



Performance Tracking of a Leading Wind Turbine Manufacturer and IPP



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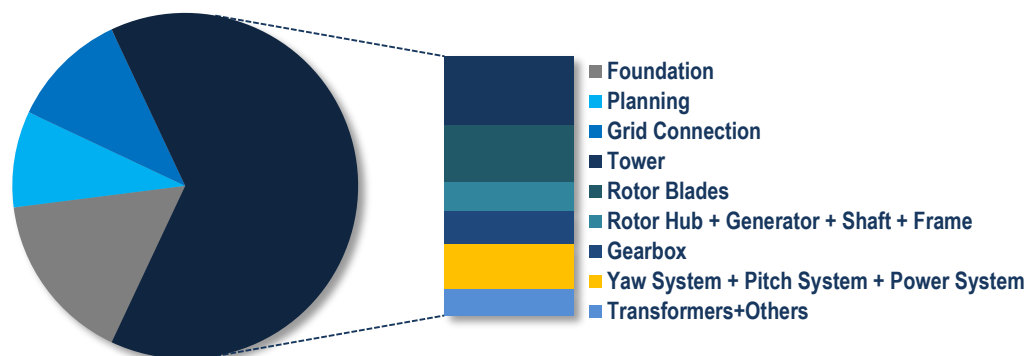
Performance Tracking Study for Wind World India Limited

Capital Cost Breakdown for a Typical Onshore Wind Power System & Turbine in India

The installed cost of a wind power project is dominated by the upfront capital cost (often referred to as CAPEX) for the wind turbines (including towers and installation) and this can be as much as 84% of the total installed cost. Similarly to other renewable technologies, the high upfront costs of wind power can be a barrier to their uptake, despite the fact there is no fuel price risk once the wind farm is built. Typically, the Asia-Pacific (A-PAC) region has seen a sharp decline in cost in the development of the wind farm especially in the bigger countries of China and India. Noteworthy, is the fact that the development of wind farms have approached parity with coal based thermal power plants and is expected to cost further below in coming years to evolve as a premier resource for power generation in India. The typical cost breakdown is depicted in Exhibit 01.

Exhibit 01: Capital Cost Breakdown for a Typical Onshore Wind Power System & Turbine in India*

ILLUSTRATIVE

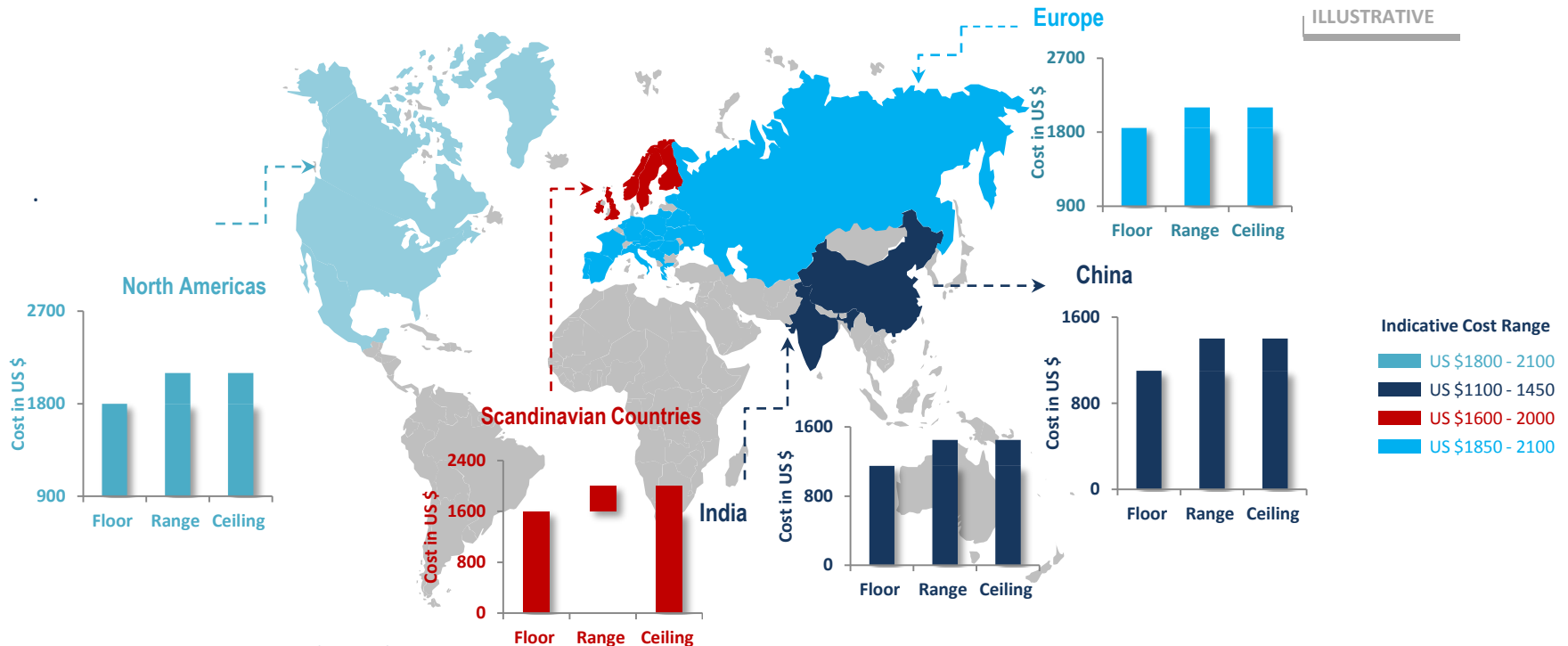


* **Note:** The breakdown considered is on the basis of a general onshore wind turbine installation and may vary as per the site specifications and variations in hub height

Source: enincon research

In India, onshore wind projects have gained reasonable ground so far and have reached an installed capacity of nearly 20 GW. Although, having experienced a hit in capacity additions in 2011 and 2012 due roll back of incentives. However, the wind sector is racing to high capacity additions since mid of 2013 and envisions a gain in same for years to come courtesy re-establishments of GBI's and ease of technological availability in India with global and domestic majors in the turbine OEM's field viz. GE, Gamesa, Suzlon, Wind World etc. aptly supporting the desired growth rate in terms of capacity additions. In India, the cost for establishing a 1 MW wind farm typically falls under a range of INR. 6-8 Crores depending upon the location, technological complications and other important parameters. To support the seamless development of wind farms in India the OEMs have initiated extended service support and among these services one of the majors is manufacturing and establishment of concrete towers .

*Exhibit 02: Capital Cost Breakdown for a Typical Onshore Wind Power System & Turbine in India**



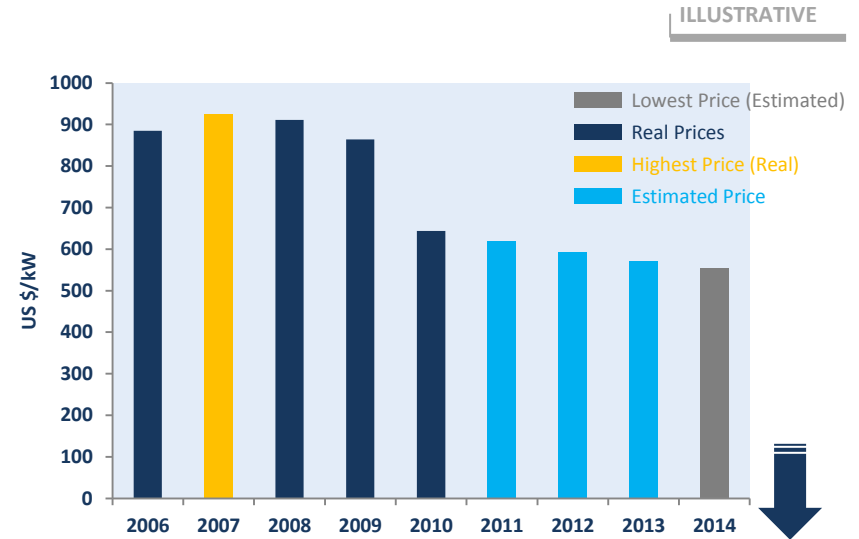
Source: IRENA , enincon research & analysis

From the Exhibit 02 it is quite evident that globally the development of a wind farm has been cheapest in China and India. However, India is slightly costlier in terms of development of wind farms purely the OEMs from China produce and sell the equipments most competitive prices. It is important to note that since in the development of a typical wind farm in general wind turbine and its components (as highlighted in Exhibit 01) would make to 64% of the total wind power system and turbine cost. Upon analyzing the range of costs for wind turbines in India would fall in the range of INR. 3.5 – 5.5 Crores/MW currently . It is therefore, can be safely assumed that an average cost of INR.4.5 Crores/MW would be spent by a project developer on wind turbine currently. However, since most of the wind turbines established in India are on less difficult terrain the cost would be on the lower side of the above indicated range of INR. 3.5 – 5.5 Crores/MW i.e. towards INR. 3.5 Crores/MW currently.

Also, the cost of development of wind turbine in the start of the century i.e. in 2000 was way higher than the current cost as lot of technological advancements have happened since then. The average price of wind turbines in real on an average on year on year (yoy) basis in India can be seen from 2006 onwards till date in Exhibit 03. Also, the rupee-dollar parity is depicted in Exhibit 04 since FY 2000 till date. We have considered the cost in US\$/kW factoring global benchmarks and to convert the same in terms of Indian currency of INR. we have used the INR. – USD parity indicated in Exhibit 04.

Also, we have considered the values from the year 2006 for the average price of wind turbine as Wind World (erstwhile Enercon India) Ltd. Commenced the production of concrete towers in early 2006 only, thereby leading to revenue through this vertical since 2006.

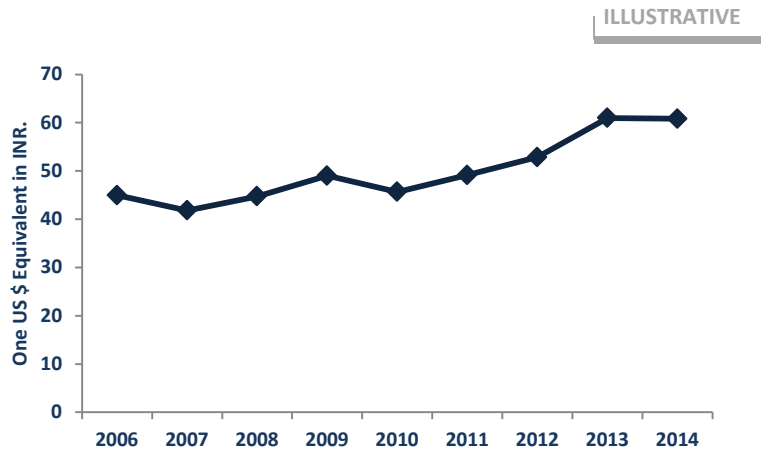
Exhibit 03: Average Wind Turbine Prices in India Since 2006 to 2014 in US \$/kW



The prices for wind turbines in India went highest in FY 2007 at US \$925/kW. As technological improvements were taking off the reduction in cost came significantly, leading to lowest cost in FY 2014 i.e. US \$554. It is an interesting trend that post 2007 the cost has been going down till 2014.

Source: IRENA , enincon research & analysis

Exhibit 04: US Dollars – INR. Parity Since 2006 to 2014 (One US \$ Equivalent in INR.)

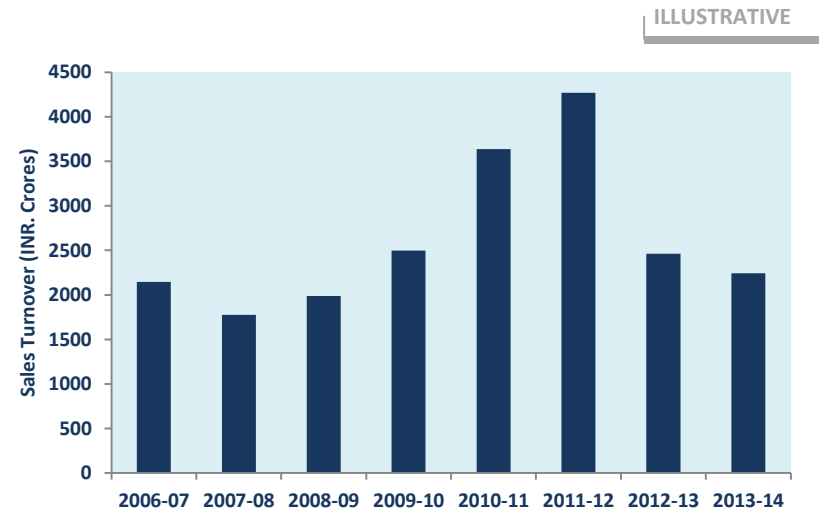


Source: IRENA, enincon research & analysis

Wind World India (erstwhile Enercon), had established the concrete tower manufacturing plant in Gujarat in the year 2006. This was followed with establishment another manufacturing plant in Karnataka’s Hubli district in 2007 and in Tamil Nadu in early 2008. The total sales turnover of WWIL came majorly through Wind turbine sales. The vertical sales for concrete towers initiated in FY 2006-07 and it would have formed a part of total sales turnover from FY 2006-07 onwards. In the following section we would estimate the sales turnover through concrete towers business of WWIL.

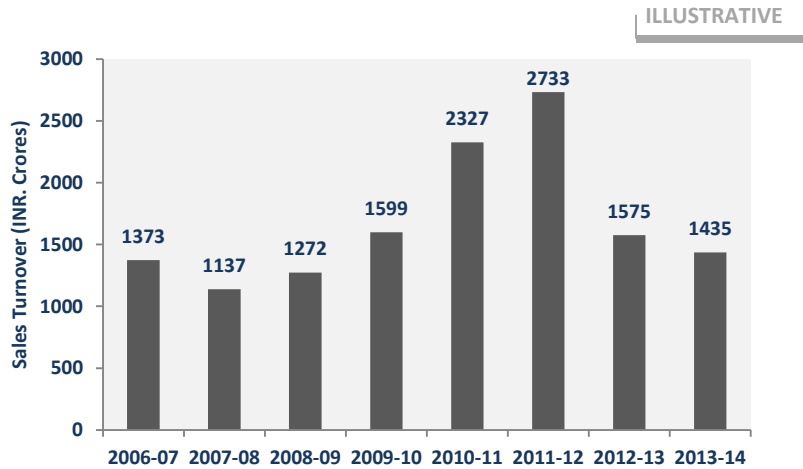
The said calculation shall be done on the basis of Cost components as indicated in Exhibit 1 previously. The values thus obtained are arguably most rational and closest to the original sales value in INR. terms. The year on year (yoy) basis map of sales turnover from FY 2006-07 till FY 2013-14 is depicted in Exhibit 1.5. The sales turnover achieved from FY 2006-07 will factor all the sources wherein WWIL (erstwhile Enercon) would have rendered services and is also inclusive of concrete tower sales.

Exhibit 05: Sales Turnover of WWIL from FY’2006-07 to FY’ 2013-14 (INR Crores)



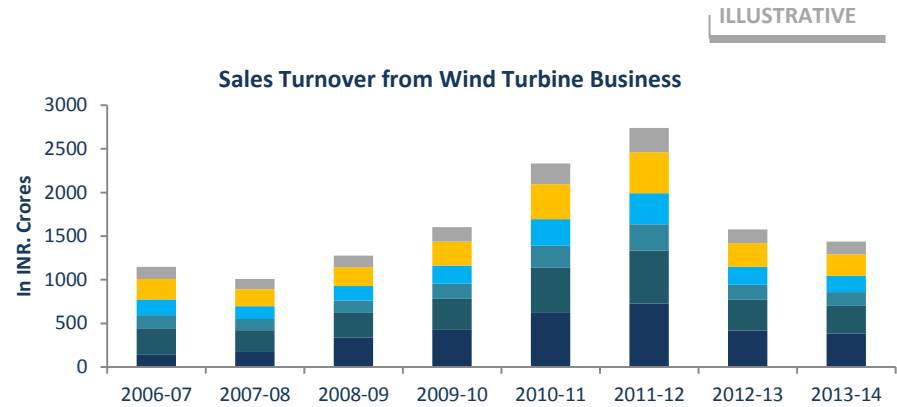
Source: Wind World Key Statistics

Exhibit 07: Sales Turnover of Wind Turbine from FY'2006-07 to FY' 2013-14 (INR. Crores)

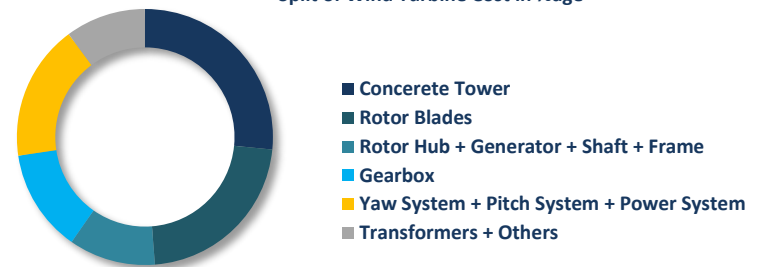


Source: Wind World Key Statistics

Exhibit 08: Sales Turnover from Wind Turbine Business of WWIL from FY'2006-07 to FY'2013-14 & Contribution as per Components



Split of Wind Turbine Cost in %age



Source: Wind World Key Statistics and enincon analysis

Comparison of WW – 53 and E- 53 of Turbine from WWIL , India & Enercon GmbH , Germany

Exhibit 09: Comparison of WW-53 and E- 53 Models as per Technical Parameters

TABULAR

S.No.	Technical Parameter	WWIL's WW – 53	Enercon's E – 53	Similarity/Dissimilarity
1	Rated Power	800 KW	800 KW	
2	Rotor Diameter	52.9 m	52.9 m	
3	Hub-height (Tower Height)	X	X	
4	Turbine Concept	X	X	
5	Rotor Type	X	X	
6	Rotational Direction for Rotor	X	X	
7	No. of Blades	X	X	
8	Swept Area	X	X	
9	Blade Material	X	X	
10	Rotational Speed	X	X	
11	Pitch Control	X	X	
12	Main Bearing	X	X	
13	Generator	X	X	
14	Grid Feeding	AC-DC-AC Converter	ENERCON Inverter	
15	Brake System	x	x	

Exhibit 09: Comparison of WW-53 and E- 53 Models as per Technical Parameters Continued

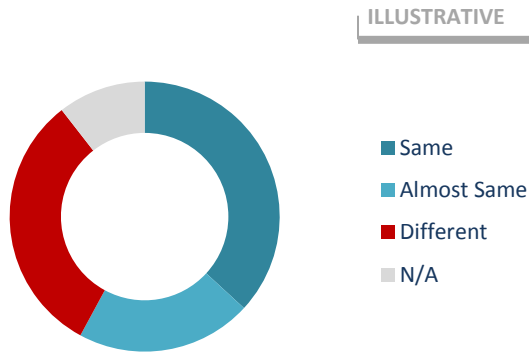
TABULAR

S.No.	Technical Parameter	WWIL's WW – 53	Enercon's E – 53	Similarity/Dissimilarity
16	Yaw Control	X	X	
17	Cut – Out Wind Speed	X	X	
18	Cut – In Wind Speed	X	X	N/A
19	Remote Monitoring	X	X	N/A

Source: enincon research

As it can be observed from Exhibit 09, that 19 parameters are taken to establish comparison between WW -53 and E -53 models of WWIL and Enercon respectively. The nature of similarity/dissimilarity are categorised under three heads namely : Same, Almost same & Different. One more category is taken under N/A category for the parameter where the datasets for comparison is unavailable. The split of the parameters under these heads is shown in Exhibit 10.

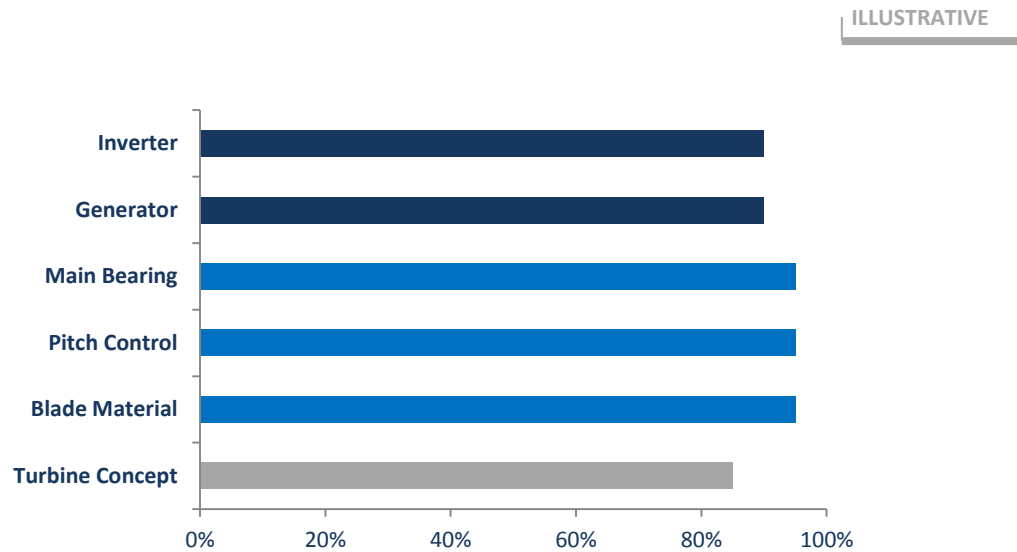
Exhibit 10 : Split of Identified Parameters Basis Nature of Similarity/Dissimilarity Between WW – 53 and E – 53



Source: enincon research

It is pertinent to note that out of 19 parameters being compared between WW – 53 and E – 53, 7 parameters are exactly same and 4 parameters are almost same which leads to almost ~ 58% of the parameters are similar in nature. Also, among the parameters 6 are categorised as different, wherein two of them namely **Generator** and **Grid Feeding** are not completely different with similarity quotient existent. We have tried to assess the extent of similarities in 6 parameters which is inclusive 4 almost same parameters and 2 different parameters as quoted earlier. The extent is depicted in Exhibit 11.

Exhibit 11 : Split of Identified Parameters Basis Nature of Similarity/Dissimilarity Between WW – 53 and E – 53



Source: enincon research