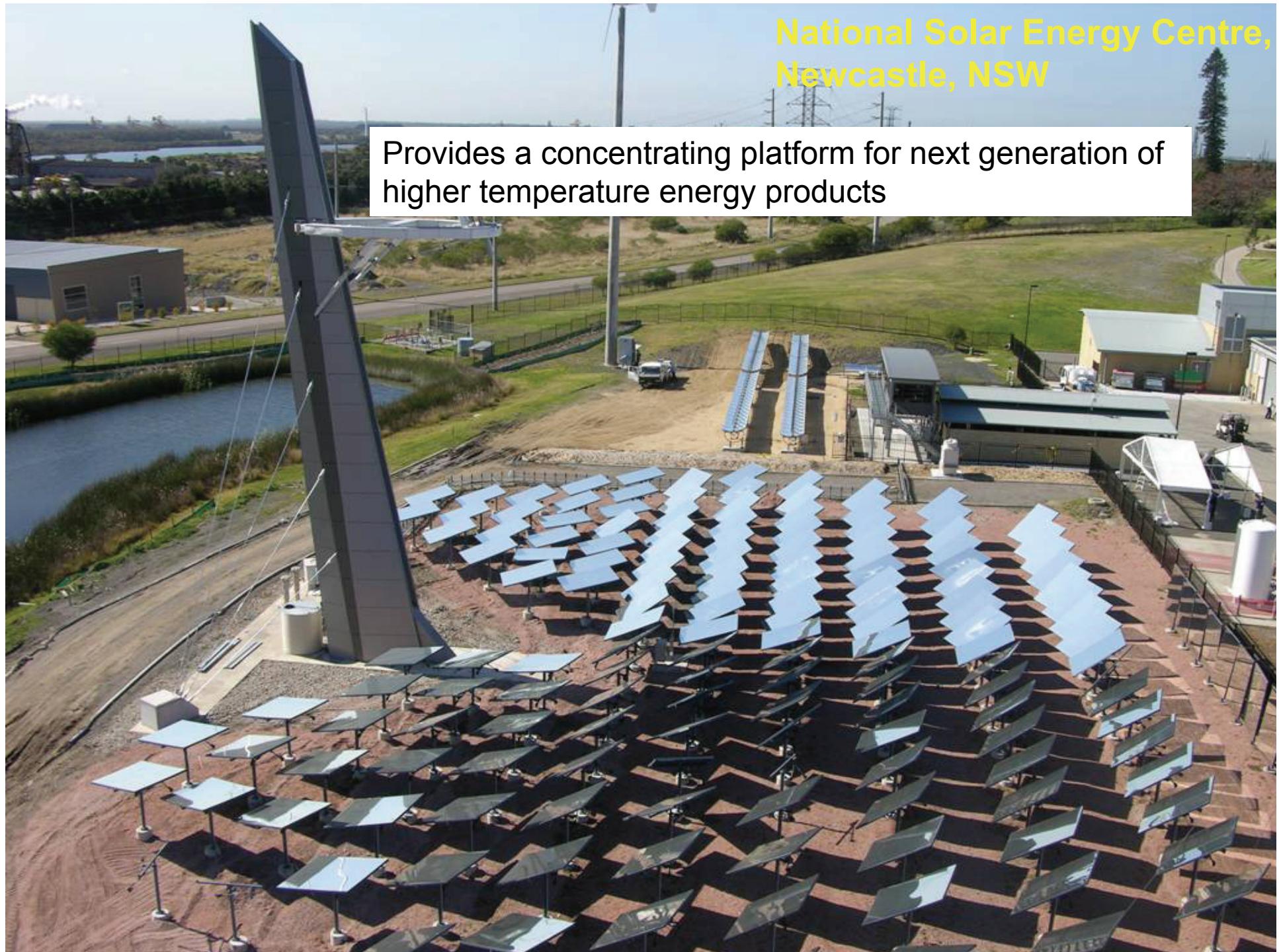
Reactor



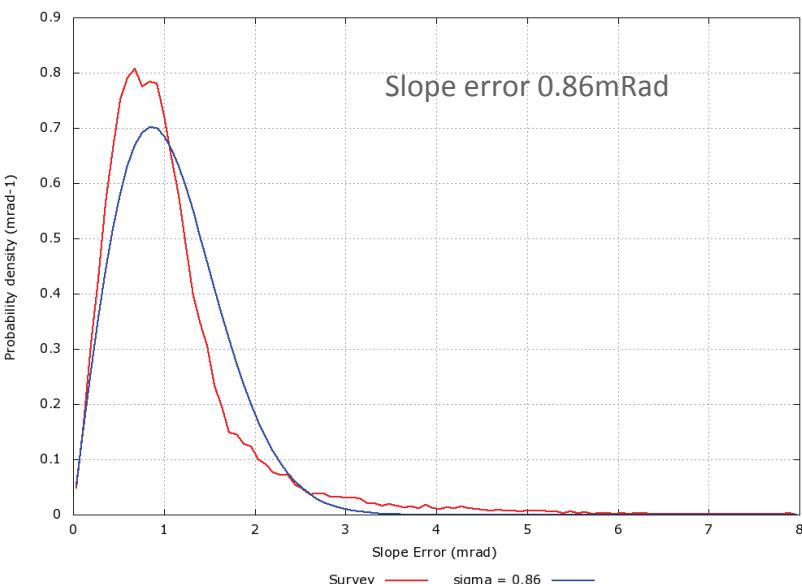
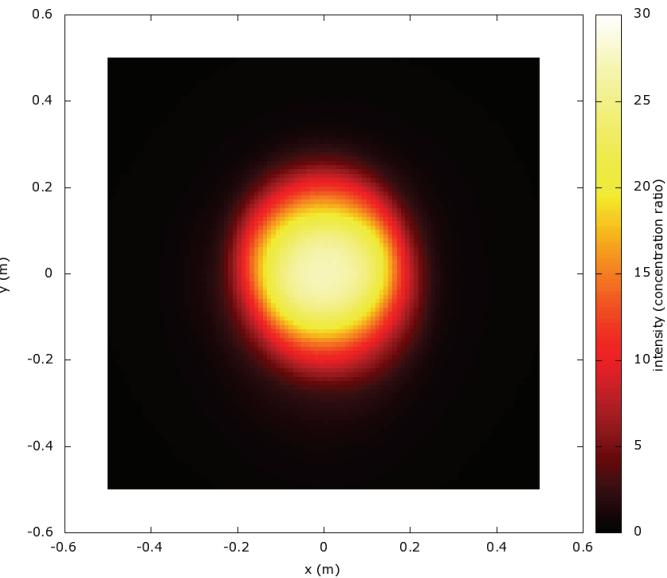
■ H₂
◆ CO₂
▽ CH₄
▲ CO

**National Solar Energy Centre,
Newcastle, NSW**

Provides a concentrating platform for next generation of higher temperature energy products

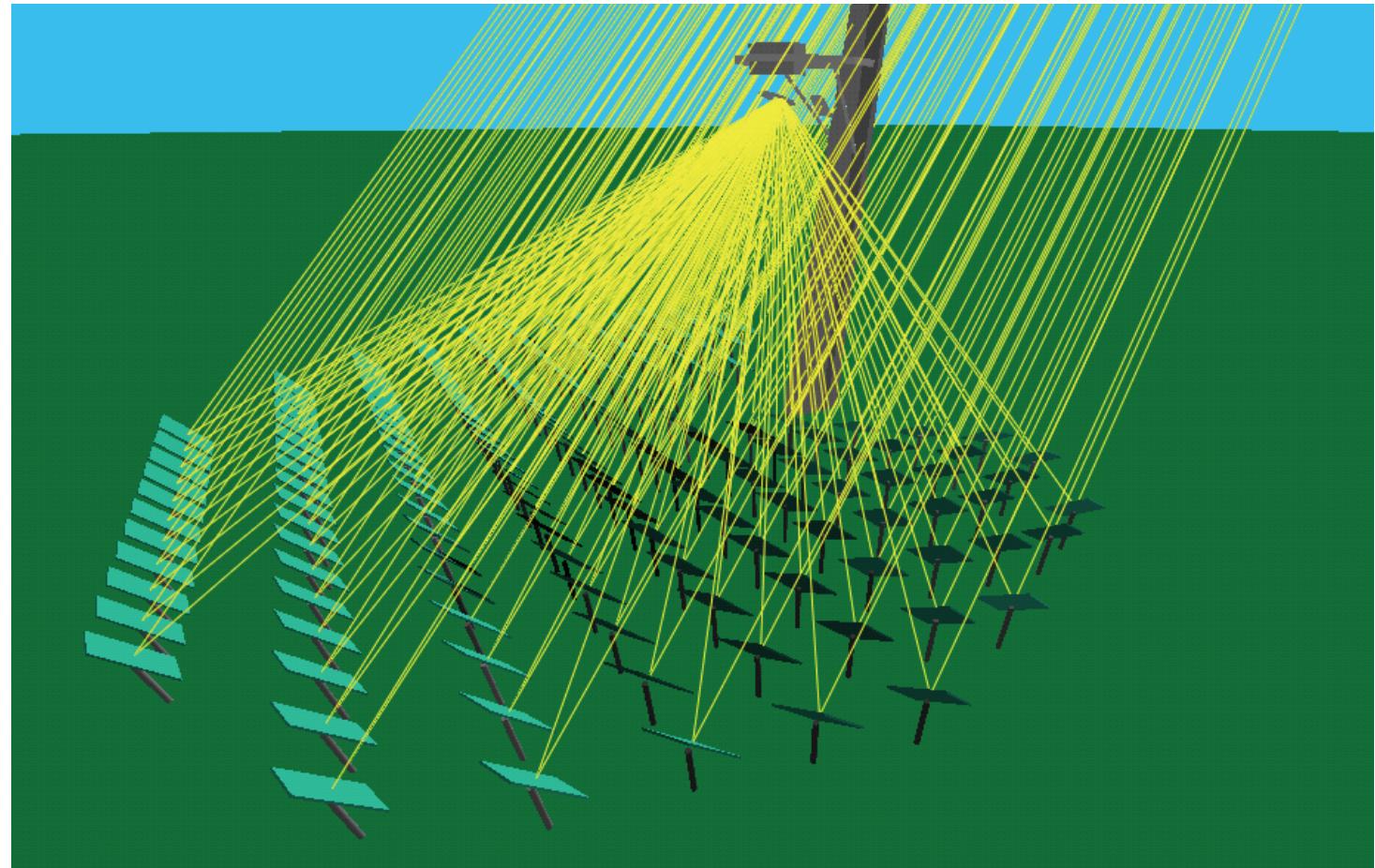


Heliostats

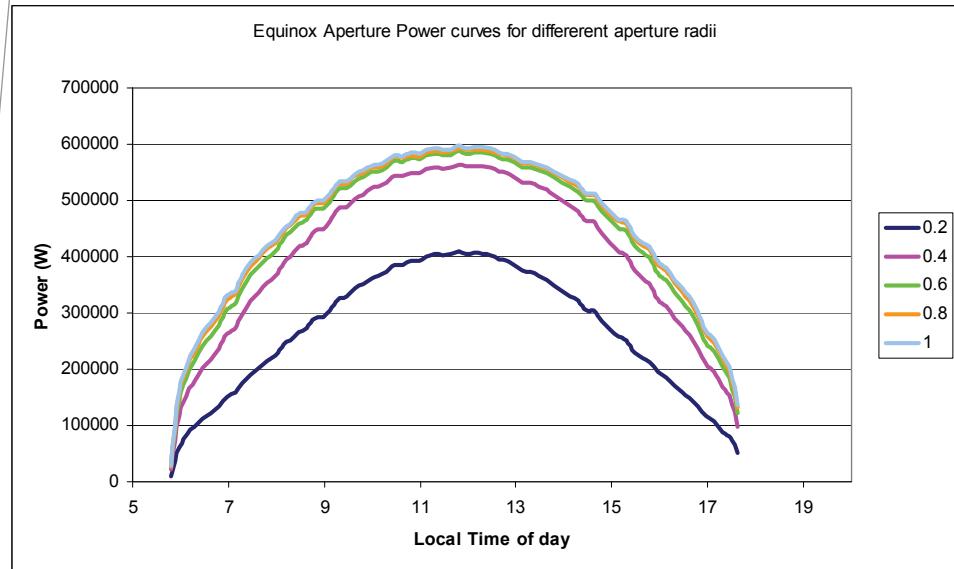


Heliostat field control software

Sun
Ray Tracing
Flux Analysis
Heliostat control
Heliostat Design
Field Modelling



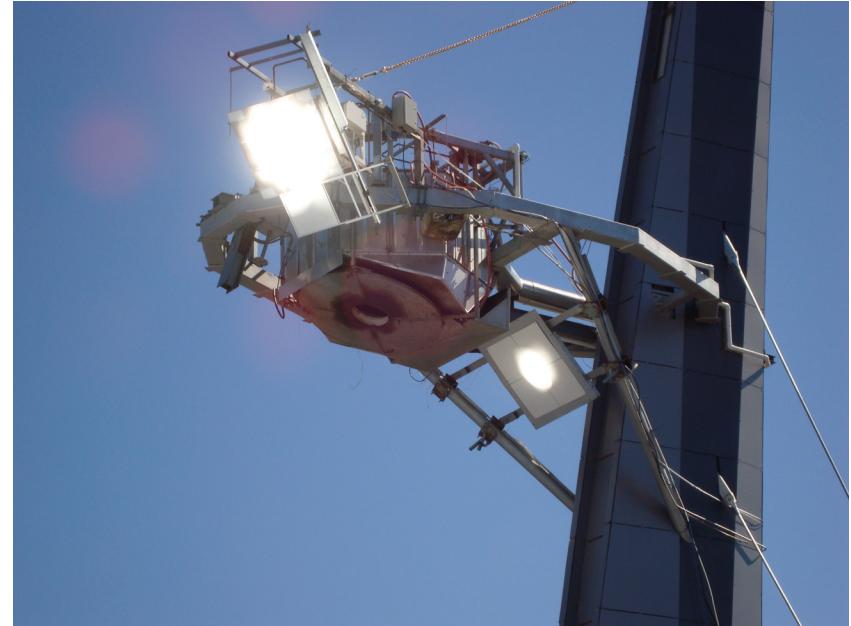
Testing heliostat designs from other developers



RECEIVERS/ ABSORBERS/ REACTORS

Existing facilities

- Controllable incident flux and real time flux mapping
- High temperature tubular reactors and cavity receivers
- Solar thermochemical reactors and balance of plant to measure gas composition; combustion genset for syngas.
- Lab facilities for catalyst development
- Experimental data for receiver efficiency model
- High temperature heat transfer rig
- Associated BoP and measurement systems

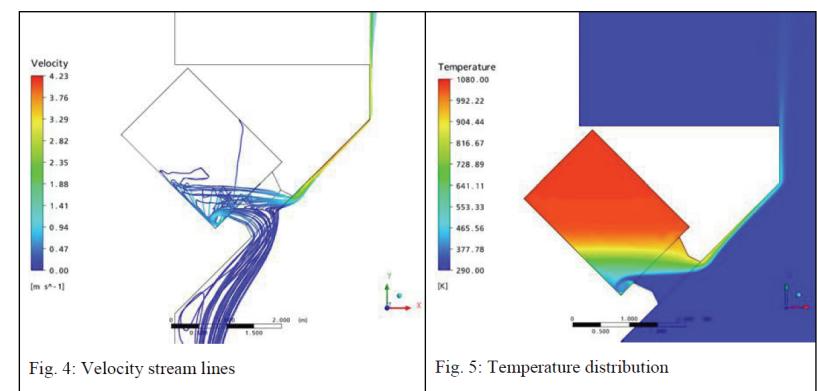


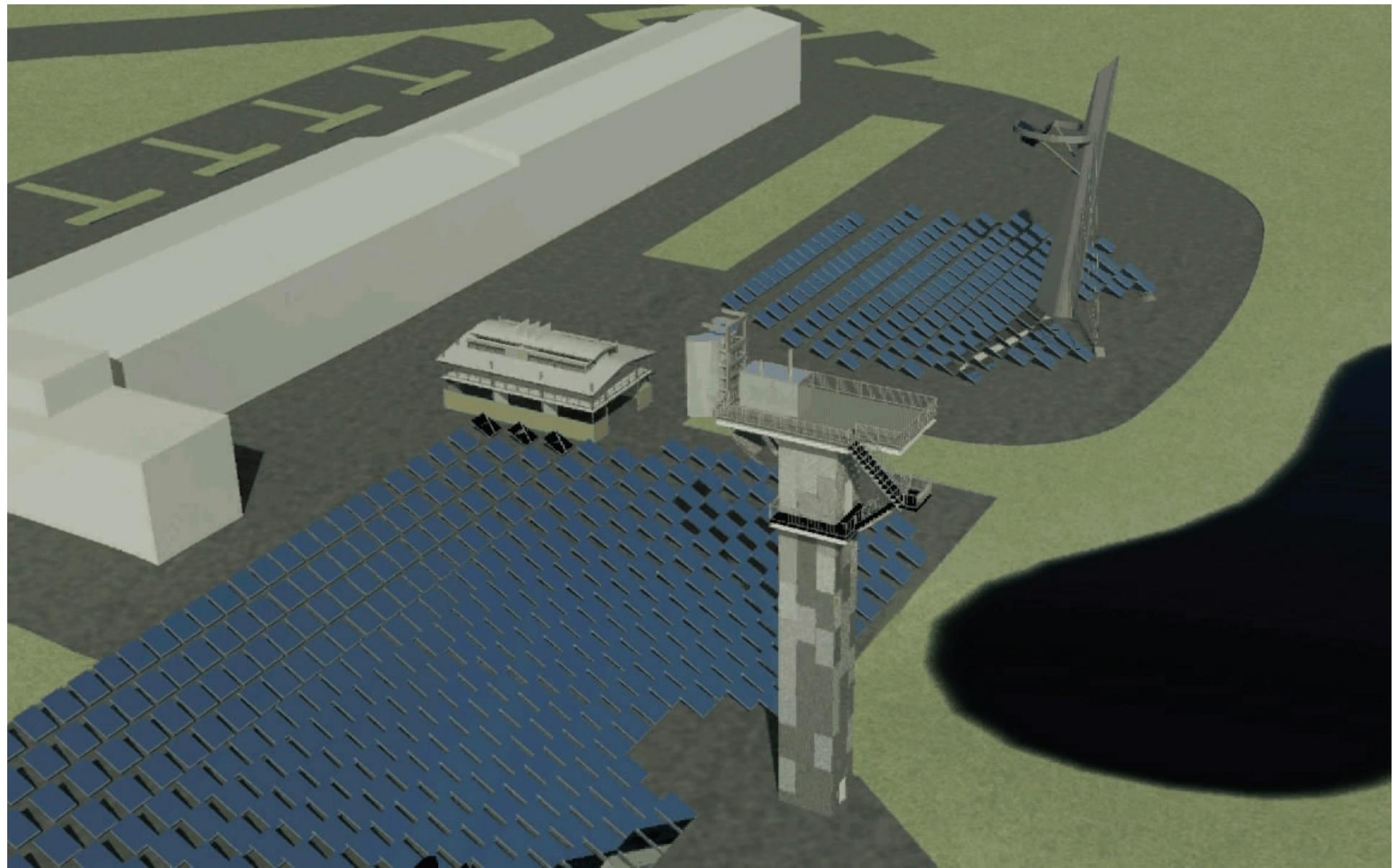
Facilities under design/construction

- High temperature heat transfer and storage fluids
- Pressurised air receivers – tubular and volumetric
- 200kW Brayton cycle microturbine
- Sub and supercritical steam generation and mgmnt

Facilities under planning

- Solar furnace







Education Investment Fund (EIF)

- Funds significant solar R&D infrastructure that supports the Solar Flagship Project

Supports such activities as:

- Solar DNI now and forecasting – instruments and software development
- Field-related assessment (optics, receiver thermal performance assessment, component durability, etc)
- Solar plant simulator (whole of life model from photons in to electrons out, grid interation, optimisation of storage (if included) and gas co-firing)

THANKYOU

Acknowledgement:
Australian Solar Institute

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