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INDUSTRY | COMMENT

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Wind Power: It's Dust in the Wind

Neutral: Wind energy impact on power companies like CPN & NRG is not well understood

Wind's impact on power prices and reserve margins is not well understood, yet, but we believe that it will not be as bad as some have imagined. Therefore, we aren't bearish on CPN and NRG – or for that matter on any other IPP – due to wind.

If, as some believe, wind replaces baseload then economics of wind should be compared to baseload, which makes wind very expensive. Typical average capacity factor for wind is ~20%-25%, while nominal cost is about $2,000/KW. Equalizing for capacity factors, wind actually costs ~$8,000/KW vs. ~$3,500/KW for super-critical coal and geothermal plants, ~$1,000/KW for CCGTs, and ~$5,000-$8,000/KW for nuclear.

Wind impact on reserve margins and power prices isn't very predictable, but is not nearly as bad as imagined, primarily due to the fact that wind is intermittent and requires back-up power. Due to intermittency, volatility of power prices should rise. This alone should increase ancillary service prices, which goes a long way into making-up for *potential* decreasing power prices.

As wind percentage increases on a grid, proportionately more back-up power is needed, which *reduces* reserve margins. This too has the effect of not only making reserve margins tighten, but also making power prices more volatile, especially due to the type of back-up power required. This too may also lead to higher, not lower prices.

If wind were to have a dire impact on power prices, particularly in off-peak markets, then we believe many intermediate plants should shut-down. This may also have the effect of increasing, not decreasing power prices. Certainly, ancillary service prices would increase.

Specifically, in regards to understanding Texas wind impact on CPN and NRG, transmission is another key. Vast majority of CPN and NRG's plants are in the Houston-load pocket, while current plans for transmission for wind extend only into the Dallas/Ft. Worth and Austin/San Antonio areas.

We believe plans for sourcing 20%-30% of US electricity from wind is foolish. The reasons why the Danes have 20% of their power source from wind are multiple, but one that sticks out is the fact that they are willing to live with interruptible power. Americans, in general, aren't: asking an American to turn off their air conditioner in the middle of July or August isn't going to win anyone votes.

Wind isn't as clean as it's portrayed by advocates. Part of the back-up power to wind has to be spinning reserves: power plants that burn fuel (typically natural gas), but are not generating electricity. Spinning reserves would typically account for some 25% of the make-up of the back-up power.

In our view, wind makes for good investments, in our view, but not so good for consumers and grid operators.

Priced as of prior trading day's market close, EST (unless otherwise noted).
All values in USD unless otherwise noted.

For Required Conflicts Disclosures, see Page 4.

Details

To crudely illustrate our thesis, we use Texas as our example. Some facts first:

1) Texas has ~111GW of installed capacity of which 21GW is from coal, 79GW is from natural gas, 5GW is from nuclear, and 4.5GW is from wind as of yearend 2007;

2) In 2007, TX generated some 405.5 MM MWh, of which coal accounted for 147.3 MM MWh, natural gas accounted for 199.5 MM MWh, nuclear was 41.0 MM MWh and wind accounted for 9.0 MM MWh;

3) Implied effective capacity factors (based on 95% availability) are: 84.2% for coal, 30.5% for natural gas, 95.8% for nuclear and only 24.1% for wind; and

4) It is assumed by most that nominally ~18GW of additional wind will come on-line in Texas by mid next decade or some ~16.2% increase in capacity.

Given that wind is supposed to replace baseload production, when equalizing for capacity factors, effective capacity is only some 4.5GW (25% of nominal capacity), suggesting that the reserve margin should grow by ~4.1% not ~16.2%.

Next, given the intermittency of wind, we would suggest that total wind capacity of 22.5GW (4.5GW of existing plus 18.0GW of new) with an effective capacity of ~5.6GW would require at least 50% back-up or some ~2.8GW.

Although there is at least 4.5GW of wind on the Texas grid, because the effective capacity is so small, we would guess that at present there is not much, if any, back-up generation for wind. But as the percentage of wind grows on the grid, we believe that back-up power will grow disproportionately faster. At 5.1% (5.6GW/111GW) of the grid, we strongly believe that the back-up power to the wind will have to be at or above 50%.

Back-up to wind has to come in the form of quick start gas turbines or spinning reserves.

Proponents of wind suggest that wind can be mapped out at least 12-24 hours in advance; however, this does not mitigate the fact that sometimes wind doesn't blow, which is why back-up power is needed. Sometimes, despite best predictions, wind doesn't blow when expected. For both reasons, i.e., 12-24 hours lead time and lack of perfect predictability, one cannot use baseload plants to back up wind. This means that the task of backing-up wind has to fall on gas turbines or spinning reserves. These are typically what form the back bone of any grid's reserve margin.

Therefore, the amount of back-up power needed must be netted against the reserve addition, suggesting that 18MW of wind capacity, only translates into net effective capacity of ~1.7MW- 2.3MW added to the grid or 1.5%-2.0% increase in reserve margin by middle of next decade.

Let's say that we are wrong and that wind has a much larger and profound effect on the grid, what then? The answer is unknown, but we believe the results will not be as bad as imagined to power companies.

If the actual impact is 18MW or an increase of 16.2% in reserve margins, and wind is the first to be dispatched along with hydro and this effectively pushes out the supply stack relative to the demand curve, and this actually results in marginal power prices that result in $0/MWh then we would suggest that power companies and utilities would shut-down marginal plants. This strongly implies to us that on-peak power prices will be much higher than they are today and ancillary service prices will sky-rocket. This may more than offset lost margins from marginal plants shutting down. Certainly, for both CPN and NRG, this would translate into much higher capacity factors for its peaking plants.

But can we actually have $0/MWh in off-peak markets? Not very likely!

Typically wind is contracted through power purchase agreements (PPAs) that have a pricing structure in it to compensate the wind farm owners for their cost of capital and a decent return. Why would the off-taker then turn around and dispatch the wind power for $0/MWh incurring a 100% loss, when capacity factor adjusted price of wind power is somewhere in the $69-$88/MWh (targeting a 10%-15% equity return)? Also, even if wind were to have 100% capacity factor, this would not be enough power to serve the off-peak load, and the marginal price of wind would be significantly higher than that of a CCGT (assuming current natural gas prices) or a coal plant. At present, the marginal price for a CCGT would be about ~$40-$50/MWh and for supercritical coal it would be $30-$40/MWh and marginal coal would be $40-$50/MWh. Lastly, most wind appears to be directly sold to utilities that would pass it on to consumers at cost. In Texas, we would assume that Reliant Energy (NRG's Retail subsidiary) and TXU Retail would buy directly from wind farms and won't buy unless they could pass-on the cost through their retail rates. So, again, the idea of off-peak power prices going to $0/MWh seems far fetched.

If wind is a major factor then on-peak prices should not only sky rocket, but also have huge volatility, which may more than offset off-peak power prices taking a big hit.

Furthermore, if wind does have an enormous effect on off-peak prices, then this is likely to force both utilities and power companies to shut-down marginal plants, particularly the intermediate coal and natural gas plants. This means that during on-peak hours, more reliance will be had on peaking plants – specifically gas turbine plants – which by design and nature are higher cost plants. Therefore, this should raise the price of power during on-peak hours. Also, given the nature of peaking power and the effect of utilizing many more peaking plants, price volatility would also increase. In turn, this should have a profound effect on ancillary service prices, including any bilaterally negotiated capacity contracts.

Wind is good for the investor, but not necessarily for the grid operator and the consumer.

Because of the guaranteed- and contracted- nature of wind investments, generally, wind farms make for very good investments, but it isn't necessarily good for the consumer nor the grid operator. For consumers, it's an expensive source of power and for grid operators, it is a headache to manage and dispatch. However, as long as wind remains a good investment, we believe investors will continue to seek opportunities in wind projects.

Companies Mentioned:

Calpine Corp. (NYSE: CPN, $12.03, Sector Perform, Above Average Risk)

NRG Energy (NYSE: NRG, $28.76, Sector Perform, Average Risk)

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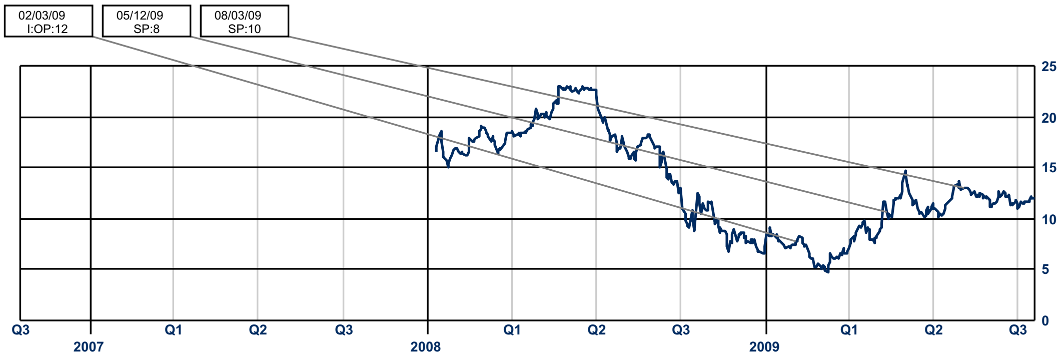
Rating and Price Target History for: Calpine Corporation as of 10-19-2009 (in USD)



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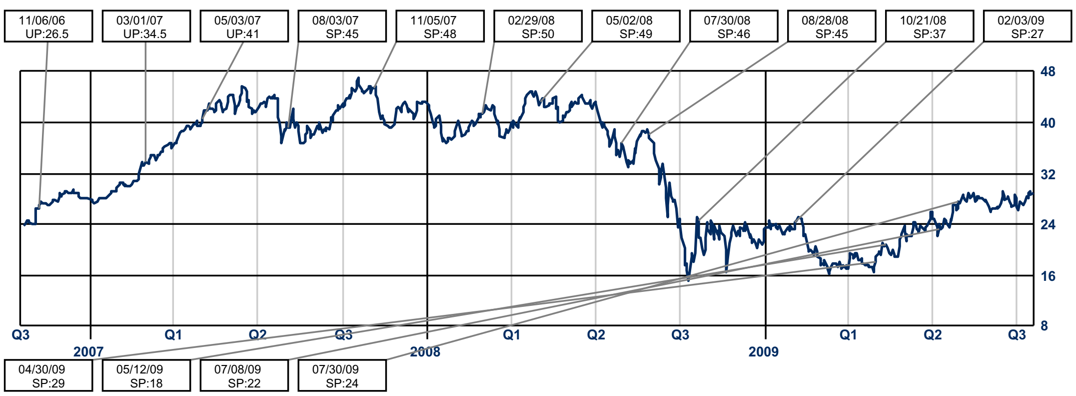
Rating and Price Target History for: NRG Energy, Inc. as of 10-19-2009 (in USD)



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