CLSA
ASIA-PACIFIC MARKETS

Wind power

Sector outlook

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February 2006

Asia-Pacific
Power

Asian wind-power basket

Babcock & Brown Wind Partners (BBW AU)

Japan Wind Development (2766 JP)

Suzlon (SUEL IN)

Viridis Clean Energy (VIR AU)

Blowing hard across Asia

Asia-Pacific wind power capacity looks set to experience a 27% Cagr over 2005-10, thanks to falling costs (down 50% since 1990), improving regulatory support (in China, Japan and India) and the high costs of gas and coal. Turbine manufacturers are rushing into China and the US, which has just renewed vital fiscal support. While investors have relatively little outside India and Australia to choose from, recent Indian IPO Suzlon has blazed the equity trail for wind power, so expect more IPOs ahead.

Asia-Pacific - Emerging growth

- Wind power is becoming increasingly attractive to governments facing high thermal energy prices. Its costs are falling rapidly and it can cut into CO_2 emissions.
- We expect Asia-Pacific wind capacity to grow from 5.1GW at end-2004 to more than 21GW by 2010, a 27% Cagr. Not many industries can match this growth.
- China's Renewable Energy Law, Japan's new National Energy Strategy and India's hinting at mandatory renewable energy targets are all highly wind power positive.
- Australian company Babcock & Brown has a growing wind power presence.

India - Asia's wind leader

- Stable regulatory support, low interest rates, and wind's growing competitiveness with mainstream power have made India the world's fifth-largest wind market.
- Maharashtra state is likely to be the key growth driver for new wind installations.
- Suzlon is moving beyond its Indian leadership to China and the US. We forecast 55% volume growth over FY05-08 with 55% of sales from overseas by FY08. This should drive a 63% EPS Cagr, but beware of rising execution risk. Outperform.

China - Supplying 60m homes by 2020

- With a staggering 1,000GW of offshore and onshore wind power potential and the January arrival of a new Renewable Energy Law, it is hardly surprising that the world's top wind-turbine manufacturers are rushing to establish local JVs.
- Industry executives expect the 2010 4GW target (1GW now) to be easily beaten.
- All eyes are now on the wind power tariff premium - a vital economic yardstick.

Japan - Good news beyond just Kyoto

- A 50% rise in renewables' market share by 2010 is already law, of which wind is 60%. The New Energy Strategy this spring should further support wind power.
- The key challenge for wind is the caps imposed by the monopoly electric utilities.

Asia-Pacific installed wind power capacity, 2002-20

(MW)	2002	2003	2004	Approved or under construction	Planned (by end 2010)	Planned (by end 2020)
Australia	104	198	380	1,281	4,202	-
Growth (%)	42	90	92	237	49% Cagr from 2004	
China	469	567	764	1,000 (by end 2005)	4,000	20,000
Growth (%)	17	21	35	31	32% Cagr from 2005	17% (Cagr from 2010)
India	1,702	2,125	3,000	3,000-4,000[2]	10,000	Highly dependent
Growth (%)	17	25	41	33	(MNES: 12GW by 2012)	on state support
Japan	461	678	936	-	3,000	11,800[1]
Growth (%)	50	47	38		21% Cagr from 2004	32% (Cagr from 2010)
Philippines	0	0	0	140	205	-
Growth (%)				(25MW in 2005)	(46%; identified by DoE)	
Total	**2,736**	**3,568**	**5,080**		**21,202**	
Growth (%)		**30**	**42**		**27% Cagr from 2004**	

[1] As proposed by Japanese Wind Power Association. [2] 3,595MW at March 2005.
Source: Various government departments, CLSA Asia-Pacific Markets

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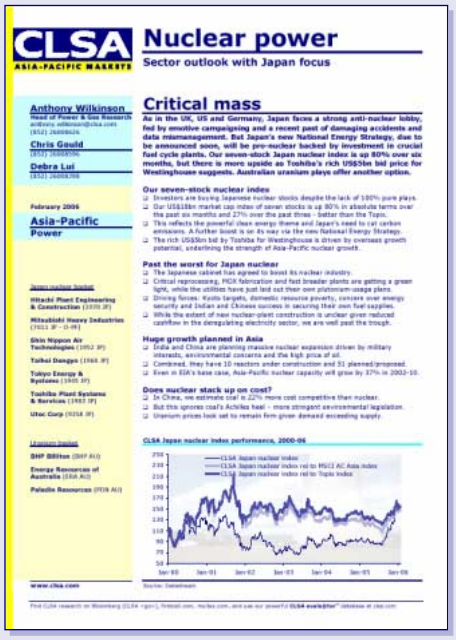
All prices quoted herein are as at close of business 1 February 2006, unless otherwise stated

More clean-energy research

In addition to this report, we have also produced a report on the exciting growth prospects in Asia-Pacific nuclear power . . .

. . . and commissioned a highly readable and topical CLSA U report on the huge growth prospects for biofuels



Blowing hard across Asia

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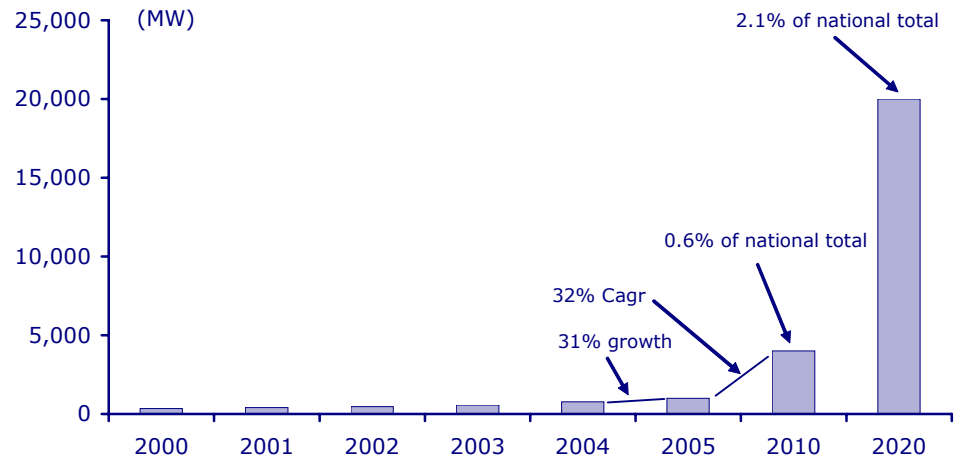
China wind power capacity, 2000-20



Source: European Wind Energy Association

Asia-Pacific - Emerging growth

Wind's competitiveness is improving rapidly

Wind power gets its clout from its declining cost, ability to compete with mainstream energy (unlike solar) and ability to cut into CO_2 emissions. It can also reduce energy import dependence and provide a hedge against volatile thermal fuel prices.

Asia-Pacific wind capacity is expected to enjoy a 21% Cagr to 2010

While 72% of wind energy is currently generated in the EU and another 14% in the US, as in other renewable energy types, Asia-Pacific is the emerging growth region, if not without its own issues to overcome. Government support is still critical for growth in Asia-Pacific, but we expect wind capacity to grow from 5.1GW at end-2004 (up 42% YoY) to at least 16GW by the end of the decade. This represents a 21% Cagr, not matched by many industries.

Figure 1

Cumulative installed wind capacity in Asia-Pacific, 2002-20

(MW)	2002	2003	2004	Approved or under construction in coming years	Planned by end of 2010	Planned by end of 2020	Total potential of wind energy	As multiple of 2004 wind capacity (x)
Australia	104	198	380	1,281	4,202	-	8,000	21
Growth (%)	42	90	92	237	49% (Cagr from 2004)			
China	469	567	764	1,000 (end 2005)	4,000	20,000	1,003,000	327
Growth (%)	17	21	35	31	32% (Cagr from 2005) but may prove very low end	17% (Cagr from 2010)	(incl 750,000 sea-based)	(only land-based)
India	1,702	2,125	3,000	3-4,000[2]	5,000	Highly	45,000	15
Growth (%)	17	25	41	33	(MNES: 12GW by 2012)	dependent on state support		
Japan	461	678	936	-	3,000	11,800[1]	-	-
Growth (%)	50	47	38		21% (Cagr from 2004)	32% (Cagr from 2010)		
Philippines	0	0	0	140	205	-	70,000	341
Growth (%)				(25MW in 2005)	(46%; identified by DoE)			(based on 2010)
Total	2,736	3,568	5,080		16,202		1,126,000	
Growth (%)		30	42		21			

[1] As proposed by Japanese Wind Power Association.[2] 3,595MW at March 2005. Note: Source: Australian Greenhouse Office; Chinese Metereology Institute; Ministry of Non-Conventional Energy Sources in India; METI In Japan; US-based National Renewable Energy Laboratory for Philippines., CLSA Asia-Pacific markets

Implementation of China's Renewable Energy Law, which came into effect in January, is already providing a big boost to China's wind capacity and manufacturing industry. Foreign companies like Gamesa, Vestas, GE Wind and India's Suzlon are rushing to set up manufacturing facilities in alliance with local players. China aims to have 20,000MW of wind capacity by 2020 compared to 560MW at end-04. The key issue here is the "wind premium", ie the excess over grid price wind power providers can sell at.

Japan's new energy strategy should provide a big boost to wind energy

Wind energy will also be boosted by Japan's New Energy Strategy, due to be announced in March/April, which is expected to reaffirm a 220% increase in wind capacity by 2010 in the context of a renewable energy market share at 1.35% by 2010 excluding large hydro and geothermal.

India may mandate a fixed proportion of renewable energy to be purchased by utilities

The strong growth in wind energy in India, Asia's wind leader, has hitherto been based on the income-tax breaks available through accelerated depreciation and purchase of wind power by the state utilities at a mandated rate. As in other countries, India's national policy aim is now to oblige utilities

to buy a minimum fixed percentage of generated MWh from renewable energy with this reflected in state-level tariffs by 1 April 2006. This could be a very important development.

Many countries now have renewable energy targets

Figure 2

Non-EU countries with renewable energy targets (including wind)

Country	Target(s)
Australia	**9.5TWh of electricity annually by 2010.**
Brazil	3.3GW added by 2006 from wind, biomass, small hydro.
Canada	3.5% to 15% of electricity in 4 provinces; other types of targets in 6 provinces.
China	**10% of electric power capacity by 2010 (expected 60GW); 5% of primary energy by 2010 and 10% of primary energy by 2020.**
Dominican Rep	500MW wind power capacity by 2015.
Egypt	3% of electricity by 2010 and 14% by 2020.
India	**10% of added electric power capacity during 2003–2012 (expected 10GW).**
Israel	2% of electricity by 2007; 5% of electricity by 2016.
Japan	**1.35% of electricity by 2010, excluding geothermal and large hydro (RPS).**
Korea	**7% of electricity by 2010, including large hydro, and 1.3GW of grid-connected solar PV by 2011, including 100,000 homes (0.3GW).**
Malaysia	**5% of electricity by 2005.**
New Zealand	**30 PJ of added capacity (including heat and transport fuels) by 2012.**
Norway	7TWh from heat and wind by 2010.
Philippines	**4.7GW total existing capacity by 2013.**
Singapore	**50,000 m² (~35MWth) of solar thermal systems by 2012.**
South Africa	10TWh added final energy by 2013.
Switzerland	3.5TWh from electricity and heat by 2010.
Thailand	**8% of total primary energy by 2011 (excluding traditional rural biomass).**
United States	5% to 30% of electricity in 20 states (including DC).

Note: Asia-Pacific nations in **Bold**. Source: Renewables 2005 Global Status Report

Investors have little to choose from, but this will change

Only four listed stocks in Asia are true wind plays, but are more likely to list

Currently, portfolio investors have little to choose from in terms of stocks which derive a substantial share of their profits from wind power:

- **Suzlon** (SUEL IN) in India only listed in Bombay in October 2005, but is already worth US$6.88bn. It is the dominant player in India with 60% market share. The company has achieved this via its smart "concept to commissioning" strategy, in-house manufacturing and progressive introduction of higher mega-watt capacity turbines. As its exports rise to markets like China and the US, its high margins are likely to moderate over time given higher logistics and transport costs. Although Suzlon is now discounting high growth rates having risen 115% since IPO, we still see more upside based on a target price of 20x FY March 2008 earnings.
  - See our analysis in the India section.

Japan Wind Development should be a big beneficiary of government renewables drive

- Minnow **Japan Wind Development** (2766 JP) launched its IPO in March 2003 and is now worth US$208m. JWD imports and maintains GE built wind turbines. Its main competition is with Eco Power which is a subsidiary of Ebara (6361 JP) and huge Tokyo Electric (9501 JP). Japan Wind Development is not cheap, trading at 68x March 2006 consensus earnings, but the company has good growth prospects.
  - See our analysis in the Japan section.

- **Babcock & Brown Wind Partners Group** (BBW AU) listed in October 2005 and contains much of the wind power capacity of Babcock & Brown. This infrastructure-style fund contains 672MW of wind power capacity in USA, Australia, Spain and Germany with a current yield forecast of 5.6% for FY06. Margins look pretty good, although not quite as good Suzlon.
  - See our analysis in Appendix 2.
- **Viridis Clean Energy Group** (VIR AU). Like BBWP, this is a clean energy infrastructure fund, albeit with a market cap of just US$103m. Viridis invests in renewable, waste or low carbon emission energy sources including wind, hydro, biomass, geothermal, solar and natural gas. By value, three-quarters of the fund is invested in wind (106MW), 15% in landfill gas, 8% in gas and 1% in hydro. Germany is the main investment location.
  - See our analysis in Appendix 2.

China has no listed wind stocks yet, but this will undoubtedly change, especially after Suzlon's success

While China does not yet have listed wind players, this will undoubtedly change given Suzlon's well-publicised success. Goldwind Science and Technology Company is the most recognised Chinese manufacturer, but there are others like Dalian Heavy Machinery with whom CLP Holdings is involved, and Baoding Huiyang Aviation Airscrew. Shanghai Electric (2727 HK) is looking to a small extent to wind energy for growth within its Environmental division.

Note also that in India, Bajaj Auto (BJA IN) and Bajaj Electricals (BJE IN) have set up wind power projects in Maharashtra to meet their captive needs. Over the past few years, Tata Power (TPWR IN), Reliance Energy (RELE IN), Essel Mining (from AV Birla Group), Godrej Industries (GDSP IN) and Ramco (RAMCO IN) have also installed wind power projects. While most of these projects have been relatively small (less than 50MW), Suzlon's success both domestically and overseas and the global opportunity that wind represents is likely to lead to greater competition. This is a key threat for Suzlon's high margins. See the India, China and Japan sections for details.

Note that there are two Asian players in the top 10 global wind turbine suppliers - Suzlon, ranked sixth, and Mitsubishi (7011 JP), ranked eighth.

Mitsubishi Heavy Industry (7011 JP) generates only a tiny proportion of its huge profits from selling wind power equipment. According to its website, MHI has now supplied about 1,100 wind turbines in California, Wyoming and Texas, which represents power generation capacity of 502MW.

Global wind market - 19% growth in 2004

Global wind capacity was 48GW at end-2004

Global wind energy capacity at end-2004 was 48GW, up 19% YoY. While this is less than the total electricity capacity of China's Guangdong province, average five-year growth in cumulative installed wind capacity globally was a massive 28%. In 2005, American wind capacity grew to 9,149MW a rise of 35% YoY. The industry employs about 100,000 people already. Spain and Germany vie for top spot, but still only a small handful of countries are so far operating meaningful wind capacity.

BTM Consult, a leading independent consultancy specialising in renewable energy, sees wind power capacity growing at 19.6% pa till 2009. BTM forecast a total of 117,142MW of capacity by end-2009, a rise of 144% from the 47,912MW installed at end-04.

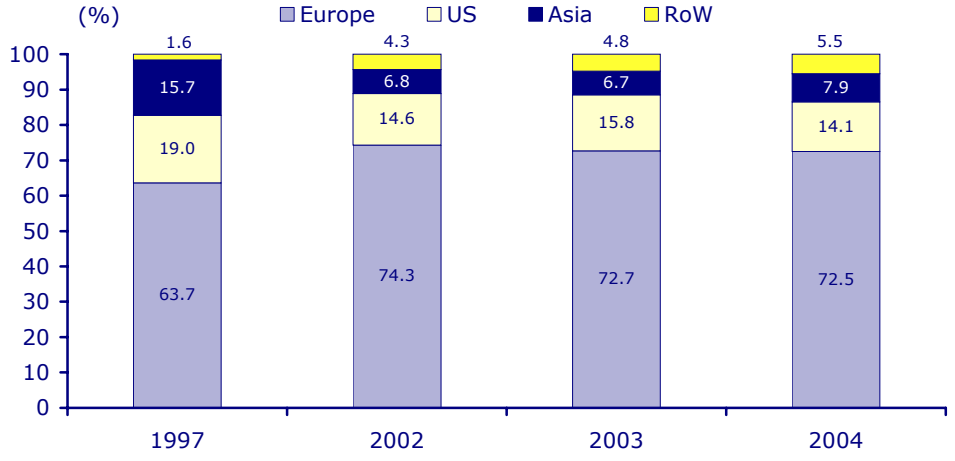
GHG reduction issue, government support, energy security concerns, high thermal fuel prices and falling wind power costs to drive growth

The number of wind-energy countries and the quantum of installed capacity are set for strong growth given:

- Global need to reduce greenhouse-gas emissions (Kyoto and other international agreements).
- Growing governmental support, especially in EU, but also Japan and India.
- Growing emphasis on energy security especially in China, Japan and India - wind is an indigenous and free resource.
- High global thermal fuel prices - expected to remain at high levels, even if down YoY in 2006.
- 50% drop in wind's capital costs since 1990.
- Employment creation/ poverty reduction.

Figure 3

Europe still accounted for over 70% of total installed base at end-2004



Source: BTM Consult, EWEA, AWEA, GWEC, CLSA Asia-Pacific Markets

Figure 4

Top wind markets 2004: Cumulative installed capacity

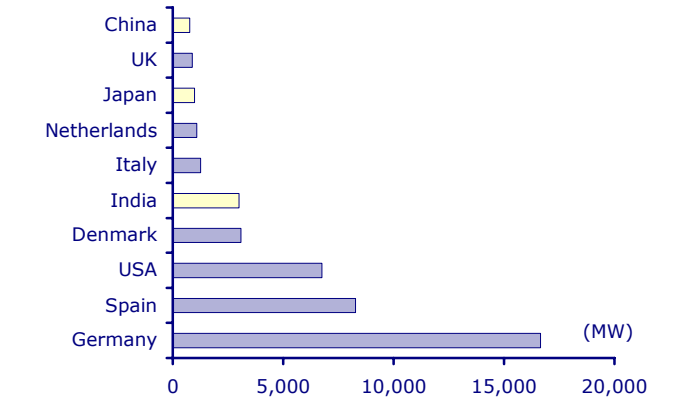
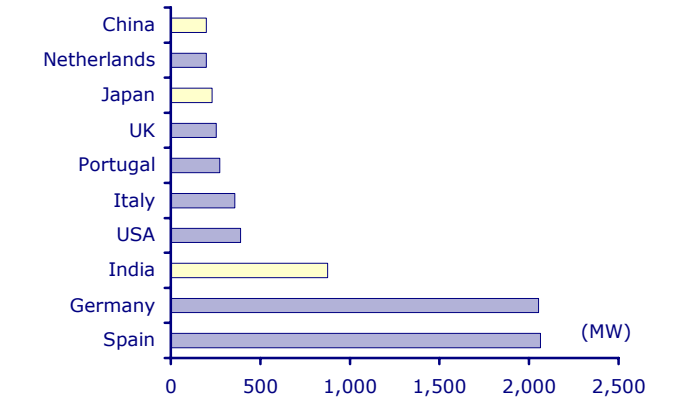


Figure 5

Top wind markets 2004: Annual capacity installed



Source: CLSA Asia-Pacific Markets

Regulatory support remains critical. 2004 actually saw a decline in global growth rates, principally as a result of the failure of the US Congress to renew the Production Tax Credit (PTC). Unique to USA, this system offers tax credits to wind farm owners worth c.US$19/MWh (CPI adjusted) and can be available for the first 10 years of operations.

Extension of US PTC to 2007 was a very significant event for the US wind industry

However, the two-year extension of PTC at the end of 2005 has provided another important boost for wind energy manufacturing in the US with 3,000MW planned for 2006 on top of 2,431MW in 2005. This is very beneficial for Suzlon which we expect will get most of its growth from overseas markets.

Worldwide, wind power is dominated by EU players - Vestas of Denmark, Enercon of Germany and Gamesa of Spain. Together they control 65% of the world market in terms of cumulative installed capacity as well as new installations. Eight of out of the top ten wind power markets in the world, including Japan and China, are dominated by these players.

EU players dominate global wind industry with GE Wind the main US player; while India's Suzlon ranks sixth

Figure 6

India's Suzlon is world's sixth-largest wind turbine supplier, while MHI is eighth

	Capacity installed in 2004 (MW)	% share	Capacity installed in 2003 (MW)	% share
Vestas (Denmark)	2,783	34.1	2,667	31.9
Gamesa (Spain)	1,474	18.1	956	11.5
Enercon (Germany)	1,288	15.8	1,218	14.6
GE Wind (US)	918	11.3	1,503	18.0
Siemens (Denmark)	507	6.2	552	6.6
Suzlon (India)	322	3.9	178	2.1
Repower (Germany)	276	3.4	291	3.5
Mitsubishi (Japan)	214	2.6	218	2.6
Ecotecnia Spain)	214	2.6	48	0.6
Nordex (Germany)	186	2.3	242	2.9

Source: BTM Consult, CLSA Asia-Pacific Markets

Wind power costs keep falling

See Appendix 1: it costs about US$4-6 cents/kWh to generate and costs are falling at about 4% a year. That compares with nuclear and is not far off coal.

Costs are falling by 4% a year

In recent years, the industry has seen three major developments:

- larger capacity and taller turbines. Prototypes are now up to 5MW, compared to 0.2MW in 1990. The cost of generation from a 1MW turbine is under half the generation cost of a 95kW turbine. Average tower height is more than 100m now compared to 43m in 1996. Wind speeds increase with the height of the turbine.
- increased efficiency - annual 2-3% increase. There have been huge advances in rotor blade technology in recent years. Better and lighter components (currently, mainly fibre glass and epoxy resins) are being used reducing costs materially. O&M costs (regular maintenance, repairs, insurance, spare parts, administration) can be 20-25% of total costs per kWh over the life of a project. Larger farms mean fixed costs (eg, fixed O&M costs) can be spread over a bigger capacity. Newer turbine designs require fewer regular service visits and reduced downtime.
- reduced investment costs - down 80% over 25 years. Low rates are important as interest is c.70% of cash costs in initial project years.

Current design efforts are focused on addressing grid compatibility, acoustic performance and the emerging offshore market.

Figure 7

Commercial wind turbines, 1980-2005

	1980	1985	1990	1995	2000	2005
Rated power (kW)	30	80	250	600	1,500	5,000[1]
Growth (%)		167	213	140	150	233
Rotor (metres)	15	20	30	46	70	115
Growth (%)		33	50	53	52	64
Hub Height (metres)	30	40	50	78	100	90
Growth (%)		33	25	56	28	(10)
Yield pa (MWh)	35	95	400	1,250	3,500	17,000
Growth (%)		171	321	213	180	386

[1] Offshore. Source: German Wind Energy Association

Wind energy Q&A

Wind is becoming cost competitive with mainstream power provision

How much does it really cost?
See Appendix 1, but basically it costs about US$4-6 cents/kWh to generate and costs are falling at about 4% a year. That compares with nuclear and is not far off coal.

Is it efficient?
Modern turbines are 45% efficient at converting energy to electricity. Black coal plants generally run at about 35%, brown coal at 30%, but new generation combined cycle gas turbines are 55-60%.

How predictable is it?
Wind farm output can be predicted up to 48 hours in advance depending on the location.

Key advantage of wind is its zero carbon emission

Does it offset carbon dioxide?
A 50MW wind farm can displace 65-115,000 tonnes of CO_2 if displacing coal.

Is it noisy?
Older turbines are, but you can have a normal conversation at the base of a modern turbine.

Can too much wind be bad for you?
Yes as its unpredictability compared to conventional thermal power generation can cause operational headaches for grids. Denmark has had problems but they get 20% of their electricity from wind, the world's highest. State/government off-takers which often guarantee a certain take per year can be penalised by intermittent generation: wind power can peak when other capacity is also high and wind still costs more than many alternatives.

No tourism discount

NIMBYism?
Not-in-my-back-yard is a big issue in many countries, like the UK and Australia. Evidence from Australia suggests that the turbines may in fact encourage tourism and are not detrimental to house prices. UK surveys support the lack of a link to house prices. A Scottish Executive survey of 1,800 residents found high levels of local acceptance and support.

India - Asia's wind leader

India is now the fifth-largest wind market in the world

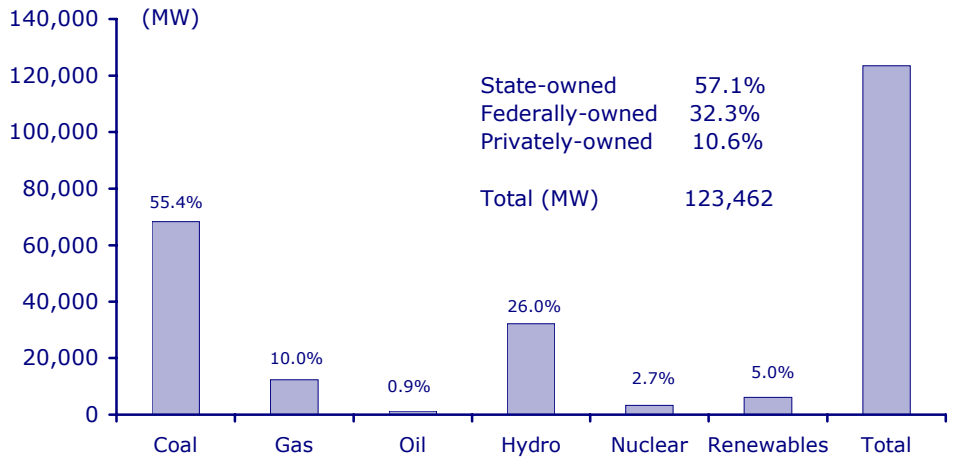
India is now the fifth-largest wind market in the world and had the fastest growth rate in capacity addition in 2004 at 41%. It ranked as third-fastest net new MW installer with 875MW, mainly in Tamil Nadu state. Over half of India's wind capacity is here as load factors are typically 35%, compared to 25% in most other sites and elsewhere in Asia. This considerably reduces the cost of generation and is driven by the two monsoons Tamil Nadu receives each year, compared to one over June-September in most other states.

MNES: 24GW by 2012 in renewable energy, half from wind power

Projections by the Ministry of Non-Conventional Energy Sources (MNES) suggest that India will have 24GW of renewable energy capacity by 2012. Half of this will come from wind power. Given the current pace of wind power capacity addition in India, MNES's estimates are likely to be beaten by a wide margin.

Figure 8

Indian power capacity, October 2005



Source: CLSA Asia-Pacific Markets

Maharashtra may extend the limit of 750MW of wind power capacity

Maharashtra state is likely to be the key driver for growth of wind power in India in FY06. Over April-September 2005, Maharashtra contributed 25% of total wind power capacity addition in the country up from 4% of total in FY05. This reflected the local regulatory commission's Rs3.5/kwh wind tariff, but this will only last till FY07 or 750MW of installations, whichever is earlier. We expect the 750MW level to be hit in early FY07. However, the commission may extend the limit beyond 750MW but reduce tariffs. In contrast, wind capacity growth in Tamil Nadu, location of 50% of Indian wind capacity, is likely to stagnate at the current levels of 500-700MW given that capacity has already crossed the technical potential.

Figure 9

State-wise wind power capacity addition in India

	FY02	FY03	FY04	FY05	FY06CL	FY07CL
Andhra Pradesh	1	-	6	22	650	600
Gujarat	-	6	29	52	100	100
Karnataka	24	56	85	201	30	70
Madhya Pradesh	-	-	-	6	20	80
Maharashtra	209	2	6	49	250	300
Rajasthan	9	45	118	106	500	400
Tamil Nadu	45	133	371	675	50	150
Total	**288**	**241**	**615**	**1,111**	**1,600**	**1,700**

Source: Historic data from MNES, forecasts by CLSA Asia-Pacific Markets

Key drivers of India's wind success

Stable regulatory support

Fiscal measures have been a key driver, notably:

Tax advantages from accelerated depreciation

- Direct taxes - 80% depreciation allowance in the project's first year, i.e. the effective cash down is 4% of the project assuming a typical 30% equity weighting. Cash-rich companies have used this as a tax saving device as well as a cheaper source of power than buying from the grid.

Tax holidays

- Tax holiday for 10 years under section 80IA. Applicable to all power projects before March 2006 and applicable in any consecutive 10 years in a project's life. Likely to be maintained given India's crippling power shortages.
- Power banking, ie most states allow captive wind power consumers to "bank" excess power with the local state electricity board at peak generation times. When the wind generation is low, the power consumer can tap into its banked supply. This is clearly a very attractive policy, but note that Tamil Nadu authorities may review their wind power policy given the financial cost of intermittent wind supply versus conventional power sources.

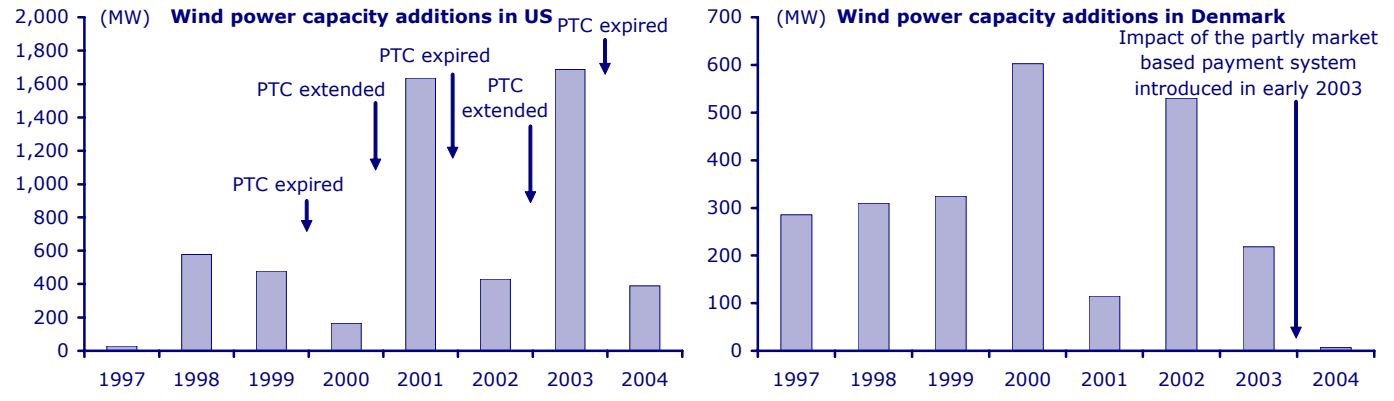
Too much wind can be bad for you

This has also become a key issue in Denmark which gets the highest global percentage of its electricity from wind power at 20%. There was almost no capacity addition in 2004 after the government moved to partly market based payment system.

Note that each Indian state has its own wind power policy. This creates risks for operators. The central government may reduce the 80% depreciation allowance to 60%.

Figure 10

Windpower capacity addition trend in US, Denmark highlights the dependence on the regulatory support



Source: BTM Consult, Annual Report Danish Wind Energy Association, CLSA Asia-Pacific Markets

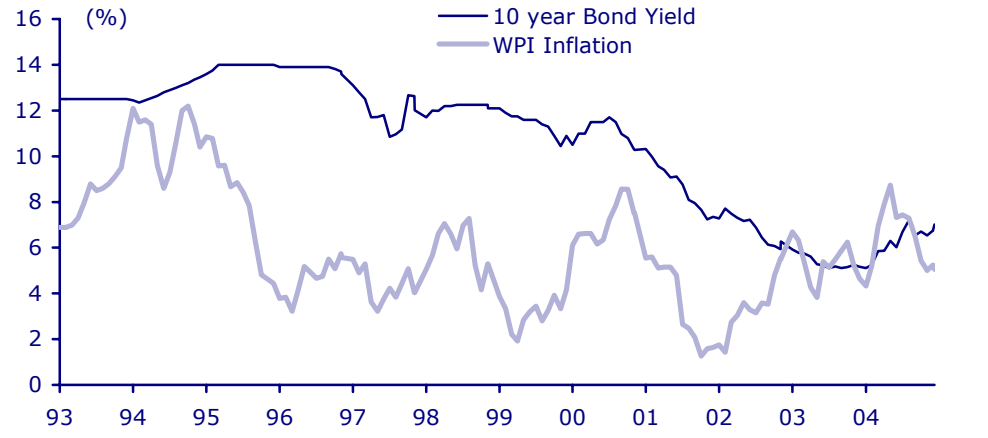
As with other renewables like solar, low interest rates are critical

Low interest rates

Assuming a 25% plant load factor, interest costs account for more than 70% of total cash costs for the first few project years, gradually declining as debt is repaid. India's 10-year bond yields have halved in the past 10 years and are expected to rise only modestly.

Figure 11

Interest rates have halved in last ten years



Source: Bloomberg, CLSA Asia-Pacific Markets

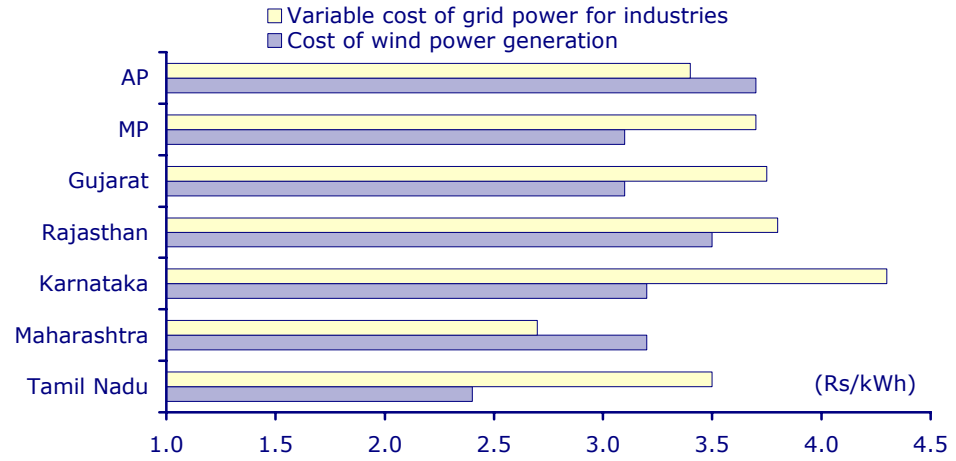
Wind energy costs can be actually lower than grid average costs for industry

Rising competitiveness of wind power

Generally high commercial and industrial electricity tariffs and India's huge power shortage have boosted the case for wind energy. According to the 2002 State Electricity Bureau annual report, the national average industrial/commercial tariff was US cents 8.7-9.8/kWh. This is higher than the average life cycle cost of an average onshore wind plant which industry guru *Eric Martinot* in his *Renewables 2005 Global Status Report* pegs at US$4-6 cents/kWh. In many Indian states with high wind power potential, the cost of power from the grid is higher than the average life-cycle cost of wind energy.

Figure 12

Cost of windpower is lower than cost of power from the grid in a few states



The cost of generation has been calculated assuming 96% grid availability, it includes the wheeling and T&D charges by respective state but does not include the banking charges.
Source: TNERC, KERC, GEB, MSEB, MPEB, APERC, RERC, CLSA Asia-Pacific Markets

The table below summarises wind development returns in various states. Category 1 states offer higher returns than Category 2 states.

Tamil Nadu - India's most popular wind state

Tamil Nadu. Remains the most popular state for new wind power capacity. Highest IRRs for captive and sale-to-SEB wind projects. However, the capacity addition in the state are likely to stagnate as the cumulative capacity has already crossed the official technical potential.

Maharashtra - attractive local policies have boosted wind capacity, especially in 2005

Maharashtra. Big growth is likely given the attractive policies of the Maharashtra Electricity Regulatory Commission (MERC). The state's development corporation is targeting 1,000MW of wind capacity by FY07 given an attractive buyback rate of Rs3.5/kWh with an escalation of Rs0.15/kWh every year thereafter for the next 13 years. Even assuming a big drop thereafter and removing all tax incentives, IRR is still 20%. The current buyback rates are valid till FY07 or at 750MW, whichever is sooner.

Karnataka. It has higher PLF (29%) than Maharashtra (26%) but lower tariffs, so returns are similar. Excellent combination of stable regulatory regime out to June 2009 and attractive returns (25% IRR fro captive use, 32% for sale to SEB)

Gujarat has huge wind potential, the highest of any state

Gujarat. This state could emerge as a front runner. Gujarat has the highest wind power potential of any state (10GW) and grid costs are high at Rs3.8/kWh. IRRs of 19% without depreciation allowance look do-able and compare favourably with anything we have seen to date in China.

Figure 13

Expected returns on wind power project across states

	Category 1 states			Category 2 states			
States -->	**Tamil Nadu**	**Maharashtra**	**Karnataka**	**Rajasthan**	**Gujarat**	**MP**	**AP**
Technical windpower potential (MW)	1,880	3,040	1,180	910	1,780	845	1,920
Capacity installed at the end of FY05 (MW)	2,036	456	411	284	254	30	121
For sale to SEB							
Levelised cost of generation (Rs/kWh) without tax benefits	2.4	3.1	2.8	3.4	3.1	3.3	3.3
Levelised tariff for sale to SEB (Rs/kWh)	2.7	4.1	3.4	3.2	3.0	2.9	3.4
Viable for sale to SEB (w/o tax breaks)	Yes	Yes	Yes	No	No	No	Yes
IRR - with 80% tax depreciation (current policy) (%)	27.7	34.8	32.4	17.2	16.4	21.5	22.8
IRR - if tax depreciation is cut to 60% (%)	25.2	31.6	29.1	16.1	15.3	19.3	20.9
IRR - with no preferred tax depreciation (%)	17.9	23.4	20.7	11.7	11.2	12.3	14.9
IRR - without preferred tax depreciation and 80IA benefit (%)	14.9	19.7	17.5	9.1	8.7	9.7	12.0
Current policy is valid until	**2006**	**Mar-07 or 750W**	**Jun-09**	**NA**	**Jun-07**	**Jun-07**	**Apr-09**
For captive use							
Net cost for captive generation (Rs/kWh) without tax benefits	2.5	3.4	3.3	3.7	3.3	3.3	3.9
Variable cost of power purchase (Rs/kWh)	3.5	2.7	4.3	3.8	3.8	3.7	3.4
Viable for captive purpose (w/o tax breaks)	Yes	No	Yes	No	Yes	Yes	No
IRR - with 80% tax depreciation (current policy) (%)	39.4	11.2	25.3	17.6	27.2	25.0	8.4
IRR - if tax depreciation is cut to 60% (%)	35.2	10.6	23.0	16.3	24.6	22.6	7.9
IRR - with no preferred tax depreciation (%)	24.6	7.3	16.1	11.2	17.2	15.8	5.1
IRR - without preferred tax depreciation and 80IA benefit (%)	21.1	5.2	12.5	8.6	14.1	12.8	3.0

Note: Our IRR and cost of generation calculations factor in average grid availability of 96%. We consider states offering highest returns on wind projects as Category 1 states. We believe these states should be the main drivers of wind power demand in the near term. We believe that contribution from Category 2 states will be relatively low in the near term but they can become significant contributors over medium tot long term. There is possibility of significant upside in technical potential for wind power in various states. 80% tax depreciation may be reduced to 60% in FY07. 80IA tax benefit is valid for projects set up till March 2006. We believe this is likely to be extended. Our calculations factor in 34% PLF for Tamil Nadu, 29% for Karnataka and 26% for other states. These are our estimates based on discussions with Suzlon and government agencies promoting wind power at the central and state levels. Source: MNES, TNERC, KERC, GEB, MSEB, MPEB, APERC, RERC, TEDA, MEDA, Directory Indian Wind Power 2004, CLSA Asia-Pacific Markets

Entry of organised players will provide a boost

Bajaj Group was the first well-known corporate house in India to get in to windpower. Both Bajaj Auto and Bajaj Electricals have wind farms in Maharashtra for captive needs. Over the last few years, Tata Power, Reliance Energy, Essel Mining (part of AV Birla Group), Godrej and Ramco have also installed wind power projects. While most of these projects have been relatively small at under 50MW, this is likely to change in the future.

Reliance Energy plans to install 500MW of wind power capacity

Reliance Energy has already announced plans to implement up to 500MW of wind based power projects in phases, spread across states of Maharashtra, Gujarat, Rajasthan, Karnataka, Tamil Nadu and Andhra Pradesh. The company anticipates that the evolving regulatory framework for the power sector may stipulate a minimum level of sourcing from non-conventional sources - something that is being hinted at currently. Tata Power, the other major private power utility in Maharashtra, too is likely to set up wind power projects. Companies like ONGC and BPCL have also expressed interest in establishing wind power capacity.

The entry of large players to improve visibility, help cut costs

The entry of organised players in the wind power market will be an important landmark for the industry. While most of the wind power capacity in the developed countries is installed by power utilities and other large organised investors, in India the demand has been almost entirely driven by small businesses and individual investors. With the entry of large organised players the visibility of wind power installations is likely to improve significantly. Increase in the size of orders will also help wind turbine suppliers achieve higher economies of scale and thus bring down per KWh cost of generation. The bargaining power of the project developers with government/regulators will also increase.

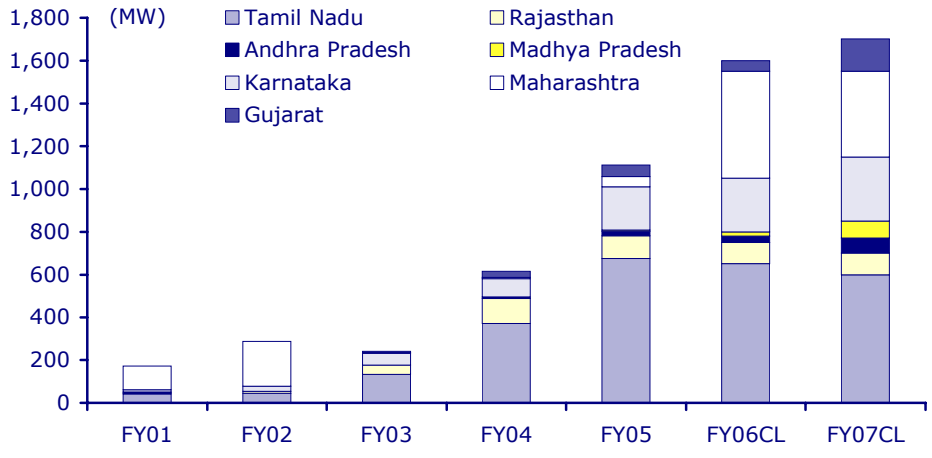
Minimum % of renewable energy may become mandatory

Regulations favour fixing a minimum % of power to be procured from renewable energy

India's National Electricity Policy and National Tariff Policy support fixing a minimum percentage of power from renewable energy. According to National Tariff Policy (NTP) "the Appropriate Commission shall fix a minimum percentage for purchase of energy from non-conventional sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by 1 April 2006."

Figure 14

India's likely wind power capacity addition



Source: Suzlon, Industry, CLSA Asia-Pacific Markets

Suzlon Energy

Rs1,098.60 - OUTPERFORM

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February 2006

India
Materials

Reuters	SUZL.BO
Bloomberg	SUEL IN

Priced on 1 February 2006
India Sensex @ 9,919.9

12M price target	Rs1,206.00
±% up/downside	+10%

Target set on 1 Feb 06

Market cap	US$7,586m
Shares in issue	287.5m
Free float (est.)	30.2%

3M average daily volume
Rs495.2m (US$10.9m)

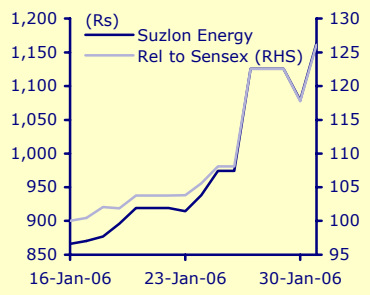
12M high/low
Rs1,188.80/818.00

Foreign shareholding 21.4%

Major shareholders
Promoters 69.8%
FIIs 21.4%

Stock performance (%)

	1M	3M	12M
Absolute	0	0	0
Relative	0	0	0
Abs (US$)	0	0	0



Source: Bloomberg

www.clsa.com

Tailwinds get stronger

The environment for wind turbine suppliers has vastly improved since our last report, *Tailwinds,* on Suzlon, driving higher volumes and better prices. Suzlon's profile as a global supplier has also got a boost with the company bagging large orders from the US, China and Australia. With a favourable policy environment in domestic market too, we forecast 55% volume growth over FY05-08 and share of exports rising to 52%, driving 63% EPS cagr. However, valuation multiples will moderate as growth slows down from FY08 (with high base effect kicking in) and market factors in the execution and regulatory risks to strong growth.

Macro environment for wind-turbine suppliers has improved

The +2,000% returns made by private-equity investors in Suzlon in less than two years is a reflection of major improvement in the prospects for wind power business worldwide and Suzlon's transformation from a local to global supplier. The first ever three-year extension of production tax credit (PTC) for wind power in US has provided a big boost to wind turbine demand over short to medium term. Demand prospects for India too have improved with power authorities hinting at a mandatory percentage of renewable energy. With most global producers facing capacity constraints (some of them are booked for next 2-3 years) prices of wind turbines have gone up sharply, reflected in better-than-expected prices for Suzlon's recent overseas orders.

Suzlon has quickly emerged as a global player in wind power

With overseas orders of Rs26bn (70% of FY06CL revenues) in FY06 YTD, Suzlon's overseas ambitions now have a solid backing. Sales to USA, Suzlon's focus export market, should grow from 81MW in FY06 to 450MW in FY07. China is likely to be the next big market for Suzlon followed by Australia, Europe and Korea. Suzlon is in the process of raising its production capacity from 1,460W to 2,060MW by FY08 and is developing commensurate vendor base. Domestic demand is likely to slow down significantly from FY07.

As Suzlon moves out of hyper-growth, valuations will moderate

55% growth in Suzlon's volumes should drive 58% revenue growth over F05-08. The strong price environment should help sustain Ebitda margins at +25% levels despite rising share of higher cost export sales, driving 63% EPS cagr. However, we see valuations multiples moderating and expect Suzlon to trade at one year forward multiple of 20x 12 months down the line (versus 23x currently), as the market factors in slower earnings growth and potential risks to earnings from slippages in execution and changes in the regulatory environment. Even mild shifts in policies could result in decline in wind turbine prices and Sulzon's profit margins.

Financials

Year to 31 Mar	04A	05A	06CL	07CL	08CL
Revenue (Rsm)	8,575	19,425	37,567	61,449	76,174
Net profit (Rsm)	1,434	3,651	8,705	14,025	17,338
EPS (Rs)	6.5	15.2	31.8	48.8	60.3
EPS (% YoY)	285.3	132.6	108.6	53.6	23.6
PEx (@Rs1,098.6)	168.0	72.2	34.6	22.5	18.2
Dividend yield (%)	0.1	0.1	0.5	0.6	0.8
ROAE (%)	46.70	63.80	47.60	40.60	36.40
Price/book (x)	67.8	36.3	11.0	7.8	5.8
Net gearing (%)	45.67	26.49	(19.37)	2.75	(8.05)
EV/Op Ebitda (x)	179.0	65.5	32.2	20.7	15.9

Source: CLSA Asia-Pacific Markets

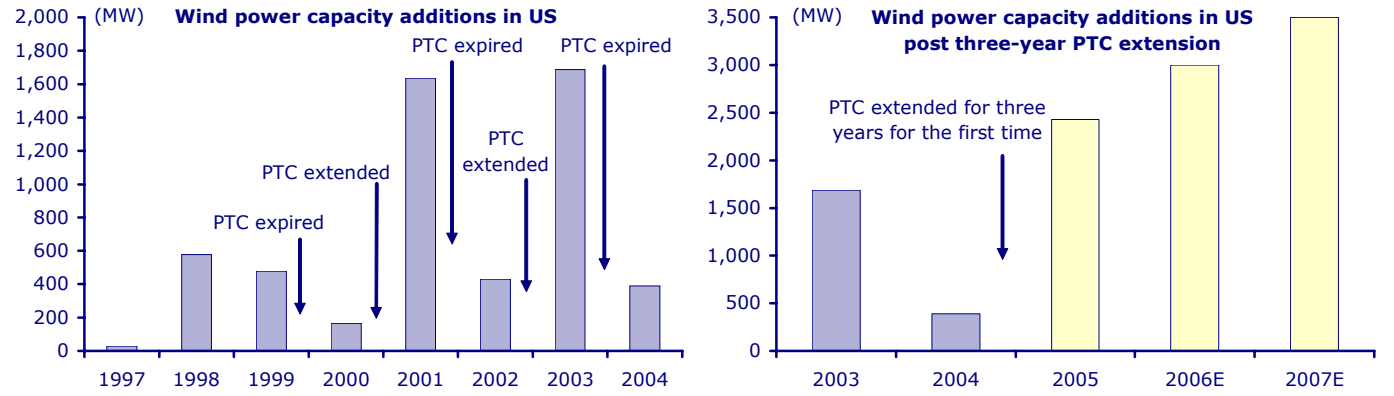
Big boost to wind power in US from the three-year extension of PTC

Demand environment has improved significantly

One of the most positive developments for the world wind power industry recently was the extension of PTC (production tax credit – an incentive of US¢1.9/kwh available to US wind power developers) till Dec 2007. The wind power industry in US has followed a boom-bust cycle for last many years with capacity addition spiking in the years when PTC was extended and falling steeply in the following years. The first three year extension of PTC has ensured a stable market for wind turbine suppliers till 2007 end. According to American Wind Energy Association US added 2,431MW of wind power capacity in 2005 and forecasts over 3,000MW of capacity addition in 2006 and continued growth in 2007.

Figure 15

Steady growth expected in US capacity addition at least till 2007 following the boom-bust cycle for last many years



Source: American Wind Energy Association, Industry, CLSA Asia-Pacific Markets

RPS, a more stable support for renewable energy, is gaining momentum

While PTC has been one of the primary drivers for the demand in US, another and more stable support is now developing in the form of RPS (renewable portfolio standards), which mandates the power utilities to procure a minimum percentage of power from renewable energy sources. 21 states in US have already mandated RPS and more are expected to follow. If RPS continues to gather momentum it should be able support a reasonable level of new wind power capacity in US even without PTC. Nonetheless, wind power lobbyists have already started pitching for extension of PTC beyond 2007.

India - Positive indications from regulatory authorities

Depreciation led tax breaks and preferential purchase by utilities are key drivers

Like all other countries wind power development in India is also dependent on regulatory support. While most of Suzlon's growth over next few years will come from overseas markets, India will continue to be the bread and butter market for the company. India's wind power demand till now has been primarily dependent on the income tax breaks available through accelerated depreciation and purchase of wind power by the state utilities at rates mandated by state electricity commissions. While the rate of depreciation (currently 80% in the first year) available for wind power companies may still change, there is growing comfort on preferential purchase of renewable energy by state utilities. We expect India's capacity addition to be in the range of 1,500-2,000MW over next few years.

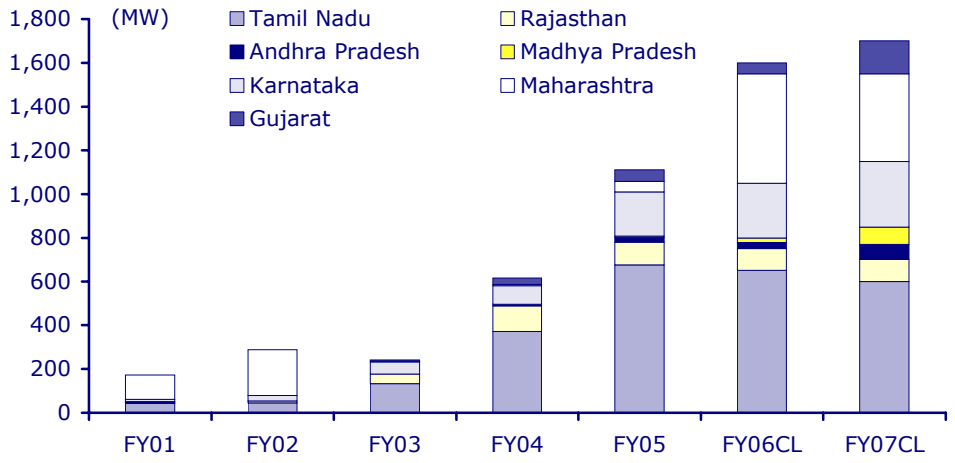
Regulations favour fixing a minimum % of power to be procured from renewable energy

India's National Electricity Policy and National Tariff Policy support fixing a minimum percentage of power from renewable energy. According to National Tariff Policy (NTP) "the Appropriate Commission shall fix a minimum percentage for purchase of energy from non-conventional sources taking into

account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 1, 2006."

Figure 16

India's likely wind power capacity addition



Source: Suzlon, Industry, CLSA Asia-Pacific Markets

Sourcing of RE at preferential tariffs to continue

NTP further says: "It will take time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission. Such procurement by Distribution Licensees for future requirements shall be done, as far as possible, through competitive bidding process within suppliers offering energy from same type of non-conventional sources. In the long-term, these technologies would need to compete with other sources in terms of full costs."

Maharashtra may extend the limit of 750MW of wind power capacity

Maharashtra is the key driver for growth of wind power in India in FY06. In 1H FY06 Maharashtra has contributed 25% of total wind power capacity addition in the country up from 4% of total in FY05. The sharp increase is driven by the favourable policy by MERC (Maharashtra Electricity Regulatory Commission) which offers an attractive tariff of Rs3.5/kwh for wind power increasing at Rs0.15/kwh for 13 years. However this policy is valid till year FY07 or 750MW of installations. We estimate that the 750MW limit should get exhausted in early FY07 itself. Our recent meeting with MERC reveals that the commission is favourably inclined towards extending this limit beyond 750MW, though the tariffs may be revised downwards.

Little growth likely in TN, Karnataka . Gujarat demand may kick in from FY08

The power capacity addition in Tamil Nadu, which accounts for over 50% of total installed wind power capacity in the country is likely to stagnate at the current levels of 500-700MW. The wind power capacity in the state has already crossed the official technical potential and problems associated with transmission and distribution of power are likely to keep the new capacity additions under check. Similarly capacity addition in Karnataka is also likely to hover around 200-300MW per annum levels. Gujarat, which has the highest potential for wind power in India, can emerge as a growth driver from FY08 if adequate support is available from the local government.

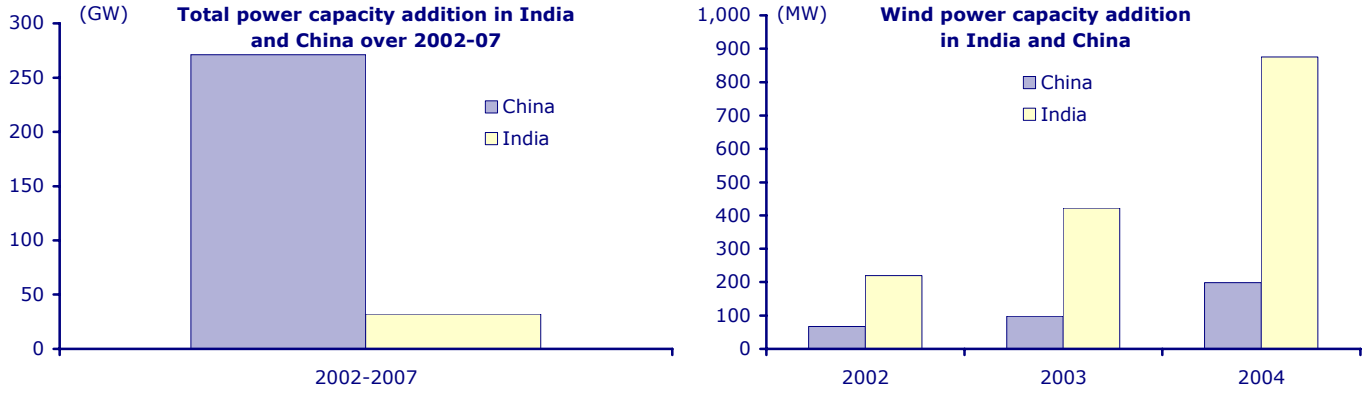
Wind power is one area where China severely lags India . . .

China – Will it beat India in wind power installations too?

Currently China's rate of annual conventional power capacity addition conventional) is running at over 5x that of India. While India is expected to add 32GW of capacity in the current five year plan (2002 to 2007) and plans to add over 60GW in the next five year plan (2008-12), China is currently adding over 60GW capacity per year. However in wind power, China's capacity addition is just about one-fourth of India (in 2004 China added 189MW versus 875MW for India).

Figure 17

China lags India in wind power installations despite higher pollution and greater wind power potential



Source: BTM Consult, CLSA Asia Pacific Markets

. . . despite higher pollution and more potential wind sites

This is despite the fact that 16 of the world's 20 most polluted cities are in China and China's wind power potential is 10 times that of India. China's renewable energy bill was passed in February 2005 and is likely to drive the development of wind power industry in China. The current targets of this bill – 4GW wind power capacity by 2010 and 20GW of wind power capacity by 2020 – will translate into about 600-1,600MW of per annum capacity addition, significantly higher than current capacity addition but still short of India's current capacity addition.

China's renewable energy bill is a positive step, but not enough

It may take some time, but China can emerge as one of the world's largest customers for wind power

There is a possibility of a significant upgrade in China's capacity addition targets and given the high pollution levels China could emerge as one of the biggest customers for wind power industry. It may take a few years for the demand in China to pick up and by the time demand growth in US starts to slow down (around 2008-2009), China could emerge as the next driver for world wind power industry.

Suzlon's sales profile will undergo a big change

Suzlon had 60% market share in India in 9MFY06 . . .

Suzlon has established itself as a clear leader in the Indian market despite the presence of global majors like Vestas and Enercon. Suzlon has been more proactive in understanding the specific needs of the Indian market and introduced the end-to-end solution approach - from land acquisition to turbine installation (done by Suzlon's associate companies) to long term O&M service - which has been one of the key reasons for its success. The company continues to consolidate its position in the domestic market and its market share has gone up from 46% in FY05 to 60% in 9m FY06. While the domestic market will continue to provide the bread and butter for Suzlon, the growth will be primarily driven by overseas markets.

. . . and has bagged orders of c.600MW for overseas supply

During FY06, Suzlon has clearly established its credibility as a global supplier. The company has supplied 81MW capacity to the US market, which will be installed there over the next few months. The company has already bagged orders of over Rs26bn (roughly around 600MW) from the overseas markets. US has been the largest contributor to these orders (450MW) followed by China and Australia. The company has also bagged a small order (15MW) from Korea.

Figure 18

Suzlon's current order backlog

	Capacity (MW)	Value (US$m)	Comments
Overseas orders			
1st US order	239	219	
2nd US order	158	147	Value of order is our estimate based on Suzlon's order backlog
China 1st order	50	38	
China 2nd order	Not disclosed	35	Value of order is our estimate based on Suzlon's order backlog
Korea	15	13	
Australia	Not disclosed	608	
Total overseas	**Around 600MW**	**589**	**Order capacity is our estimate**
Domestic orders	**Around 400 MW**	**360**	**Order capacity is our estimate**
Total	**Around 760MW**	**949**	

Source: Suzlon, CLSA Asia Pacific Markets

Most of the orders currently in hand should be delivered in FY07. The current overseas orders are 92% of our estimated overseas sales for Suzlon in FY07.

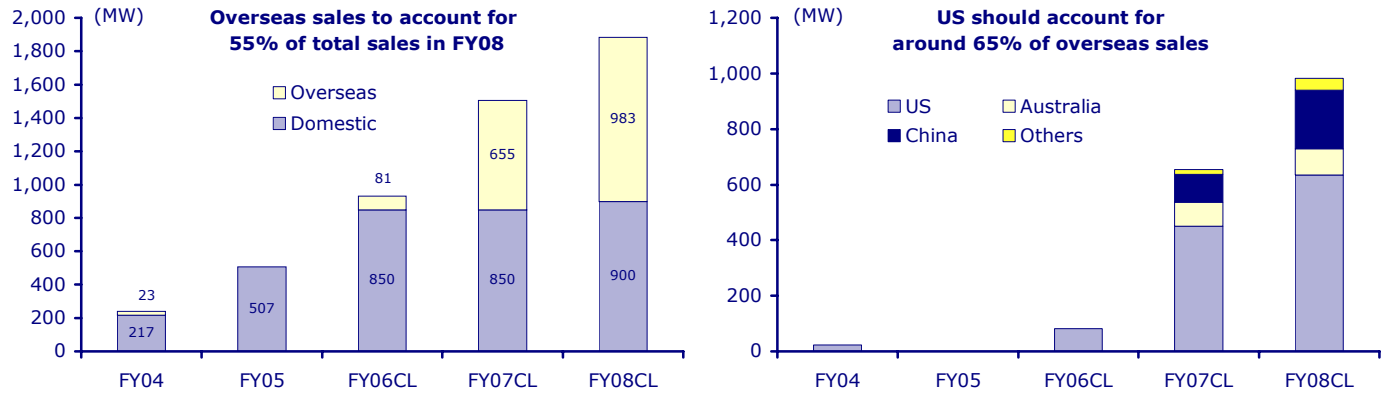
Orders in hand provide visibility to FY07 overseas sales

Suzlon's sales to grow at 55% cagr

We forecast 55% cagr in Suzlon's overall sales volumes over FY05-08 driven by the strong 68% growth in domestic sales in FY06 and strong overseas sales from FY07 onwards. By FY08 overseas sales should surpass domestic sales in volumes and is likely to account for 52% of total sales. US will be the key target market for Suzlon and is likely to account for around 2/3rd of Suzlon's total overseas sales.

Figure 19

Overseas sales, driven by US, are likely to surpass Suzlon's domestic sales in FY08



Source: Suzlon, CLSA Asia-Pacific Markets

Suzlon is raising its production capacity to meet the rising demand

Suzlon is raising its production capacity for wind turbine generators (WTGs) from 1,460MW to 2,060MW and for rotor blades from 1,595MW to 3,211MW by mid-FY07 to meet the growing demand. The new WTG capacity will be added in China, while the capacity for rotor blades will be added in new

locations in India (which are closer to the new demand centres), China and US. The company is also contemplating to add a tower manufacturing facility in US. Suzlon's capability to deliver higher volumes also depends on the ability of the company's vendors to support the higher volumes. The company is giving a lot of focus to vendor development.

Figure 20

Suzlon's manufacturing facilities

Location	Products	Manufacturing capacity WTGs (MW)	Manufacturing capacity rotor blades (MW)	Date of commissioning
Existing manufacturing facilities				
Diu, Western India	WTG	35		
Daman, Western India	WTG, Rotor Blade	525	525	Expanded by 125MW in FY04
Pondicherry (South India)	Rotor Blades, WTGs	900	1,070	FY04
Gandhidham Gujarat	Towers (JV with 75% stake)			FY05
Current total WTG manufacturing capacity		**1,460**	**1,595**	
Planned expansion				
Dhule, Maharashtra (Western India)	Rotor blades		213	FY07
Mandvi, Gujarat (Western India)	Rotor blades		213	FY07
Chakan, Pune	Generators (under 75% JV)			FY06
Tianjin, China	Rotor Blades, WTGs	600	600	FY07
Pipestone, USA	Rotor Blades		600	FY07
Tianjin, China (expansion)	Nacelle cover, generator, tubular tower			FY07
Pipestone, USA	Tower			FY07
Total manufacturing capacity at FY07 end		**2,060**	**3,211**	

Source: Suzlon, CLSA Asia-Pacific Markets

Rising prices, backward integration to support margins

Suzlon incurs higher costs on overseas sales

The total cost of shipping a turbine from India to Suzlon's target export markets is expected to be around Rs4.0-4.5m per turbine for 1.25-1.5MW turbines (7-10% of realisations) and Rs10-11m for 2MW turbines (over 10% of realisations, higher MW turbines have longer blades which increases the transport cost disproportionately). This will result in significant increase in transport costs in FY07. For sales in overseas market Suzlon also procures some parts (like towers) from those markets, which are likely to cost more than in the domestic market.

Overseas production facilities should help to cut transportation costs

The transportation costs on overseas sales should come down from FY08 onwards as the company is planning to set up manufacturing facilities in its key target markets. It is setting up a complete manufacturing facility in China and a rotor blade manufacturing facility in US (rotor blades account for around 60% of the transportation cost of turbine).

However, prices have also been going up

However, strong demand growth (driven by favourable regulatory environment) and supply constraints has resulted in better prices for wind turbines in both domestic and overseas markets. In 9m FY05 Suzlon's average realisations in the domestic market has gone up by 7% YoY from Rs36.2m/MW to Rs38.8/MW. Suzlon's overseas price realisations have also seen a sustained upturn.

Suzlon's overseas orders are at a significant premium to domestic market

Suzlon's first export order to US in FY04 was booked at a 6% discount to Suzlon's domestic realisations. However, the recent orders are being booked at a premium to the domestic sales. In FY06 Suzlon supplied 81MW of turbines to the US market the average realisations on these turbines was at a

2% premium to domestic realisations for FY06. The 239MW order booked by the company in 2Q FY06 was at a 5% premium to the 81MW order. While the company has not disclosed the realisation for its recent 158MW order, given the market conditions we believe this would have been at a premium to the previous order. Thus we expect Suzlon's Ebitda margins to sustain at +25% levels in near to medium term.

Suzlon's backward integration efforts will help cut costs

Suzlon's backward integration efforts should also help protect its margins. The company has set up a tower manufacturing facility through a JV company in FY06 which now meets 40-50% of Suzlon's tower demand. In FY07 Suzlon's generator facility will be ready which should meet 40-50% of its generator requirements. For gear box, Winergy, world's leading gear box producer for wind turbines, has set up an exclusive facility in India which should meet over 60% of Suzlon's requirement for gearbox.

Figure 21

Increased indigenisation will help reduce Suzlon's costs

	% of wind turbine's cost	Supply source in FY05	Supply source in FY08	% savings in cost
Blade	20	95% in house	100% in house	-
Gearbox	15-20	Imported	Exclusive domestic supplier	6-10
Generator	7-9	Domestic purchase	40-50% in house	4-6
Tower	20	Domestic purchase	40-50% in house	3-6
Total	62-69			

Source: Suzlon, Indian Windpower Directory, CLSA estimates

63% earnings cagr over FY05-08

Driven by growing overseas sales, rising product prices and backward integration led cost savings we expect 63% EPS cagr for Suzlon over FY05-08.

Figure 22

Key operating assumptions

	FY04	FY05CL	FY06CL	FY07CL	FY08CL
India's wind power addition (MW)	615	1,111	1,600	1,600	1,700
Suzlon's domestic sales (MW)	217	507	850	850	900
Suzlon's overseas sales (MW)	23	0	81	655	983
Suzlon's total sales (MW)	240	507	931	1505	1883
Realisation - domestic (Rsm/MW)	34.0	37.0	39.4	38.7	37.9
Realisation - overseas (Rsm/MW)	36.3	na	40.3	42.0	41.2
Material cost as % of revenues	64.6	58.6	58.4	58.0	58.4
Number of employees	1,234	2,005	2,726	3,433	3,923
Warranty expense domestic (Rsm/MW)	1.9	2.0	1.80	1.70	1.60
Warranty expense overseas(Rsm/MW)	-	-	0.30	0.80	0.80
Transportation cost (Rsm/MW)	0.65	0.49	0.78	1.73	1.20
Net tax rate (%)	2.5	8.1	12.0	14.0	15.0
Domestic WTG revenues (Rsm)	7,362	18,736	33,509	32,877	34,067
Overseas WTG revenues (Rsm)	994	-	3,276	27,482	40,493

Source: Company, CLSA Asia-Pacific Markets

High base effect to kick in from FY08 onwards

India is likely to add 1,600-1,800 MW in FY07 and US likely to add 3,000MW

Based on our current estimates Suzlon's total sales volumes would go up 6-fold between FY04 and FY07 – from 240MW to over 1,500MW. In the same time capacity installations in Suzlon's two key markets - India and US - would have also grown 2-3 fold. In FY07 India is likely to add around 1,600-1,800MW of wind power while US is likely to add around 3,000MW.

Growth in new capacity additions in US, India will moderate from FY08

These are very significant numbers on absolute basis and even when compared to historic wind power capacity additions in these two countries. India is likely to achieve over 50% of its current technical wind power potential (which could be revised upwards) by FY08 and constraints on availability or good windy sites are also likely surface. Some of these constraints can be partly overcome by continued improvement in wind turbine technology and development of the national transmission grid in India. However, the growth in wind power capacity addition beyond FY07 levels is likely to be moderate (single digits to low double digit) and that too will be contingent upon continued regulatory support.

Risk of dilution in regulatory support in the US, India

If PTC is not extended, the US market may show a decline in new capacity additions in 2008. In India if states like Tamil Nadu or Maharashtra reduce the support to wind power there could be sharp decline in new capacity. Getting new sites for wind parks in these countries could also pose a problem over medium to long term. There is growing lobby of people opposing wind power due to high cost of power, intermittent supply, visual impact and noise levels. If this lobby gathers more support new wind power installations could suffer.

The slowdown in capacity addition is likely to put pressure on turbine prices, as new capacities catch up with the demand. Thus we expect slowdown in revenue and profit growth for Suzlon from FY08 onwards. We expect profit growth to go down from 61% in FY06-07 to 24% in FY08.

China could surprise on the upside

With the likely slowdown in growth in the US and India, pickup of wind power development in China is a key assumption behind sustained growth in demand for wind turbine suppliers. If the wind power sector in China picks up in a big way by FY08-09 (ie, 2,000-4,000MW capacity addition per annum), it may provide fuel for sustained strong growth for Suzlon even beyond FY07.

In the near to medium term execution is the key risk

Managing rapid growth

Suzlon sales are expected to grow nearly four fold between FY05 to FY08. From being a pre-dominantly Indian player, Suzlon is likely to supply to 5-6 countries over next few years. Suzlon's production facilities too will be spread across India, US and China. Even in terms of products Suzlon plans to phase out its current 0.35MW and 1.25MW turbines and replace these with 0.6MW and 1.5MW turbine over a period of time. Suzlon will need to significantly boost its employee base and managerial capabilities to achieve this.

Limited experience in the overseas market

Till now Suzlon has completed supplies of only 23MW in overseas markets. The 81MW turbines to be delivered in FY06 have been shipped from India to Suzlon's overseas office but have not been delivered to the customer's project site yet. Thus Suzlon has limited experience in the overseas market and a failure to meet the strict quality specifications, time deadlines could negatively impact Suzlon's revenues and may even make it liable for penalties. To address this, the company has hired a number of people with long experience in the wind power business to help in sales and execution.

The company is taking steps to avoid component shortages

Some players in the wind power industry have been hit by shortage of components. In addition to raisings its own production capacity, Suzlon is closely monitoring the capacity expansion by its vendors to avoid delays due to unavailability of components. Suzlon has long term agreements with its vendors for some of the critical components, which should help it achieve the targeted growth.

Product risks

Wind power industry is notorious for large penalties/warranty costs associated with technical failures / product performance. Given the modular nature of wind power turbines, mistakes in one product could be replicated in hundreds of other products. The chances of these mistakes could be especially high when the company is trying to develop a new product or is growing at a rapid pace. The financial liabilities associated with such events could be very high.

Vestas stock was down +30% after revision in guidance

The recent earnings downgrade by Vestas is a case in point. In November 2005, Vestas, the world's largest wind turbine supplier, revised its 2005 Ebit margin guidance form 4% to -3% due to severe component shortages, additional warranty provisions, revised product development plans, cost overruns on US projects and adverse change in the mix of turbines. Vestas's stock price corrected by over 30% in response to the revision in the guidance.

Valuations

Suzlon's strong growth is largely reflected in its premium valuations. Except for ABB, Suzlon trades at a premium to other engineering companies under our coverage, but also offers superior growth. Suzlon trades at par with Vestas, the global leader in wind turbine business. Suzlon's market cap is higher than the combined market cap of Vestas and Gamesa (the top two players in wind power business in the world), which reflects significantly higher profitability of the company.

We expect the newsflow on orders and earnings to be positive in the near to medium term which would be the key driver for the stock price. Our target of 1,206 is based on 20x FY08 EPS. Investors should be cautious about the execution risk and dilution in regulatory support which could lead to a quick derating of the stock.

Figure 23

Comparative valuations

	Market price (Rs)	Market cap (US$m)	FY07 PE (x)	FY08 PE (x)	EPS cagr (05-08) (%)	Rec
BHEL	1,794	9,938	21.1	15.9	39.9	BUY
ABB India	2,541	2,440	32.1	22.4	45.4	BUY
Crompton Greaves	916	1,087	16.9	13.8	41.2	BUY
Cummins India	200	896	18.4	15.3	23.2	O-PF
Suzlon	1,125	7,286	22.5	18.2	63.3	O-PF
Vestas[1]	112.2	3,471	32.5	19.3	na	N-R
Gamesa[1]	13.3	3,135	13.8	12.1	6.0	N-R

[1] The currency for Vestas's share price is Danish Krone, for Gamesa it is Euros. For Vestas, Gamesa and ABB India FY07 refers to year ending 2006 and FY08 to year ending Dec-07.Source: Bloomberg, CLSA Asia Pacific Markets

Strong revenue growth driven by rising share of overseas revenues, which will account for 52% of sales by FY08.

In the near term free cash flow is likely to remain negative . . .

. . . as working capital needs will rise substantially in FY06 and FY07.

Strong price environment should help maintain Ebitda margins above 25% levels

High return ratios likely to sustain in near to medium term.

Figure 24

Summary P&L forecast (Rsm)

Year to 31 March	2004A	2005A	2006CL	2007CL	2008CL
Revenue	**8,575**	**19,425**	**37,567**	**61,449**	**76,174**
Operating Ebitda	1,435	4,691	10,229	16,221	20,751
Operating Ebit	1,299	4,197	9,844	15,489	19,600
Interest income	0	0	0	0	0
Interest expense	(276)	(458)	(419)	(429)	(439)
Other items	441	234	467	1,248	1,238
Profit before tax	**1,464**	**3,974**	**9,892**	**16,308**	**20,398**
Taxation	(30)	(322)	(1,187)	(2,283)	(3,060)
Others	0	0	0	0	0
Profit	**1,434**	**3,651**	**8,705**	**14,025**	**17,338**
Summary cashflow forecast (Rsm)					
Operating Ebit	**1,299**	**4,197**	**9,844**	**15,489**	**19,600**
Depreciation/amort	136	493	385	733	1,151
Working capital - trade	(1,320)	(4,039)	(6,197)	(12,916)	(5,830)
Other operating items	354	(389)	(876)	205	512
Operating cashflow	**469**	**263**	**3,156**	**3,511**	**15,433**
Net interest/taxes/other	(306)	(781)	(1,606)	(2,712)	(3,499)
Cashflow	**163**	**(518)**	**1,550**	**800**	**11,934**
Capital expenditure	(820)	(1,920)	(4,262)	(4,947)	(3,173)
Acq/inv/disposals	(93)	65	0	0	0
Free Cashflow	**(750)**	**(2,373)**	**(2,712)**	**(4,147)**	**8,760**
Ord div paid/Other items	(472)	1,662	10,685	(2,527)	(3,224)
Decrease in net debt	(1,222)	(710)	7,972	(6,674)	5,537
Summary balance sheet forecast (Rsm)					
Cash & equivalents	681	1,545	8,767	2,443	7,480
Debtors - trade	3,443	6,929	12,150	21,925	27,313
Inventories - trade	2,213	5,756	12,316	22,810	27,784
Other current assets	1,785	3,247	5,047	6,547	7,547
Fixed assets	1,652	3,079	6,956	11,170	13,193
Intangible assets	0	0	0	0	0
Other term assets	319	323	509	772	1,084
Total assets	**10,092**	**20,878**	**45,746**	**65,667**	**84,401**
Short-term debt	0	0	0	0	0
Creditors - trade	2,990	5,980	11,565	18,917	23,450
Other current liabs	990	1,829	2,286	2,744	3,018
Long-term debt/CBs	2,384	3,958	3,208	3,558	3,058
Other long-term liabs	0	0	0	0	0
Minorities/other equity	180	1,217	67	67	67
Shareholder funds	3,548	7,893	28,619	40,380	54,807
Total liabs & equity	**10,092**	**20,878**	**45,746**	**65,667**	**84,401**
Ratio analysis					
Revenue growth (%)	227.1	126.5	93.4	63.6	24.0
Op Ebitda growth (%)	322.7	226.9	118.1	58.6	27.9
Op Ebit growth (%)	441.5	223.2	134.5	57.3	26.5
Op Ebitda margin (%)	16.7	24.1	27.2	26.4	27.2
Op Ebit margin (%)	15.1	21.6	26.2	25.2	25.7
Net profit margin (%)	16.7	18.8	23.2	22.8	22.8
Dividend payout (%)	17.0	8.8	15.7	14.4	14.9
Tax rate (%)	2.0	8.1	12.0	14.0	15.0
Ebitda/net int exp (x)	5.2	10.2	24.4	37.9	47.2
Net debt/equity (%)	45.7	26.5	(19.4)	2.8	(8.1)
Gross debt/equity (%)	63.9	43.4	11.2	8.8	5.6
Net debt/op Ebitda (x)	1.2	0.5	(0.5)	0.1	(0.2)
Gross debt/op Ebitda (x)	1.7	0.8	0.3	0.2	0.1
Return on equity (%)	46.8	63.8	47.7	40.7	36.4
ROCE (%)	40.7	52.3	59.5	51.7	45.3
Return on assets (%)	17.9	23.6	26.1	25.2	23.1

Source: CLSA Asia-Pacific Markets

China - Supplying 60m homes by 2020

China could easily overtake India as Asia's largest wind market

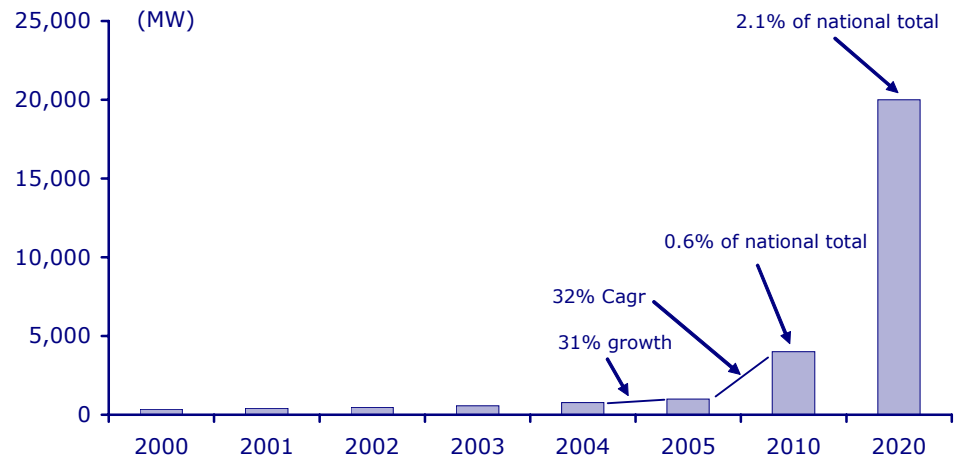
China could become a wind behemoth given its size and the length of its coastline. The China Meteorology Institute states that China has potential wind power capacity of 253GW (253,000MW) with another 750GW offshore. This is based on a height level of 10 metres, but modern turbines can be 100 metres high. At end-05, total Chinese generating capacity from all sources was 510GW. By 2010, this could reach 700GW, possibly higher.

32% Cagr in wind power capacity, 2005-10

By end-05, China may have 1,000MW (1GW) of wind power capacity, up from 764MW at end-04. The plan is to have 4,000MW by 2010, or a 32% 2005-10 Cagr and 600MW of new wind capacity a year. However, these figures could prove very conservative. The official 2020 target is 20,000MW (inside China's 2005 Renewable Energy Law), implying an average addition of 1,600MW a year from 2011 to 2020 and a Cagr of 17%. China is beginning to develop off-shore wind with plans for a first farm off the coast of Shanghai in 2006.

Figure 25

China wind power capacity, 2000-20



Source: European Wind Energy Association

But wind development has been a stop-start affair

But China's wind power development has been far from smooth. In the late 1990s, China was expected to have 1,000MW of wind capacity by 2000. The real figure was just 346MW. Much of this relates to a lack of clear and transparent operational regulations.

The importance of the new Renewable Energy Law cannot be overstated

While international wind power technology was transferred to China and the local element in production has gradually risen, Chinese manufacturers have focused on small turbines and the cost of wind-generated electricity has remained stubbornly and substantially higher than dominant coal-fired power plants. While there have been successful wind farms built on Nan'ao Island near Shantou on China's south-east coast which exports electricity into high coal-price Guangdong, and wind projects near Shanghai, plus some interesting investments by CLP Holdings, the importance of the new Renewable Energy Law cannot be overstated.

China's Renewable Energy Law is an ambitious first step

Wind is expected to be the biggest beneficiary of the REL

China's Renewable Energy Promotion Law went into effect in January 2006 having been passed in 2005. It is expected to have most impact on wind power within a targeted share for renewable energy of 10% of China's gross energy needs by 2020 from 1% currently.

25% Cagr for wind, 2004-20

Specifically, wind power is projected to see a Cagr of 25% over that period from the 2004 base of 560MW. Solar growth is projected at 21% Cagr, Biomass at 15% Cagr and Hydro at 9%.

Figure 26

Expected growth of renewables under China's Renewable Electricity Law

Renewable	Current capacity - end-04	Expected capacity - 2020	Implied Cagr (%)
Wind	560	20,000	25
Solar	50	1,000	21
Biomass	2,000	20,000	15
Hydro	7-8,000	31,000	9

Source: China People's Daily, March 2005

Some regulatory progress has already been made

Wind energy providers can already expect from 2003 legislation:

- Guaranteed grid access.
- Sharing of excess cost of wind energy over conventional energy with the grid owners. For its part, the grid can pass on the cost of new grid connection through to the end user.
- Tax concessions, ie a 50% reduction in VAT rates from 17% to 8.5%, and a similar reduction in income tax from 33% to 15%.
- Bank loans at preferential rates.
- The creation of a renewable energy fund based on usage of wires (ie transmission and distribution networks) which will support renewable energy development.

But key issue of tariff premium remains undecided

But an important point to note is that wind power tariff premium over grid average regional electricity pricing has yet to be revealed by the NDRC. The good news is that we understand that in January 2006 the biomass premium was announced at Rmb25/MWh for 15 years. The hope is that wind power is next on the list.

Premium needs to be Rmb20-50/MWh

On the basis of Rmb8-9m/MW capital cost and capacity factors of 20%-25%, the tariff premium over the average Rmb300/MWh wholesale grid tariff for conventional fossil fuels would need to be Rmb20-50/MWh.

Carbon emission credits will figure more strongly in wind economics

On top of that, income from Certified Emission Reductions of perhaps Rmb6/MWh is do-able given a sale price of €7-10/tonne of CO_2. This is likely to become an increasingly important element in the calculations of wind power providers.

Promotion of manufacturing potential

NDRC now promoting large-scale wind farms

China wants to promote its wind turbine manufacturing base. The National Development and Reform Commission (NDRC) is now promoting large scale wind farms of at least 100MW with a tendering process aimed at reducing the generating cost and increasing the proportion of locally-sourced components. Indeed, 70% local sourcing content has been mandated.

According to Wind Force 12, the major elements of these concession projects are:

- 100MW projects with minimum turbine of 0.6MW. By way of comparison, Suzlon's turbines are typically larger at 1.25MW, but they are launching a new smaller 0.6MW turbine to capture the lower end of their Indian markets.

70% locally sourced component mandate is driving the arrival of new foreign wind manufacturers

- 70% of components locally sourced - this is a key issue and explains the arrival in force of foreign wind majors like GE Wind, Vestas, Gamesa and Suzlon.
- Local authorities responsible for building the road access to the wind farm sub-stations and the local grid company covers transmission.
- The electricity must be bought by the provincial power grid which covers the extra cost of the wind power generation (but at what price?).
- 25-year contracts (but unconfirmed).
- After the first 30,000 turbine hours (ie effective minimum of 4 years), the tariff reduces to grid average.

Private money coming in

With a staggering 1,000GW of offshore and onshore wind power potential and the January arrival of a new Renewable Energy Law, it is hardly surprising that world's top wind turbine manufacturers are rushing to establish mainland JVs.

Shift to private capital underway

Historically, most wind power projects have been funded by state or international donor funding, but a shift to the private sector is now underway. NDRC approval is not required for projects at less than 50MW which saves both time and money for investors.

CLP Holdings, the Hong Kong-listed power utility, is a good example of the new wave of private investment in China's wind sector. CLP Power Asia, a wholly-owned subsidiary, has investments in four wind farms in China:

- 45% stake in two greenfield wind farms totalling 46.5MW on the coast of Shandong province due to be commissioned at end-1Q06 (Changdao) and 2H06 (Weihai) - one using Gamesa equipment, and the other Dalian. CLP's equity IRR is "low double digits" based on Rmb247m invested in Changdao and Rmb165m in Weihai. CLP owns 45% with local partner China Huaneng Group owning 55%. The potential capacity of Weihai is estimated at 150MW.

CDM rights help the economics

- Targeting the forward sale of Clean Development Mechanism rights (CDM, a carbon credit methodology under the Kyoto Protocol), CLP has also invested for 12.5MW share in a 50MW wind farm in Jilin province with China Datang, another of the "Big Five" China electricity generating companies. Targeted commissioning is late 2006/early 2007, and the project is about to appoint its manufacturer.
- 45MW wind farm in Nanao in which CLP will have a 25% stake, China Huaneng 50% and Guangdong Huedian 25%. Targeted commissioning is early 2007.

CLP is also conducting wind monitoring at various wind sites in Guangdong, Guangxi and Hainan Island which have a combined wind power generation potential of 300MW.

CLP wants renewables to be 5% of group capacity by 2010

The company wants to have 5% of its total generating capacity in renewables (including hydro) by 2010. Including what is under construction and the 167.5 equity MW in wind farms in Australia (existing and under construction), that equates to about 920MW, compared to the current renewable energy capacity of 261MW.

Local players will benefit from overseas technology transfer

Goldwind is China's market leader, while Gamesa and NEG-Micon are the top foreign manufacturers . . .

Data from the Tsinghua-BP Clean Energy Research and Education Center suggests that GoldWind Science and Technology Company has a 20% market share of the Chinese wind turbine market. But Xi'an Nordex is also a player, albeit with a very small market share. Gamesa and NEG-Micon are the top two foreign-owned manufacturers with 36% and 29% shares, followed by GE Wind (part of behemoth GE) which entered the market in 2004 and has an 8% market share.

. . . but this is likely to change rapidly with the arrival of new players like GE Wind and Suzlon

This data is likely to change considerably as major foreign manufacturers like GE, Gamesa, Vestas and Suzlon set up their manufacturing stalls in China in joint venture with local players.

Goldwind Science and Technology Company is an (as-yet-unlisted, www.goldwind.cn) five-year old Xinjiang-based manufacturer of wind turbines and the largest in China. It is 55% state-owned. 2004 sales were Rmb250m compared with Rmb12m in 2000. The company expects Rmb400m (US$49m) of sales in 2005 with a 30% domestic market share. Growth thereafter is pegged by the company at 35%. Manufacturing facilities are based in eastern coastal areas and it owns an R&D centre in Germany.

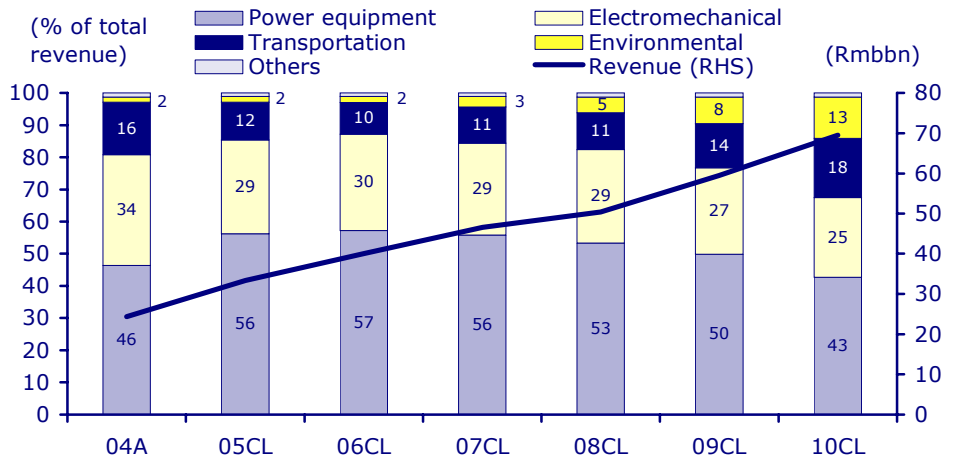
Xi'an Nordex is a joint venture between German wind company Nordex AG and the Xi'an Aero Engine Company. Established in 1998, the JV has built a 24MW wind farm in Yingkou in north-east province Liaoning with 35 generators, including the first 4MW wind turbines to be introduced in China. Xi'an is located in Shanxi province. Nordex is headquartered near Hamburg, has manufactured 2,300 wind powered generators in 25 countries with a combined capacity of 2GW. No firm figures are available but we understand that the JVs operates at good margin.

Shanghai Electric is looking to a small extent at wind to generate growth

Shanghai Electric is looking to a small extent to wind energy for growth, but on current projections, this will still be about 3% of sales by 2007. Unlisted **Dalian Heavy Machinery** and **Baoding Huiyang Aviation Airscrew** are also signing technology transfer agreements with major foreign makers. *See our Shanghai Electric report, Not in synch (November 2005).*

Figure 27

Shanghai Electric's revenue growth and mix



Source: CLSA Asia-Pacific Markets

Japan - Good news beyond just Kyoto

That 6% reduction is proving mighty hard work!

Japan was host country to the Kyoto Protocol. It has targeted an ambitious 6% reduction in its 1990 greenhouse gas emissions by 2012. To get there, Japan passed a Renewable Portfolio Standard Law in April 2003 with the aim of raising renewable energy levels to 1.35% of total electricity generation by 2010. That compares to 0.9% currently of which wind is 60%. The main method is forcing the electric utilities to buy a certain proportion of their requirements from wind energy providers.

Japan's new energy strategy should be alternative energy positive . . .

This is likely to be backed up by Japan's new National Energy Strategy, which should be announced in the spring, which we understand will call for lowering Japan's dependence on oil as a primary energy source from the current 50% to 40% or less by 2030 through promotion of alternative energy sources such as solar and wind power.

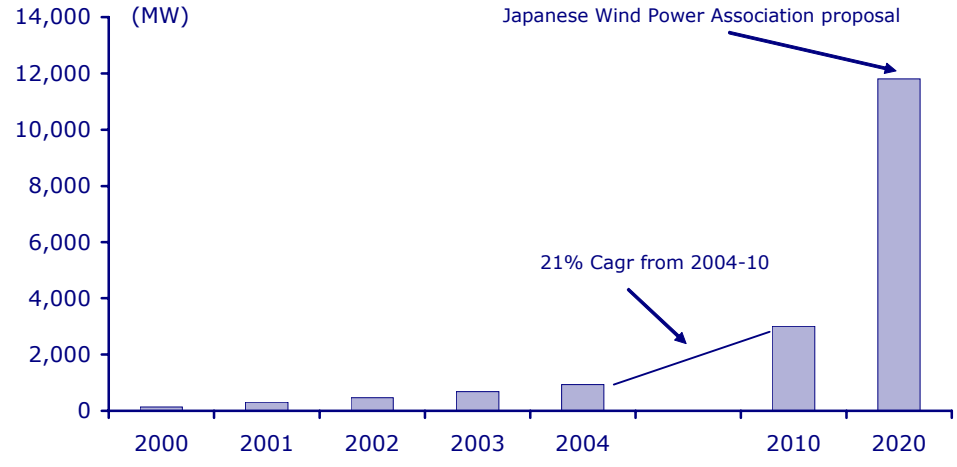
Incentivised pricing for renewable generated electricity and capital grants have been made available. Power purchase agreements for renewables with a reasonably long 17-year lifespan have engendered stability and confidence. Japanese wind capacity rose 38% in 2004 to 936MW. Most of this is located in Tohoku, Hokkaido and Kyushu.

. . . and 60% of Japan's alternative energy consumption is now from wind power

Of total alternative energy consumption, 60% is now from wind power and the Japanese government wants to see 3,000MW of wind capacity built out by 2010, three times the level at the end of 2004 (936MW).

Figure 28

Japan wind power capacity, 2000-20



Source: JPWA

Wind power will continue to dominate the alternative energy space in Japan as access to the national network is crucial in order to sell wholesale power to the Public Utility companies. A key issue for Japan's wind industry is site selection given the relatively high population density and often difficult topography. Offshore wind development is being seriously considered but the low number of shallow water sites is a real challenge.

Big electricity is already challenging minnow wind power

The big electric utilities are challenging wind already, placing caps on wind's market share

But big electricity is challenging the minnow wind industry, perhaps a sign of wind's growing competitiveness.

In a situation that has similarities with high wind energy penetration areas like Tamil Nadu in India and western Denmark, Japan's 10 monopoly electric power companies have placed caps on the amount of wind powered generation they are prepared to accept (most opted to buy from third parties than do it themselves). Their excuse, for that is what it seems given the very low wind market share compared to Tamil Nadu or Denmark, is that wind power is destabilising their electricity grids.

JPWA has stated that 1,700MW of new projects failed to secure purchase agreements in 2003 alone

They have argued that the intermittent nature of wind energy supply means they have to regularly switch supply to thermal plants which can be destabilising and that this results in problems for industry users operating sensitive equipment. Many utilities have now established caps on wind energy capacity on their grids which if not removed by the government, could stall Japan's wind industry. The JPWA has already stated that 1.7GW of wind projects failed to secure purchase agreements in 2003 alone as a result of the earlier caps.

Figure 29

Japanese wind power distribution by region, 2003, and wind energy caps

	MW	Number of turbines	Cap (MW)
Tohoku	275	239	520
Hokkaido	159	187	250
Kyushu	113	115	mid-06
Kanto	54	72	
Chubu	27	41	
Okinawa	12	26	
Shikoku	16	22	200
Kinki	14	20	
Chugoku	13	18	

Source: IEA

But there are grounds for optimism

But Japan is too long CO2 and other options have their own major millstones attached

Still, there are grounds for optimism driven by:

- Japan may fall 3.75bn tonnes of CO_2 equivalent short of its Kyoto target on current run rates
- The new National Energy Policy - government wants a more balanced energy mix, with less reliance on increasingly expensive imported fuel (which includes uranium)
- Continued public fears over nuclear plant safety
- If wind is destabilising, so are volatile thermal fuel prices

Wind power's costs are falling rapidly

- Wind costs are falling - they are down 12-18% with each doubling of global wind capacity. Against this, we have seen thermal fuel prices remain at high levels.

See Appendix 1 for details on renewable energy and fossil fuel energy costs.

- Wind represented only 1.2% of all electricity supply in y/e March 2005

At least 3GW by 2010 looks do-able

The likelihood of Japan reaching 3,000MW by 2010 looks good. That would represent an industry Cagr of 21% between 2004 and 2010.

For Australia and Philippines - please see Appendix 2.

Japan Wind Dev't

¥252,000

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February 2006

Japan
Power

Reuters	2766.T
Bloomberg	2766 JP

Priced on 1 February 2006
Topix @ 1694.2

Market cap	US$208m
Shares in issue	97,000
Free float (est.)	62.3%

3M average daily volume
¥221.2m

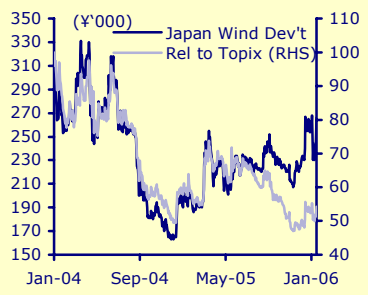
12M high/low
¥268,000/186,000

Foreign shareholding 9.8%

Major shareholders
Masayuki Tsukawaki 16.9%
Master Trust Bank of Japan 7.7%
Mantaro Kito 7.5%
Tokyo Small Bus Invest't 4.5%

Stock performance (%)

	1M	3M	12M
Absolute	(1.2)	12.5	26.6
Relative	(3.8)	(2.2)	(14.3)
Abs (US$)	(1.0)	11.4	11.9



Source: Bloomberg

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Japan's only listed wind play

JWD's 48 employees opened their first 15MW wind farm with GE Wind in April 2003, a month after its IPO. Since then, JWD has expanded in Japan and Germany. 83% of sales is wind power generators principally from GE Wind, while the rest is of electricity to the grid. Growth potential looks excellent given regulatory support and manufacturing capacity expansion. The key challenge is from big power - the utilities have capped wind's market share - a sign of wind's potential as well as a risk.

Beneficiary of Japanese renewable energy drive

In addition to a likely big boost from the new National Energy Strategy, Japan agreed in 2003 to raise its alternative energy mix (solar, water, biomass and wind) from 0.9% to 1.35% by 2010. Of this, 60% is wind already and wind will continue to dominate the wholesale alternative energy space in Japan as access to the national network is crucial in order to sell wholesale power to the public utility companies and scale end-users. The government wants 3GW of wind capacity by 2010, a 21% Cagr from 2005. That now looks do-able.

Hibikinada wind farm was a milestone

Not only was this JWD's first wind farm, it was for GE too which supplied the turbines. It is one of the largest in Japan at 15MW (ten 1.5MW turbines) and can service 10,000 households. The project was notable also for the instrumental support of the government and the backing of Nippon Steel.

Growth potential is high given manufacturing capacity growth

At March 2005, the company had 83.2MW of capacity and we understand it is developing 75MW this financial year. The aim is to have total capacity at 180MW by March 2007 and 300MW by 2010. Taking into a negative working capital and long-term debt, gearing at end-2005 was 88%, so investors may face dilution risk going forward. The last financial year also saw a big rise in accounts receivable to 142 days, up from 24 the year before.

Key challenge is the electric utilities' capping of wind contribution

Japan's 10 monopoly electric utilities have capped the amount of wind powered generation they will accept. Their excuse (Japan has a very low wind market share compared to Tamil Nadu or Denmark) is that wind power is destabilising their electricity grids due to its intermittent supply. If not removed by the government, these caps could stall Japan's wind industry growth. The JPWA has already stated that 1.7GW of wind projects failed to secure purchase agreements in 2003 alone as a result of the earlier caps.

Preliminary earnings analysis[1]

Year to March	2002	2003	2004	2005	2006
Sales (¥m)	1,272	4,064	4,872	5,827	7,300
Operating profit (¥m)	(6)	193	402	730	1,040
Operating margin (%)				12.5	14.3
Current profit (¥m)	(2)	17	631	504	660
Net profit (¥m)	(13)	95	359	273	380
EPS (¥)	(237)	1,606	4,831	3,092	3,909
EPS growth (%)		(778)	201	(36)	26.4
PE (x)		156.9	52.2	81.5	64.5
ROE (%)			8.9	3.9	5.7

[1] Not based on detailed modelling. Source: Japan Company Yearbook, CLSA Asia-Pacific Markets

Appendix 1: Renewables cost comparison

Renewable energy and fossil fuel energy - cost comparison

Technology	Characteristics	Current costs (US¢/kWh)	Cost trends	Costs beyond 2020
Power generation				
Natural gas	Large-scale peak load 2-year construction	2-4	Declining capital costs given tech advances, but offset by higher fuel costs given oil linkage.	similar
Coal	Large-scale base load 3-year construction	3-5	Declining capital costs given tech advances, but may be offset by higher fuel costs.	similar
Nuclear	Large-scale base load 5-year construction	4-6	Design standardisation helping to reduce costs towards US$3-5 cents/kWh but capital costs an Achilles heel.	3-5
Wind - onshore	1-3MW turbine size; 60-100m blade diameter	4-6	Costs have fallen 12-18% with each doubling of global MW. Costs now half 1990 levels. Turbine size up from 600-800kW 10-yrs ago. Further reductions from improved blade/generator design, elect's	2-3
Wind - offshore	1.5-5MW turbine size; 70-125m blade diameter	6-10	Market still small. Future cost reductions due to market maturity and technology improvements.	2-5
Solar PV (module)	Cell type and efficiency: single crystal:17%, poly- crystalline: 15%, thin film: 10-12%	-	Costs have declined by 20% for each doubling of installed capacity, or about 5% pa. Future reductions due to materials, design, process, efficiency and scale.	
Rooftop solar PV	Peak capacity: 2-5kW	20-40	Continuing declines due to lower solar PV module costs and improvements in inverters and balance-of-system components.	4
Solar thermal power	Plant size: 1-100MW; Type: tower, dish, trough	12-18 (trough)	Costs have fallen from about US$44 cents/kWh from 1980s. Future reductions dependent on scale and technology.	4-10
Geothermal	Plant size: 1-100MW; Type: binary, single-flash, double-flash, nat'l steam	4-7	Costs have declined since 1970s. Future declines predicated on improved exploration technology, cheaper drilling, better heat extraction.	1-8 (electricity) 0.5-5.0 (heat)
Biomass power	Plant size: 1-20MW	5-12	Stable	4-10 (electricity) 1-5 (heat)
Biofuels				
Ethanol	Feedstocks: sugar cane, sugar beets, corn, wheat, cellulose (in future)	25-30 cents per litre gasoline equivalent	Declining costs in Brazil due to production efficiencies, now 25-30 cents/equivalent litre (sugar), but stable in USA at 40-50 cents (corn). Other feedstocks higher, up to 90 cents. Cost reductions for ethanol from cellulose are projected, from 53 cents today to 27 cents post-2010, modest drops for other feedstocks.	From 53 to 27 c/le (cellulose)
Bio-diesel	Feedstocks: soy, rapeseed mustard seed, waste vegetable oils	40-80 cents per litre gasoline equivalent	Costs could decline to 35-70 cents/ litre diesel equivalent post-2010 for rapeseed and soy, and remain about 25 cents (current) for bio-diesel from waste oil.	35-70 (rapeseed/soy)
Rural off-grid energy				
Mini-hydro	Plant capacity: 100-1,000 kW	5-10	Stable	
Micro-hydro	Plant capacity: 1-100 kW	7-20	Stable to moderately declining with efficiency improvements.	
Pico-hydro	Plant capacity: 0.1-1kW	20-40	Stable to moderately declining with efficiency improvements.	
Biogas digester	Digester size: 6-8 cm	n/a	Stable to moderately declining with economies of construction and service infrastructure.	
Biomass gasifier	Size: 20-5,000 kW	8-12	Excellent potential for cost reduction with tech advances.	
Small wind turbine	3-100 kW turbine size	15-30	Moderately declining with tech advances.	
Household wind turbine	0.1-1 kW turbine size	20-40	Moderately declining with tech advances.	
Village-scale mini-grid	System size: 10-1,000kW Options: battery back-up or diesel	25-100	Declining with reductions in solar and wind component costs.	
Solar home system	System size: 20-100W	40-60	Declining with reductions in solar component costs.	

Note: All costs are economic costs, exclusive of subsidies and other policy incentives. Typical energy costs are under best conditions, including system design, siting, and resource availability. Some conditions can yield even lower costs, eg down to 2 cents/kWh for geothermal and large hydro and 3 cents/kWh for biomass power. Less-optimal conditions can yield costs substantially higher than the typical costs shown. Typical solar PV grid-connected costs are for 2,500 kWh/sq metre per year, typical for most developing countries. Costs increase to 30-50 cents/kWh for 1,500 kWh/ sq metre (ie for Southern Europe) and to 50-80 cents for 1,000 kWh/sq metre (ie UK).
Source: Eric Martinot, Renewables 2005 Global Status Report

Appendix 2: Australia and Philippines

Australia - 300% growth on the table

Three times current capacity is under construction or approved

Given its size, Australia has one of the strongest and most prolific wind sources in the world, certainly on a per capita basis.

Having doubled its capacity in 2004 to 380MW, current wind power capacity is 421MW. Three times that capacity is either under construction or approved. Over 4,000MW more of projects have been identified. A total of A$1.6bn (US$1.2bn) capex will have been spent or under way by 2007.

Growth in renewable energy in Australia is driven by the Mandatory Renewable Energy Target (MRET). The intention of MRET was to increase renewable market share by 2% over 1997 levels in 2010 and to maintain that increased level of production until 2020.

However, according to the Australia Wind Energy Association, due to greater than anticipated electricity consumption, the current MRET measure will result in a loss of 2% market share for renewables by 2020. There is growing pressure on Australia's federal government to promote renewable energy given the 30% rise in greenhouse gas emissions since 1990, but current federal government support is much weaker than say China.

This has not stopped **CLP Holdings** (2 HK) from investing on its own back - A$110m for a 50% stake in Hydro Tasmania's Roaring 40s Renewable Energy company.

CLP has invested A$110m in Hydro Tasmania's Roaring 40's company

Roaring 40's currently owns:

- 100% of the 65MW Woolnorth Bluff Point wind farm in Tasmania
- 50% of the 66MW Cathedral Rocks wind farm in South Australia

Roaring 40s also has four advanced stage development wind projects in Australia and further development projects in New Zealand and China. The late stage Australian projects include the proposed 75MW Woolnorth Studland Bay wind farm as well as the 129MW Musselroe wind farm, both in Tasmania.

Another interesting company is **Babcock & Brown** (BNB AU) which listed an infrastructure-style fund called **Babcock & Brown Wind Partners Group** (BBW AU) on 28 October 2005. Current market cap is US$685m.

This global investment and advisory firm worked out wind power's potential a while back. As an advisor and investor in the wind energy sector in Australia, US and EU, they have arranged US$2bn financing for about 2,000MW of wind energy projects to date. Some of these projects formed the basis for the BBWP flotation in 2005.

Babcock has been very active in wind energy

On top of the wind projects listed below, Babcock acquired in December 2005 for €490m 100% of Enersis debt and equity, one of Europe's largest integrated independent renewable energy companies with 620MW of hydro and wind projects (existing and under construction) in Portugal, Spain and France. Enersis also has 360MW of projects at various stages of licensing and small investments in bio-fuels and wave technologies. Enersis' principal seller was Semapa, a listed Portuguese conglomerate. On the basis of the operating assets' €44.0m Ebitda for y/e December 2005, the EV/Ebitda multiple was 11.1x. That looks rich, but if the 360MW of projects deliver, say, 80% of the

Wind power capacity under development now at 3,000MW

per MW Ebitda of the existing portfolio, then the multiple falls to 7.6x. That is just below the average market cap-weighted EV/Ebitda multiple of our listed Asia power stock universe.

The Enersis deal takes Babcock's wind power capacity under development to c.3GW which puts the company well ahead of India's wind power leader, Suzlon, at least in terms of capacity.

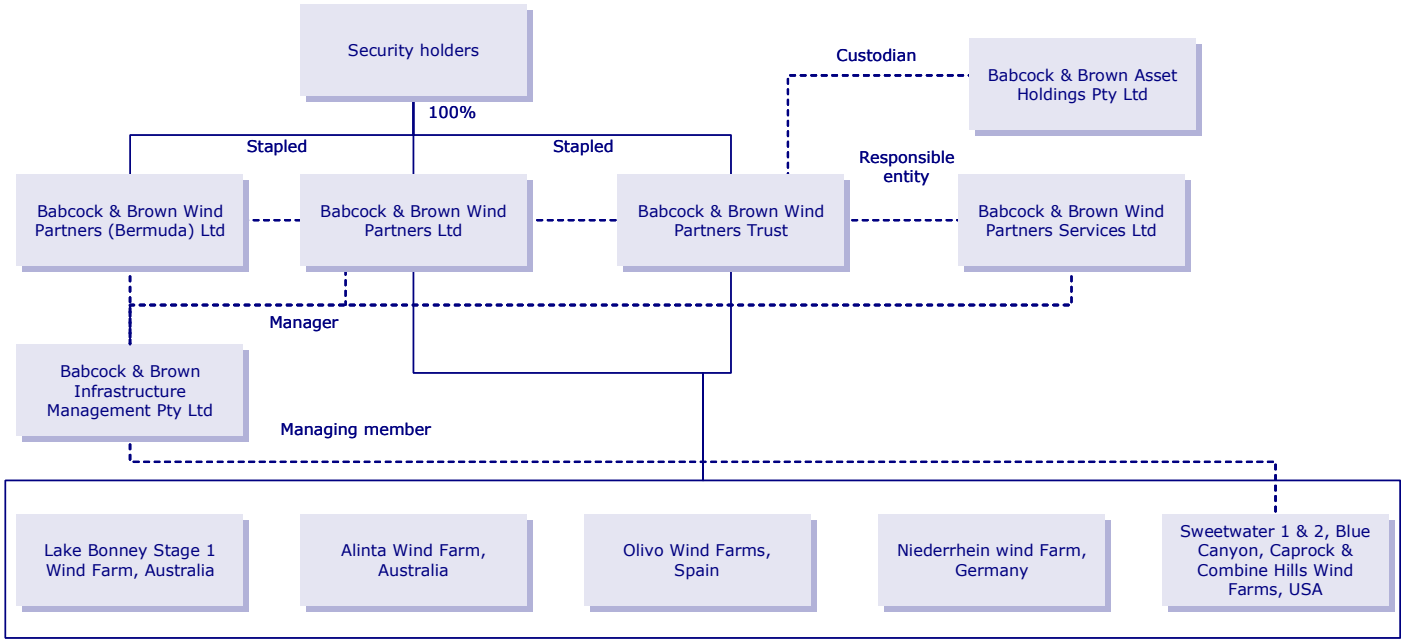
At listing, BBWP owned 15 wind farms totalling 672MW: two in Australia, eight in Europe and five in USA.

Babcock & Brown Wind Partners Group wind power portfolio on listing

Wind Farm	Location	Equity (%)	Start date	Capacity (MW)	Turbines data	Energy supply (GWh pa)
Australia						
Alinta	Western Australia	100	Dec-05	89.1	54/ NEG Micon 1.65MW	366.5
Lake Bonney (Stage 1)	South Australia	100	Feb-05	80.5	46/ Vestas 1.75MW	211.2
Europe						
Sierra del Trigo	Spain - Jaen	100	Jan-02	15.2	23/Gamesa 660kW	32.3
La Muela Norte	Spain - Zaragoza	100	Aug-03	29.8	35/ Gamesa 850kW	70.6
El Redondal	Spain - Leon	100	Jan-05	30.6	36/ Gamesa 850kW	66.5
Sierra da Loba	Spain - Galicia	100	Oct-05	36	18/Gamesa 2MW	99.9
La Plata	Spain - C. La Mancha	100	Jun-05	21.3	25/ Gamesa	45.6
El Sardon	Spain - Andalucia	100	Nov-05	25.5	30/ Gamesa 850kW	47.9
Wachtendonk	Germany - Westphalia	99	Oct-05	12.0	8/ Nordex 1.5MW	23.7
Bocholt-Liedern	Germany - Westphalia	99	Oct-05	7.5	5/ Nordex 1.5MW	13.3
North America						
Sweetwater 1	USA - Texas	40	Dec-03	37.5	25/ GE 1.5MW	141.7
Sweetwater 2	USA - Texas	40	Feb-05	91.5	61/ GE 1.5MW	361.8
Caprock	USA - New Mexico	64	Dec-04 May-05	80.0	80/Mitsubishi 1MW	316.6
Blue Canyon	USA - Oklahoma	40	Dec-03	74.3	45/ Vestas 1.65MW	264.1
Combine Hills	USA - Oregon	40	Dec-03	41.0	41/Mitsubishi 1MW	119.6
Total				671.6MW	546 turbines	2,181

Source: BBWP prospectus

Babcock & Brown Wind Partners Group structure



Source: BBWP prospectus

BBWP's margins are only marginally lower than Suzlon's

BBWP's margins are marginally lower than Suzlon which benefits from lower costs of production in India (but we expect these to erode over time as transport costs rise and execution risks multiply). BBWP is forecast by its directors to have 18 and 21% net margins in FY June 2006 and FY07. This compares to a steady 23% for Suzlon.

BBWP historical and forecast P&L

Year to June (A$000)	2004	2005	2006 directors' forecast	2007 directors' forecast
Total product revenue	-	16,607	76,964	105,279
Growth (%)			363	37
Operating costs	-	(2,070)	(13,251)	(17,459)
Corporate costs	(46)	(1,677)	(9,162)	(12,524)
Ebitda	(46)	12,860	54,555	75,296
Ebitda margin (%)		77	71	72
Share of equity associates[1]	-	-	2,899	4,868
Depreciation & amortisation	-	(5,672)	(19,946)	(25,995)
Ebit	(46)	7,188	37,508	54,169
Ebit margin (%)		43	49	51
Net borrowing costs	3,045	(2,280)	(18,188)	(22,776)
Profit before tax	2,999	4,908	19,320	31,393
Income tax	(236)	(1,775)	(5,796)	(9,418)
Profit after tax	2,763	3,133	13,524	21,975
PAT margin (%)		19	18	21
Net output generated (GWh)		191	716	978
Australia & Europe			939	1,204
USA		191	1,655	2,182

[1] Includes US wind farms. Source: BBWP prospectus

BBWP historical and forecast cashflow

Year to June (A$000)	2004	2005	2006 directors' forecast	2007 directors' forecast
Net operating cashflow (includes US wind farms)	(18,109)	(5,719)	43,254	68,506
Capex	(82,728)	(236,989)	(395,616)	-
Capital raising (incl offer)	62,116	121,305	332,968	-
Net proceeds/ (repayment) of borrowings	119,302	164,084	241,369	(15,920)
Distributions to holders of stapled securities[1]	(1,138)	(12,010)	(47,620)	(52,546)
Net increase in cash held	79,443	30,671	174,355	40
Cash at beginning of period	-	79,443	110,114	284,469
Cash at end of period	79,443	110,114	284,469	284,509

Note: Based on trading price of A$1.83, this implies yield of 5.6% for FY06 and 6.1% for FY07. [1] Distribution policy: half-yearly. Forecast A$10.2 cents per stapled security for FY06; A$11.2 cents in FY07. Source: BBWP prospectus

Finally, we note small cap **Viridis Clean Energy Group** (VIR AU) (www.viridisenergy.com). Like BBWP, this is an infrastructure fund with stapled securities, albeit with a broader clean energy focus and a much smaller market cap of just US$103m. Viridis invests in renewable, waste or low carbon emission energy sources including wind, hydro, biomass, geothermal, solar and natural gas. By value, three-quarters of the fund is invested in wind (106MW), 15% in landfill gas, 8% in gas and 1% in hydro. Germany is the main investment location.

Philippines - newcomer with potential

400MW in 10 years

The country's first wind farm opened in June 2005 at a cost of US$48m with a 25MW capacity. The aim is to install over 400MW of wind power within ten years. The US-based National Renewable Energy Laboratory reckons 4% of the country is wind power friendly which implies 70,000MW of wind power potential. That represents seven times current electricity demand.

The Department of Energy has identified 16 areas for development with total capacity of 345MW. Contracts covering 40% of this have been awarded. The state-run Philippines National Oil Company Energy Development Corp has a 40MW wind farm project in Ilocos Norte.

The most interesting point about the Philippines' first wind farm project is that it is an excellent example of the developed world, in this case Denmark, working to meet its Kyoto Protocol emissions reduction targets by fostering a clean energy project in the developing world. This project was registered under the Clean Development Mechanism, one of the three ways of securing carbon credits under the protocol.

Notes

Notes

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Key to investment rankings: BUY = Expected total return greater than >10%; **O-PF** = Expected to outperform the local market by 0-10%; **U-PF** = Expected to underperform the local market by 0-10%; **SELL** = Expected to underperform the local market by >10%. Performance is defined as 12-month total return (including dividends).

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