

# ASX Release

14 November 2012

**ASX Code: PTR**

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**PETRATHERM LIMITED**  
**ABN 17 106 806 884**

## **MD presentation to the annual Australian Geothermal Energy Conference**

Petratherm's Managing Director, Terry Kallis will present later today at the annual Australian Geothermal Energy Conference in Sydney.

The presentation covers the Company's flagship Paralana project, its Tenerife project, the new Clean Energy Precinct project and includes photos from the Company's recent presentation to the Prince of Wales.

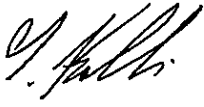
The presentation outlines key areas of differentiation the Company believes it has in the Australian geothermal energy sector, including:

- Business model – based on JVs with right projects, partners and people – securing key skills and funding
- Project portfolio – several projects across geothermal technology spectrum to manage risks
- Track record of success – drilled, cased, fraced and flowed Paralana 2 well, confirmed economic temperature and existence of natural fracture network
- Extraction model for a pumped, deep engineered geothermal systems well that is technically valid/optimal for target temperature
- Clear commercialization path, for both the local off grid and long term on grid and growing power markets



Prince of Wales receives a presentation from Petratherm's MD  
(Photo - courtesy of the Adelaide Convention Centre)

Yours faithfully

A handwritten signature in black ink, appearing to read 'T. Kallis', written in a cursive style.

**Terry Kallis**  
Managing Director

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*AGEC 2012*

*Company Update*



*Exploring for Geothermal Energy*



*November 2012*

# Disclaimer and competent persons statement

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All amounts in Australian dollars (AUD) unless stated otherwise.

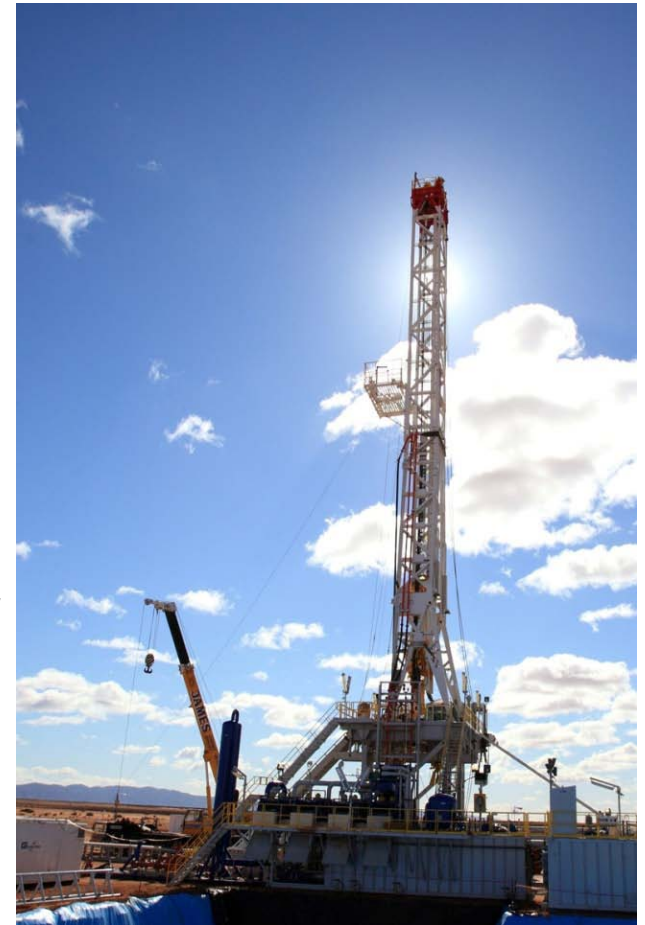
The information in this presentation that relates to Exploration Results, is based on information compiled by Peter Reid, who appears on the Register of Practising Geothermal Professionals maintained by the Australian Geothermal Energy Group Incorporated at the time of the publication of this report. Peter Reid is a full time employee of the Company. Peter Reid has sufficient experience which is relevant to the style and type of geothermal play under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the Second Edition (2010) of the Australian Code for Reporting Exploration Results, Geothermal Resources and Geothermal Reserves. Peter Reid has consented in writing to the inclusion in the presentation of the matters based on his information in the form and context in which it appears.

# Our business model – consistent and robust

*“To explore for and develop low emission energy projects that are commercially attractive”*

- Unlock Paralana’s vast geothermal resources value through demonstration of viable power production.
- Develop a portfolio of quality geothermal energy projects
- Identify complementary wind, solar and gas power opportunities to assist geothermal development
- Introduce joint venture partners with common interests, the right skills/knowledge, risk appetite & funding ability

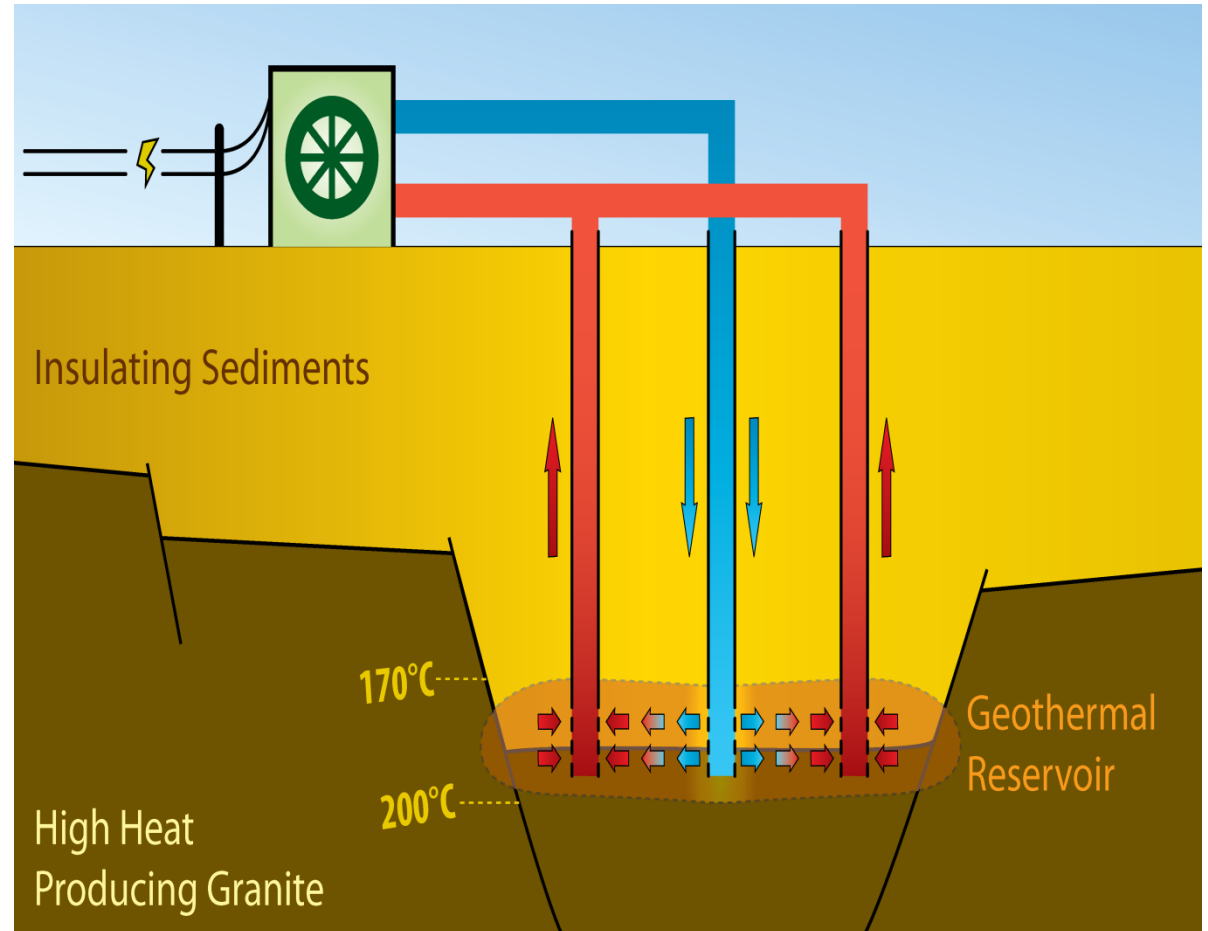
**“Right projects, right partners, right people”**



# Resource Development Model – Heat Exchanger Within Insulator (HEWI), and Fractures at Basin-Basement Interface (FABBI)

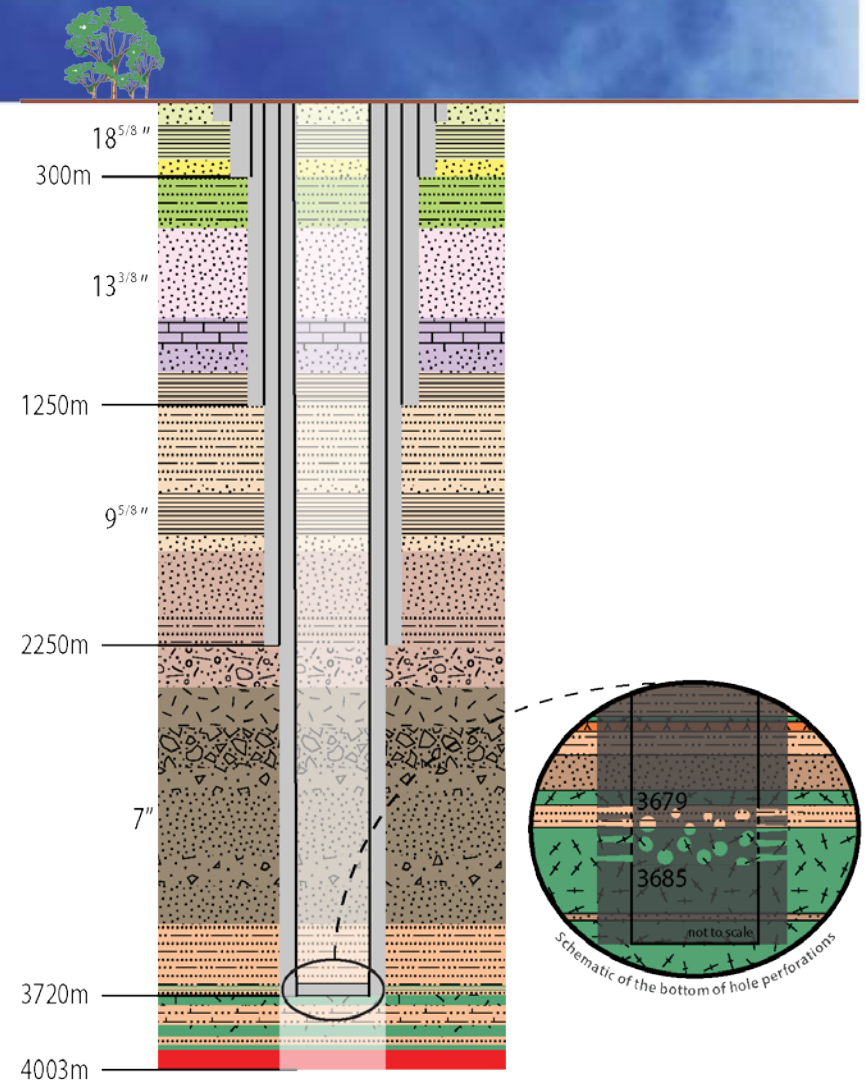
Targeting Fracture Permeability in

- > Meso-proterozoic metasediments - bedding / joint surfaces (HEWI model)
- > Fracture Permeability at Basin / Basement Interface (FABBI model)



# Project Milestones

- > Drilled Paralana 2 to depth 4003m (G.L. A.H.D.) ✓
- > Confirmed optimum bottom hole temperatures ~ 190°C at 4000m ✓
- > High pressure geothermal brines intersected and natural fractures intersected from 3680m – may assist flows ✓
- > Fracture stimulation produced a large complex fracture cloud extending (1100m) ✓
- > Initial injection rates of 27 l/sec with scope to increase to commercial rate ✓
- > Successful flow test produced 1.3 million litres due to natural overpressure ✓



# Paralana Independent Resources Statement – Nov 2011

Depth Interval (metres)	Inferred (PJ <sub>th</sub> )	Indicated (PJ <sub>th</sub> )	Measured (PJ <sub>th</sub> )	Total (PJ <sub>th</sub> )
<3,500	2,400	1,100		3,500
3,500 - 4,000	4,900	4,400	41	9,300
4,000 - 4,500	5,900	5,700		12,000
4,500 - 5,000	6,900	6,700		14,000
<b>Total (PJ<sub>th</sub>)</b>	<b>20,000</b>	<b>18,000</b>	<b>41</b>	<b>38,000</b>

Paralana Joint Venture: Petratherm 79%, Beach Energy 21%. If remaining staged equity investments are met, Beach Energy may earn up to 36% .

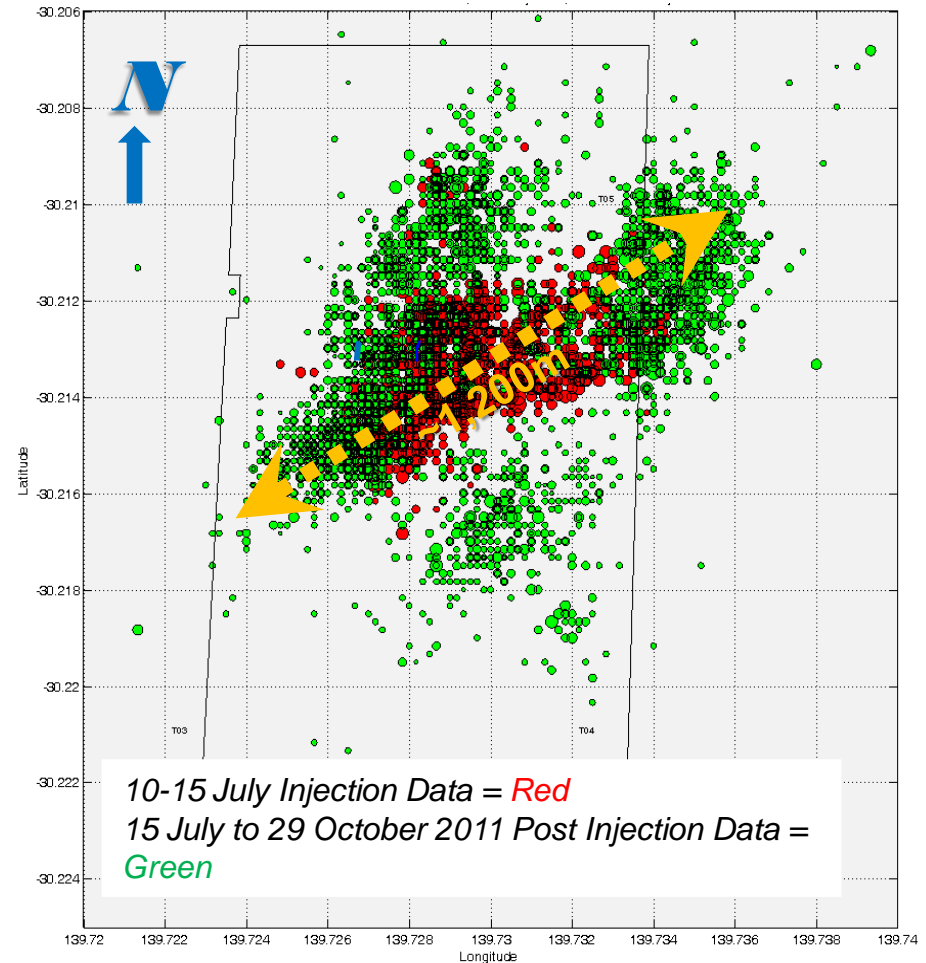
- Initial stimulated rock volume = **5.4 MWe power potential for 30 years**
- Paralana Resource at the 3500–4000 metre depth interval is estimated a 9,300 PJ<sub>th</sub> which is sufficient to generate **1,300 MWe of electrical power for 30 years**

*The information on this slide that relates to Geothermal Resources is an extract from a report compiled by Dr Graeme Beardsmore, who appears on the Register of Practicing Geothermal Professionals maintained by the Australian Geothermal Energy Group Incorporated at the time of the publication of this Slide. Dr Beardsmore is employed by Hot Dry Rocks Pty Ltd, an independent consulting group that provides professional services to Petratherm Ltd. Dr Beardsmore has sufficient experience which is relevant to the style and type of geothermal play under consideration and to the activity which he/she is undertaking to qualify as a Competent Person as defined in the Second Edition (2010) of the 'Australian Code for Reporting Exploration Results, Geothermal Resources and Geothermal Reserves'. Dr Beardsmore has consented in writing to the inclusion on the slide of the matters based on his information in the form and context in which they appear.*



# Paralana Project Next Steps

- > Project has followed clear plans and milestones with spend tightly managed by JV to ensure value for partners, government and PTR shareholders.
- > Next step is to drill Paralana 3 deep producer well, perform large scale fracture stimulation works, and to demonstrate a high flow rate between wells.



# Commercialization Path

- > Initial 3.5MW off-grid pilot plant to Beverley Mine (11 kms away).
- > Growing up to 30 MW to meet off-grid needs.
- > Long term path for large scale geothermal (300MW+) via the Clean Energy Precinct (gas, wind and solar), that aims to secure the large growing market from the mining sector.



Paralana Flow Test – October 2011

# HEWI and FABBI Resource Development Models – Optimizing Temperature, Drilling Costs and Flow!

- HEWI Targets Working in Sediment rather than Granite:
  - Lower drilling costs (depth and rock hardness)
  - Shallower depth (temperature gradients normally higher in sediment than granite)
  - Probable lower stimulation challenges
    - weaknesses along sedimentary layers (partings) and joints
    - Overlap with standard petroleum stimulation method
    - May contain some primary permeability and porosity
- FABBI Targets natural Fracture Permeability at Basin / Basement Interface:
  - Exploits natural fracture and flow zones
  - Easier to stimulate (enhance)

**Aimed at improving chance of high flows and lowering development costs !**

# Extraction model for a pumped EGS well

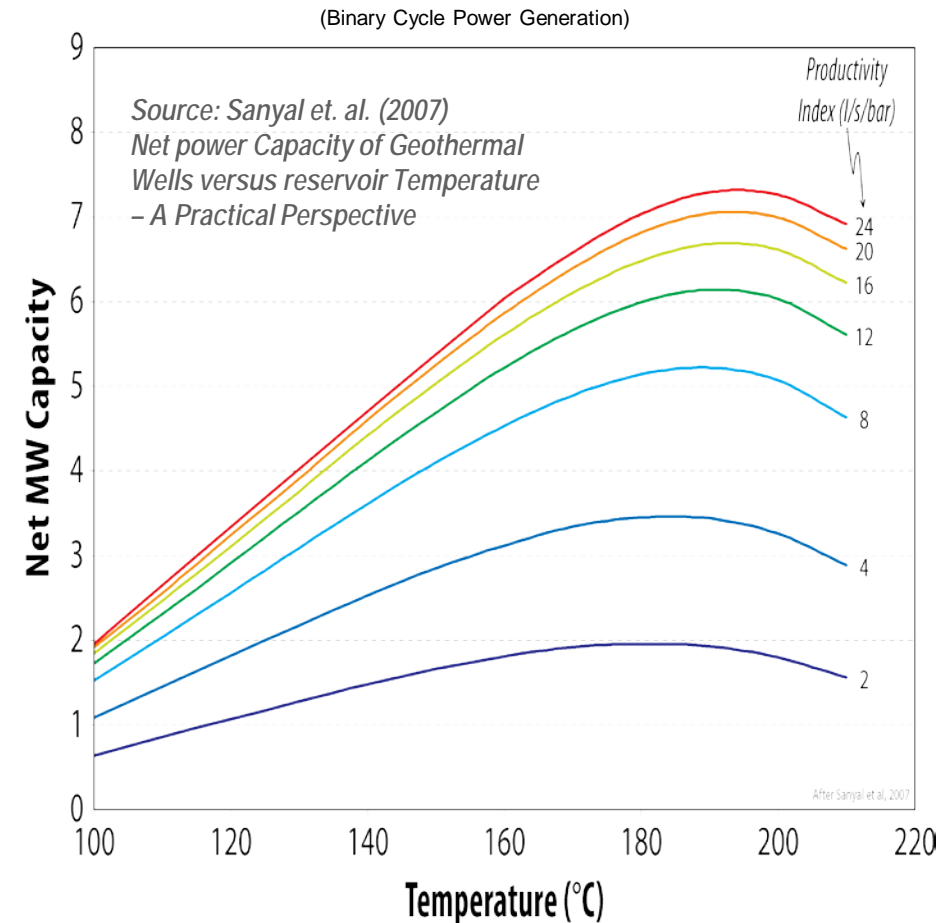
**Sanyal (Geothermex) et. al. 2007\***  
independent expert paper reports :

- Standard industry pump operating temperature limit is ~ 190°C
- Max MW per well ~7.3MW (unless pumps improve on setting depth and pump rate)

## Paralana Extraction Model :

- Targeting optimal temperature parameters to maximize output of a pumped EGS well
- Temperatures of 190°C confirmed at 4,000m
- JV decision not to drill deeper than 4km based on cost/depth trade-off – validated
- Remaining uncertainty to test is flow rate which is measured to Productivity Index (PI)
- Paralana target flow is 75 litres/sec or PI ~ 4 achieving a net capacity of 3.5 MW

## Net MW Capacity of a Pumped Well vs Temperature



\* Sanyal 2007 paper available for download at  
[www.geothermal-energy.org/pdf/IGAstandard/SGW/2007/sanyal3.pdf](http://www.geothermal-energy.org/pdf/IGAstandard/SGW/2007/sanyal3.pdf)

# Paralana - Project Funding

- Next stage of works budgeted at around \$26 million
  - Covers drilling Paralana 3, fracture stimulation and demonstration of commercial flows. This work is the immediate precursor to building a 3.5 MW pilot plant.
- Petratherm has lodged a \$13 million grant application under the Australian Renewable Energy Agency (ARENA) \$126 million Emerging Renewable Program (ERP) to fund to half of the total costs.
- Beach Energy's – Paralana JV partner- have 21% equity share.
- Petratherm – project equity share is 79% - if ERP grant is successful the PTR funding need for next stage of works is around \$10 million.
- Petratherm could receive up to 7.2 million in cash rebates\* for eligible expenditures under the R&D Tax Incentive scheme (\* post eligible spend & assessment)
- ***Potential net cost to Petratherm to achieve Commercial Demonstration of Commercial Flows could be around \$3 million***

# Key Milestones for the Paralana Geothermal Project

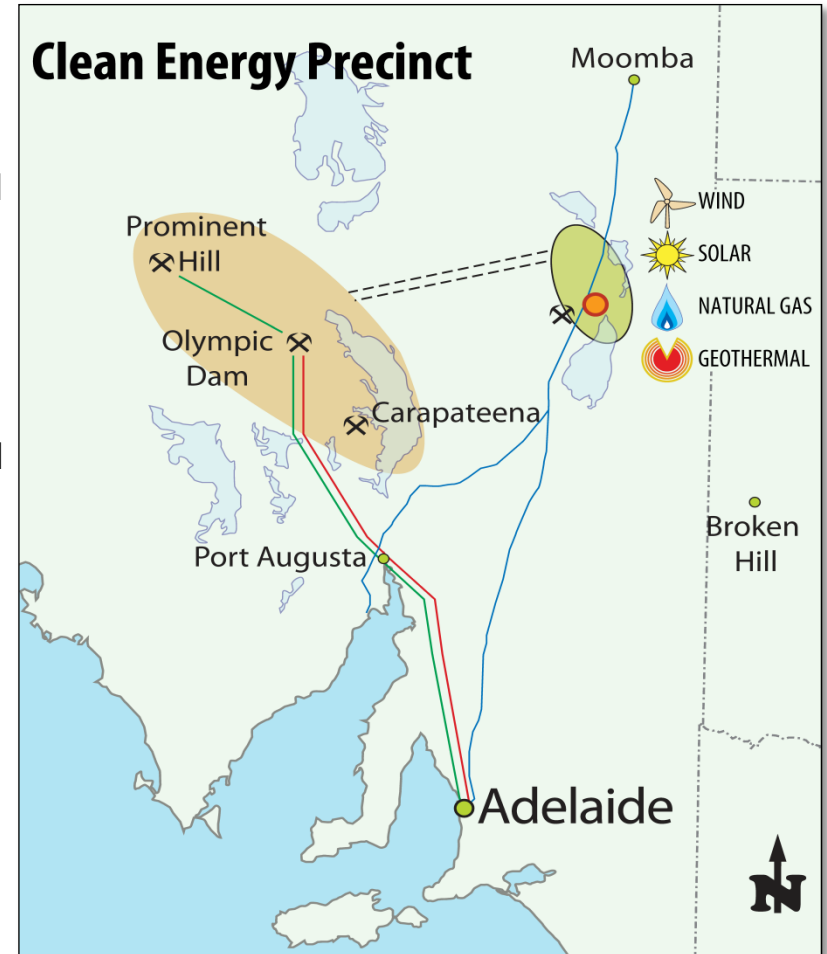
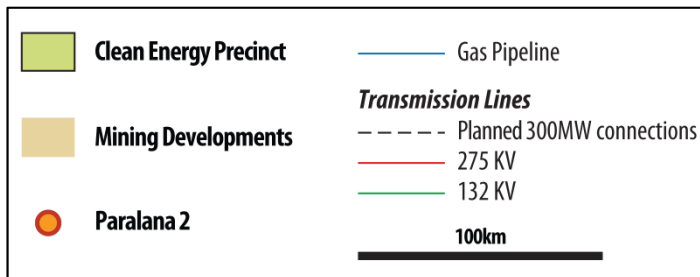


## Paralana JV project planned milestones

- 1<sup>st</sup> Qtr 2011: Main fracture stimulation ✓
- 3<sup>rd</sup> Qtr 2011 : Flow test ✓
- 2<sup>nd</sup> half 2013: drilling of the Paralana 3 deep producer well
- Early 2014: Large scale hydraulic stimulation works of Paralana 2 and 3
- Mid-2014: Circulation Test – **Demonstration of Commercial Flows**
- 2015: Commission first stage 3.5 MW power plant

# Clean Energy Precinct

- Plan to deliver 600 MW into a large growth market driven by Mining Developments
- It is the only site where Gas, Wind, Solar and Geothermal Converge
- Key enabler for delivery of large scale geothermal energy into the SA Power Grid
- Exclusive access to over 1,800 square kilometres of land for power generation
- Initial 300MW gas and wind development followed by solar and geothermal

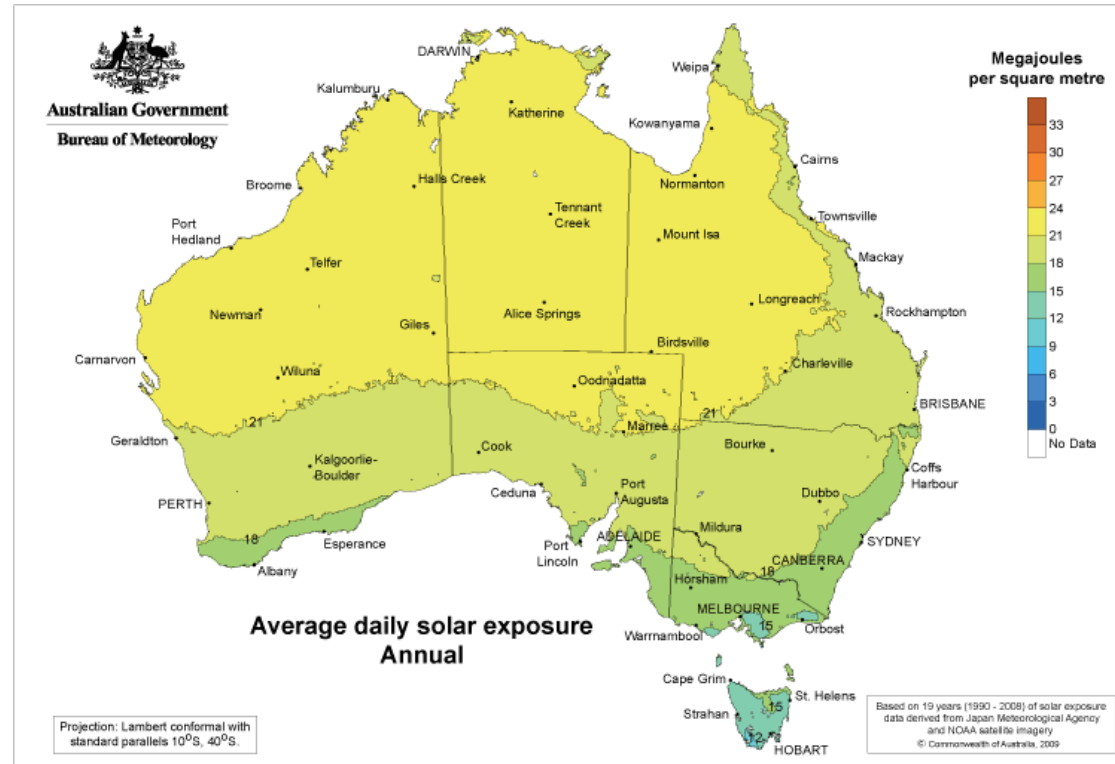


# Preliminary Resource Assessment Summary for Precinct

- > BOM data suggests solar resource 20 MJ/m<sup>2</sup>/day or (5kWh/m<sup>2</sup>/day). GH confirms it as an excellent solar resource<sup>1</sup> ✓
- > Expect competitive gas supply contract availability from Moomba producers<sup>2</sup> ✓
- > Expect sufficient gas pipeline capacity from MAP<sup>2</sup> ✓
- > Wind regime expected to confirm good quality wind resource<sup>1</sup> ✓

(1- Subject to further detailed resource assessment by GH )

(2 - Subject to negotiations with gas suppliers and EPIC Energy)

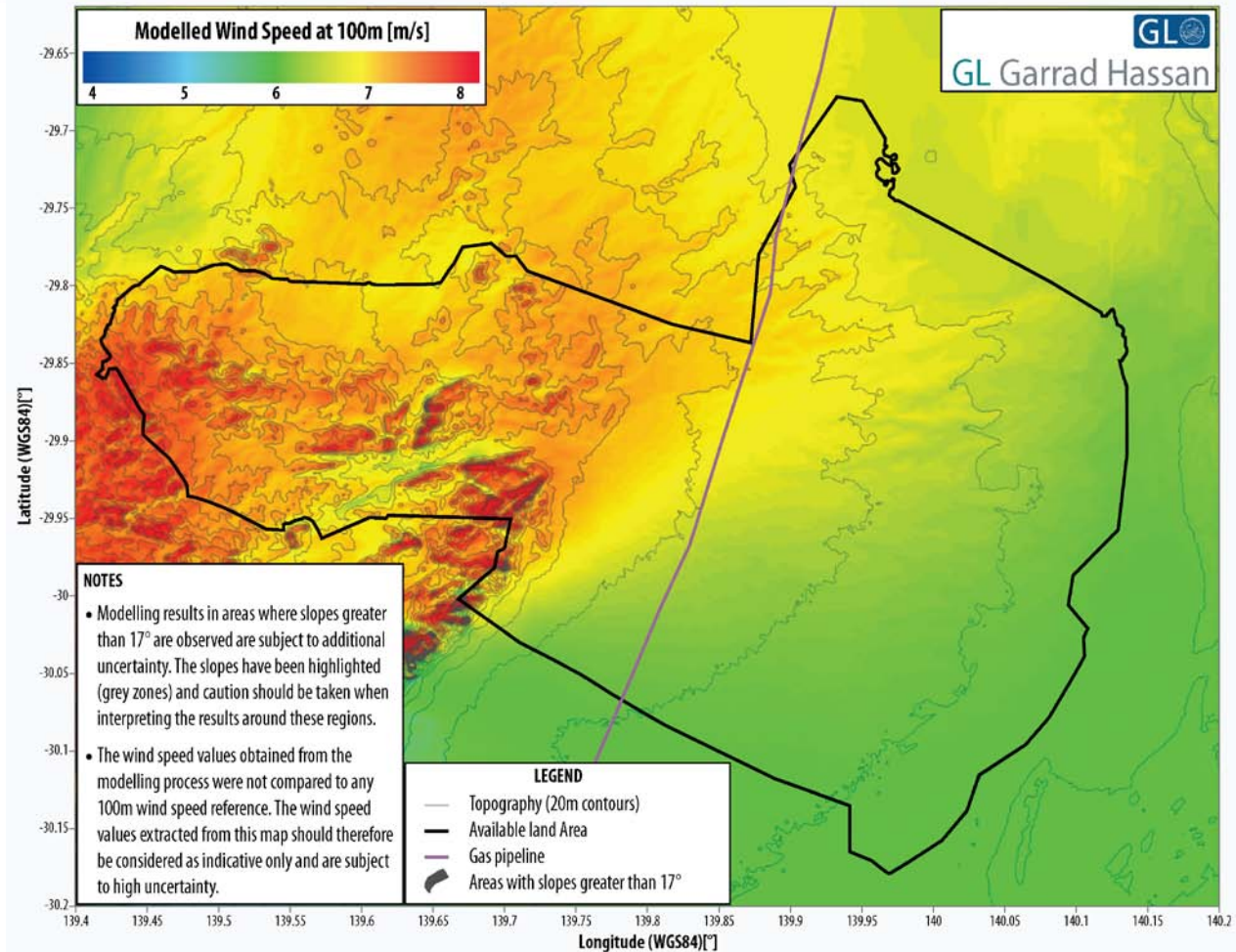


Resources – gas, wind, solar and geothermal expected to be available in large quantities of 150 MW+ each – actual mix of generation is yet to be determined

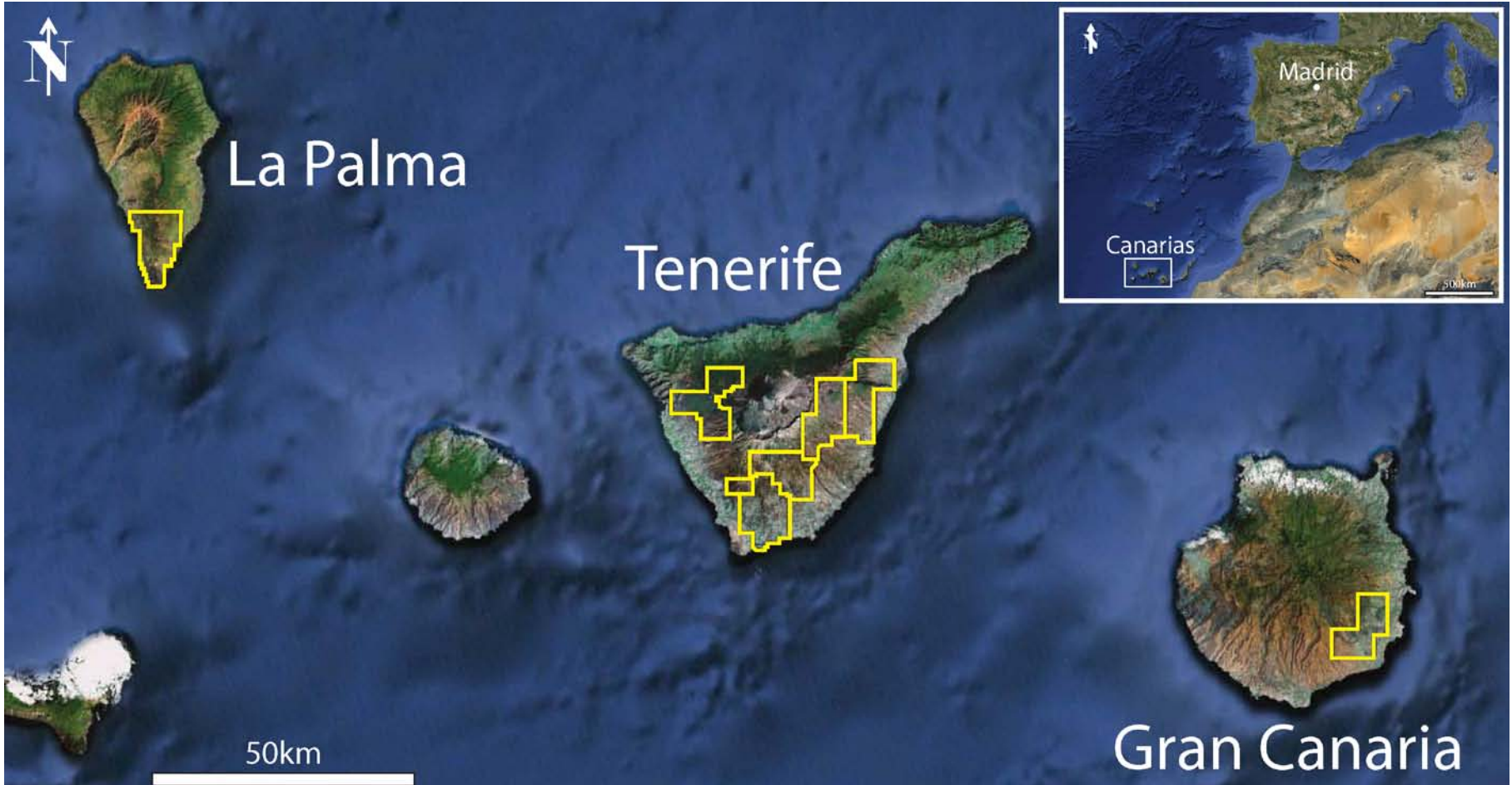


# Clean Energy Precinct - Preliminary Wind Assessment

- Preliminary wind assessment for a 150MW and 300MW wind farm by Garrad Hassan (GH) – world's leading wind consultants
- Wind speeds in northwest area is assessed as being 7 to 8 metres/sec at 100 metre height
- Capacity factors modelled to range between 33.2% (good) and 42.8% (excellent).
- Expected to be well suited to a Class 2 turbine, large blade with 100 metre hub height

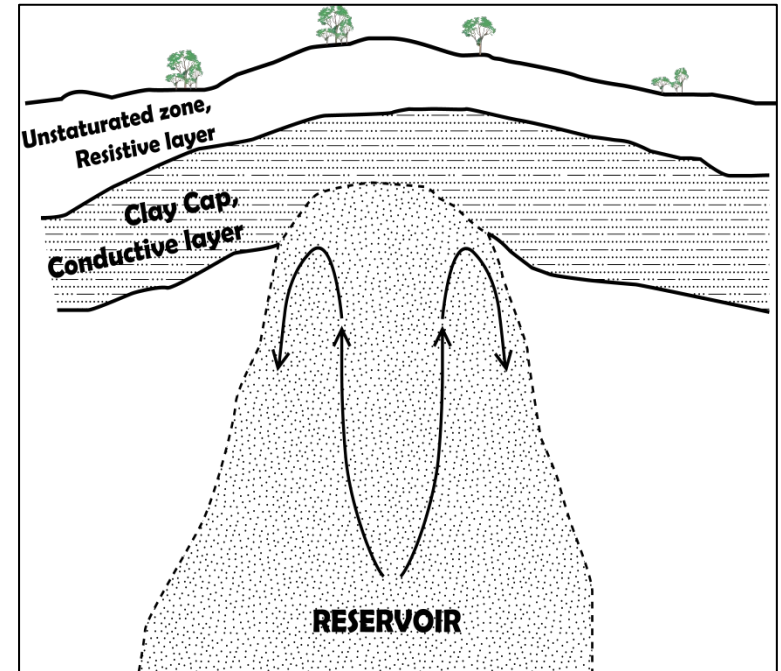
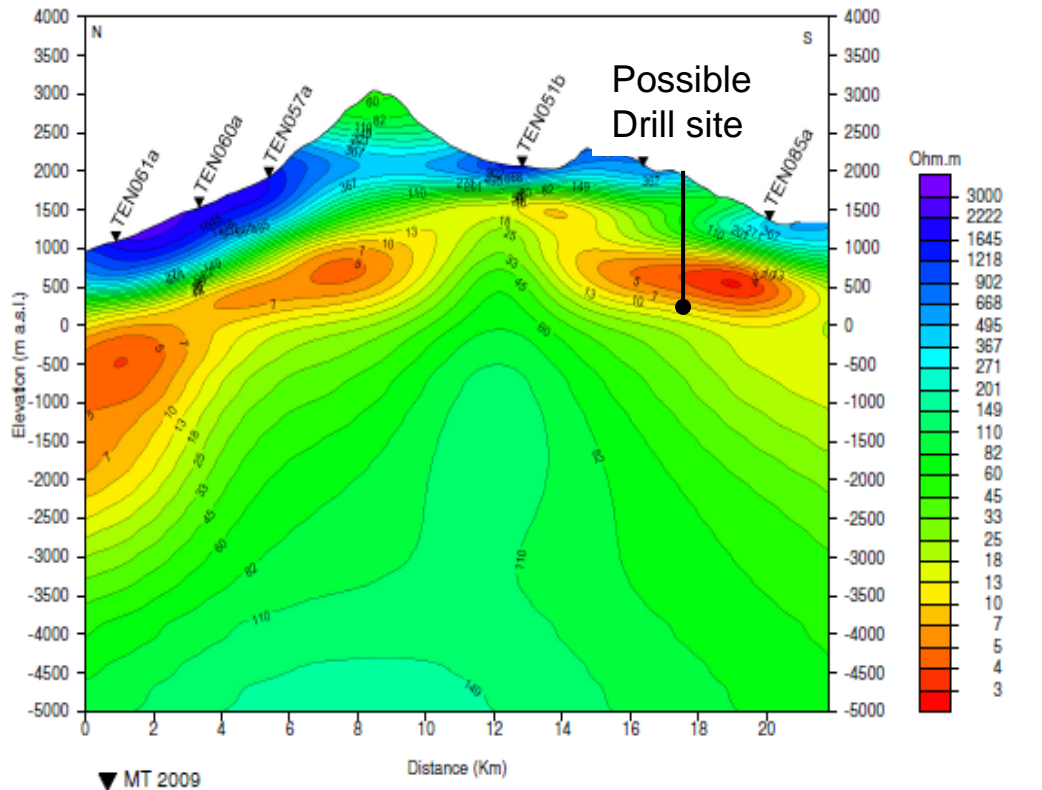


# Canary Islands Projects



**Tenerife and Gran Canaria – licences awarded**  
**La Palma – licence application being assessed**

# Tenerife - Primary drill target



Schematic of the Geothermal System

- Geochemistry suggests a liquid dominated system and temperatures up to 240°C beneath the volcanic dome
- Proposed test well to the base of the conductive layer – “the clay cap” at approximately 1500 metres depth

# *Petratherm's Five Key Areas of Differentiation*

## 1. Business model

- Project selection – clearly filtered through **resource, market and permitting**
- JV partners with **complementary skills/capabilities, funding capacity and risk appetite**
- Project viability is project specific and an optimization process of key parameters

## 2. Project portfolio

- Several projects to **manage risks of projects not proceeding**
- Projects across the geothermal spectrum – **volcanic, district heating, HSA and EGS**

## 3. Track record of success

- Successfully **drilled, cased, fraced and flowed** 4km deep Paralana 2 EGS well –confirmed **economic temperature** and **existence of natural fracture network**

# *Petratherm's Five Key Areas of Differentiation*

## 4. Extraction model for EGS

- Optimization of key parameters for a pumped EGS geothermal well – drill depth/cost, temperature and target flow (HEWI) – technically valid/optimal approach\*
- Focus on utilizing known and standard technologies and plant to mitigate risks – surface and subsurface (multi-zone fracing, pumping, ORC/binary plant, pipework)

## 5. Commercialization path – unique in Australia

- Local off grid and willing customer at just 11 kms away, distant from built up areas and enabling viability at small scale (3.5 MW net initial power production)
- Long term path for large scale geothermal via unique Clean Energy Project (gas, wind and solar) that aims to secure large and growing market from mining projects

(\* refer previous slide on Extraction Model for a Pumped EGS Well)

# Prince Charles visit – 7 November 2012

## Prince to see best of SA's green energy

SOUTH Australia's credentials in renewable energy will be shown to the Prince of Wales today.

Wind, solar, wave and geothermal power will each be demonstrated to Prince Charles who is known internationally for promoting environmental initiatives.

Four companies selected by the State Government – EnergyAustralia, ZEN Energy Systems, Oceanlinx and Petratherm – will have an opportunity to explain their work.

Prince Charles will also be shown models and plans of the Riverbank precinct which will revitalise the heart of the city.

Norwood-headquartered ZEN Energy Systems is a national leader in solar energy, having installed nearly 200,000 solar panels across the country.

But it is ZEN's latest breakthrough in energy storage

BUSINESS  
EDITOR

CHRISTOPHER  
RUSSELL



which managing director Richard Turner wants to bring to Prince Charles' attention.

Assembled in Adelaide, the ZEN Powerbank system is a computer-controlled, battery-based storage system which can be coupled to solar panels, wind farms or store energy from conventional power networks during times of low demand for later reuse.

"With a strong interest in the environment, we expect the Prince to be very interested in what we have developed and its potential for use around the world," Mr Turner said. Petratherm is one

of the two most advanced geothermal developers in Australia with its Paralana project in the Far North of the state.

Managing director Terry Kallis and exploration manager Peter Reid will tell Prince Charles about plans for a 3.5MW plant to power the nearby Beverley uranium mine.

"In Cornwall, where the Prince has interests, they have similar hot rocks developments" Mr Kallis said.

EnergyAustralia operates the Waterloo wind farm outside Clare and is in a joint venture with Acciona Energy to run the Cathedral Rocks wind farm south east of Port Lincoln.

Oceanlinx is developing a \$7.2 million project in the state's South East to harness wave power. It wants to build a 1MW Commercial Wave Energy Demonstrator off Port MacDonnell.



### SHOWCASE

Companies that will make a presentation to Prince Charles:

**EnergyAustralia:**  
Wind farm operator.

**ZEN Energy Systems:**  
Solar power and energy storage.

**Oceanlinx:** Wave and tidal energy.

**Petratherm:**  
Geothermal developer.

MAN ON A MISSION: Petratherm exploration manager Peter Reid says he will be telling Prince Charles about the plans for a 3.5MW plant to power the Beverley uranium mine.

# Prince Charles visit – 7 November 2012



# Prince Charles visit – 7 November 2012





# CLEAN ENERGY FOR FUTURE GENERATIONS