



## Manufacturing and sourcing

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"2015 was a busy year. Not only did we manage to increase MW produced and shipped by 30 percent, we also successfully continued the implementation of new production processes and technologies without compromising quality."

**Jean-Marc Lechêne**  
Executive Vice President & COO

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## Manufacturing footprint

As is often the case in infrastructural businesses, national political climates around the world change, which calls for an agile organisation that can adjust quickly to changes in demand. By continuing to manufacture core components in-house, while acquiring non-core wind turbine components from a group of sub-suppliers chosen through a careful selection process, the current manufacturing setup of Vestas is established as one that is lean and scalable, but nonetheless with the Vestas quality stamp on every single wind turbine sold.

The geographical distribution of countries in which Vestas receives wind turbine orders makes the company less vulnerable to the constant fluctuations in the market. Vestas uses its geographic reach to generate economies of scale on new projects and to ensure its manufacturing, transportation, and sourcing costs are continuously optimised. The global manufacturing setup allows timely optimisation of production to match various shifts in demand across geographies.

## Flexibility and scalability

The year 2015 has been very busy as the number of MW produced and shipped reached 7,948 (3,330 wind turbines), compared to 6,125 MW (2,527 wind turbines) in 2014. Due to the high activity level, a further ramp-up of the production was called for in 2015 to meet demand, especially in the USA, where the MW produced and shipped increased by 70 percent compared to 2014.

### Produced and shipped per region in 2015 compared to 2014

Percent

#### Produced and shipped, Europe, Middle East, and Africa:

Vestas produced and shipped 3,643 MW to Europe, Middle East, and Africa  
- an increase of 5 percent + 5%

#### Produced and shipped, Americas:

Vestas produced and shipped 3,795 MW to Americas  
- an increase of 83 percent + 83%

#### Produced and shipped, Asia Pacific:

Vestas produced and shipped 510 MW to Asia Pacific  
- an decrease of 10 percent - 10%

**Total produced and shipped: + 30%**

In addition to the general high activity, resources have also been deployed for the implementation across the blades factories of the new structural shell production setup.

The installation of the new moulds and the process for the new production lines for the V110 and V126 blades were fully rolled-out by the end of 2015, with the V136 blades to follow in the coming years. The new blade design reduces the capital investment in new production lines because of a much-reduced use of equipment required in the production. Further, the less specialised materials needed in the new design make production more flexible and outsourcing to third party suppliers an option, as seen with TPI Composites in China and Aeris Energy in Brazil.

Work continues in close collaboration with R&D to phase in the various new subsystems for the 3 MW platform at the factories.

Despite the conversion to a new production line for blades and the phasing in of other new upgraded components, combined with a general, demand-driven ramp-up, Vestas continued the positive trend in productivity per employee with an increase of 9 percent compared to 2014.

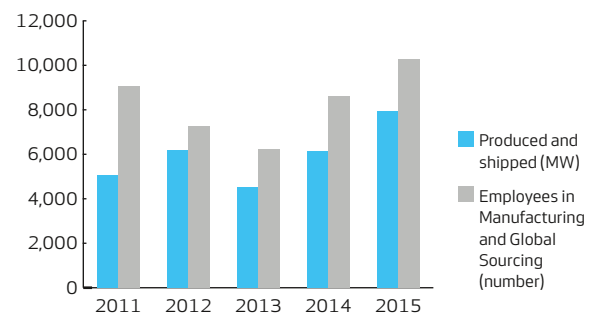
At the same time, warranty consumption was EUR 95m in 2015 compared to EUR 108m the year before – which is also true of the Lost Pro-

duction Factor, both indicators that the quality of the products has been maintained at the industry's highest levels and that Vestas has managed to maintain a well-functioning operation throughout the ramp-up.

Globally in 2015, Vestas increased the workforce at the factories by 20 percent compared to last year, where a similar expansion took place. Despite the number of new employees, the rate of lost time injuries was reduced, showing the strength of Vestas' safety culture.

## Productivity

MW · Number



## Intensified focus on specific growth markets

To ensure profitability in new markets with high growth potential, Vestas has outlined separate plans for the target markets China, India, and Brazil. Local presence and local sourcing is of great importance in these countries, be it for reasons of proximity to customers, cost-effectiveness, or fulfilment of requirements to local content in production.

In China, after the successful engagement in 2014 with TPI Composites to supply blades, further sourcing efforts have led to identifying and establishing agreements with a series of suitable Chinese suppliers, for e.g. weldments, castings, and generator parts.

The Brazilian Development Bank (BNDES) has in recent years required increasing levels of local content supply for developers seeking the low-rate BNDES financing through the FINAME programme, which in turn reflects on the wind turbine manufacturers.

To comply with these local content requirements, Vestas has signed partnership agreements with local suppliers, as well as invested in a new factory, the construction of which was carried out according to plan in 2015.

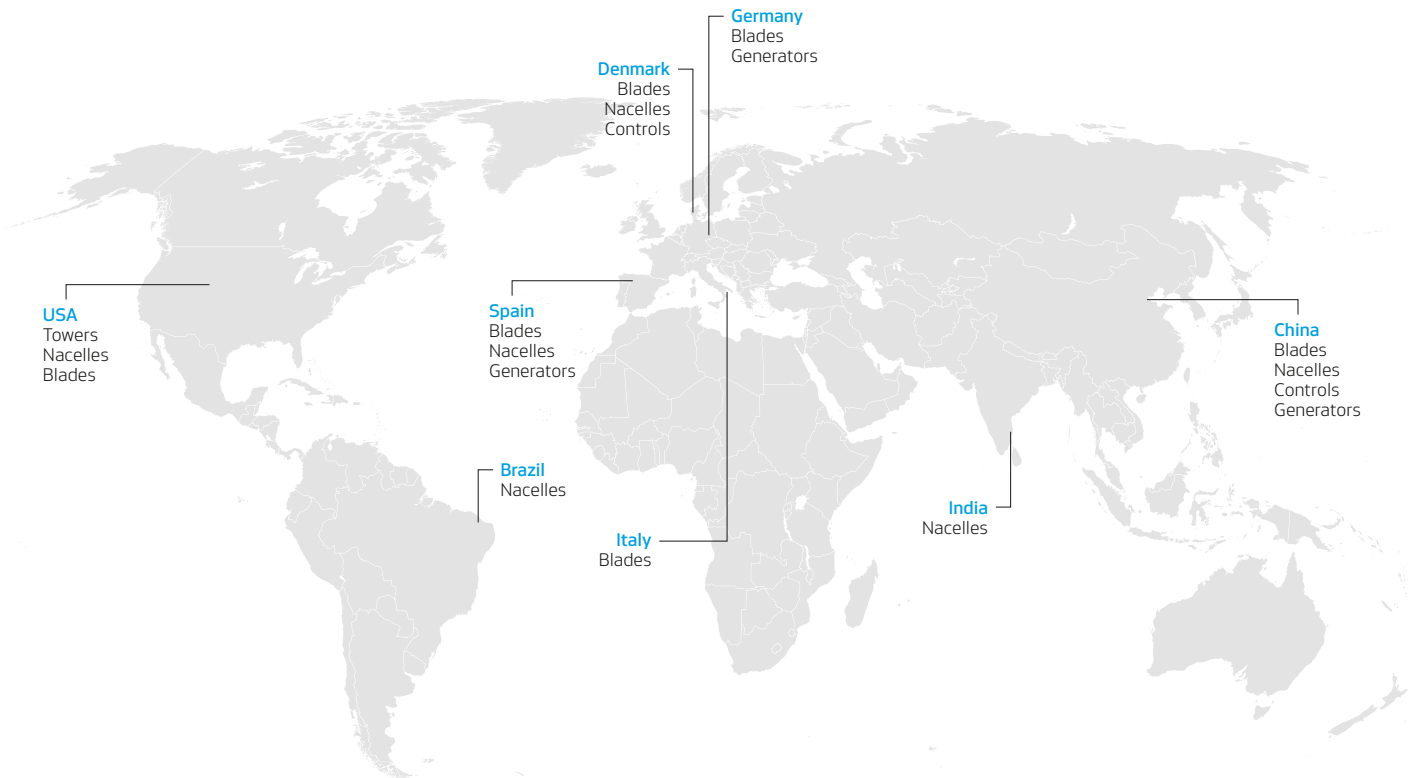
The new Vestas facility, which will also encompass a warehouse and training facility, started operations in December 2015. In the same month, Vestas' investments and focused strategy allowed Vestas to be included in the attractive approved supplier list of BNDES.

# 2 new facilities

In November 2015, Vestas announced that a new blade factory is planned to be built in India, and in December, Vestas opened its new factory in Brazil.

As announced earlier this year, Vestas also intensifies its efforts in India, where a new blade factory is planned to be built, supplementing the existing nacelle factory in Chennai. Vestas' CEO and Chairman of the Board of Directors met with Indian Prime Minister Modi in connection

## Manufacturing footprint



with revealing the investment plans. The new factory will support Vestas' operations in the Indian market as well as potentially servicing activities in other markets. It is expected to be fully operational by early 2017.

In addition to these three specific growth markets, Vestas continues working on establishing supply chains in new markets around the world with growth potential. Strategic collaboration with large, global suppliers that have an understanding of the market conditions to be able to meet regulatory and customer requirements in new markets is key to succeed. As the company is maturing, the need for flexibility and agility is also extended to supplier partnerships, requiring key suppliers to be able to act quickly and adapt to market shifts.

### Sourcing and suppliers

The collaboration with suppliers has generally moved to a new level of maturity, and now a supplier account management programme is being rolled out, similar to the one on the customer side.

Vestas is forming close partnerships with large suppliers and involve these in the development of products and processes, as the suppliers often possess many years of knowledge and experience that can be utilised to the benefit of both parties. Exemplified by Vestas' 2015 annual supplier day, during which workshops were held to identify initiatives by which suppliers could become more active contributors.

In support of the Profitable Growth for Vestas strategy, cost savings and achieving cost leadership within the wind power industry is still a priority for the company.

The first Accelerate Earnings programme was concluded by the end of 2014 with a considerable achievement in the area of short-term cost-out. The next phase, called Accelerate Earnings Pro, is planned to run until 2017, and will aim at a sustainable optimisation of the total cost on the full value chain.

One of the means by which this is to be achieved is by embedding category management to a higher degree throughout the organisation.

With an end-to-end perspective, cross-functional teams are identifying commercial, technical, and value chain levers to maximise the value of the supply base.

## 8 countries

Vestas has delivered wind turbines in 75 countries around the world and have manufacturing facilities in eight countries – in North and Latin America, Europe, and Asia.

### Timely crisis management in 2015

During the year, Vestas' crisis management and business continuity capability was put to the test when a chemical goods warehouse exploded in the port of Tianjin in China. The Vestas manufacturing facility itself was not affected, neither had any of the employees suffered any injuries in the accident, however, the incident caused a huge disruption in the supply chain as well as uncertainty of the exposure to the chemicals involved in the explosion.

Mitigation plans were quickly identified and executed, both in terms of assuring the safety of the employees, as well as identification and proper handling of the components that had been affected.

Crisis management was handled as an efficient joint effort between Vestas' headquarter and the factories located 17 kilometres away from the blast zone and the resulting impact proved to be very limited.

### Working capital management

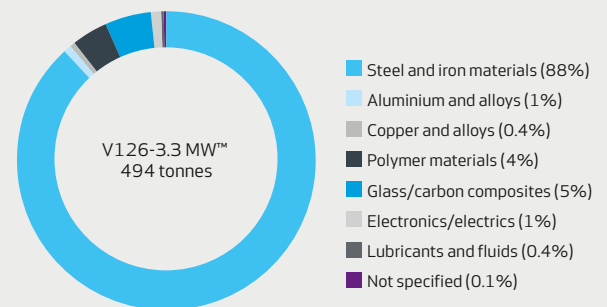
Due to the high activity in 2015, focus has been mainly on keeping working capital under control. Improvements have been made to increase efficiency through further process standardisation and system automation, e.g. by introducing an electronic procurement system, which is to be rolled-out globally during 2016.

## VESTAS FACTS

The Vestas working capital initiative is continuing the improvement journey from previous years, exceeding the internal targets for the Cash Conversion Cycle. Different improvement projects have been successfully executed, targeting both payment terms and controlling of inventory levels by running a rigorous sales & operations planning process and operationally reducing supply chain lead times.



**Material breakdown of a V126-3.3 MW™ wind turbine**  
Percent



## Did you know?

Manufacturing and Global Sourcing facts:

- 10,282 dedicated employees.
- 7,948 MW (3,330 wind turbines) produced and shipped in 2015 – an increase of 30 percent compared to 2014.
- 100 percent of electricity consumption coming from renewable sources in 2015.
- 0 significant environmental accidents or breaches of internal control in 2015.