

Bloomberg Intelligence

Climate Change & Clean Energy

BI Solar Energy Equipment, Global Dashboard



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Climate Impact Aligns With Pollution, Costs in Clean Power Shift

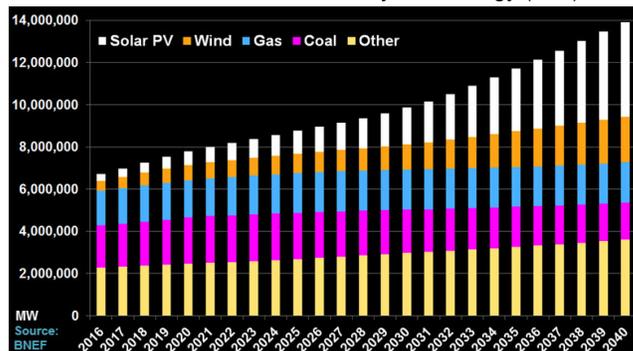
(Bloomberg Intelligence) -- Government policy incentives to mitigate climate change spurred development of a global clean energy equipment industry, yet the sector is increasingly supported by competitive technology costs and a public health impetus to **cut air pollution**. Unlike commodity-price reliant fossil generation, solar and wind power **expenditures are technology derived and are demonstrating dramatic cost declines with rising deployment**. (02/15/18)

1. Solar Is Greatest Climate Action Power Opportunity

Solar and wind energy offer the greatest growth potential of any power technology in the longer-term, even without any new climate action stimulus, as costs continue to fall. The price of solar panels **has fallen at an annualized rate of 20% in the past three years, partly due to 30% growth in annual** installations over the same period. Price declines per watt for solar and wind energy will continue, as scale lowers costs and technology drives efficiency gains.

Solar's capacity share in the global energy mix is set to rise from under 5% in 2016 to about one-third of all power and the largest source of generation by 2040. Wind power may more than double to 15%. Coal and gas power may be half current levels, yet any concerted climate action may accelerate this, with some countries such as the U.K. already phasing out coal. (02/15/18)

Global Power Mix Forecasts by Technology (MW)



2. China Solar Growth Persists, End-State Uncertain

The massive supply additions by Chinese solar energy equipment makers have helped drive panel costs ever lower, which is anticipated to endure with a new phase of capacity growth expected. The largest panel suppliers globally include JinkoSolar, Trina Solar and Canadian Solar. The solar industry is historically adept at providing supply in the face of beneficial policy incentives, an event that could occur with any new climate-related policy stimulus.

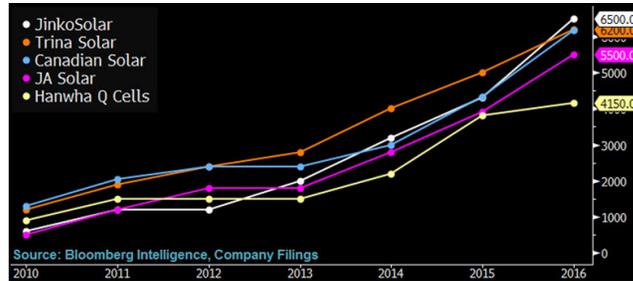
While solar industry installs will persist, its market landscape can shift dramatically on changes to technology and scale, with many market leaders a decade ago no longer active. Companies investing in efficiency gains via PERC

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technology such as LONGi Solar and Hanwha Q Cells, that compete with SunPower's high-performance panels, may be set to retain a competitive advantage. (02/15/18)

Capacity Growth of Leading Solar Panel Makers (MW)

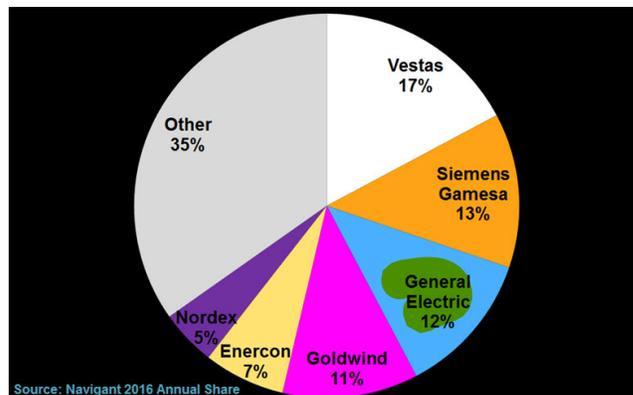


3. Big Wind Players' Grip Tighter Post-Consolidation

The global wind turbine industry is dominated by four major suppliers, which recent consolidation has heightened. **Vestas, Siemens Gamesa, GE and China's Goldwind** represent half of annual installs. The rising scale of these providers and extent of capital spending needed for new product iterations, especially offshore wind, offers these larger suppliers cost structure and purchasing power advantages. Goldwind's dominance in China may position it to capitalize on any growth of green certificate or emissions trading momentum.

Aside from wind energy's ability to abate power sector emissions to curb global warming, the technology is one of the least water-intensive of any power generation. This makes it suitable for water-constrained environments, with water security potentially worsening on any climate change effects. (02/15/18)

Wind Turbine Producer Annual Market Share



4. Climate Impasse Won't Stop Renewable Trend

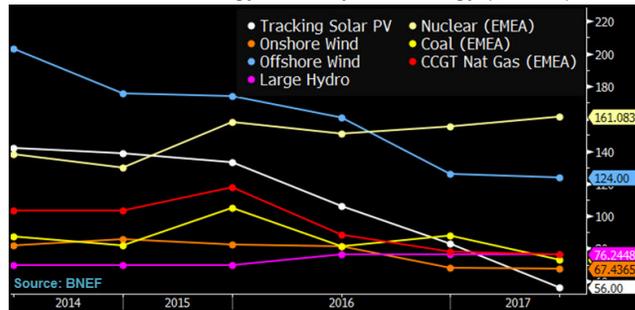
Any lack of concerted climate change policy action isn't set to halt the use of renewable power globally, with **technology costs falling below new thermal power plants in many countries**. Cost competitiveness is most evident **in solar power and onshore wind energy** in areas with good weather resources and high power rates. The distributed nature of clean energy suits deployment in remote locations in developing nations without established grid infrastructure but with rising power needs.

The narrative for clean energy use is increasingly shifting from carbon reduction to one of public health, with major countries such as China seeking to prioritize cleaner sources of generation to reduce air pollution. Rising use of renewable power sources can also help limit exposure to fossil-fuel commodity-price volatility. (02/15/18)

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Levelized Energy Costs by Technology (\$/MWh)



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