Wind Energy Trend
Index

- Indian Wind Energy Sector – Overview
- India Market – Dynamics & Framework
- Suzlon Group – Overview
- Technology and Products
Wind Power Project Installation YOY

Total Installation in MW

<table>
<thead>
<tr>
<th>Year</th>
<th>Installation in MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-06</td>
<td>1748</td>
</tr>
<tr>
<td>2006-07</td>
<td>1778</td>
</tr>
<tr>
<td>2007-08</td>
<td>1584</td>
</tr>
<tr>
<td>2008-09</td>
<td>1484</td>
</tr>
<tr>
<td>2009-10</td>
<td>1565</td>
</tr>
<tr>
<td>2010-11</td>
<td>2345</td>
</tr>
<tr>
<td>2011-12</td>
<td>3180</td>
</tr>
<tr>
<td>2012-13</td>
<td>1721</td>
</tr>
<tr>
<td>2013-14</td>
<td>2078</td>
</tr>
<tr>
<td>2014-15</td>
<td>2318</td>
</tr>
<tr>
<td>2015-16</td>
<td>3472</td>
</tr>
</tbody>
</table>

Total Installation: 3472 MW
India: Power Sector Highlights

- World’s third largest producer of electric power, yet one of the lowest per capita access & consumption
- India’s GDP growth seen accelerating to 7.6% in FY 16. Estimated 9% Y-o-Y increase in power demand
- Peak power shortage (3.2%)
- Total installed capacity of more than 300 GW with very high dependence on fossil fuel (local coal, imported coal, oil & gas)
- Increasing participation of private players in power sector
- Sustained focus of government and emerging interest of investors in renewable energy

**Per Capita Power Consumption (kWh per head)**

- USA: 12985 kWh
- Russia: 6539 kWh
- South Africa: 4328 kWh
- China: 3762 kWh
- World: 3555 kWh
- Brazil: 2529 kWh
- India: 1010 kWh

Source: World Bank

**Demand to grow at 9% over next 20 years (GW)**

- FY12: 215 GW
- FY17E: 331 GW
- FY22E: 510 GW
- FY27E: 785 GW
- FY32E: 1207 GW

Source: CEA

www.suzlon.com
Wind And Solar Poised To Contribute To India’s Sustainable Energy Architecture

Share of Wind Energy in India

- Large Hydro: 14% (42,783 MW)
- Nuclear: 2% (5,780 MW)
- RES: 14% (42,752 MW)
- Thermal: 70% (210,675 MW)

Wind Energy has proven and successful track record of over 20 years in India:

- Wind: 63% (26,769 MW)
- Solar: 16% (6,763 MW)
- Bio Power: 11% (4,831 MW)
- Small Hydro: 10% (4,274 MW)
- Other: 0.27% (115 MW)

Source: CEA & MNRE Website, Data as on March, 2016
Government Support for Wind Sector

- Aggressive target set by the government to achieve 60 GW of wind energy capacity i.e. 5 GW annually by 2022
- MNRE announces Draft Guidelines for Development of Onshore Wind Power Projects
- Recently launched policy for unlocking the offshore wind potential
- Commitment of renewable energy capacity building underlined in NAPCC and mandated under the Renewable Purchase Obligation (RPO) across the states
- Wind-Solar Hybrid draft policy in process
- Investor friendly, long term and sustainable framework of policies and encouraging incentives and facilities provided. Key incentives include;
  - Long term committed feed-in-tariff mechanism
  - Generation based incentive scheme
  - 10 years tax holiday for wind power projects under S80-IA
  - Allowance for ECB as well as 100% FDI for financing the wind projects
Wind Energy Development Trend

- Continued momentum in Wind Market in India primarily driven by:
  - Stable Policy outlook at both State and Central Level
  - Healthy mix of both Global and local players (contributing to both Retail and IPP segment)
    - Abundant resource availability with huge untapped potential @302GW
    - Availability of Capital (both debt and equity side)
- Market likely to continue its northward march with expected installations likely to exceed 4GW in FY17
- In sync with the Government Target of 60 GW installed wind power capacity by 2022

Best market scenario to accelerate growth to soon attain 5GW / per year size
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Drivers of Renewable Energy in India

**Market Potential**
- Increasing demand & current high deficit of power
- High dependency on imported fuel for power generation
- Huge Wind Power Potential >302GW onshore of which ~90% is still untapped

**Global Interest**
- World’s 4th largest wind power market with big scope for IPPs
- Established market with >30 yrs experience
- Keen interest of Global PE Capital

**Policy Support**
- Encouraging Policies and matured regulatory framework
- Multiple revenue options and fiscal incentives
- Stable Government (Both Central & State)

Right scenario for global wind IPPs and Utilities to invest in India
Wind Power Potential

- NIWE (Government’s nodal agency for wind power) assessed India’s wind energy potential of 302 GW at 100m HH.
- Potential is primarily concentrated in the 9 states.
- Current cumulative installed base: Over 27.76 GW.
- Current five year plan aimed to add 15GW of wind energy between 2012-17.
- New government has recently enhanced the target to 60 GW by 2022.
## Prevailing State-wise Policy & Untapped Potential

<table>
<thead>
<tr>
<th></th>
<th>Maharashtra</th>
<th>Karnataka</th>
<th>Gujarat*</th>
<th>Rajasthan*</th>
<th>Tamil Nadu</th>
<th>Madhya Pradesh</th>
<th>Andhra Pradesh</th>
<th>Telangana*</th>
<th>Kerala</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIT (Rs/kWh)</strong></td>
<td>INR 5.56</td>
<td>INR 4.50</td>
<td>INR 4.68*</td>
<td>Upto INR 6.02</td>
<td>INR 4.16</td>
<td>INR 4.78</td>
<td>INR 4.84</td>
<td>-</td>
<td>INR 5.07-6.34</td>
</tr>
<tr>
<td></td>
<td>INR 4.94</td>
<td>INR 4.19*</td>
<td>Upto INR 5.74</td>
<td>INR 3.70</td>
<td>INR 4.78</td>
<td>INR 4.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duration of PPA</strong></td>
<td>13 years</td>
<td>20 years</td>
<td>25 years</td>
<td>25 years</td>
<td>20 years</td>
<td>25 years</td>
<td>25 years</td>
<td>-</td>
<td>25 years</td>
</tr>
<tr>
<td><strong>RPO Target</strong></td>
<td>10%</td>
<td>11%</td>
<td>8.25%</td>
<td>8.9%</td>
<td>9%</td>
<td>6.50%</td>
<td>4.75%</td>
<td>-</td>
<td>4.5%</td>
</tr>
<tr>
<td><strong>GB Incentive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>INR 0.5 per kWh, Cumulative cap of INR 10 mil per MW (Federal incentive, independent of FIT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Potential</strong></td>
<td>45394</td>
<td>55857</td>
<td>84431</td>
<td>18770</td>
<td>33800</td>
<td>10484</td>
<td>44229</td>
<td>4244</td>
<td>1700</td>
</tr>
<tr>
<td><strong>Installed Capacity MW</strong></td>
<td>4659</td>
<td>2869</td>
<td>4038</td>
<td>3993</td>
<td>7614</td>
<td>2141</td>
<td>1432</td>
<td>78</td>
<td>35</td>
</tr>
<tr>
<td><strong>Untapped potential</strong></td>
<td>90%</td>
<td>95%</td>
<td>95%</td>
<td>79%</td>
<td>77%</td>
<td>80%</td>
<td>97%</td>
<td>98%</td>
<td>98%</td>
</tr>
</tbody>
</table>

* For FY16 new tariff likely shortly. ** Potential at 100 M Hub Height as per NIWE
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Suzlon Journey

Founded in 1995
Handful of Committed Individuals with a Big Dream

@ 2016

Amongst the top 10 Global Wind OEMs

Comprehensive products portfolio

>15.5 GW installed

1800+ customers worldwide

~7,000 employees across 19 countries

www.suzlon.com
## India – The Key Global Hub of Suzlon

<table>
<thead>
<tr>
<th>Global HQ</th>
<th>Manufacturing Hub</th>
<th>Technology Hub</th>
<th>Largest Market</th>
</tr>
</thead>
</table>
| • Global HQ at Pune India  
• LEED Platinum rated GREEN BUILDING complex  
• 100% powered by renewable energy | • Manufacturing capacity of 3600 MW in India  
• Three fully integrated WTG assembly facilities and various units for components manufacturing across India  
• Supplying to ALL global project destinations of Suzlon | • New Products Design, Engineering & Proto Testing team at Pune  
• Asia’s first and only blade testing facility at Gujarat  
• Global Domain Expertise in Wind Resource Analysis  
• Global SCADA center at Pune | • India is Suzlon’s home market and also the largest one globally  
• Sustained market leadership for 17 years  
• Wind parks and active projects pipeline in all 9 windy states  
• Vast experience, end-to-end capabilities and proven performance |
Index

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Comprehensive Range of Products

<table>
<thead>
<tr>
<th>0.6 MW</th>
<th>1.25 - 1.5 MW</th>
<th>2.0 - 2.25 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>S52 600 kW</td>
<td>S66 1.25 MW</td>
<td>S82 1.5 MW</td>
</tr>
<tr>
<td>S88 2.1 MW</td>
<td>S95 2.1 MW</td>
<td>S97 2.1 MW</td>
</tr>
<tr>
<td>S111 2.1 MW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Technology Bandwidth to Meet Varied Market Requirements
<table>
<thead>
<tr>
<th></th>
<th>S52 600 kW</th>
<th>S66 1.25 MW</th>
<th>S82 1.5 MW</th>
<th>S88 2.1 MW</th>
<th>S95 2.1 MW</th>
<th>S97 2.1 MW</th>
<th>S111 2.1 MW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wind class</strong></td>
<td>II A</td>
<td>III A</td>
<td>III A</td>
<td>II A</td>
<td>II A</td>
<td>III A &amp; II B</td>
<td>III A</td>
</tr>
<tr>
<td><strong>Hub height</strong></td>
<td>75 m</td>
<td>64.5 m, 74.5 m</td>
<td>78.8 m</td>
<td>80 m, 100 m</td>
<td>80m, 90m, 100m</td>
<td>80m, 90m, 100m, 120m</td>
<td>90 m</td>
</tr>
<tr>
<td><strong>Swept area</strong></td>
<td>2124 m²</td>
<td>3421 m²</td>
<td>5281 m²</td>
<td>6082 m²</td>
<td>7088 m²</td>
<td>7541 m²</td>
<td>9817 m²</td>
</tr>
<tr>
<td><strong>Rotational speed at rated power</strong></td>
<td>24.19 rpm</td>
<td>20.62 rpm</td>
<td>16.3 rpm</td>
<td>15.47 rpm</td>
<td>15.83 rpm</td>
<td>15.47 rpm</td>
<td>13.0 rpm</td>
</tr>
<tr>
<td><strong>Max. rotational speed</strong></td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Power regulation</strong></td>
<td>-----</td>
<td>-----</td>
<td>STV, LTV, SFS control</td>
<td>STV, LTV, PIT, SFS control</td>
<td>HTV, Lightning protection class-I, Lift, PIT, compliance to international standards like CE, UL, CSA</td>
<td>HTV, Lightning protection class-I, Lift, PIT, compliance to international standards like CE, UL, CSA</td>
<td>Electric blade pitch control</td>
</tr>
<tr>
<td><strong>Special features of product</strong></td>
<td>-----</td>
<td>-----</td>
<td>STV, LTV, SFS control</td>
<td>STV, LTV, PIT, SFS control</td>
<td>HTV, Lightning protection class-I, Lift, PIT, compliance to international standards like CE, UL, CSA</td>
<td>HTV, Lightning protection class-I, Lift, PIT, compliance to international standards like CE, UL, CSA</td>
<td>HTV, Lightning protection class-I, Lift, PIT, compliance to international standards like CE, UL, CSA</td>
</tr>
<tr>
<td><strong>Product Presence:</strong></td>
<td>Asia</td>
<td>Asia, North America</td>
<td>Asia</td>
<td>Asia, North America, South America, Europe</td>
<td>Asia, South America, Australia</td>
<td>Asia, North America, South America, Australia</td>
<td>Asia</td>
</tr>
</tbody>
</table>

**SUZLON**
Pioneer in Platform Evolution For Low Wind Markets

Class III: Low Wind Sites

- Increasing rotor diameter and hub height
- Innovative “hybrid tower” option available
- Increasing energy yield and lowering the energy cost
- Higher RoI for Customers
- Expanding market size by opening-up more sites for viable development

Technology Optimized For Maximizing RoI At Low Wind Sites In India

Note: AEP increase are approximate and under certain conditions
Hybrid Tower: The Game Changer

- 120 m Hub Height (33% higher w.r.t. S97-90)
  - ~ 3-4% more wind speed at higher height
  - 12-15% increase in energy generation (AEP)
- Hybrid Tower (lattice base + tubular top)
  - Reduces weight, Easy on logistics
- Increased RoI for customers
- Suzlon has 3-4 years head start in this technology
- Leadership in innovative application of technology for maximizing the RoI from the project
  - Available for S97 and S111 WTGs
  - Prototype commissioned in June 2014
  - Orders received in the USA and India

Note: AEP increase are approximate and under certain conditions
New S111 : Doing More With Less

- Latest addition to our successful 2.1 MW Low Wind Technology Platform
- Builds on the success of S9X (>1.3GW operating base)
- Bigger rotor diameter (111.8 m) & option of 90 meter & 120 meter hub heights
- **Delivers 20% higher AEP w.r.t. S97**
- Suzlon manufactured rotor blades with airfoil and design to suite low wind speed conditions
- 2.1 MW asynchronous induction generator platform
  - Proven on over 3750 WTGs (7875 MW) globally
  - 6 poles design with DFIG for 30% variable speed operations and grid compliance in India & other markets
  - 6 yaw drives for better stability & operational efficiency
Way Forward

• Wind:
  - Increase Yield by technology improvement.
    - Larger Rotor Diameter & higher Hub height
    - Change in turbine technology platform

• Wind -Solar Hybrid system:
  optimization of transmission infrastructure.
  Wind CUF 25% & Solar CUF 22% cumulative ~50%
  Reduction in variability of Generation.
  Generation pattern of Wind & Solar will supplement.

• Smart Grid:
  • To Help Proper distribution of power.
Thank you