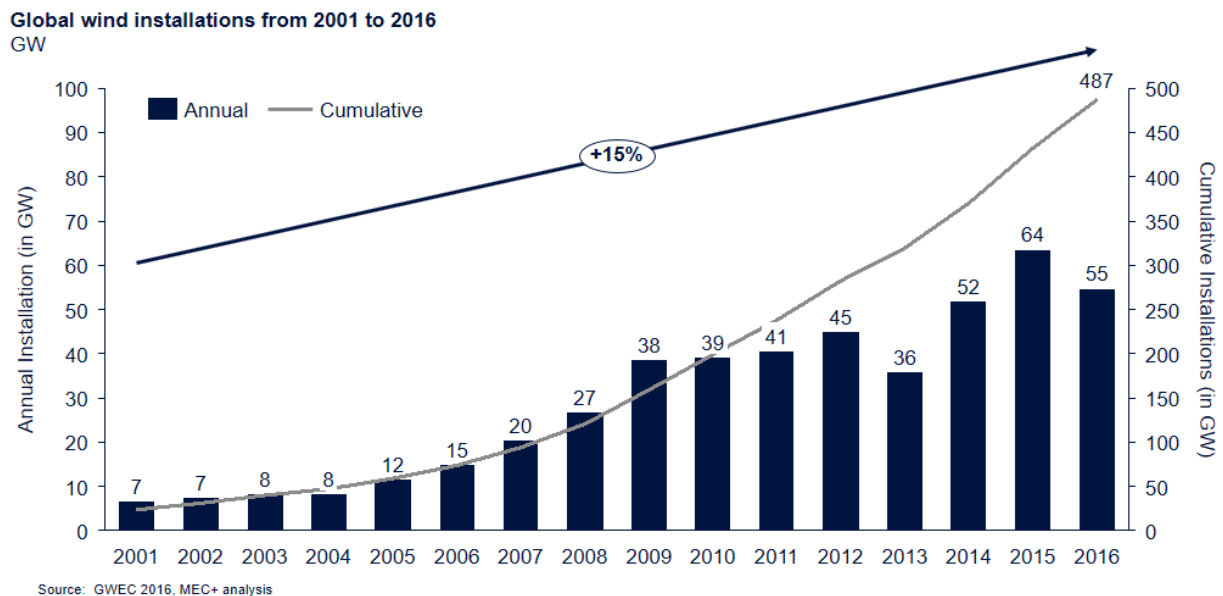


## State of the art in O&M commercial models- Opportunities in India.

Global new wind installations are increasing at a CAGR of 15% since 2001. This is a positive outlook for the new build of wind industry which is expected to be an attractive opportunity.

Figure 1



At the same time, the installed capacity has almost reached 500GW. Maintaining this large asset base appears to be large business opportunity. Also, recently several mergers and acquisitions were noted within wind services sector. This increases our interest to analyze the trends and see what opportunities it brings to the Indian market. The objective of the analysis is to highlight the global trends and how they can be used to increase wind market valuation in India.

### 1.1 Components of the wind service market

To understand the opportunity, first a clear understanding of the wind services is required. Wind service market consists of five components-

- a) Spares management consisting spare engineering, repair and spare delivery, logistics management;

- b) Maintenance planning and execution which consists of diagnostic, basic maintenance and advanced maintenance;
- c) Upgrades which is product improvement done for performance improvement and are highly dependent on user's preference;
- d) Asset Management which includes maintain data infrastructure for park control, advanced analytics, resource forecasting, life estimation & outage planning, Sourcing, contract management and administration;

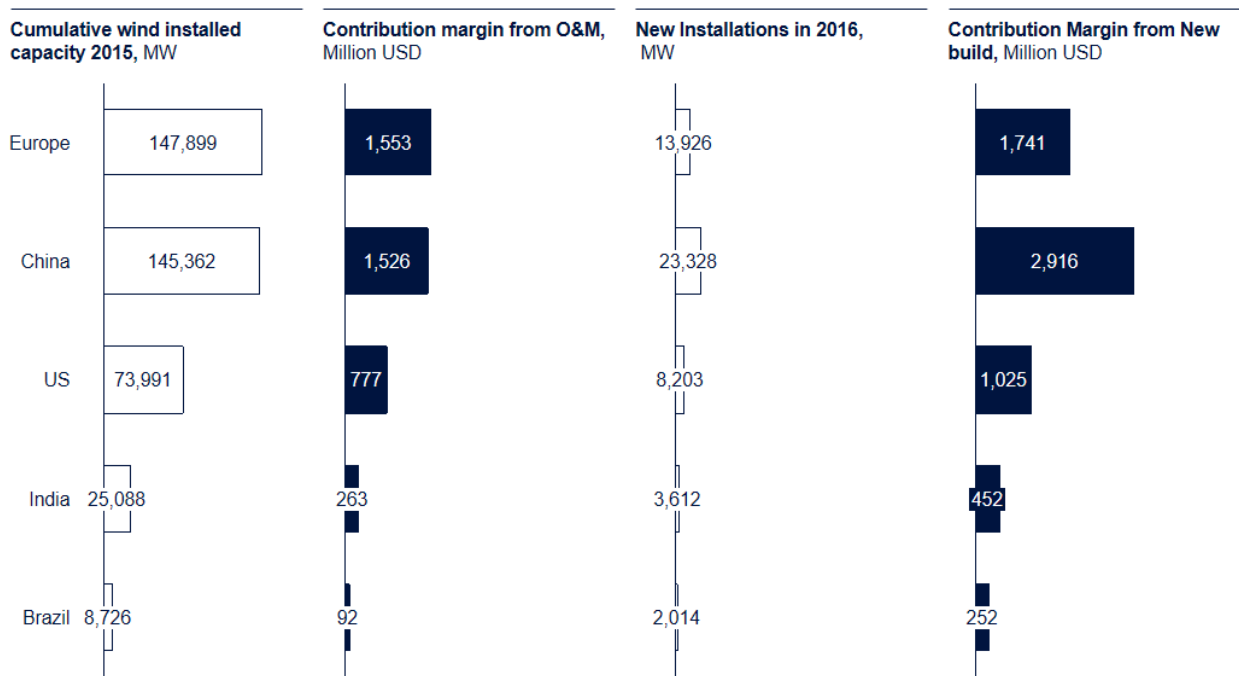
Spare Parts and Maintenance planning and execution constitute around ~90% of the cost to the owners of the wind assets. While asset management constitute 5-10% of the cost, product improvements are a high onetime cost on asset owners' discretion.

### 1.2 Increasing commercial opportunity within O&M market

An estimate (Figure 2) on the contribution margin from both new build and services segment within wind indicates a comparable size of the opportunity. This is evident from the analysis below. Regionally, as well, the opportunity is of comparable size.

Figure 2

O&M service market is increasingly becoming an equally attractive opportunity vis-a-vis new build



Note: O&M cost assumed at USD 35,000 per MW per year and Capex is assumed at USD 1.250 mn per MW; Contribution margin in O&M assumed at 30% and That for New build is assumed at 10%  
 |Source: GWEC, Lazard- 2016 ; MEC+ analysis

This large opportunity within wind service has been assessed by the large players across the energy industry. Large wind OEM like Vestas made a few very key corporate acquisitions last year (Upwind and Availon) to build their service capabilities. Developers like EnbW also expanded their services by acquiring Connected Wind. Many more players have developed their service portfolio organically. This interest in the services industry confirms the large scale of the opportunity and high margin expectation.

### **1.3 New approaches to wind O&M**

This interest in the service industry from all kind of players has also resulted in new business models. With an increasing number of owners with large wind capacities, the O&M models have transitioned from OEM dependent O&M to a more owner driven model.

The traditional model is the outsourcing of the complete O&M from the owners to the wind turbine OEMs. Even today, more than 70% of the installed capacity is under similar completely outsourced model. However, as the wind industry has matured and technological knowledge has increased, these services have standardized. The cost of these services has declined by more than 30% in the past three years. This has led to emergence of the owner driven models, where the owner undertakes in-house responsibility of the O&M instead of being completely dependent on the OEM. Independent service providers have emerged in the markets which provide the basic services at even lowered prices. Two variants of this model are a) the complete undertaking by the owners by developing a competent team and collaborating with OEM for specific tasks, b) a few services in-house, while others through an ISP, thereby limiting the role of the wind turbine OEM to complex repairs or upgrades.

### **1.4 OEMs driving innovation to find technology niches**

With increasing number of owners and ISPs in the O&M, the OEMs are leading the technological innovation within the power output, grid codes, forecasting, remote monitoring and control, preventive maintenance and design. (Figure 3)

Figure 3

Areas of Innovation	Description
<b>Power output improvement</b>	Learning from database on wind-weather conditions, turbine condition and output, control algorithm for high power output from wind turbine in real time is being developed through analytics, machine learning, neural networks.
<b>Grid code compliance</b>	New converter and control modules are being developed to ensure the effective compliance of all known grid codes- automation of grid stability and future code compliance is the key area of development
<b>Forecasting</b>	Building on the vast historical wind and weather database, solutions which can do efficient siting and, control system solutions which can forecast on real time data inputs
<b>Remote Monitoring, Control &amp; Service</b>	Developing systems for remote turbine and park control, inspection, surveillance and minor services using IoT, digitization drones and other advanced HMI devices Using various and new types of sensors for condition monitoring of the turbine and its sub-components
<b>Predictive Maintenance</b>	Use of big data and analytics to predict the faults and wear of various component within the system in order to reduce the downtime and schedule maintenance efficiently
<b>Design</b>	Reduce the number and size of the components in the turbine Innovation to designs better blades and develop control systems around them

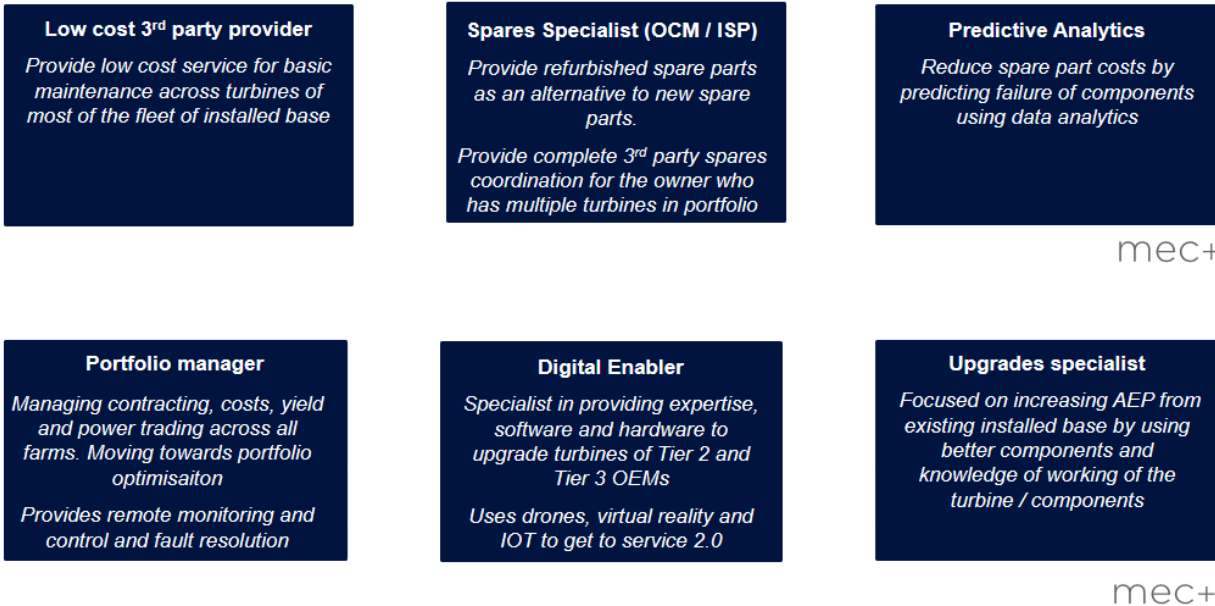
| Source: Company Websites, News; Product portfolio; Analyst presentations; MEC+ analysis

## 1.5 Value opportunities in the service market – what is in it for the Indian players

Indian market has witnessed a significant change in the past year. The wind farm approvals are now allotted through auctions. This has highlighted the need for the optimal performance of assets as well as increase the production throughout the lifetime. This increases the need of re-defined approach to the wind farm O&M. Following global O&M trends should be referred to have an advanced approach to O&M. Six specific value pockets exist to capture the opportunity, relevant for both Indian and global markets. (Figure 4)

Figure 4

Six value pools exist in the market from perspective of third party ISP and OCM



## About MEC Intelligence

MEC Intelligence is a market advisory and consulting firm with vast experience in wind energy sector. In wind services, we have worked with leading utilities, turbine OEMs and private equity firms on projects like strategy support, opportunity scanning in regional markets, commercial due diligence.

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