WHY WIND ENERGY?

- Need to achieve MRET?
- More electricity capacity?
- Lagging behind the rest of the world?
- Greenhouse gas reduction?

NATIONAL MRET TARGETS

Year	2003	2004	2005	2006	2007	2008	2009	2010
GWh a year	1800	2600	3400	4500	5600	6800	8100	9500
MWh	205	297	388	514	639	776	924	1084
Contribution of 60% wind averaging 30% of capacity	410	594	776	1028	1278	1552	1848	2168
Contribution of 60% wind averaging 25% of capacity	492	713	931	1234	1534	1862	2218	2602

Australia-wide, the average electricity load is 25456 MW (SA 1469 MW)

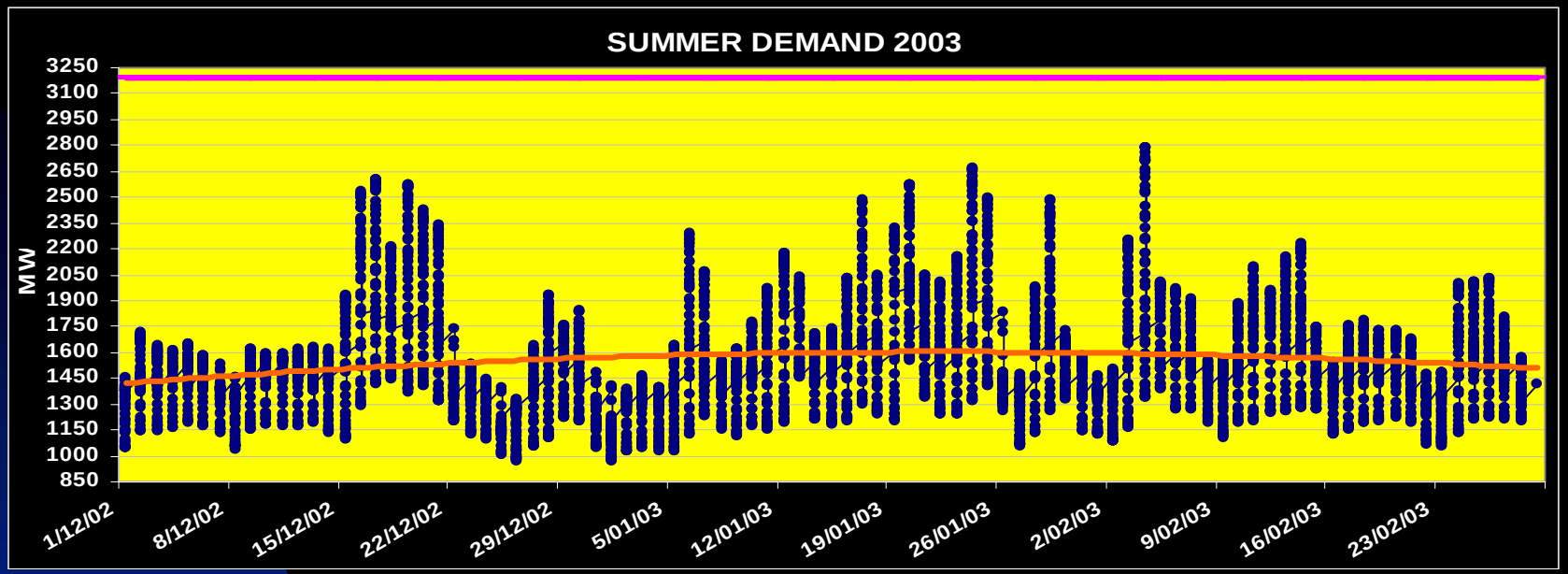
Projects From 2001	Rest of Australia (23970) MW	Sth Australia (1469) MW
Installed	129.5	34.5
Going ahead	296	382
Approved	205.5	355
Planned	1016.5	1490
Total	1687.5	2260.5
Potential Penetration	6%	153.88%

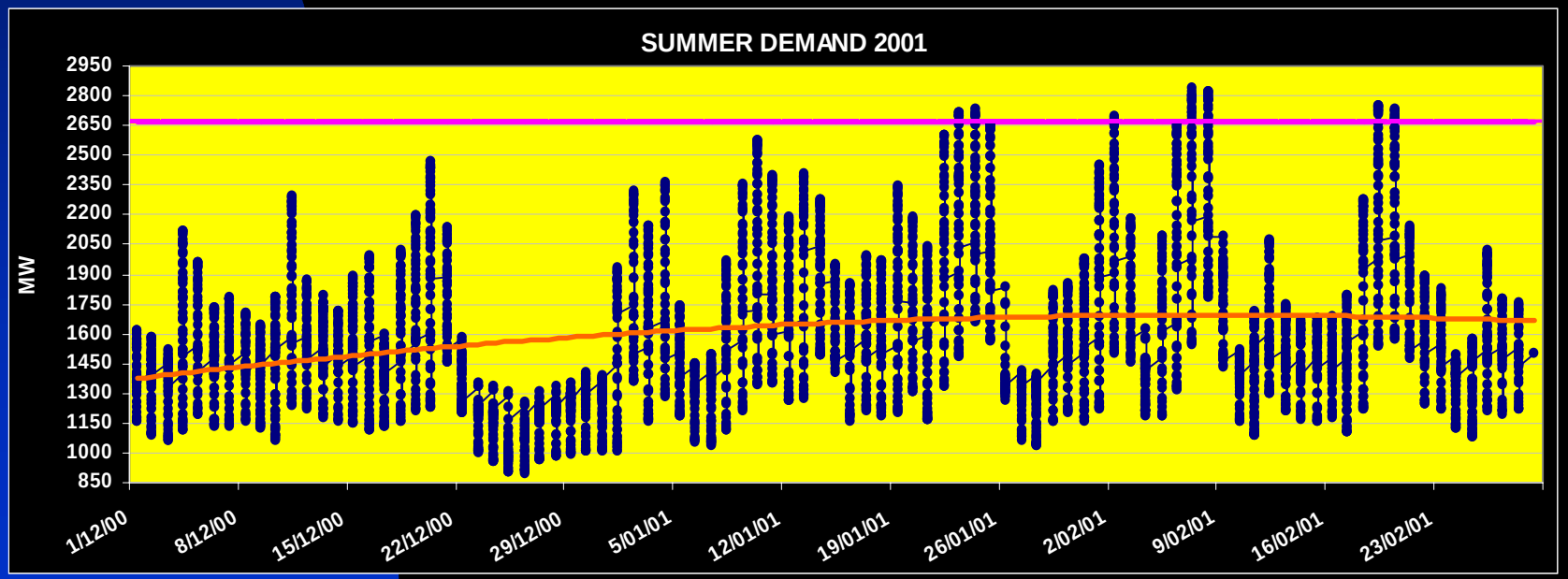
SUPPLY AND DEMAND

- The present summer capacity is 3195 MW + 750 MW of interconnectors
- Half hourly demand in the last 12 months has averaged 1469 MW
- Between December 2002 and November 2003, half-hourly demand has ranged from 894 MW to 2787 MW
- The maximum summer peak is still 2838 MW (2001)
- The maximum winter peak is still 2142 MW (2000)

Source: NEMMCO

SUMMER ELECTRICITY DEMAND





Source: NEMMCO

The average maximum temperature for the summer of 2001 was the highest since 1905

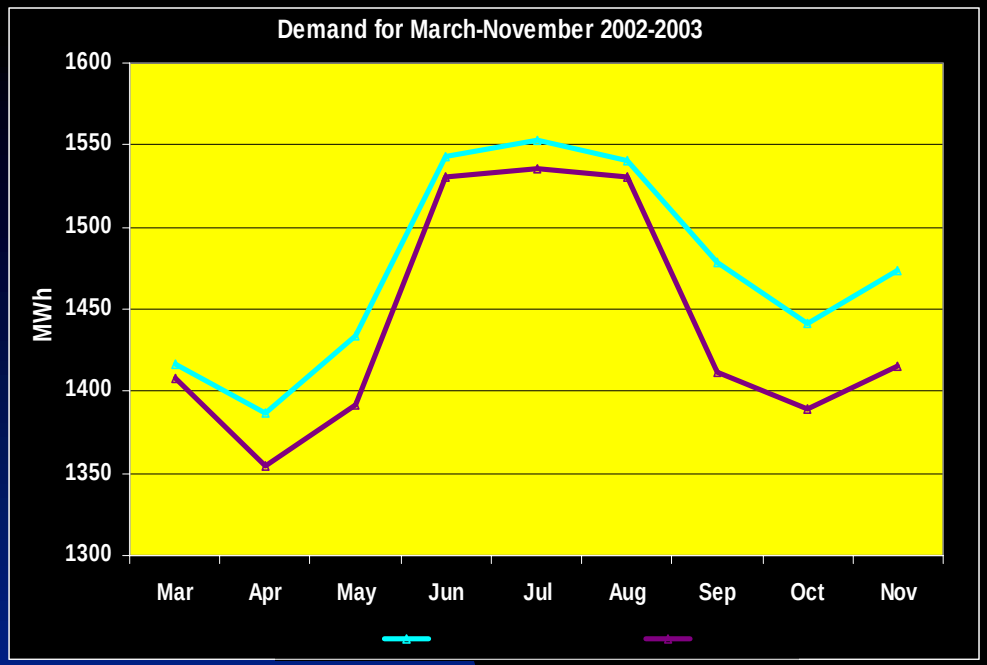
AVERAGE SUMMER DEMAND AS % OF INSTALLED CAPACITY

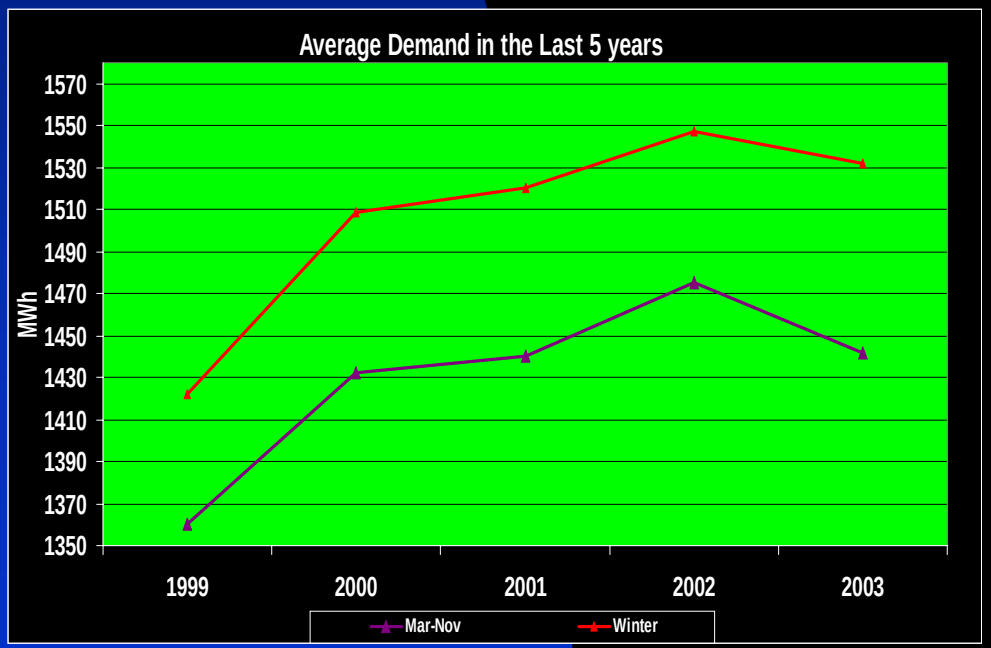
	1998-99	1999-00	2000-01	2001-02	2002-03
December	102%	97%	92%	62%	81%
January	95%	106%	102%	74%	83%
February	98%	106%	106%	83%	87%
March	92%	105%	92%	68%	67%

Source: NEMMCO
*** Using 1999-00 summer capacity**
**** Overall rather than summer capacity**

- It is notable that when the 2787 MW peak was reached on 4/2/03, 478 MW was being imported from Victoria, hence reducing the peak to 72% of installed capacity

CHANGES IN DEMAND





Source: NEMMCO

ESPIC (2003) have predicted a 5% increase for this year

The period March to November has seen a decrease in demand of 2.36% since last year, no increase since 2001 and an increase of only 0.6% since 2000

This has happened despite

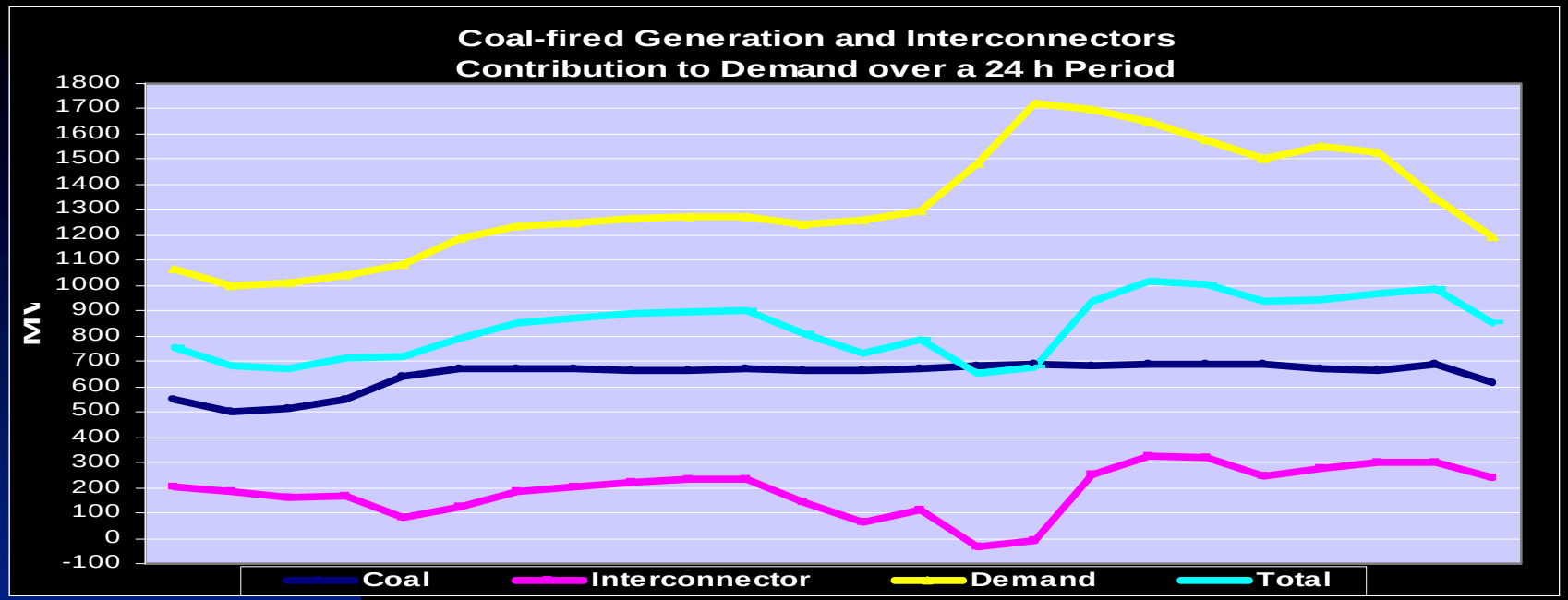
- The coldest winter in 7 years
- The coldest August in 13 years
- The coldest September in 7 years
- The coldest October in 57 years
- The hottest November in 21 years

In the last three months, demand has fallen by 4.2 % compared to last year

In November 2000, the average maximum temperature was slightly lower than this year but

- Peak demand was 183MW lower this year (a 7.5% drop)
- Average demand was also lower (4.88%)

NEED FOR MORE ELECTRICITY



On the 31/08/03

- At present, we use around 660 MW of coal-fired electricity
- An average of 180 MW is imported from Victoria when the price is lower
- The rest is mostly gas-fired
- Coal-fired electricity has to run continually
- Gas and wind will compete to supply between between 54 and 1947 MW (average of 629 MW)
- This will have implications for the viability of gas-fired plants and subsequently for the price of electricity and gas in this state

EXPORTING TO OTHER STATES

- This is limited by the current maximum exporting capacity of our interconnectors (500 MW)
- The voltage variation of wind energy may lower this capacity
- Interconnectors can only operate one way
- Export could deprive us of an average 180 MW (up to 700 MW) of cheaper electricity from Victoria
- Both Victoria and Tasmania plan to have 1000 MW of wind energy
- Victoria can only absorb a limited amount of export
- Tasmania, unlike SA, does not peak at the same time as Victoria
- Tasmania, with 95% of its energy being hydro, will be able to export its cheaper hydro power through Basslink

WORLDWIDE WIND FARM INSTALLATIONS

Year	World	Annual Additions	Germany	Spain	USA	Denmark	India
	MW	MW	MW	MW	MW	MW	MW
1990	1,930	200	62	0	1,484	343	0
1991	2,170	240	112	5	1,709	413	39
1992	2,510	340	180	50	1,680	458	39
1993	2,990	480	335	60	1,635	487	79
1994	3,488	730	643	70	1,663	539	185
1995	4,778	1,290	1,130	140	1,612	637	576
1996	6,070	1,292	1,548	230	1,614	835	820
1997	7,636	1,566	2,080	512	1,611	1,120	940
1998	10,153	2,597	2,870	830	1,837	1,428	940
1999	13,932	3,922	4,445	1,584	2,490	1,718	1,095
2000	17,785	3,853	6,110	2,235	2,550	2,300	1,220
2001	24,349	6,564	8,754	3,337	4,275	2,383	1,507
2002	31,166	6,817	12,001	5,040	4,674	2,880	1,702
31/11/03	34,143	2,977	13,262	5,198	5,326	2,927	1,869

Source: Wind Service Holland, American Wind Energy Association, Windpower Monthly

- These five countries have accounted for 83.7% of all worldwide installations
- Germany currently has 39% of all installations

WIND ENERGY WORLDWIDE 2002

Country	Pop (Million)	Rank	Average Load	Rank	Wind Capacity	Rank	Penetration	% of Supply
USA	287.4	1	459703	3	4674	12	1.02%	0.22%*
China	1280.7	2	182876	9	473	21	0.26%	
Japan	127.4	3	122260	10	486	16	0.40%	
Russia	143.5	4	101826	26	7	28	0.00%	
Canada	31.3	5	67351	13	270	16	0.40%	
Germany	82.4	6	66324	1	12001	2	18.09%	4.50%**
India	1049.5	7	65639	5	1702	7	2.59%	
France	59.5	8	63812	15	183	19	0.29%	0.02%
UK	60.2	9	44063	8	570	11	1.29%	0.45%
Brazil	173.8	10	39041	25	24	25	0.06%	
Italy	58.1	12	32420	6	806	8	2.48%	
Spain	41.3	13	27968	2	5043	3	18.03%	4.06%**
Australia	19.7	14	25456	17	104	16	0.40%	
Ukraine	48.2	18	19748	20	44	22	0.22%	
Sweden	8.9	19	16895	11	372	9	2.20%	0.40%
Poland	38.6	20	16438	24	27	23	0.16%	
Norway	4.5	24	14954	18	97	25	0.06%	
Netherlands	16.1	28	10958	7	727	4	6.63%	
Argentina	36.5	30	9703	23	28	19	0.29%	
Benelux	10.8	32	9246	19	60	14	0.64%	
Czech Republic	10.3	33	8675	26	7	24	0.08%	
Finland	5.2	35	8562	21	41	15	0.48%	0.08%
Switzerland	7.3	36	7648	28	5	25	0.06%	
Austria	8.1	37	7534	16	139	10	1.84%	
Greece	11.0	39	6278	12	297	5	4.73%	
Portugal	10.4	44	5137	14	196	6	3.82%	
Denmark	5.4	48	4452	4	2880	1	64.69%	12.47%**
New Zealand	3.9	49	4338	22	32	13	0.73%	
Sth Australia	1.5	65	1469	6	1000	1	68.07%	

Source: BP, AWEA, Danish Energy Ministry, German & British Wind Energy Association, RED, Elforsk, NEMMCO, BTM, VTT, Swedish Statistics, Population Reference Bureau

* Based on California average for 1996-2001 (22%)

** Based on statement by Peter Ahmels, president of the German Wind Energy Association on the 22.02.2003

PROPOSED WIND FARMS

Installed, under tender or given go ahead	MW
Starfish Hill	34.5
Cathedral Rocks	66
Clements Gap	67.5
Yabmana	61
Lake Bonney stage 1	80.5
Wattle Point	107
Total	416
Penetration	28.32%

Approved	MW
Shea Oak Flat	72
Lake Bonney C	50
Lake Bonney 2	128
Sellicks Beach	35
Green Point	44
Troubridge Pt	25
Total	355
Penetration	24.17%

Very likely to go ahead

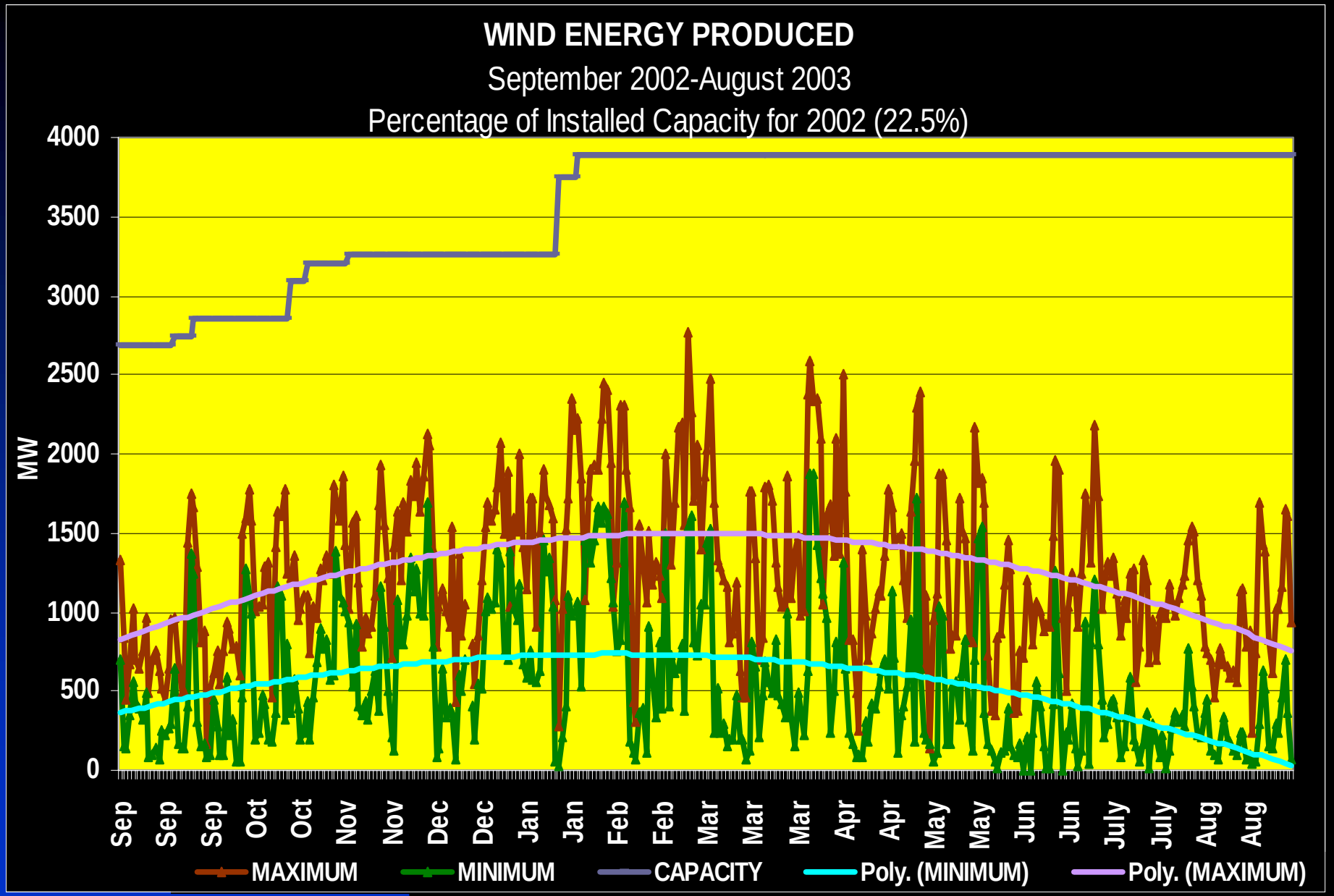
Planned	MW
Barunga	260
Hallett	250
Beach Port	130
Mt Vincent	200
Pt Lowly	50
Coorong	300
Meningie	50
Lake Eliza	50
Kemmis Hill	30
Windy Hill	50
Kongorong	30
Barn Hill	90
Total	1490
Penetration	101.5%

More likely to go ahead

Unlikely to proceed	MW
Lake Hamilton	110
Uley	90
Elliston stage 1	50
Tungketta	50
Total	300

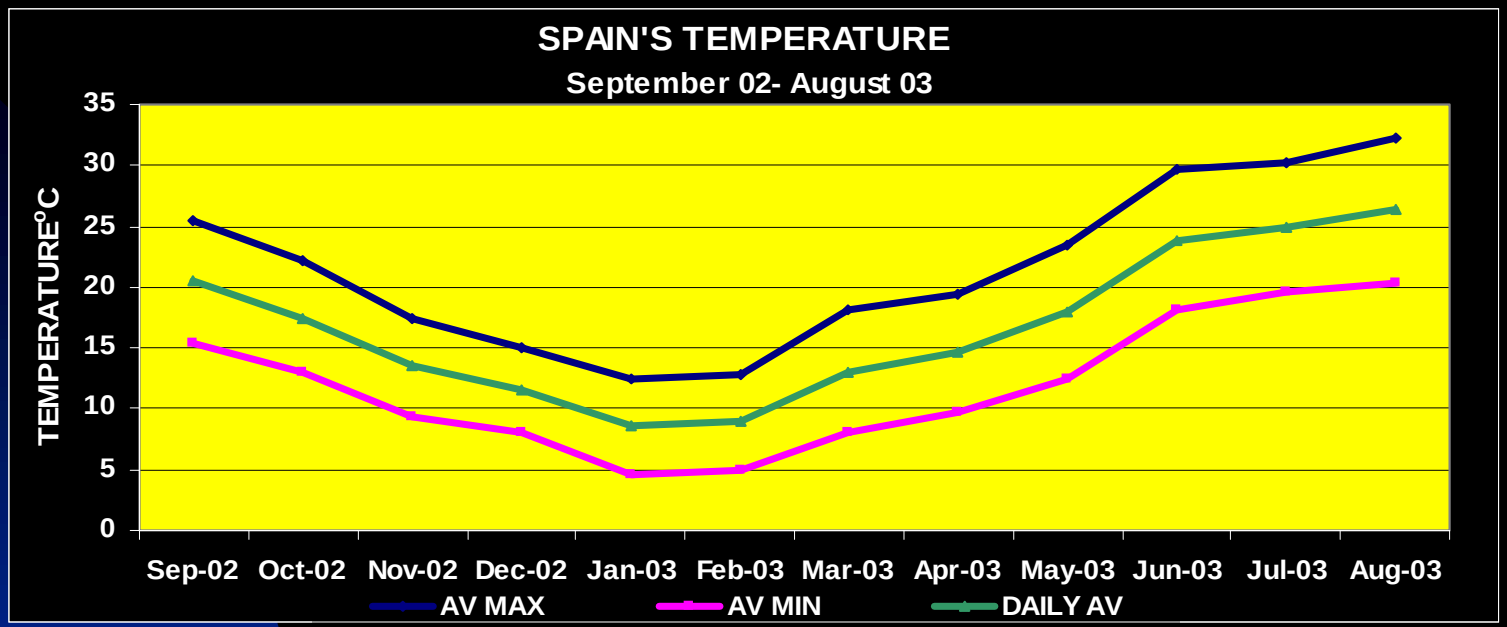
- South Australia consumes 5.83% of the electricity in Australia but has 57% of all wind farm proposals

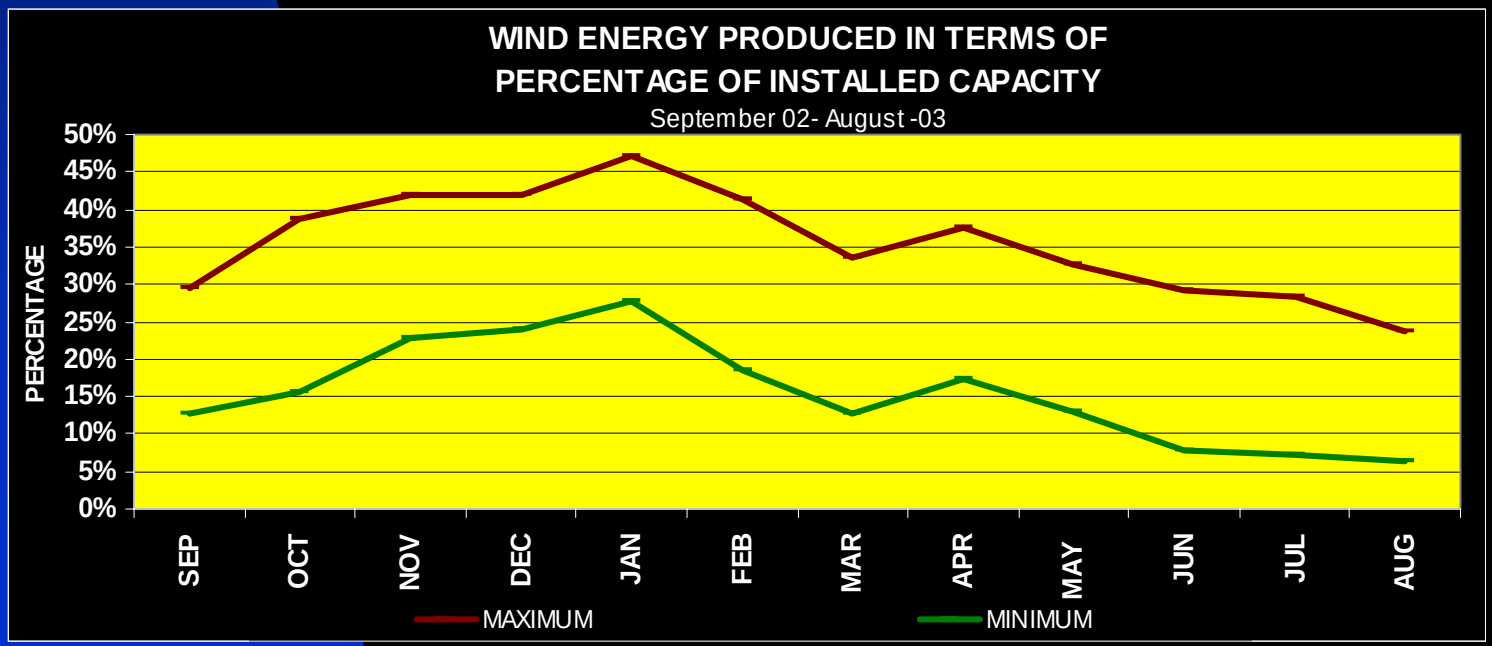
SPAIN



Source: www.ree.es

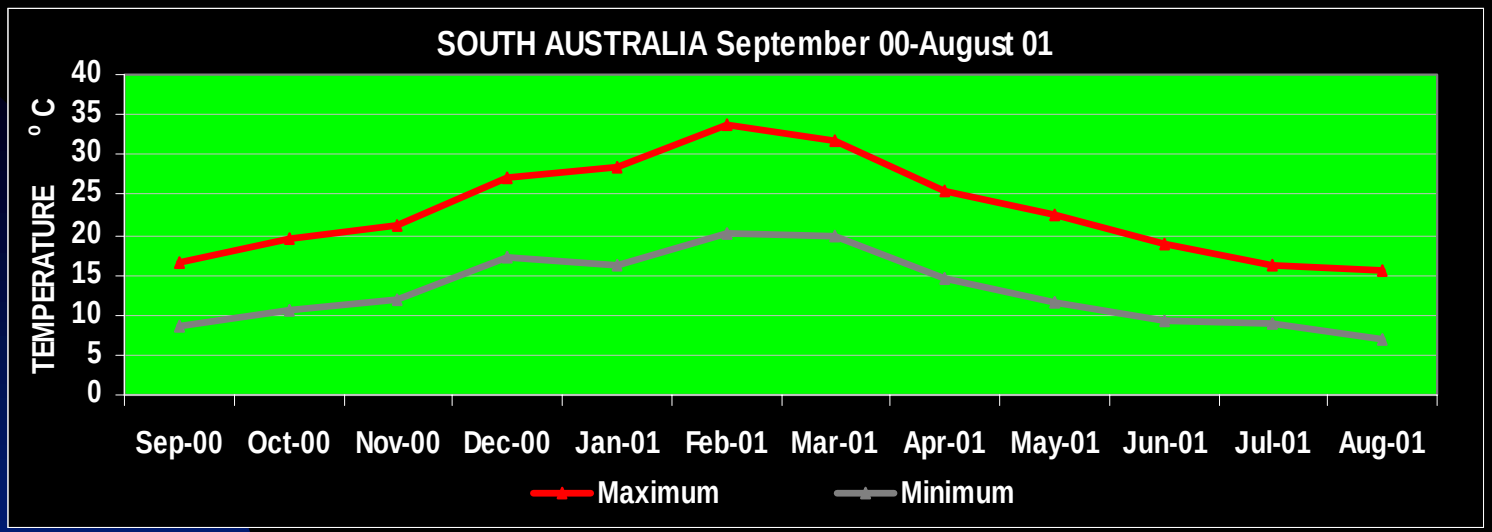
SPAIN
TEMPERATURES & ENERGY PRODUCTION



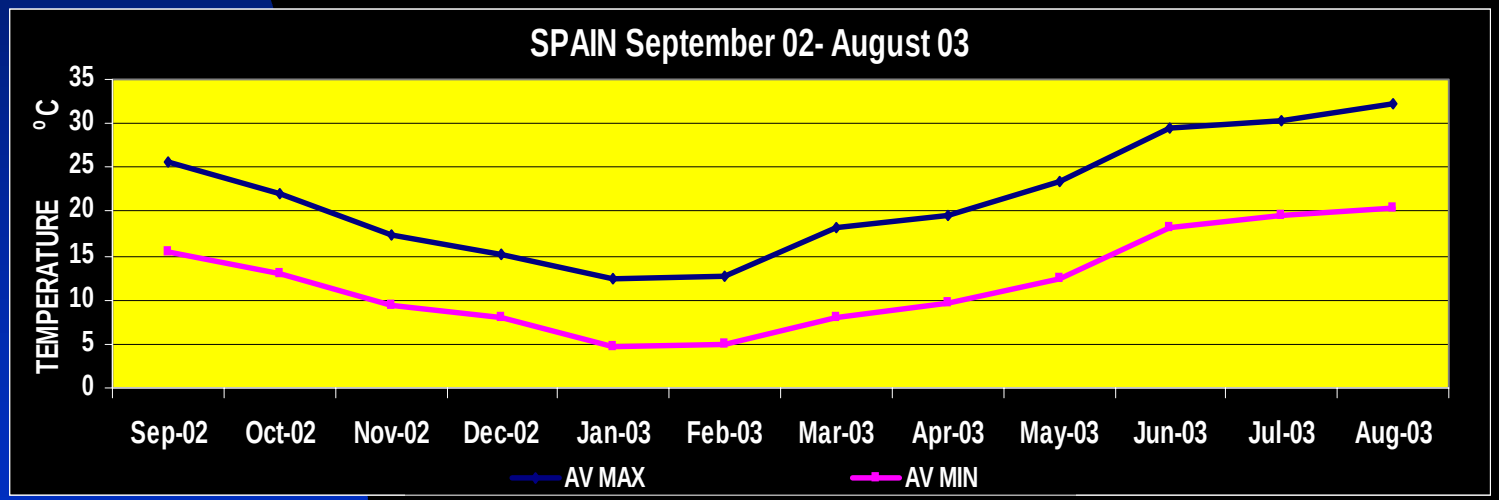


Source: www.ree.es

SPAIN & SOUTH AUSTRALIA'S TEMPERATURES



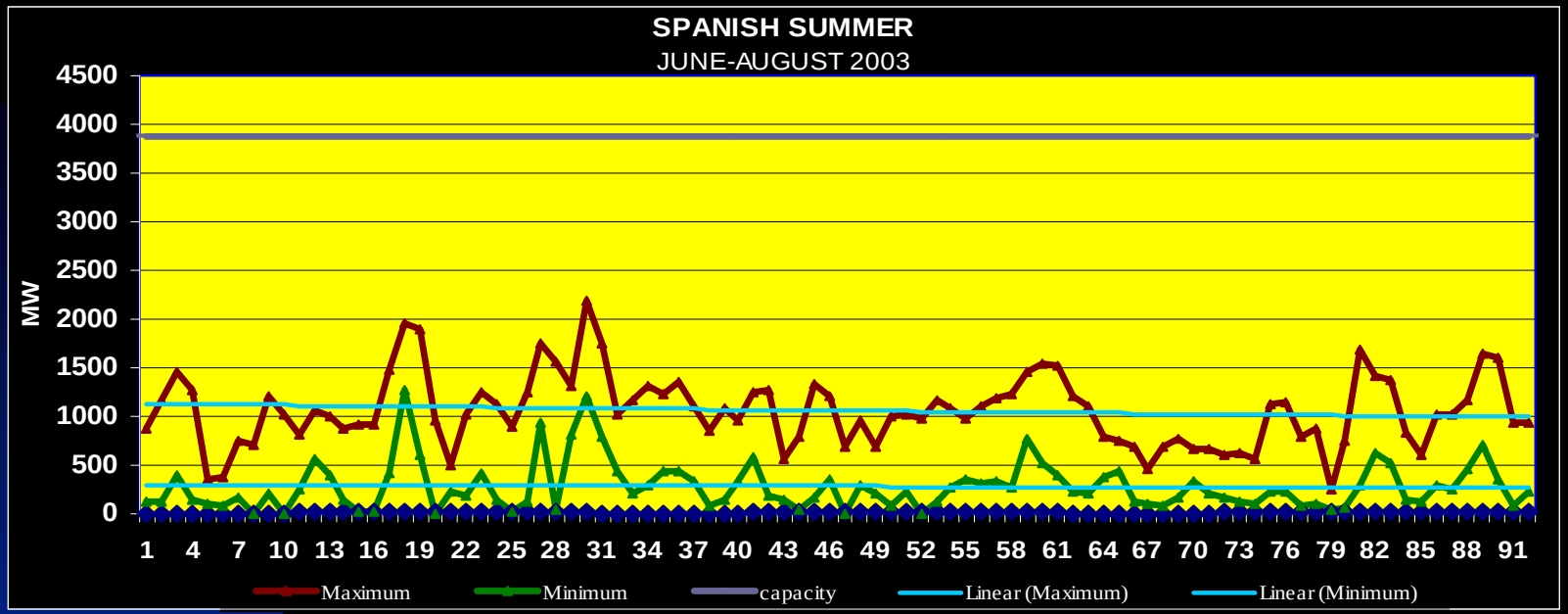
Source: Australian Bureau of Meteorology



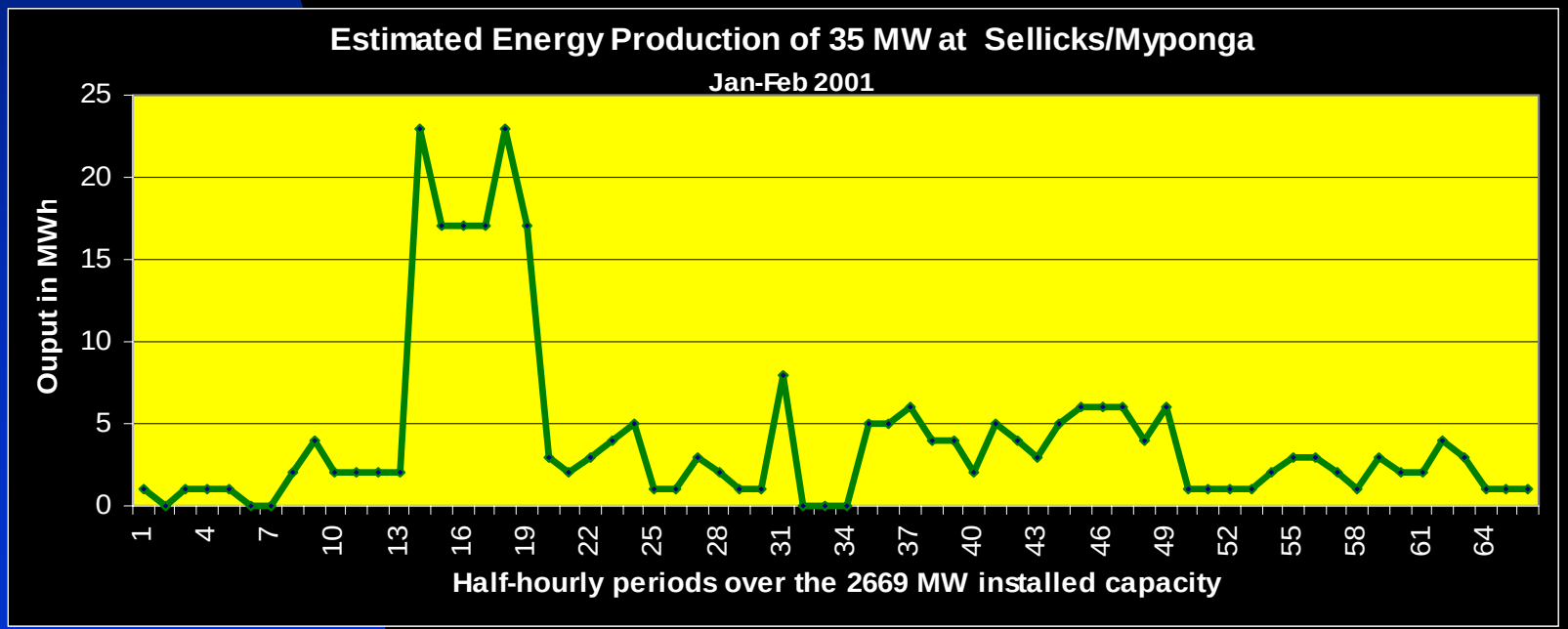
Source: www.ree.es

- Summer average maximums were 31.2ºC for SA and 30.7ºC for Spain
- Average minimums were 18.6ºC for SA and 19.4ºC for Spain
- Average median temperatures were 24.9ºC and 25.05ºC

SUMMER ENERGY PRODUCTION

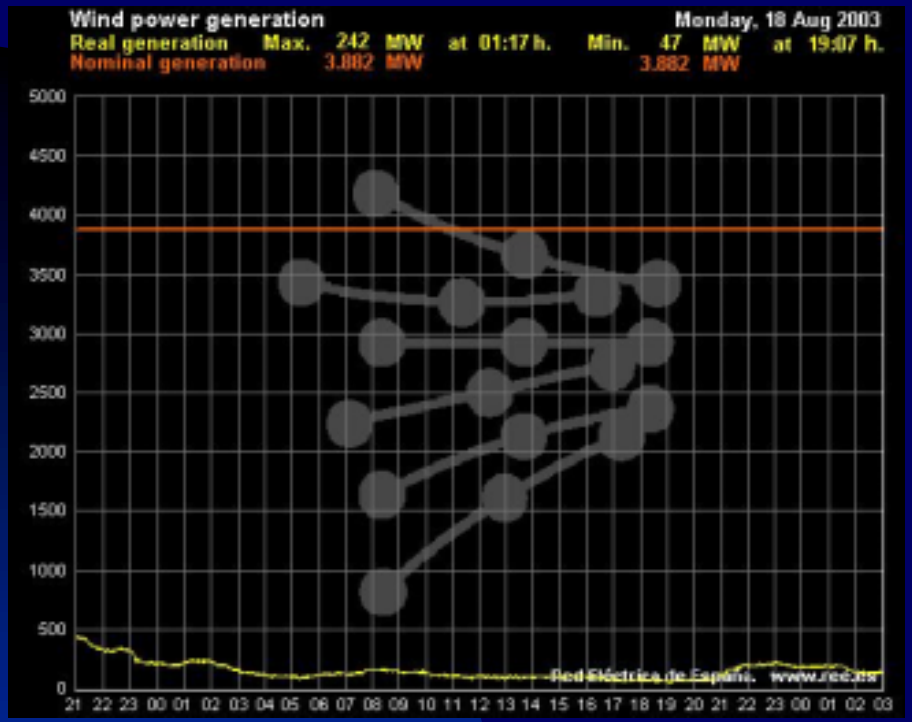


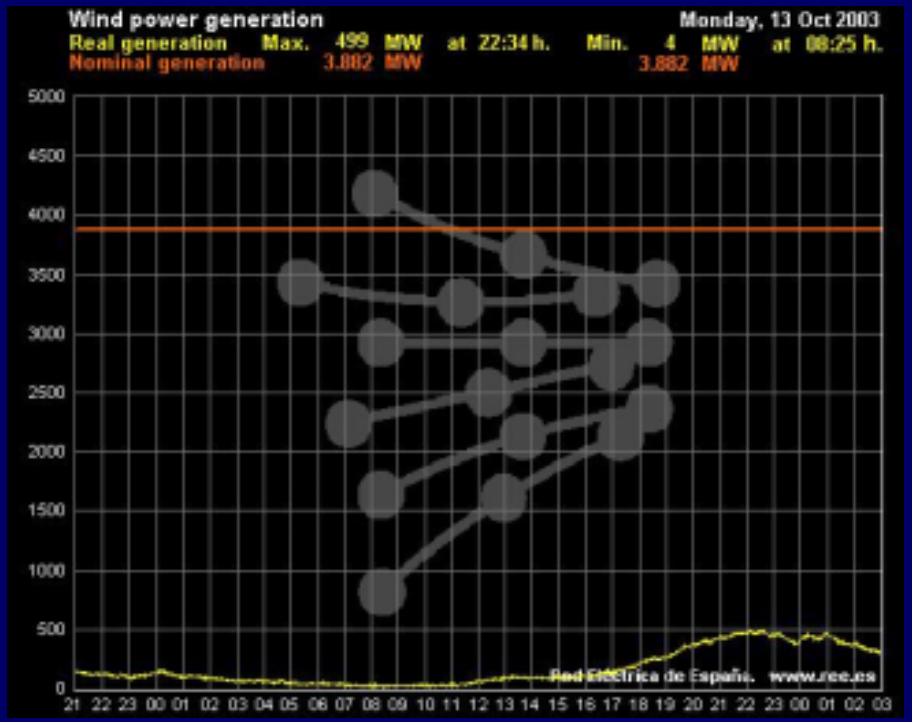
Source: www.ree.es



Sources: Nemmco, BOM

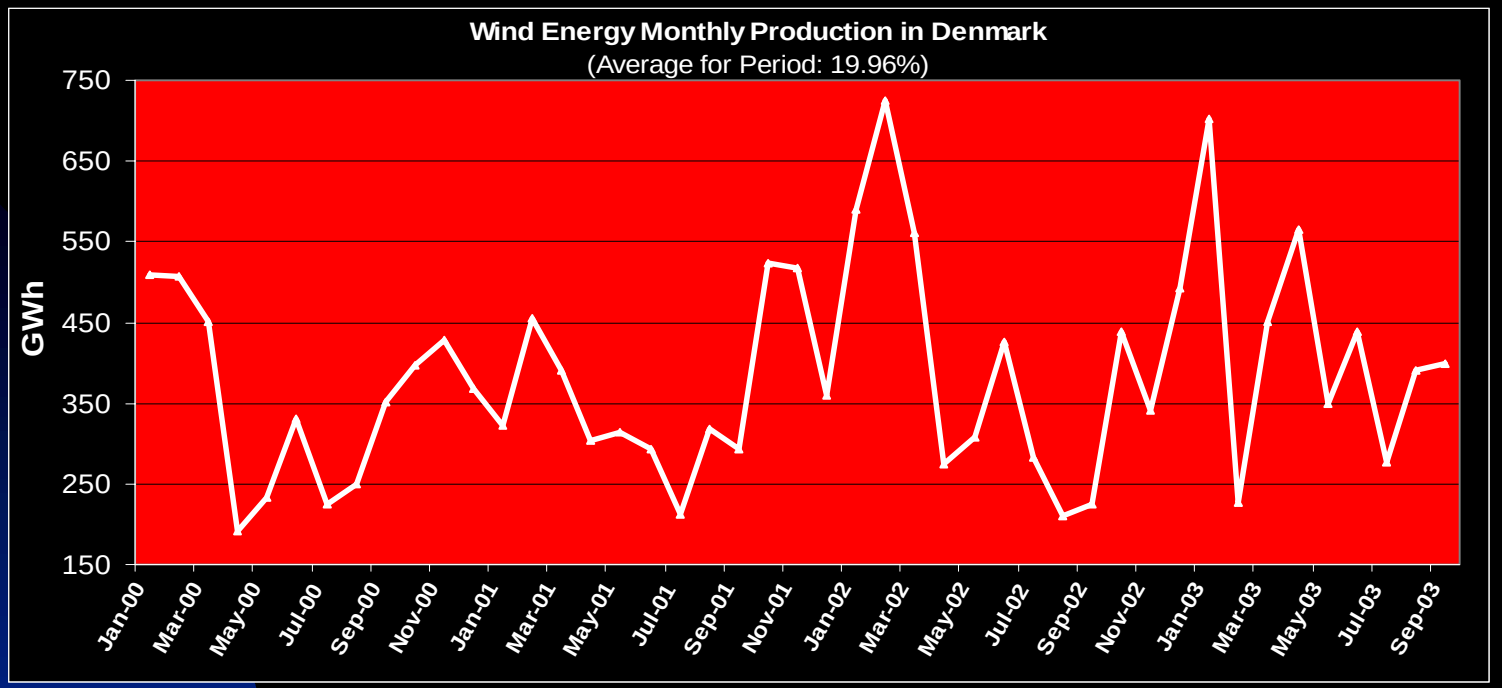
THE LOWS AND LOWS OF WIND ENERGY

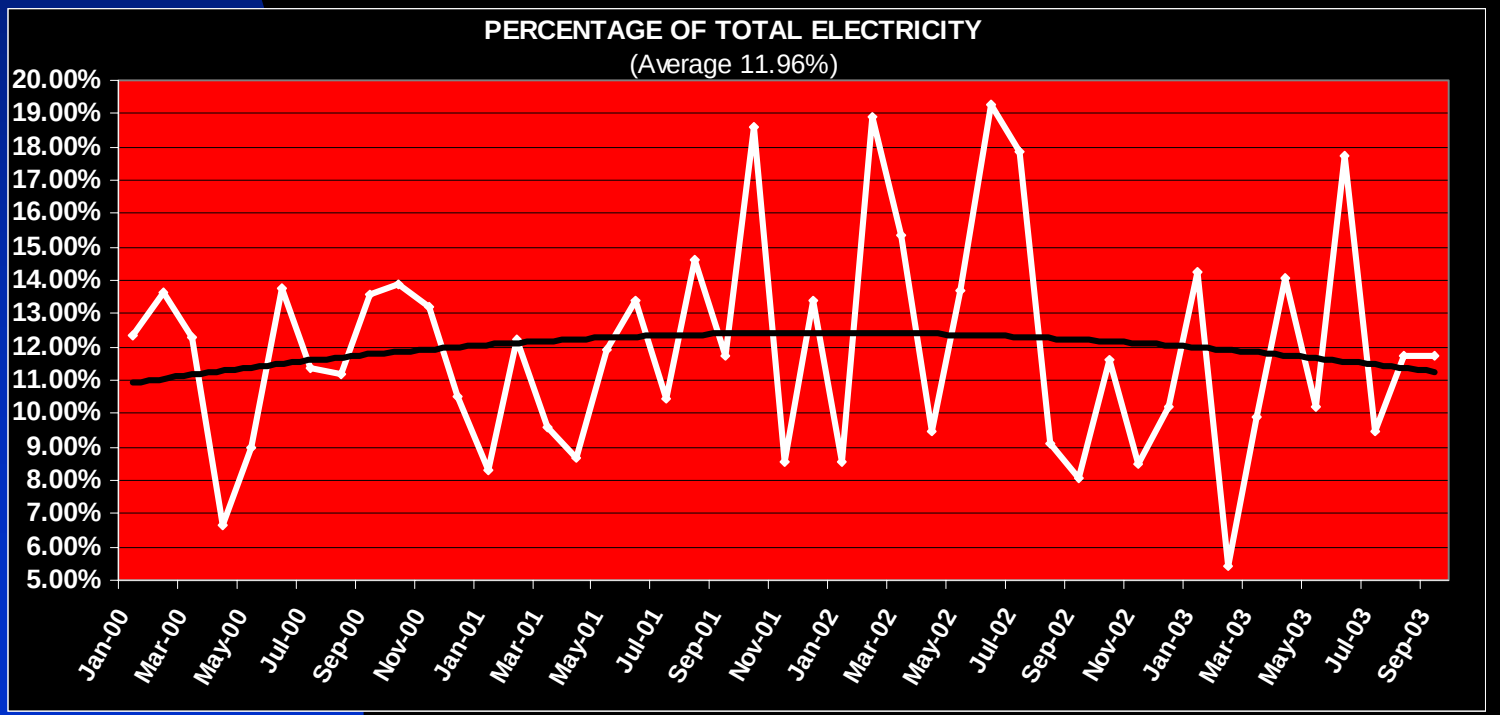




- At 1 am on the 18th of August 2003, wind energy production in Spain reached a maximum of 242 MW or 6.2% of capacity
- On the 13th of October 2003, 3882 MW of wind turbines produced a minimum of 4 MW or 0.1% of their capacity
- In Summer, 4 MW would only service around 2000 homes similar to my home despite a wind energy capacity 20% greater than South Australia's total installed capacity

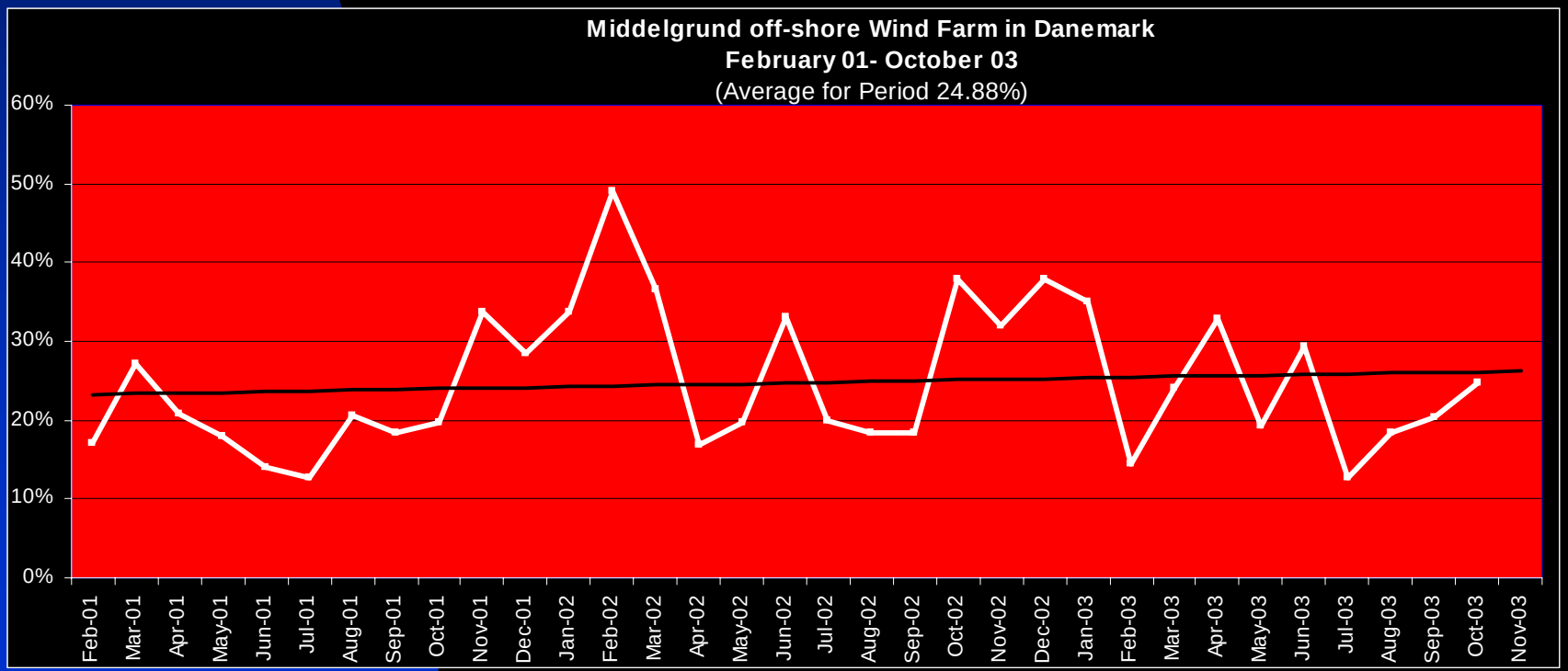
DENMARK





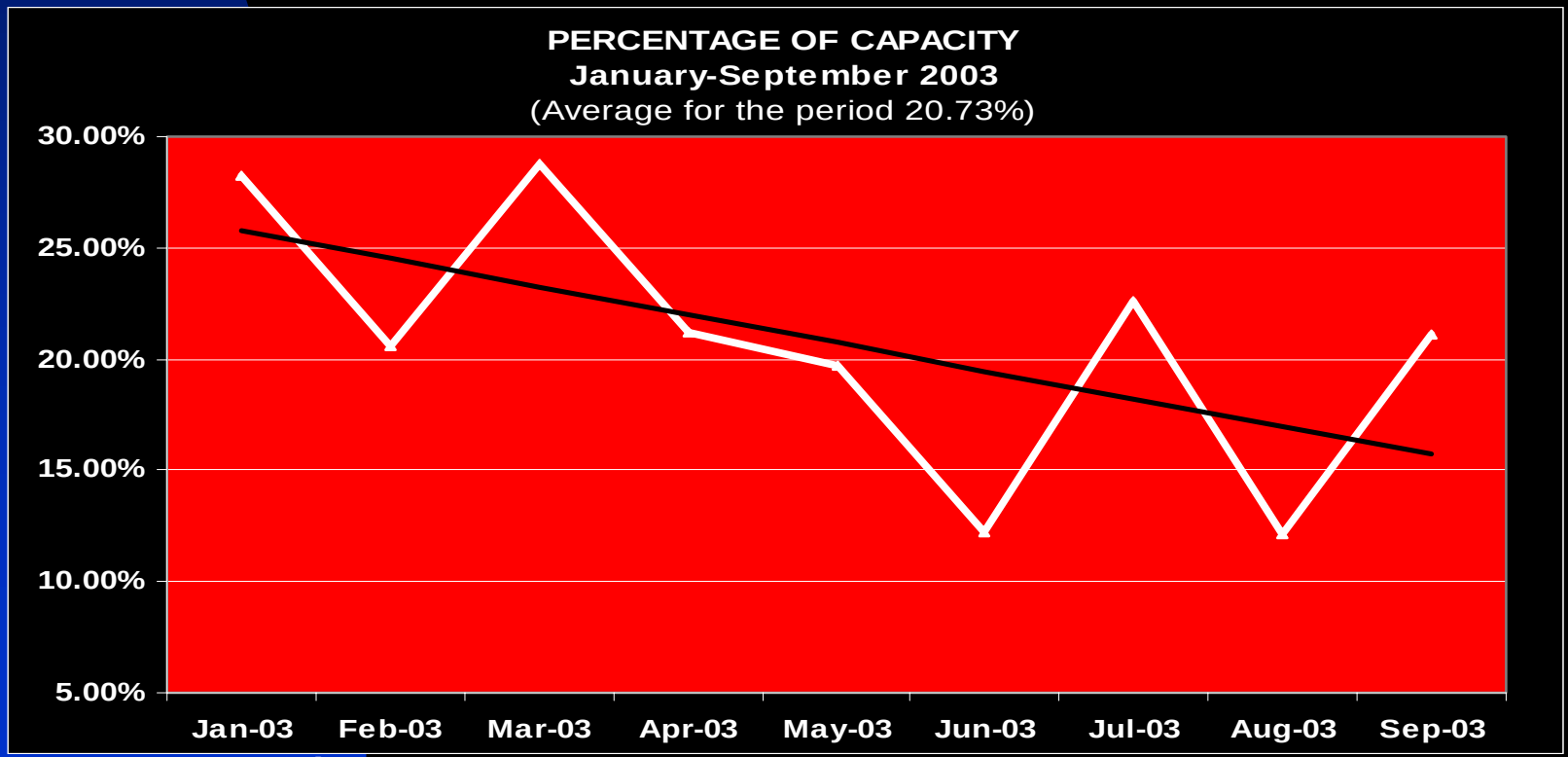
Source: Danish Energy Authority

MIDDELGRUND
Offshore Wind Farm



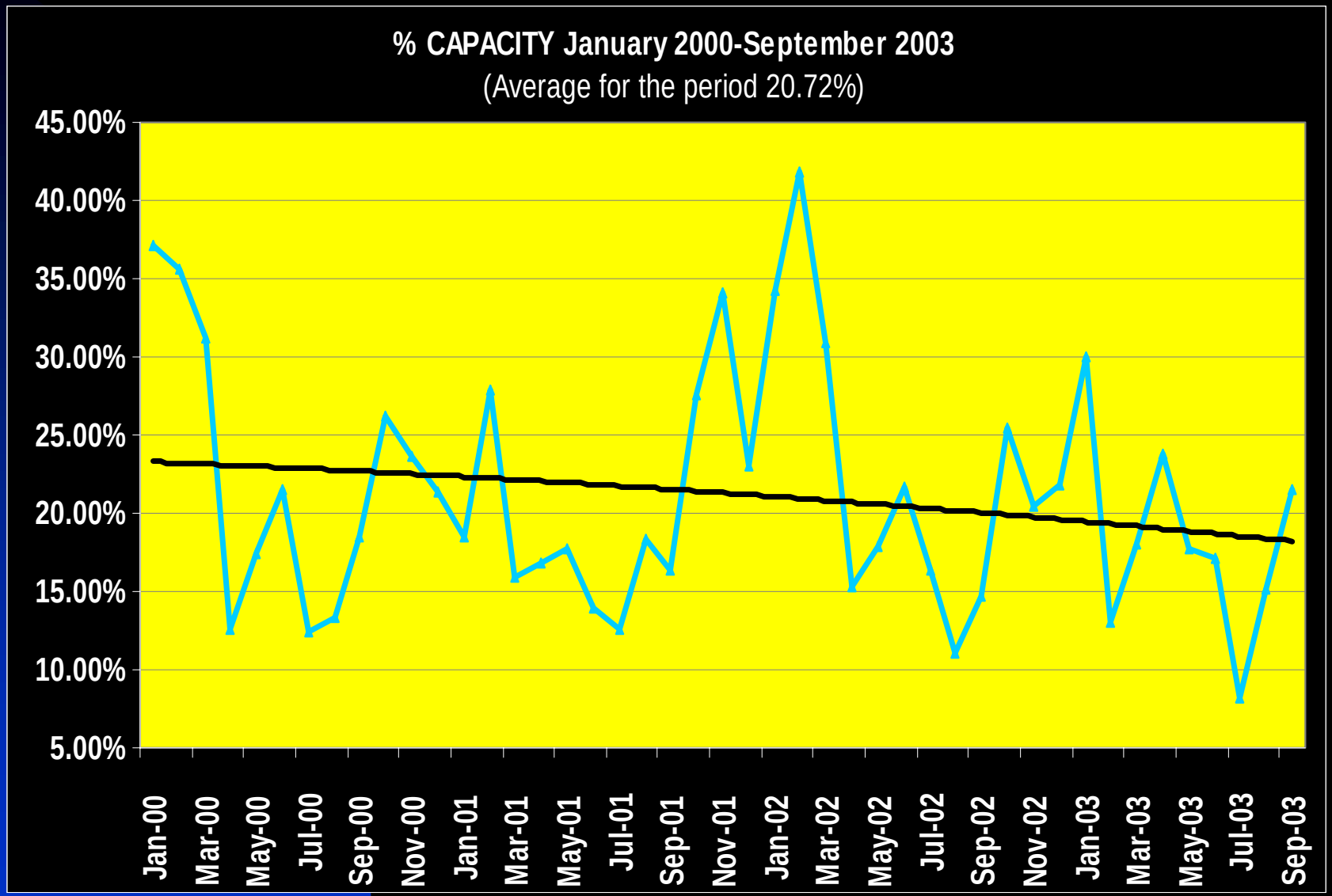
Source: Middelgrund cooperative (www.middelgrund.com)

TAUERN WIND FARM IN AUSTRIA



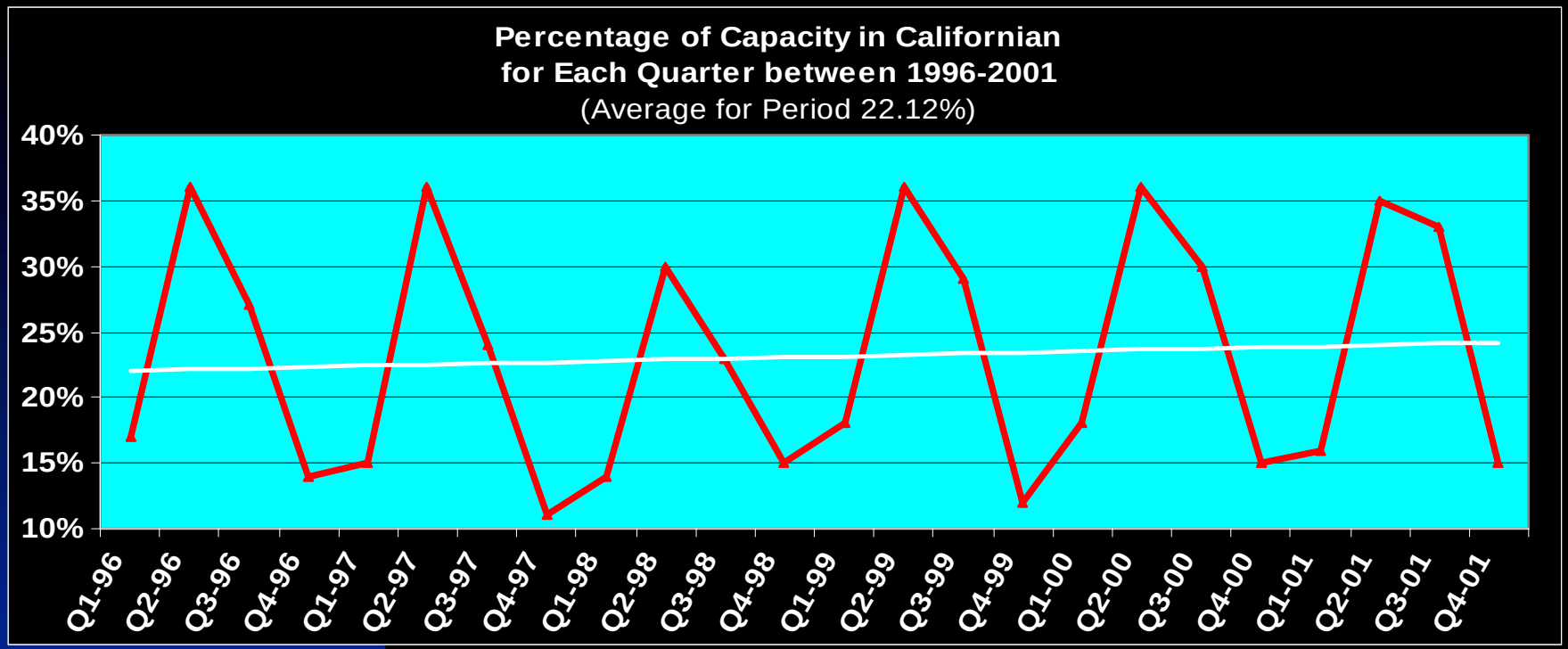
Source: www.tauernwind.com

SWEDEN



Source: Elforsk (http://www.elforsk.se/varme/varm-vind_drift.html)

CALIFORNIA



Source: California Energy Commission

- Installed capacity went from 1679 MW in 1991 to 1549 MW in 2001
- In 2002, wind contributed 1.3% of electricity production, biomass 2.3%, geothermal 5.1% and hydro 11.45%
- All Californian wind farms are located inland – not near the coast

CO_2 REDUCTION

- AusWea's formula
  - A (MW capacity) x 0.3 x 8760 (hrs) x 0.860 (tonnes of CO_2)
  - This amounts to 2260 tonnes per year for each MW of capacity
- However, emission savings for SA have been calculated by ESIPC (2003) at around 0.500 tonne per MWh, not 0.860 tonne. Therefore, 1 MW of wind would only displace 1310 tonnes per year
- A large number of wind farms average between 20-22% of their capacity, not 30% as the formula suggests. If this were to apply here, it would only result in a saving of only 960 tonnes per MW per year
- 1000 MW of wind farms, therefore, would only displace between 0.96 and 1.31 million tonnes of CO2, not 2.26 million tonnes a year nor as suggested in Jay Weatherill's recent Sellicks Myponga assessment, 4 million tonnes

WHAT DOES IT ALL REALLY MEAN?

Percentage in Terms of Various Benchmarks on the Impact of 1000 MW of wind farms*			
1000 x	0.96 t 0.22 x 8760 x 0.5	1.31 t 0.3 x 8760 x 0.5	2.26 t 0.3 x 8760 x 0.86
World's total emission 36200 million tonnes	0.00265%	0.0036%	0.006%
Australia's total emission 543 million Tonnes	0.177%	0.24%	0.42%
Australia's yearly increase 8 million tonnes	12.00%	16.38%	28.25%
Parramatta Council's yearly increase * 2.6 million tonnes	36.90%	50.38%	87.00%

Source: Australian Greenhouse Office,* Sydney Morning Herald

* Based on 2001 figures

ARE WE DOING MORE THAN OURSHARE?

	Coal-Fired Electricity Capacity [3]	% of Average load	% of National Grid
NSW	11670 MW	143.06%	43.30%
Queensland	8102 MW	153.44%	30.10%
Victoria	6395 MW	116.97%	23.75%
SA	770 MW	52.41%	2.85%
Total	26937 MW	132.00%	100.00%

Source: Nemmco

	Average demand for July 02-June-03 [1]	Wind Farm Proposals [2]	% Potential Wind energy Penetration
NSW	8157 MW	115 MW	1.40%
Queensland	5280 MW	40 MW	0.75%
Victoria	5496 MW	542 MW	9.86%
SA	1469 MW	2255 MW	153.50%
Total	20418 MW	3952 MW	19.36%

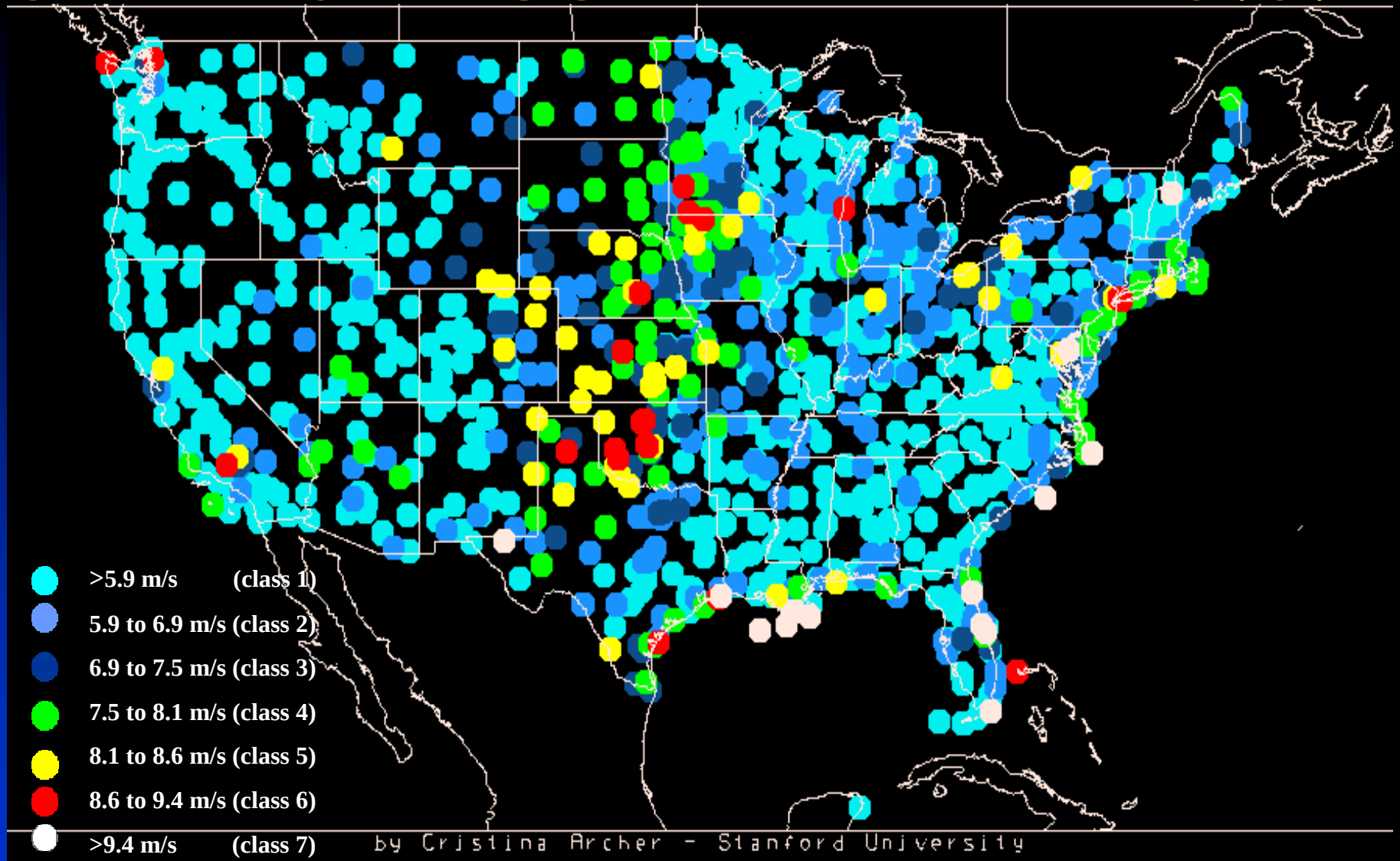
Source:[1] Nemmco, [2] AusWea

NUMBER & LOCATION

- No policy on number (550, 600 or 2200 MW?)
- No policy on appropriate siting
- Ministerial PAR talks of avoiding, not excluding, areas of scenic beauty.
- Sellicks Myponga has been deemed an appropriate location, hence setting a very low benchmark for areas of scenic beauty
- We are told by developers that the best wind is near beautiful coastlines

WIND IN CALIFORNIA

MAP OF MEAN 80 m WIND SPEEDS IN CONTINENTAL U.S.



Source:http://www.stanford.edu/group/efmh/winds/

From 1327 Surface Stations and 87 Soundings in 2000

PROBLEMS

- We may have already reached saturation point
- Too many wind farms can only but put pressure on electricity prices
- A large amount of unpredictable energy into a reliable system will introduce unreliability to the system
- Leaving decision making to councils has given the government no control over final numbers
- Approving Sellicks/Myponga puts other areas of scenic beauty at risk

CONCLUSION

- The government strategy seems largely based on hope
- hope that
  - Some of the projects will not get up
  - The wind will blow at the right time during peak demand
  - Siting wind farms in varied areas will improve production
  - Some technological advances will make wind energy more predictable
  - We can export most of our wind energy
  - We can build a few more interconnectors
  - The MRET are increased
  - A large penetration of dearer wind energy will not add to the cost of an already over-priced electricity
  - More reliable technologies do not emerge in the near future and make the government's zeal towards wind energy look rather hasty and lacking in vision

Thank You For Your Attention