

Enhar Forum Presentation
Wind Energy:
Global turbine trends and developments in Victoria

Demian NataKhan - Enhar

21st November 2008



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The evolution of wind turbines



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Offshore: 5MW turbines operating!




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An expanding industry...

- New manufacturers:

 600kW / 750kW / 1.2MW / 1.5MW

 1.5MW

- New scales of manufacturing



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Wind Energy: Global achievements

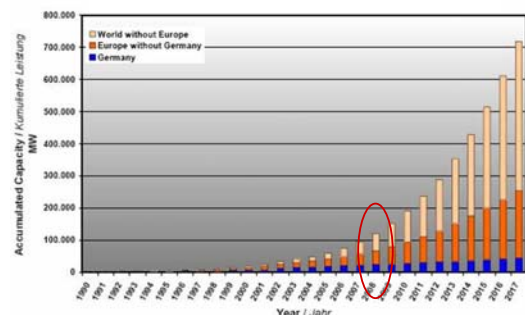
- In 2007, ~20,000MW new capacity installed
- During 2008, Global capacity exceeded 100,000MW (~110,000 turbines)
- China:
 - Now in top 5 countries, expect 100,000MW capacity by 2020
 - >50% of Chinese market met by ~50 domestic manufacturers
 - hosted ~8,000 delegates for global wind conference last month
- Spain:
 - With 1/15th land area of Australia, had installed ~20 times as much wind power (15,145MW from 16,103 turbines by start of 2008), now supplying over 10% of Spain's annual power demand



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Global Cumulative Capacity – Data to 2007 plus projections



Source: German Wind Energy Institute



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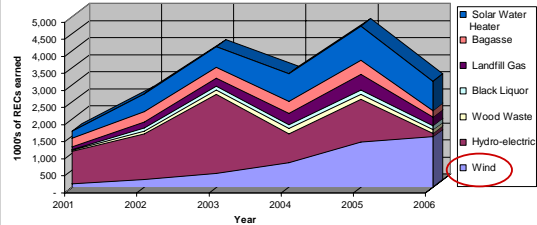
Global projections

- By 2020, ~8% of global electricity demand to be met from >1,000,000MW of wind power
- Feasible contribution from wind is much higher:
 - Denmark already obtains >30% of national power from wind turbines during windy months, curtailment of production from wind is unnecessary even at peaks



Wind Power in Australia

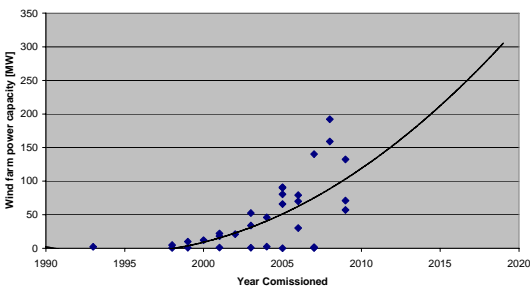
MRET Renewable Energy Credits registered by technology, 2001-2006



Source: ORER statistics, analysed by McLennan Magansnik Associates,

Trends in Wind Farm Scale in Australia

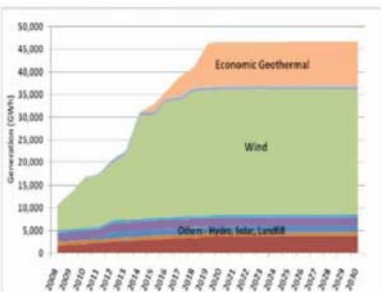
Australian Wind Farms - Operating and Under Construction



What will a legislated 20% MRET mean?

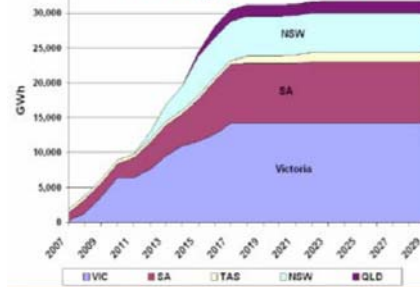
Key points:

- 45,000GWh / yr to come from renewables by 2020, a nearly 5-fold increase on the existing MRET
- Current uncertainties on timescale and design details including price caps are preventing industry progress
- Design completion due by end 2008, legislation mid 2009, commencement at start of 2010
- Parallel policy: Emissions Trading



Hugh Outhred, Prospects for wind energy in Australia

Wind energy distribution by state



Wind Farms in Victoria

- Developed under 2% MRET (effective from 2001):

Name	Status	Capacity
Codrington	Commissioned 2001	18MW
Toora	Commissioned 2002	21MW
Challicum Hills	Commissioned 2003	52MW
Wonthaggi	Commissioned 2005	12MW
Yambuk	Commissioned 2006	30MW
Total		134 MW

- Under construction, probably progressing thanks mainly to VRET:

Name	Completion date	Capacity
Waubra	~ 60 turbines to go	192MW
Portland II Cape Bridgewater	All turbines up	58MW
Portland III Cape Nelson	First turbines up in Sept	44MW
Total		294 MW

Already sufficient projects to meet VRET targets



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Wind in Victoria

From This.....

Codrington

Completed 2001

13 turbines,
1.3MW each
18MW total capacity



Windmill specifications

Rated capacity	1.3MW
Manufacturer	ABB Bhusa
Tower height	50 metres
Tower material	Special alloy steel
Tower weight	80 tonnes
Nacelle weight	30 tonnes
Rotor weight	30 tonnes
Rotor diameter	62 metres
Rotor speed	18/13 rpm
Start up wind speed	10.8 km/h (3 m/s)
Maximum power wind speed	54 km/h (15 m/s)
Cut off wind speed	51 km/h (15 m/s)
Survived wind speed	138 km/h (38 m/s)
Blade length	29 metres
Blade material	Fibreglass reinforced



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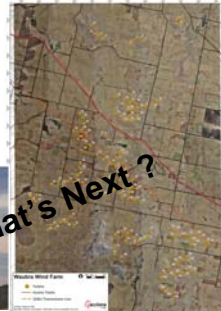
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To This.....

Waubra

Scheduled completion early 2009

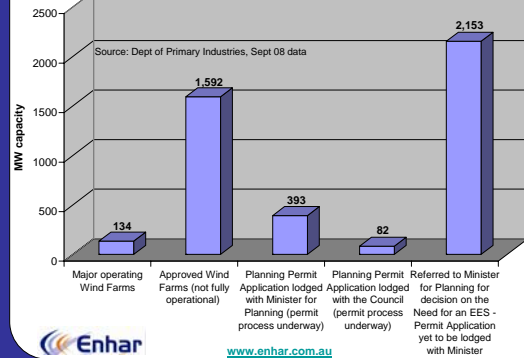
128 turbines,
1.5MW each
192MW total capacity



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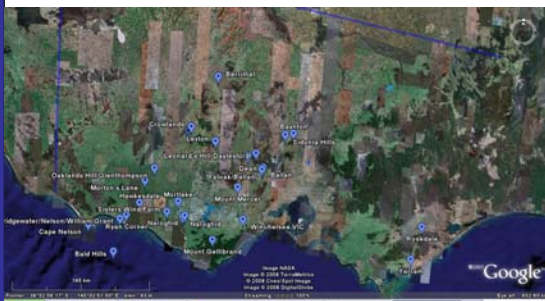
3. Wind Energy Capacity Pipeline in Victoria (MW)



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Planned Wind Farm Site Locations in Victoria



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The Wind Energy Contribution

- To provide 1/3 of Victoria's electricity needs from wind energy:
 - 6,000 MW of additional wind turbine capacity (134MW currently operating in Victoria)
 - 20km by 30km total required land area
 - Spread over maybe 20 new wind farms of a range of sizes, average size 300MW



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Wind Energy

- Opportunity exists for wind to contribute further to renewable energy targets, but are we going to hit limiting factors, such as:
 - Land area, limited space?
 - Grid connection capacity?
 - Social (un)acceptability ?

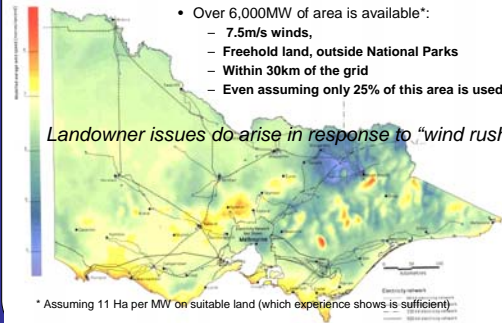


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Wind Energy in Victoria

- Land area is not a problem
 - Over 6,000MW of area is available*:
 - 7.5m/s winds,
 - Freehold land, outside National Parks
 - Within 30km of the grid
 - Even assuming only 25% of this area is used



* Assuming 11 Ha per MW on suitable land (which experience shows is sufficient)

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Grid capacity in Victoria

- Looking at Victorian total summer demand of 12,000MW, and assuming 4,000MW of wind capacity, Vencorp assessment concluded:
 - Short term variations from wind farms “will not detrimentally affect system operation”
 - “Feasible technical solutions can be found”
 - “Up to 3,000MW can be accommodated”
 - “UP to 4,000MW may be possible”



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Social acceptability

- Fundamental availability of large amount of space in Victoria/Australia is a positive
- As more people become aware of local wind farms, greater levels of scrutiny will be applied. Example: Recent in depth panel hearing for WestWind’s Lal Lal wind project



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Distributed Wind Energy



Rottneest Island, Western Australia



Elgo Estate, Victoria



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Distributed scale Wind Turbines:

Off the shelf

- WindFlow 500kW
- Enercon 330kW, 800kW
- Ecotecnia 750kW
- Gamesa 850kW

Second hand

- Bonus 150kW, Vestas 225kW & many more

Service supply chain: under-developed



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Domestic scale wind energy



Photo: Swift™ wind turbine from Renewable Devices



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The Wind Industry in Victoria

Some developers and generators in Victoria :



Wind Turbine suppliers with staff in Victoria :



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Next Event

Date: Friday February 20th 2009

• Marine Energy Experts Roundtable

- Wave resource
- Tidal resource
- Emerging technologies
- Site Development
- Government incentives



- Participation by experts to share knowledge & information for mutual benefit of our industry
- Call for Event sponsorship
- Event Details and registration - coming soon via the Enhar website: www.enhar.com.au



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Thank you for Attending

- We welcome your feedback

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