

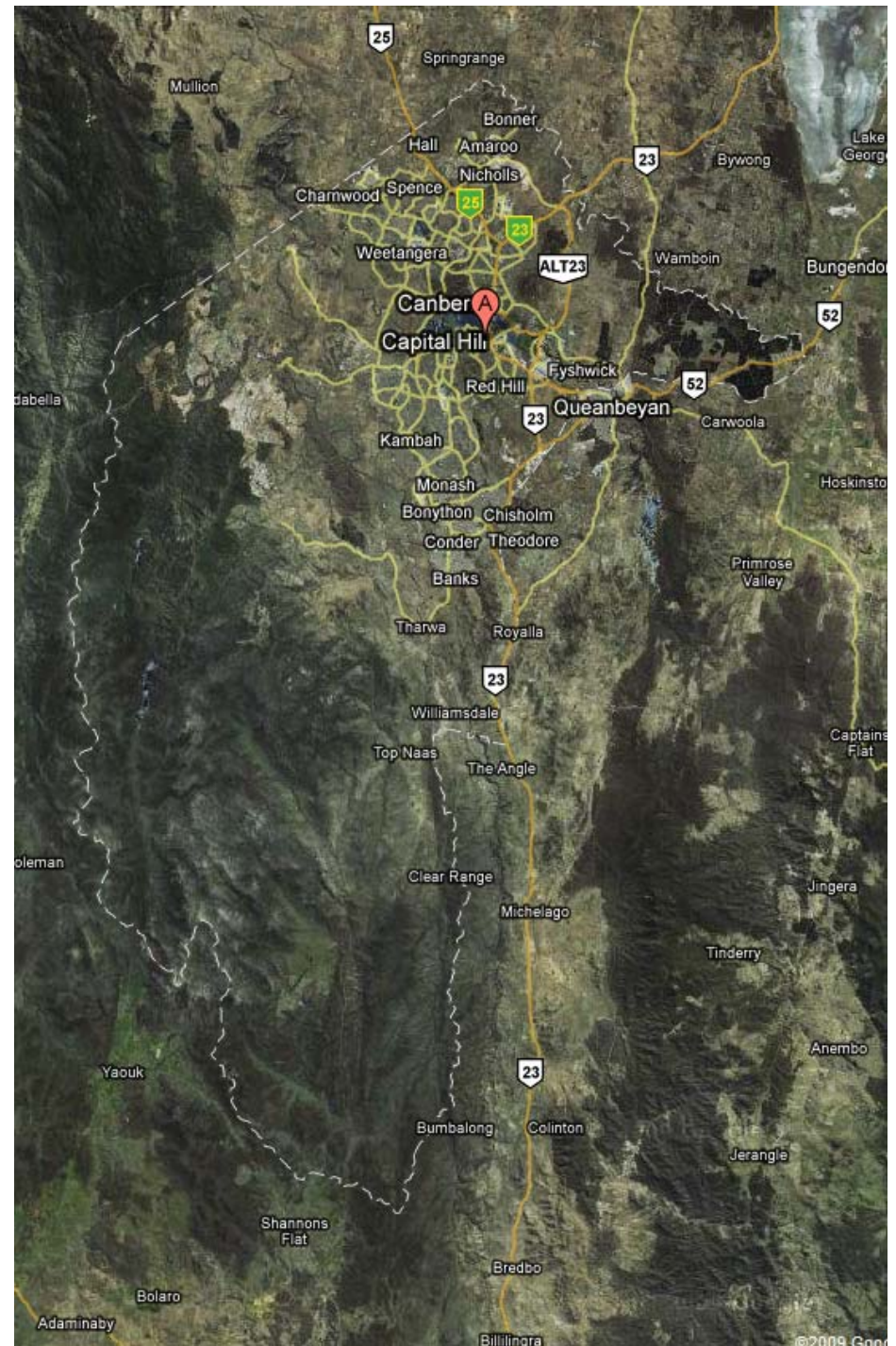
Net Zero ACT (Electricity Sector)

Power Consumption
2,717,000MWh/y

310MW average

\$300 - 500 Million retail
gas and electricity sales

(Actew AGL breakdown
needed)



Net Zero ACT option 1

- 341 Vestas V90 Wind Turbines
- 30% Capacity factor



Net Zero ACT option 2

- 21 eSolar mirror fields + storage
- 1344 hectares

Each Block

46MW

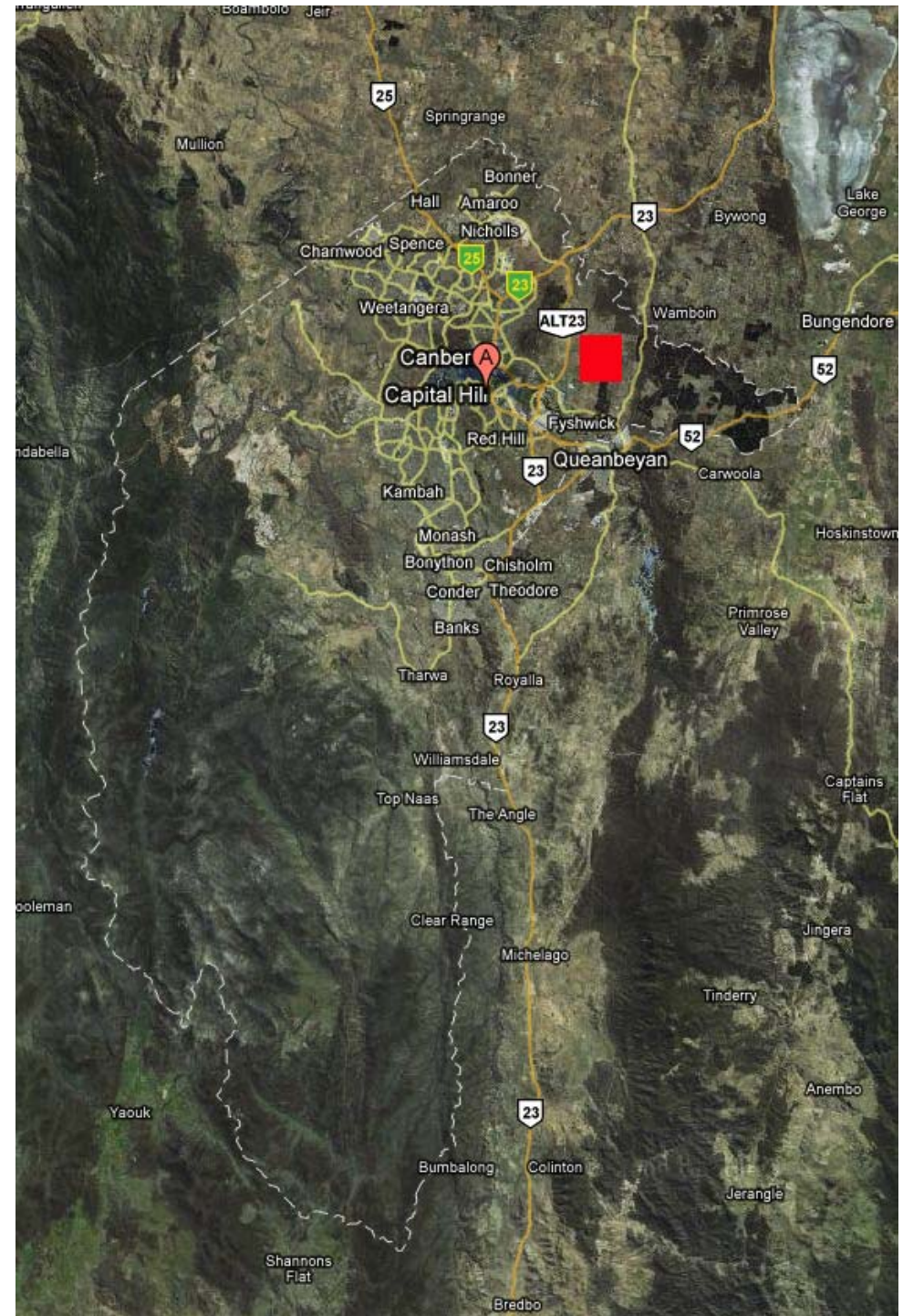
16 Towers 18m high

64 hectares



Net Zero

- 21 eSolar mirror fields + storage
- 1344 hectares
3.6km x 3.6km
- Each Block
- 46MW
- 16 Towers 18m high
- 64 hectares



Net Zero ACT option 3

- 11 eSolar mirror fields with storage
- 700 hectares
- 1,412,840MWh/y
- 164 Vestas V90 Wind Turbines
- 1304160MWh/y



Fossil Fuel Gas results in “Greenhouse Gas”

- Short term thinking
- We must transition from gas.

smh.com.au
The Sydney Morning Herald

Banned heaters in NSW schools



Fumes emitter ... one of 51,000 unflued heaters in NSW schools.

Ben Cubby Environment Reporter
May 28, 2009

THE NSW Government will continue to fit out public schools with gas heaters that have failed World Health Organisation tests, as it awaits further tests taking place in schools this winter.

The unflued gas heaters, which emit carbon monoxide, nitrous dioxide, carbon dioxide and formaldehyde fumes, can only be used safely if classroom windows and doors are left open.

The Canberra Times

canberratimes.com.au

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News → Local News → News → General → Actew buys land for gas power plant

Actew buys land for gas power plant

BY JOHN THISTLETON
BUSINESS EDITOR
23/01/2009 12:00:00 AM

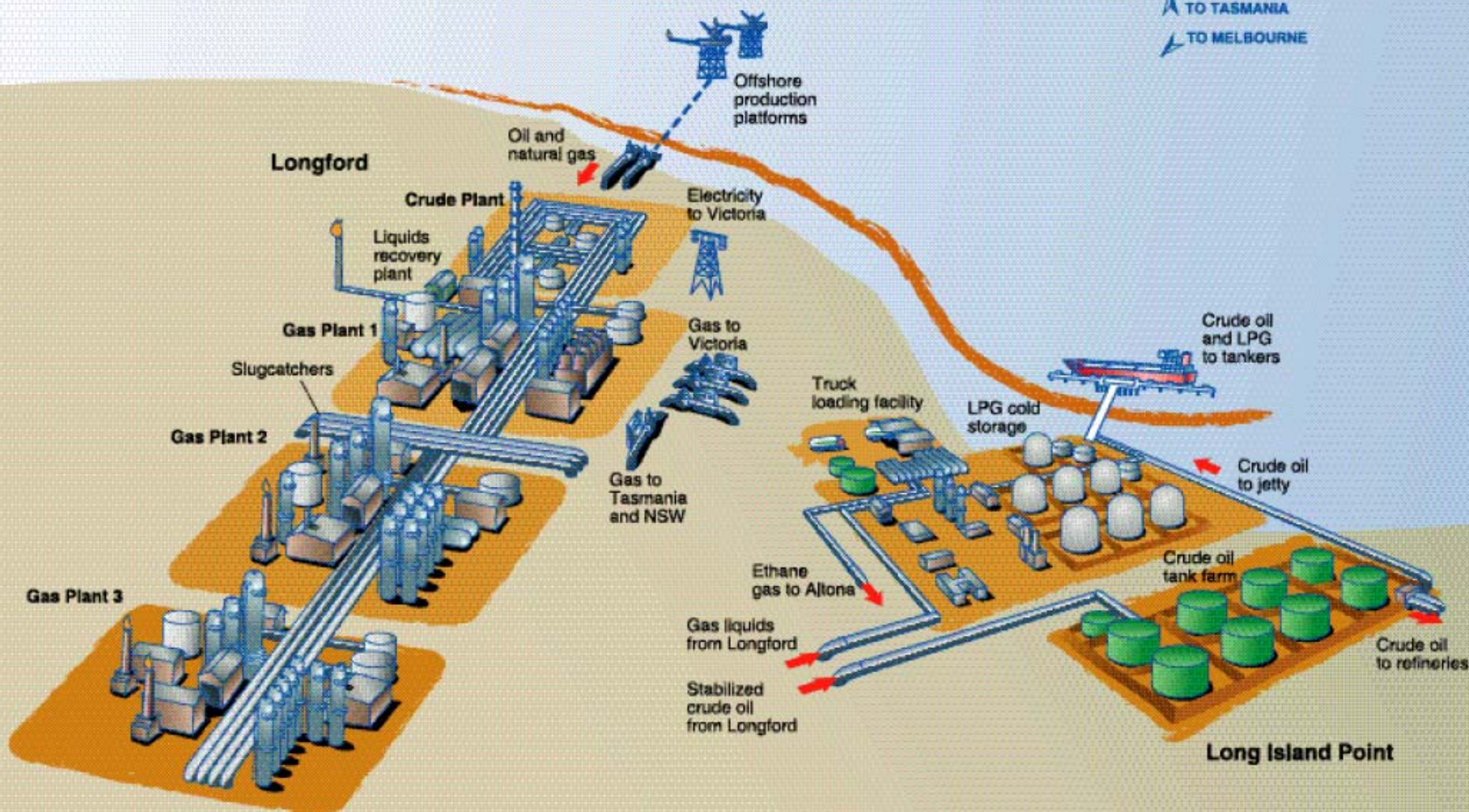
Actew has bought a large block of land on the ACT/NSW border, where its subsidiary, ActewAGL, plans to build a 500-megawatt gas-fired power plant.

The company is still preparing a business case for the \$650 million plant, but it will build power lines on the Williamsdale property near the Hume Highway as part of an upgrade of Canberra's power supply.

Once completed, the network will be the ACT's second supply point, providing greater security.

BASS STRAIT

TO TASMANIA
TO MELBOURNE



Since 1969 the oil and gas which have passed through Longford have supported a myriad of Australian industries including power generation, transportation, gas retailing, plastics, petrochemicals, manufacturing and minerals processing.

Longford has been supplying most of Victoria's gas requirements since 1969. It also supplies gas to New South Wales, Tasmania, and in 2004 will commence supply into South Australia.

Longford also supplies around 20% of Australia's crude oil requirements.



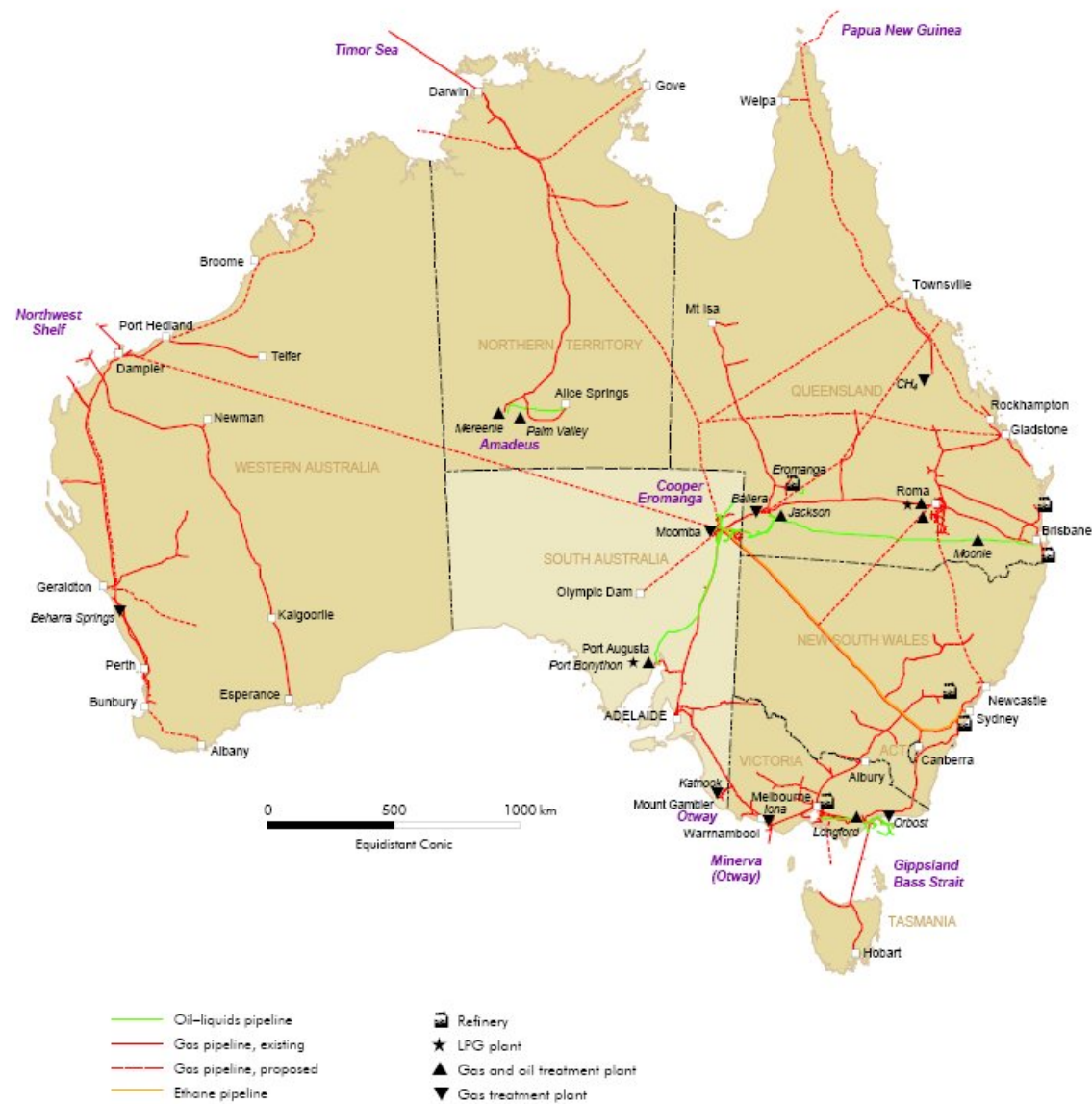


Figure 1

Australia PETROLEUM PIPELINE NETWORK



Government of South Australia
Primary Industries and Resources SA

PIRSA 2036742_003





Longford and Moomba Gas Explosions





Lightning sparks gas pipeline explosion

Font size: Email article: Print article:

November 21, 2007 09:13pm

LIGHTNING hit a gas pipe during thunderstorms west of Sydney tonight.

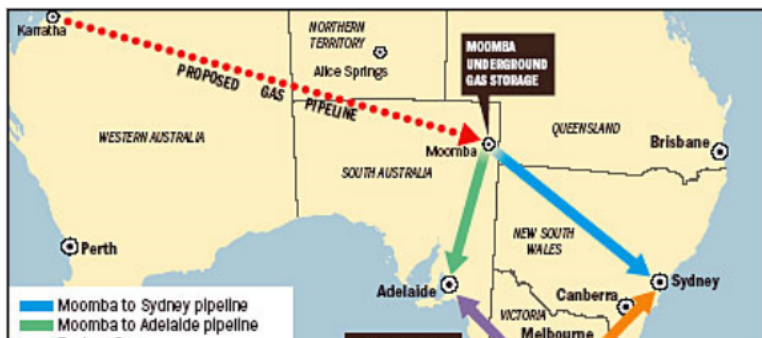
It struck the pipeline at Glenbrook in the Blue Mountains just after 7pm (AEDT), causing an explosion which blew in the windows of nearby homes, a New South Wales Fire Brigade spokesman said.

He said the strike had also sparked a small fire which had gone out on its own.

Fire crews are at the scene monitoring the gas, while crews from AGL are repairing the pipe, he said.

Corporate fallout from gas explosion spreads

By Rod Myer
January 7, 2004



BUSINESS

MARKETS MONEY PORTFOLIO QUOTES SMALL BUSINESS

Santos linked with pipeline explosion

November 24, 2006

The explosion in the state-owned Pertamina East Java gas pipeline near Surabaya yesterday also injured 16 people and at least three more were missing.

The explosion occurred near Santos's troubled part-owned Banjar Panji-1 well, which has been the site of a disastrous, and continuing, mud flood since May.

Experts have been struggling to stop a mud leak believed to have been caused by a drilling incident at the exploratory gas well - 18 per cent owned by Santos - in May.

Millions of cubic metres of hot mud have spewed from the site, flooding more than 400 hectares, swallowing eight entire villages, hectares of rice paddy fields and numerous factories in East Java, and displacing 12,000 people.

Last night's gas explosion, which sent a fireball 500 metres into the air, was believed to have been triggered when the East Java gas pipeline cracked under pressure, authorities said.

"The gas pipe exploded because the land has sunk more than 5 metres in the centre of the mudflow," said Basuki Hadimulyono, head of the national team overseeing the mud disaster.

Home Business Politics Technology Travel Sport Enter

Report reveals the full impact of gas pipeline explosion

The West Australian Chamber of Commerce and Industry (CCI) says the Varanus Island gas explosion and the resulting supply crisis has put a \$6.7b hole in business production forecasts...

Fri Jul 2008 10:07 (11 months, 3 weeks ago)





Spanish Solar Subsidy Seduces FPL

By Gianluca Baratti



May 8 (Bloomberg) -- Spain has turned itself into the world's biggest builder of solar-energy plants, attracting developers from the U.S. and France by guaranteeing prices that weigh down Spanish consumers.

As a result, developers now plan enough solar thermal projects to generate the power of nine new atomic reactors, or 14,000 megawatts if all get built, Spain's industry ministry said. That's the biggest project pipeline, beating sun-blessed Australia and the U.S., where Congress increased aid this year for alternative energy, an [Emerging Energy Research](#) study said.



U.S. ARMY

ARMY.MIL/NEWS RELEASE

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Army Launches New Energy Initiatives, Test Projects at Posts

Oct 06, 2008

The U.S. Army recently established a Senior Energy Council to serve as a board of directors focusing on Army energy policy, programs and funding to leverage the Army's nationwide energy-conservation efforts. The secretary also announced five major energy projects as part of the council's initial work. These projects are in addition to ongoing efforts like the solar projects at Fort Sam Houston, Texas, and Fort Carson, Colo.; large-scale energy-management programs at Fort Hood, Texas; ambitious recycling programs at Fort Bragg, N.C.; new photo voltaic equipped housing at Fort Shafter, Hawaii; and high-tech energy conservation projects at Fort Lewis, Wash.



-- The Army will partner with the private sector to construct a 500 megawatt solar thermal plant at Fort Irwin, Calif, in the Mojave Desert, that will provide renewable power on the grid and provide the sprawling Army post with added energy security against disruption of power supply.

PS10, PS20 Spanish Solar Powers tower, Seville Spain





Andasol Solar 1 + 2 Spain 50MWe

**7.5 hours Thermal Salt storage
BASELOAD Solar**

















eSolar™

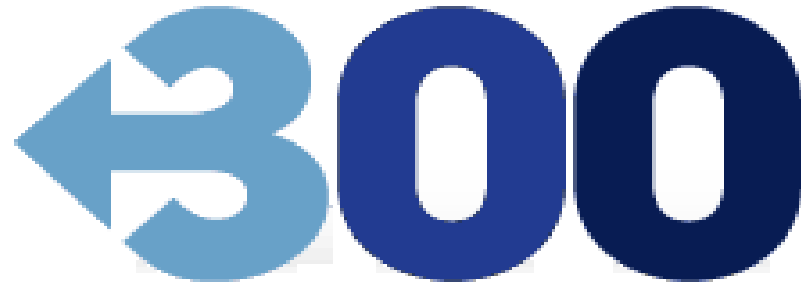


http://www.esolar.com/esolar_brochure.pdf

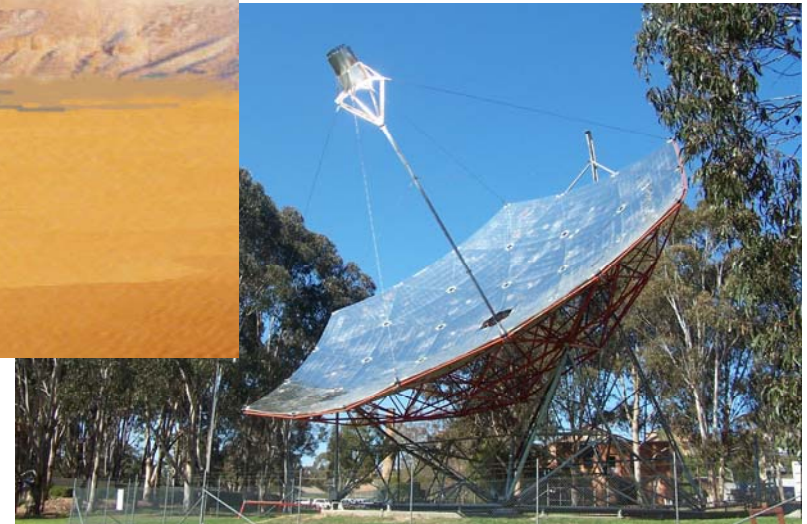
eSolar™



Google™
eSolar™ Makani POWER



**ANU - Wizard Power Australia
BASELOAD SOLAR**



Ammonia Thermochemical Storage

Abengoa Solar – California

5065 m², 249C – 2.4MW peak



ABENGOA SOLAR

Abengoa Solar Inc.



Southern Californian Edison

- Solar Millenium (Troughs) 726MW
- Brightsource Energy (Towers) 1300MW

Nevada and Sierra Pacific Power Co

- Solar Millennium (Troughs) 240MW

Pacific Gas & Electric

- eSolar (Towers) 92MW
- Brightsource Energy (Towers) 1310MW
- Ausra 177MW

NET Zero ACT + GAS

- 8097 Terajoules = 1812GWh
- However gas use is Space Heating + Hot Water heating
- Therefore Heatpumps with Coefficient Performance = 3.0 can be used.
- $1812 * 0.9$ (efficiency of gas) $* .3$ (heat pump) = 544 GWh increase in electricity demand. 20% More Renewable Energy Required.

<http://www.actewagl.com.au/publications/corporate/AnnualReport.pdf>

<http://www.environmentcommissioner.act.gov.au/soe/2007actreport/indicators07/energy07>

Heat Pump is 300% Better Than Boiler / Chiller Combo

Heat Pump is 300% Better Than Boiler / Chiller Combo

Mitsubishi Electric's ground source heat pump system has proved itself to be over 300% more efficient than a chiller / boiler combination in trials with a closed loop ground source 'slinky' coil.

The company, which has created the world's first inverter-driven VRF ground source heat pump system, has been monitoring a City Multi WY Series water-sourced condensing unit linked to the slinky – a coil of plastic tubing buried horizontally in a 1.8m trench – at its headquarters building in Hatfield since the start of 2006.

The WY system proves itself to be an average of 338% more efficient than a boiler / chiller combination producing an average COP of 5.40, compared to 1.60 for the boiler / chiller. In heating mode the ground source heat pump system does even better delivering a performance that is 515% more efficient than a boiler (COP of 4.89 compared to 0.95).

"However you look at the results the ground source heat pump wins hands down," explained Philip Ord, Mitsubishi Electric's City Multi Product Marketing Manager. "WY costs an average of £2.10 per m2 per year compared with £13.10 for a chiller / boiler and produces 857.46 Kg CO2 emissions over the year compared to 2,089.40 Kg for the chiller / boiler system."

The City Multi WY series, and its sister range, WR2, are the only air conditioning products to have been included on the Government's 10% Renewable Energy Target list, which many local authorities are now using to review planning applications. The 10% Renewable list also includes solar, wind, photovoltaics and Biomass technologies.

The WY transfers heat to and from the slinky to provide the energy required to heat or cool the refrigerant circuit. The inverter driven system is also incredibly efficient at ensuring the condenser consumes the minimum energy needed to match requirements.

Latest News

 08-05-2008

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 18-04-2008

Industry Top COP Turns Up
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 19-10-2006

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 05-10-2006

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 21-07-2006

Heat Pump is 300% Better
Than Boiler / Chiller Combo

←300

ELECTRIFY PASSENGER TRANSPORT



The Mediterranean TGV:
The marriage of technology
and the environment

300



ELECTRIFY CITY FREIGHT CARGO TRAMS



←300

ELECTRIFY LONG HAUL FREIGHT



Net Zero ACT + Travel opt1

- 3,104,000,000 Vehicle kilometres travelled
- *1.1 for passenger km's 3,414,400,000
- 50% Rail 50% Motor car
- Rail = 1,707,200,000 passenger km's
- Car = 1,707,200,000 passenger km's
- Rail 30 Watt hours per km = 51GWh
- Car 80% km electric 181W/h pass km = 310GWh
- Total electric Transport 361GWh

Net Zero ACT + Travel opt2

- 3,104,000,000 Vehicle kilometres travelled
- *1.1 for passenger km's 3,414,400,000
- 80% Rail 20% Motor car
- Rail = 2,731,520,000 passenger km's
- Car = 682,880,000 passenger km's
- Rail 30 Watt hours per km = 82GWh
- Car 80% km electric 181W/h pass km = 124GWh
- Total electric Transport 206GWh

Elec + Gas + Transport opt 1

- $2717 + 544 + 361 = 3622$ GWh renewables
31% increase over just doing electricity
90% of Passenger km's Electric
15 Million litres of liquid Fuel Required for
20% Car km's (range extension PHEV)
135 Million litres of liquid fuel saved
Fuel saving @ \$175 Million p/a

Elec + Gas + Transport opt 2

- $2717 + 544 + 206 = 3467$ GWh renewables
28% increase over just doing electricity
96% of Passenger km's Electric
6 Million litres of liquid Fuel Required for
20% Car km's (range extension PHEV)
144 Million litres of liquid fuel saved
Fuel saving @ \$187 Million p/a

Elec + Gas + Transport opt 1

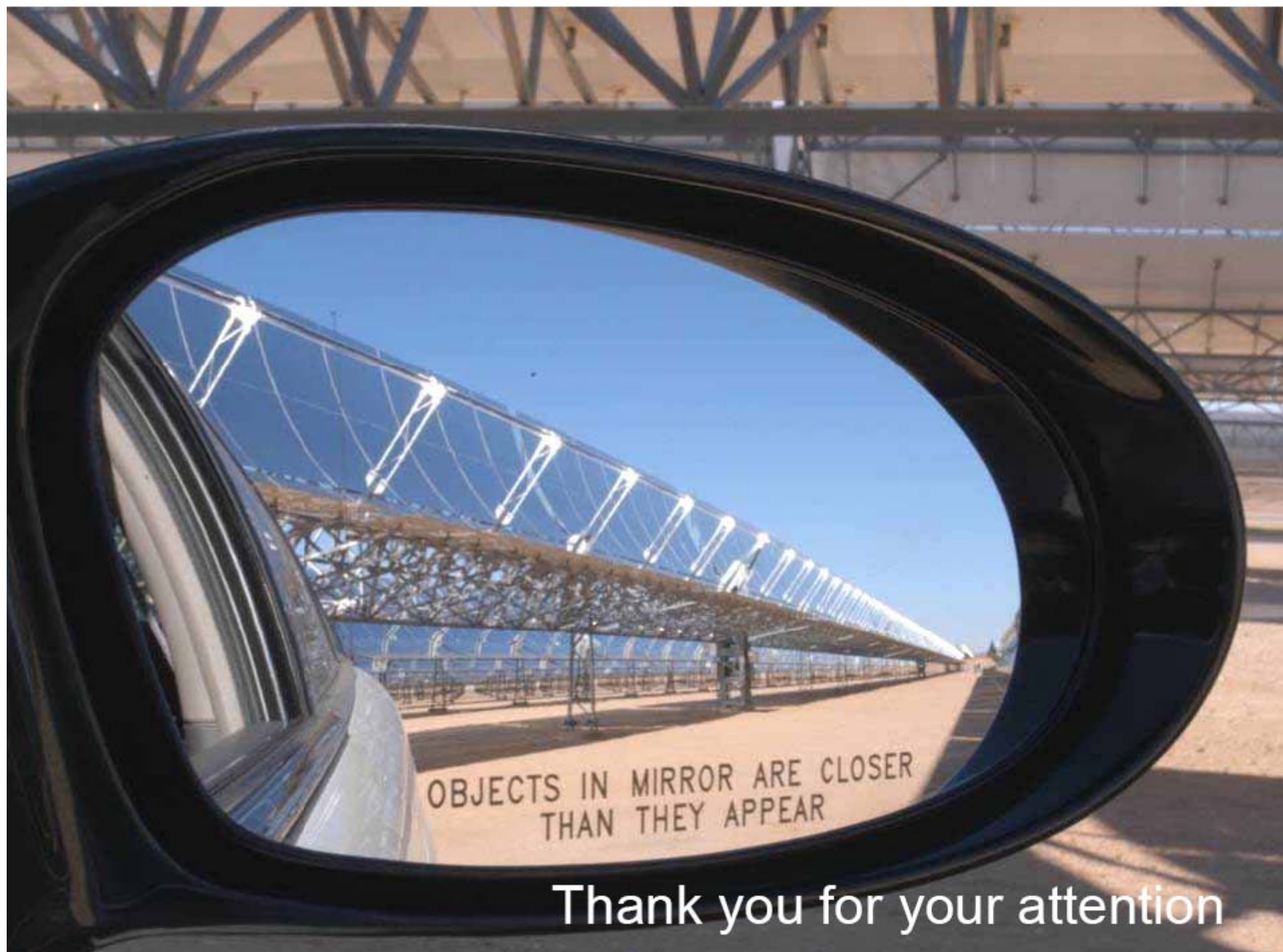
- Solar Field 4.15km x 4.15km
- (up from 3.6 x3.6km for just stat energy)

OR

453 Vestas V90 Wind Turbines (up from 341
for just stat energy)

OR

3x3km Solar Mirror Field + 218 Vestas V90
And 833,000 Barrels of Biodiesel



Thank you for your attention