



WIZARD POWER

CONCENTRATING SOLAR POWER TECHNOLOGY FOR UTILITY SCALE POWER
STEPS ON THE PATH TO COMMERCIALISATION

AUSTRALIAN INSTITUTE OF ENERGY, 6 FEBRUARY 2013

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- Market Focus & Business Model
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INTRODUCTION

- Wizard Power is an Australian Proprietary Limited company based in Canberra
- Wizard Power develops and provides world leading Concentrating Solar Power (CSP) technologies that produce high temperature heat to deliver cost competitive utility scale power as well as provide energy for a diverse range of high to ultra high temperature industrial processes
- Wizard Power's core technology is the Big Dish, a multi-purpose solar energy collection and delivery platform originally developed at the Australian National University

Wizard Power is the only company specialising in high-performance, low-cost, solar dishes



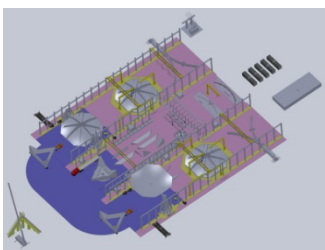
TECHNOLOGY PORTFOLIO

Wizard Power's core technology focus is the Big Dish and its complementary technologies.

The technologies are ready for commercial developments today.

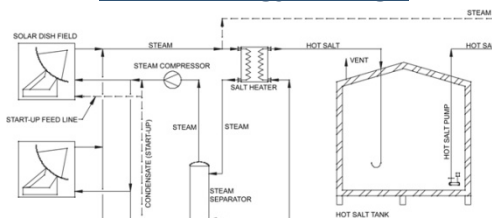
The Big Dish can be deployed in stand-alone solar power projects, with or without storage, or supplemented with gas or other fuels to deliver fully dispatchable power generation systems.

Factory in the Field (FiF)



Rapid and cost effective solar field deployment.
Flexible manufacturing setup.
Integrated quality assurance.

SUMO energy storage



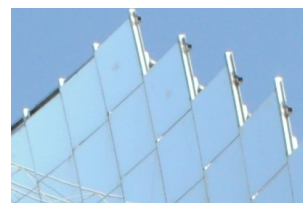
Extends daily operation.
Superheated steam as energy transport medium.
Salt storage requirement 1/3 of trough systems.

The Big Dish



Highly cost effective design.
Highest efficiency for commercial CSP plant.
Concentration ratio >2000x.
Heat generation 500 °C to > 1700°C.

Solar Mirror Panel (SMP)



Laminated construction, robust and durable.
Focally accurate and structurally integrated.
Adaptable to other CSP systems.

SMP Factory



Key equipment sourced and tested.
System is ready to implement for the first commercial project.
Market driven expansion plans for to 5.5 MW_{th} per day throughput.

THE BIG DISH

Big Dish technical advantages

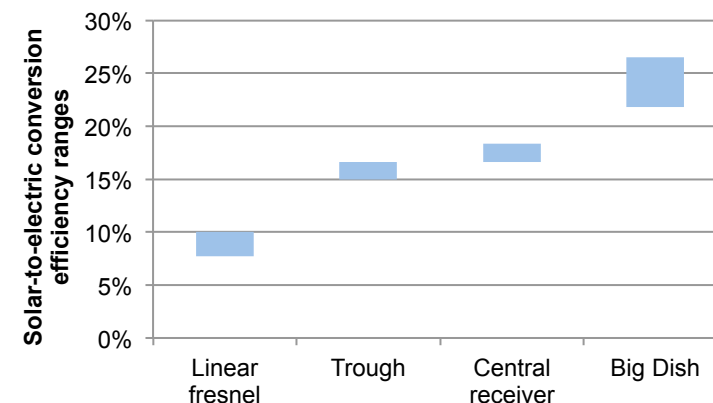
Solar dishes have the highest efficiency of all CSP technology types due to their:

- **Superior optical efficiency** - achieved by tracking the sun with the full face of the dish at all times. Trough, central receiver and linear Fresnel technologies all suffer cosine losses due to their geometry and tracking.
- **Highest temperature operation** - allowing best thermal-to-electrical conversion efficiencies as the plant operates at a point further up the Carnot efficiency curve.
- **Lowest thermal losses** - by virtue of the superior concentration ratio of the Big Dish, which leads to much lower receiver area subject to thermal losses by radiation and convection.

The bar graph on this slide illustrates the efficiency range for each type of CSP technology based on current projects (minimum) and various industry reports (maximum).

The table on this slide demonstrates some of the key performance advantages of parabolic dishes over other CSP technologies and shows that parabolic dishes support a broader range of applications than other CSP technologies.

Big Dishes offer the highest conversion efficiency
(including scope for further improvements above 26%)

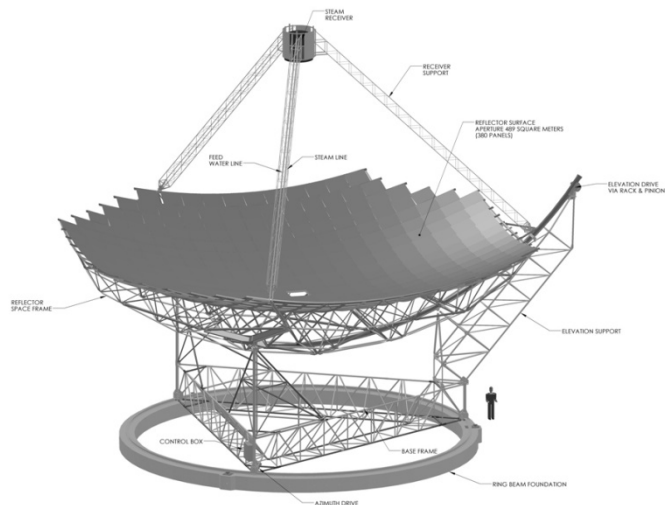


The performance advantages of Big Dishes lead to a wide range of applications

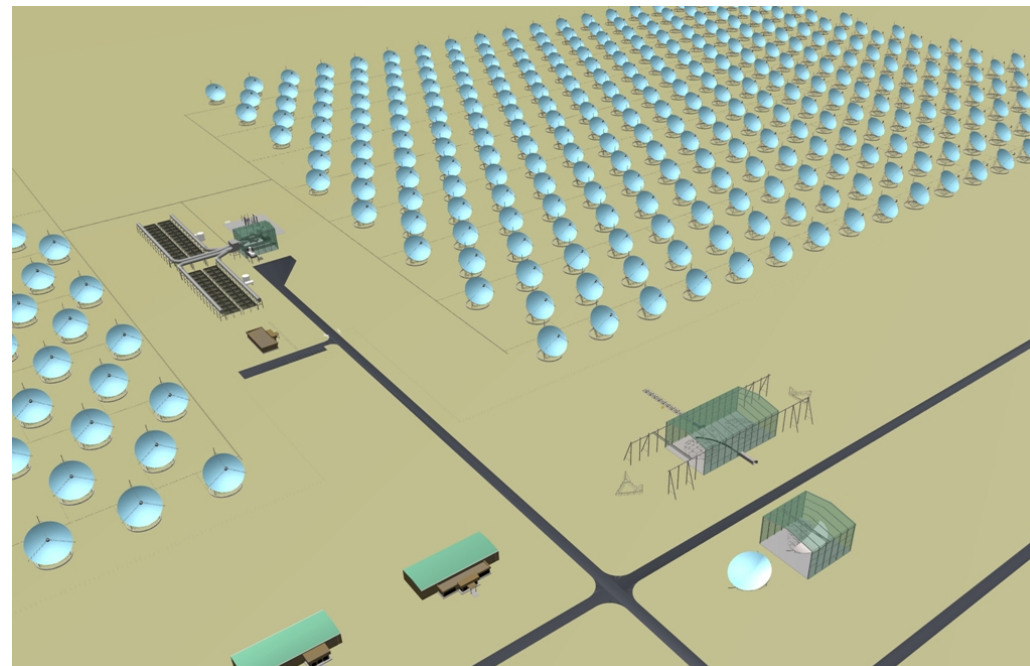
Power Generation Technology (as at 2011)	Linear Fresnel	Parabolic Troughs	Central Receiver	Big Dish
Annual solar-to-electric conversion efficiency	7.7%	15%	16.6%	21.8%
Temperature capability	medium	medium	high	high – ultra high
Optical efficiency	43%	57%	56%	86%
Thermal efficiency	75%	81%	82%	90%
Applications				
Power generation	✓	✓	✓	✓
Energy storage		✓	✓	✓
Thermo-chemical conversion processes			✓	✓
Advanced high temperature conversion applications				✓

THE BIG DISH

- A typical steam-based Big Dish power plant consists of a large field of Big Dishes connected to a central power block via an insulated piping network.
- Energy loss in transmission of feed water and superheated steam in the piping network is minor, making very large solar fields of thousands of dishes feasible, enabling single plants of gigawatt capacity.



A Big Dish field with power block

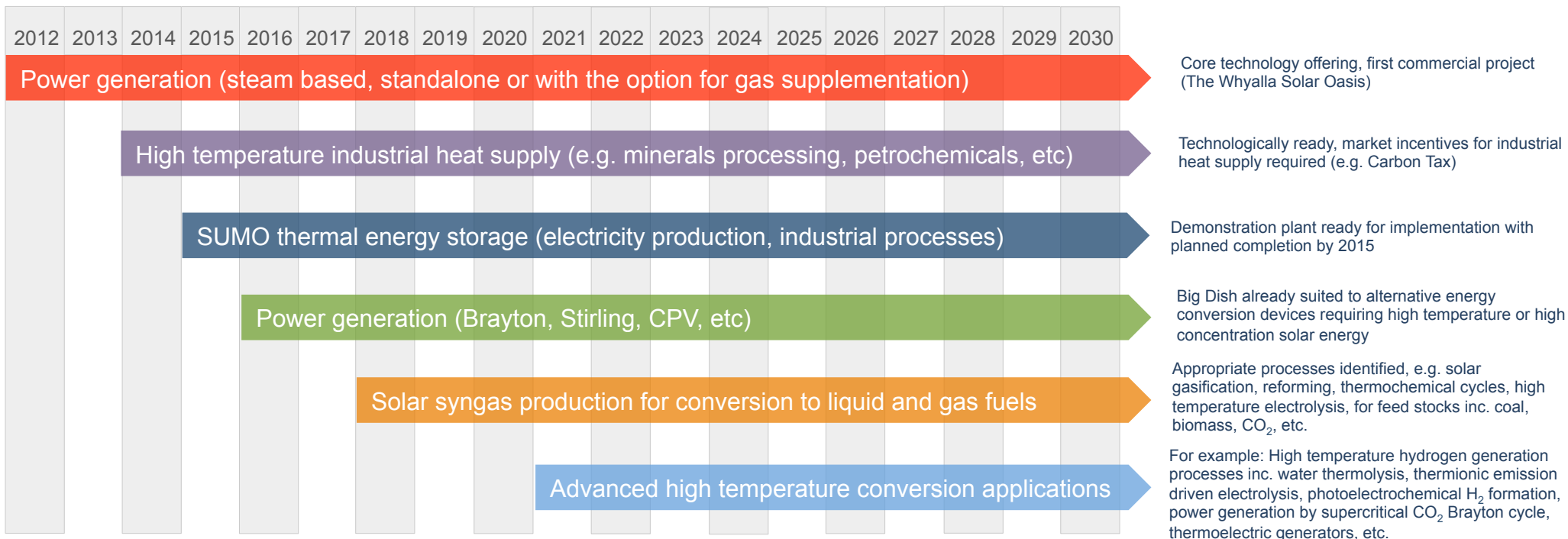


MARKET FOCUS

Markets and Wizard Power's key advantages

Wizard Power's key markets are the dispatchable electricity market and the high to ultra high temperature industrial heat market. The electricity market for CSP technology alone is estimated by the International Energy Agency to reach a capacity of over 330GW by 2030 with an estimated value of over \$500 billion dollars.

Of the technology options in the CSP market, the Big Dish is the most optically and thermally efficient. It brings unique opportunities for powering high to ultra high temperature applications for both electricity production and industrial processes, including:



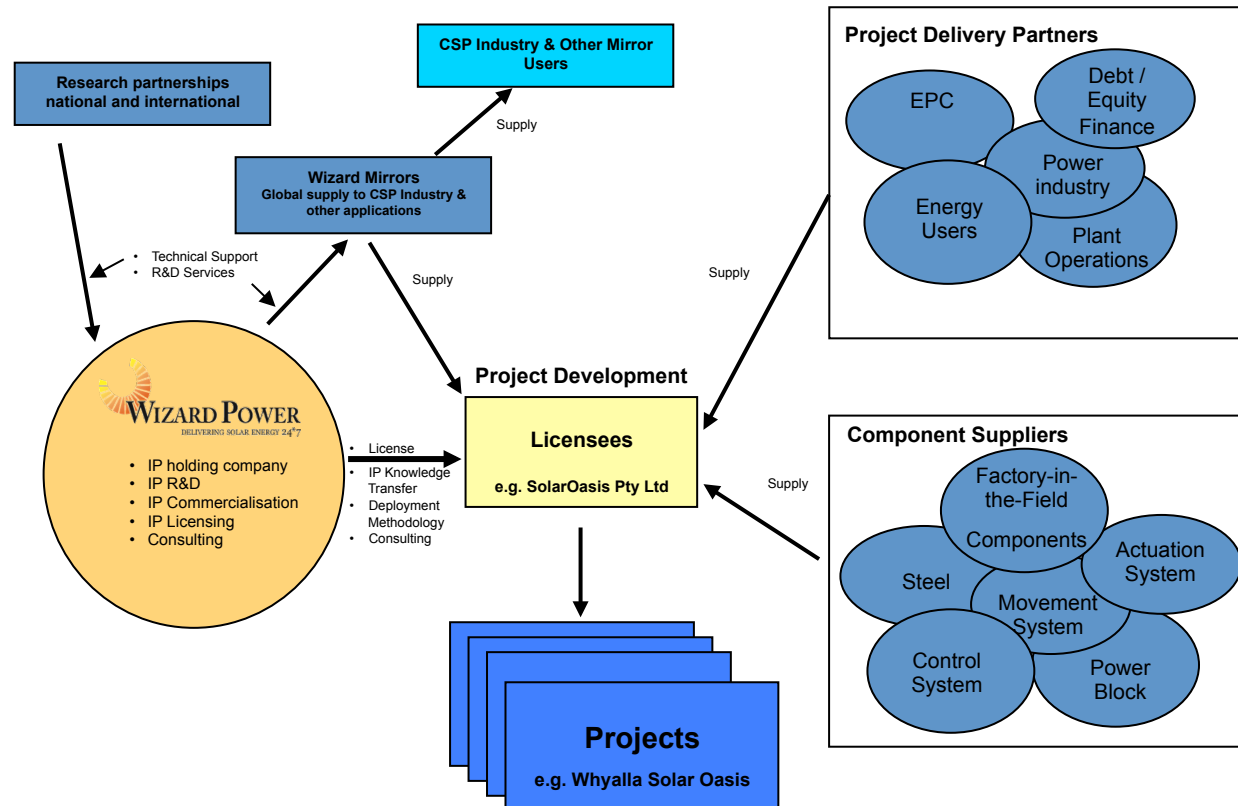
BUSINESS MODEL

Wizard Power's core asset is the intellectual property that enables the development of high-efficiency, cost-effective, solar power plants using the Big Dish solar concentrator and associated products and services.

Wizard Power's business model is to provide the Big Dish technology to clients under licence, with documentation and consulting support throughout the planning, design, construction, commissioning and operation of projects.

The licensing model was developed by Wizard Power to enable the company to develop a broad range of business opportunities with the limited resources available to it.

This model allows Wizard Power to be agile and responsive to a dynamic market unconstrained by the resource requirements inherent in implementing large projects.



Typical project development model under Wizard Power's licensing arrangements

THE WHYALLA SOLAR OASIS - STAGE 1

- The project is owned and developed by SolarOasis Pty Ltd, a special purpose vehicle with Australian and international shareholder companies
- Equity, debt and procurement partners are primarily Chinese, with a State Owned Enterprise parent, in conjunction with one Australian and one internationally headquartered bank
- Supported by a \$60 million grant from the Australian Government's Renewable Energy Demonstration Program, now an ARENA solar project
- 300 Big Dish solar thermal concentrators producing super-heated steam and integrated with a gas boiler. Generating 40MW_e to deliver 131 GWh of dispatchable electricity each year
- Enough electricity to power 18,000 average Australian homes and reduce greenhouse gas emissions by 72,000 tonnes per year
- The project will directly employ an average of over 200 people in its 2 year construction period, in addition to the employment generated for materials and components suppliers
- Plant expansion to 200MW+ (1,500+ Big Dishes) will be evaluated in Stage 1
- Wizard Power's role includes:
 - Providing access to the Big Dish and Factory-in-the-Field IP under license
 - Supplying approximately 155,000m² of Wizard Power's Solar Mirror Panels
 - Providing consulting services in support of Front End Engineering Design (FEED), detailed design, plant construction and commissioning

KEY MILESTONES (calendar years)

Financial close	3 rd Qtr 2013
Commence construction	3 rd Qtr 2013
Detailed design complete	4 th Qtr 2013
FiF ready, Big Dish roll-out commences	1 st Qtr 2014
Plant operational	2016

Note: Milestones to be confirmed at Financial Close

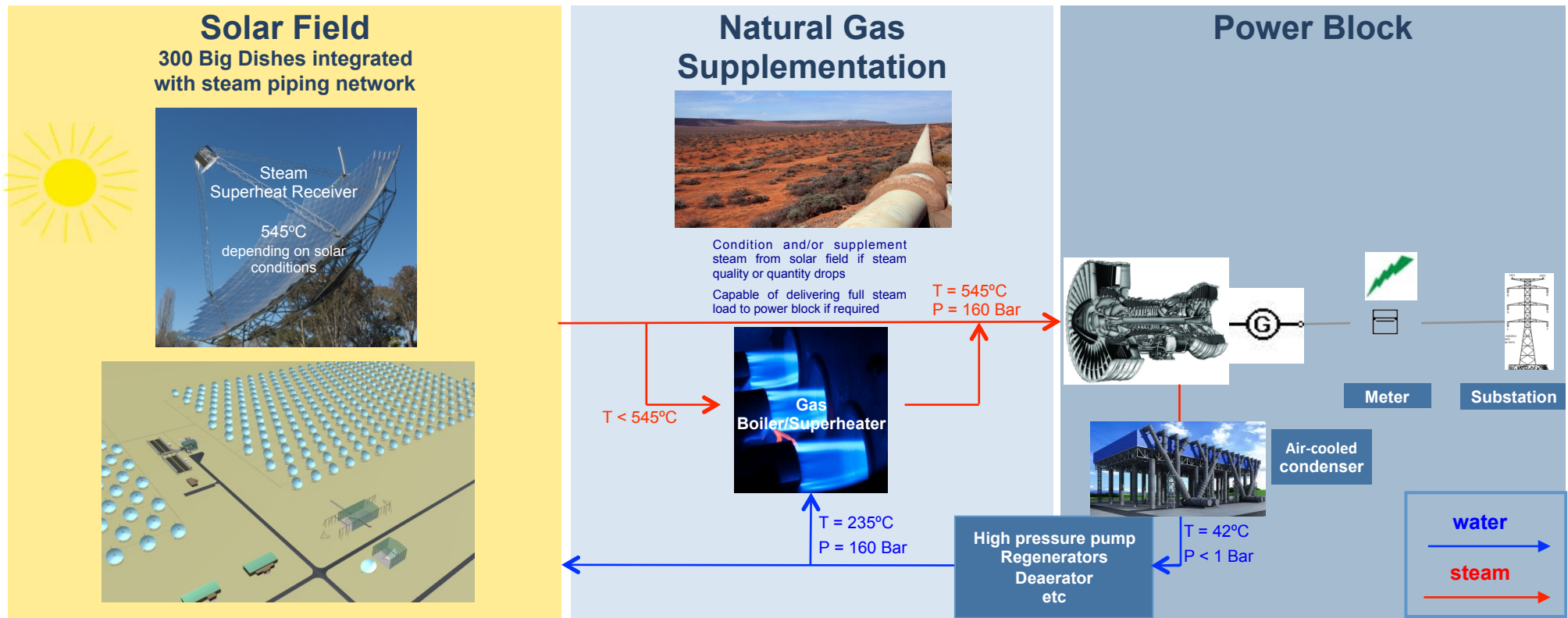


THE WHYALLA SOLAR OASIS - STAGE 1

A simplified representation of the Whyalla Solar Oasis plant's scheme is shown below

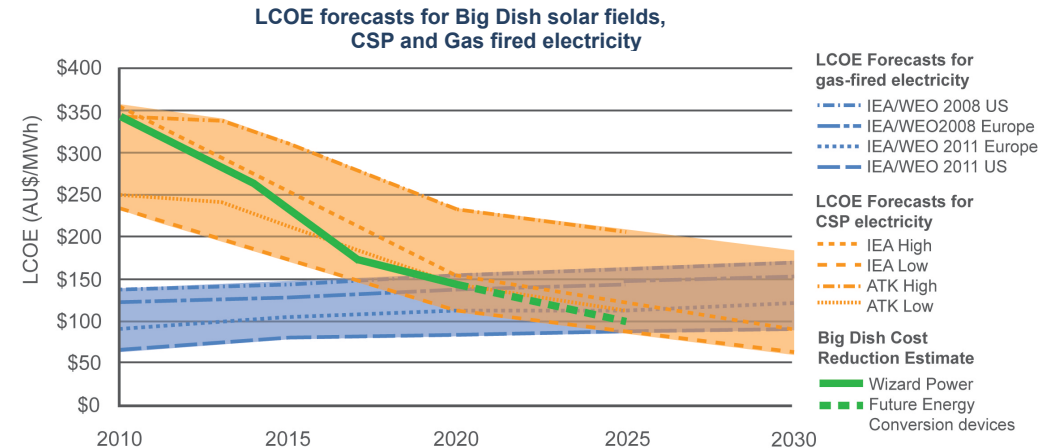
- Temperatures and pressures will be subject to the final selection of turbine and its optimum input and output conditions. Expected range:
 - Temperature: 520 to 585°C
 - Pressure: 120 to 160 Bar
- Key plant specifications and equipment selections will be finalised during the Front End Engineering and Design phase of the project

The Whyalla Solar Oasis Stage 1 Big Dish Power Plant with Gas Supplementation

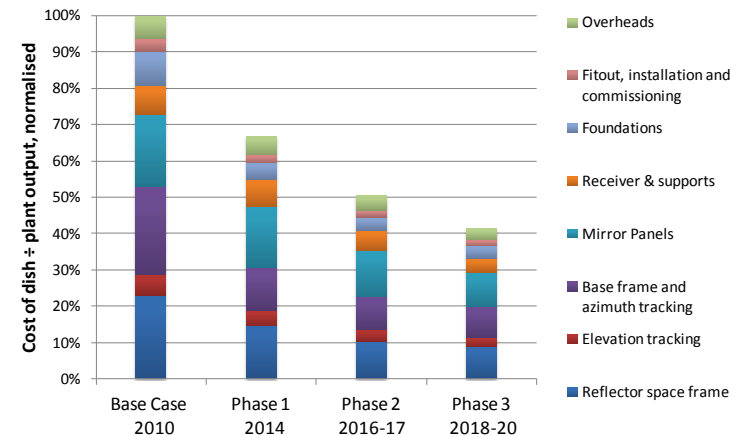


STRATEGIC ENGINEERING & COST REDUCTION PLAN

- Wizard Power has a structured engineering strategy to reduce the Levelised Cost of Energy (LCOE) from Big Dish power plants to compete directly with gas-fired power plants within 5 to 8 years
- Cost reduction and performance improvement plans have been classed in three phases, and build upon a well-understood Base Case:
 - **Phase 1:** near-term and well-understood design improvements, design initiatives underway, in various stages of completion
 - **Phase 2:** medium-term, and clearly identified design improvements, with a focus on manufacturing efficiency, standardisation of components, and lean material use
 - **Phase 3:** materials reduction through a focus on design efficiency, plus further FiF automation, and more aggressive material and component sourcing



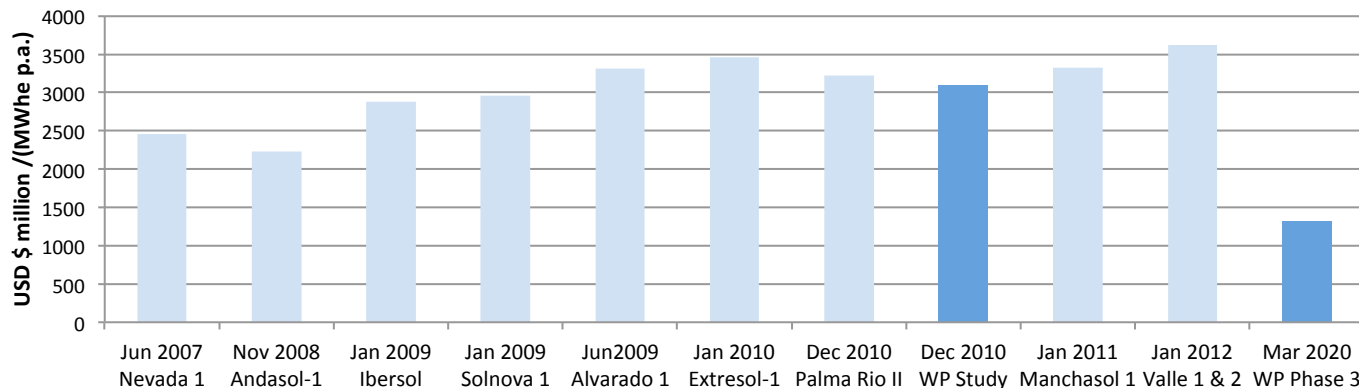
Big Dish cost breakdown showing planned cost reductions by phase
(Cost of dish ÷ plant output, normalised)



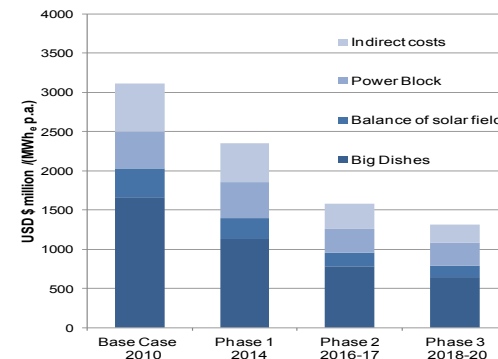
STRATEGIC ENGINEERING & COST REDUCTION PLAN

- Wizard Power has a well defined technology roadmap for cost reduction that, combined with the impact of increasing plant scale, is targeted to deliver the lowest LCOE for utility scale solar power from CSP plants
- It is expected that in less than 10 years, Big Dish plants will compete, without subsidies in some markets, with gas-fired electricity generation to provide dispatchable power
- The graph below left compares a selection of existing CSP trough plants in terms of their ratio of capital cost to plant output, based on publically available information
- The graph below right shows a snapshot of the impact on plant costs per megawatt-hour of electrical output, of Wizard Power's phased cost reduction plans. The timeline for all phases of the cost reduction program is 6-8 years

Comparison of plant costs (normalised to DNI 2200 kWh/m²/annum)



Roadmap for Big Dish solar plant cost reduction



Wizard Power's Big Dish and complementary technologies deliver utility-scale power at a LCOE already cost competitive with other CSP technologies, and have a well documented roadmap for further significant cost reductions.

IN SUMMARY

- Big Dish power plants are already cost competitive with 25 years of commercial development of trough based CSP
- Wizard Power's engineering strategies will deliver a decrease of over 50% in capital cost for Big Dish solar plants within the next 6-8 years – based on independent market projections for the cost of gas fired electricity in that period, Big Dish power plants will be cost competitive with gas without subsidy in markets paying world parity prices for gas.
- The ~50% capital cost reduction requires no break through technologies. The development of power plants such as the Whyalla Solar Oasis and the undoubted advent of new technologies will allow Wizard Power to reduce costs further and continue to improve the performance of the Big Dish and its related technologies.
- At the present time global CSP growth is challenged by the GFC, in some markets by developments with unconventional gas and lower cost utility scale PV. Forward looking economies continue investment in CSP; with strategic energy and sustainability imperatives providing continued growth in demand for dispatchable solar solutions.
- Wizard Power has a near to medium term project opportunity pipeline of more than 1,000 MW, primarily (but not entirely) outside Australia. Developers of these projects are keenly interested in the development of the Whyalla Solar Oasis project.

TECHNOLOGY FOR UTILITY SCALE SOLAR POWER



Thank You

Head Office:

George Turner House
11 McKay Gardens
Turner
ACT 2612

Postal Address:

GPO Box 3002
Canberra
ACT 2601

Phone: +61 (0)2 6162 3456

Fax: +61 (0)2 6162 8188

Email: solarsolutions@wizardpower.com.au

Website: www.wizardpower.com.au