"VESTAS WIND SYSTEMS A/S"

COMPANY REPORT

"WIND ENERGY INDUSTRY / HEAVY MACHINERY"

3 JANUARY 2018

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Blown away – or not yet?

Vestas up and down continues

- The onshore wind market is facing a slowdown in growth. A shift in political frameworks supporting renewable energy installations to competitive auctions and political uncertainty bring a halt to the growth rally. The growth rates of annual installed capacity will remain around 6 to 8% versus previously 20 to 40%.
- The competitive environment of Vestas changes. Europe, India and Brazil introduced auction based mechanisms for capacity additions in onshore wind, with short-term turbulences and ongoing increase in price pressure towards the levelised cost of electricity/energy (LCOE) of onshore wind an wind turbine producers.
- Political uncertainty in Vestas main market, the U.S., poses short term instability upon revenues and order intake even after the tax reform under the Republicans is passed, as uncertainty in the equity tax market persists.
- Long-term prospects especially concerning the higher margin entailing service market remain promising, as are the prospects for offshore wind, in which Vestas' JV with MHI might develop to a top market player in the long-term. However, due to invisibility, it remains unclear in how far Vestas will be able to unfold this potential.

Company description

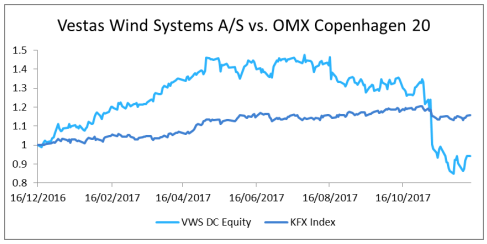
Vestas Wind Systems A/S is the global number one wind turbine manufacturer with 87 GW of wind turbines installed in 76 countries. With more than 73 GW of wind turbines under service, Vestas is also a top player in the operations and maintenance (O&M) market for wind energy.

Recommendation:	**HOLD**
Price Target FY18:	**503 DKR**
Price (as of 3-Jan-18)	**438 DKR**

Reuters: VWS.CO, Bloomberg: VWS:DC

52-week range (DKR)	357.4-632.5
Market Cap (DKR)	92.45bn
Outstanding Shares (m)	215.5
Absolute Performance 12M	-8%

Source: Bloomberg



Source: Bloomberg – The chart measures the relative performance against the OMX Copenhagen 20 Index.

(Values in € millions)	2016	2017E	2018E
Revenues	10,237	10,926	10,355
EBITDA	1,826	1,725	1,850
EBIT	1,421	1,316	844
EBIT Margin	13.9%	12.0%	8.2%
Net Profit after tax	965	985	634
EPS (EUR/share)	4.4	4.5	2.9
P/E (x)	8.86	13.76	12.91
EV/EBITDA (x)	5,06	6,78	6,47
Net Debt /EBITDA	-1.8	-1.9	-2.7
Expected Capital Gain (%)		6.5%	
Expected Cash Gain		0.2%	

Source: Company and own calculations

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Executive Summary

We initiate coverage of Vestas Wind Systems A/S with a target price of 503 DKR and a hold recommendation. Our target price is based on a Discounted Cash Flow Valuation (DCF), with a specific forecasting period until 2024, where we see an average year stabilizing. Vestas is the leading onshore wind turbine original equipment manufacturer (OEM), with a global market share of 17.7% in 2016.

Fundamental Change in Market Dynamics

Recent shifts of governments in Europe, India and Brazil towards market based support mechanism for wind installations have fundamentally changed the market environment for Vestas. A surprisingly fast deterioration in prices in the first rounds of winning bids have increased pricing pressure towards OEMs significantly, and we expect to have negative impacts on margins. We estimate that the EBIT margin will decrease to 7% in 2024 induced by deteriorating prices, down from 13.9% in 2016, as the increased competition already sent the 9-month EBIT margin in 2017 down to 12.4%. Even though the order intake (in MW) is increasing steadily, the value of the order intake is not increasing at the same pace, already reflecting the increased price pressure with lower average selling prices and we estimate this trend to continue in the short-term.

Political Uncertainty Resurfacing

After the dramatic shock in stock prices of renewable energy related companies after the presidential election in the U.S. in 2016, with prospects for renewable energy support under President Trump at risk, almost a year with a rebound passed until the second hit had to be taken. Vestas' has a high exposure to the U.S. market and when uncertainty about a cut in the support of renewable energy under the tax reform surfaced, the share price had to take another hit of interim as much as -15%. Even though under the final version of the tax reform that got passed just before Christmas, most of the uncertainty was removed, and no changes to the status quo of the subsidies were made, some uncertainty persists concerning the tax equity market, used to finance new wind projects. It is still unclear, in how far this will have an impact.

Service Market Attractiveness

The service segment in the onshore wind market allows for attractive operating margins, which invites independent service providers to newly establish themselves in the market and incentivises utilities to build up own in-house facilities. Yet, especially the multi-brand market remains vast, Vestas made a move with two strategic acquisition to position itself and thanks to a net cash position growth is possible for Vestas also via further strategic M&A activity.

Company Overview

History

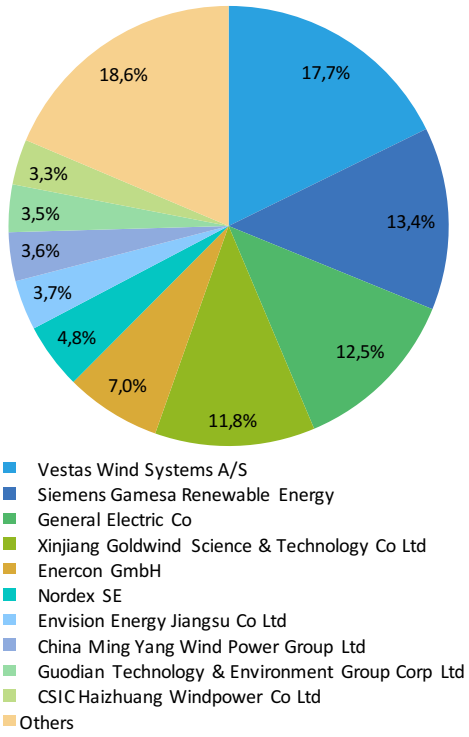
Founded in 1898 by the Hansens family in Lem, Denmark, as a blacksmiths business, Vestas Wind Systems A/S first starts the design of wind turbines in 1971. The company decides to dedicate its focus solely on the design, production and sale of wind energy solutions in 1987. The global expansion starts in 1980 with the first order from the American company Zond, leading to a rapid growth of Vestas wind turbine manufacturing business. In 1995, Vestas installs the first offshore wind turbine farm in Denmark. In 1998 Vestas goes public, with a listing on the Copenhagen Stock Exchange. It expands its operations to a global reach and towards emerging markets, with its first production facility in China opening in 2006. In 2013, Vestas decided to form a joint venture with Mitsubishi Heavy Industries for the offshore wind turbine and service segment, holding a 50% equity stake.

Vestas Today

Today, Vestas Wind Systems A/S is the leading global wind turbine OEM, with a global market share in of 17.7% (see graph 1). By the end of September 2017, Vestas has the biggest installed capacity of wind turbines (87 GW) amongst its peers in 76 countries and services 73 GW of wind turbines across the globe.

Vestas has manufacturing facilities in eight countries across North and Latin America, Europe and Asia and provides services in 63 countries worldwide. Vestas has a current production capacity of approximately 10 GW.

Graph 1: Global Market Share 2016



The market share is calculated as the deliveries of each company as a percentage of the annual installed new global wind capacity.

Sources: Bloomberg and Company Information.

Shareholder Structure

The total share capital of Vestas Wind Systems A/S amounts to DKR 215,496,947. Its shares are listed on the Nasdaq Copenhagen. Vestas has one share class and a total of 215,496,947 shares, of which 100 % are free floating. Each share carries one voting right. Vestas Wind Systems A/S has no shareholder with controlling influence, i.e. more than 5 % of the voting share capital. At the end of October, Vestas had 141,917 registered shareholders, including custodian banks. The registered shareholders held 89% of the Vestas' share capital. Four % of the shareholders were not registered by name.

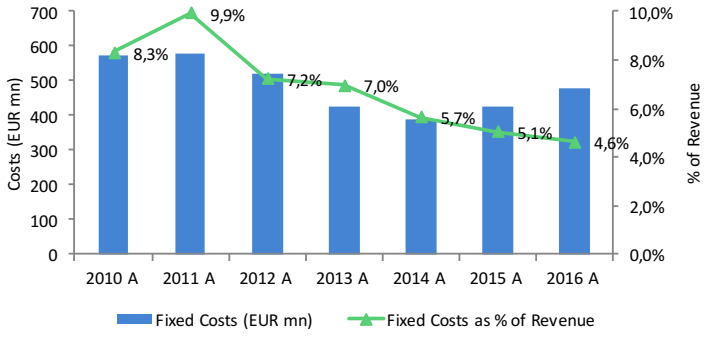
Business Model

Vestas provides a holistic service to customers in the wind energy market, from the manufacturing of wind turbines to operations & maintenance services (O&M), as well as providing individual wind farm solutions and construction thereof. Vestas has set up a global production and commercial network, with hubs in strategic markets like Brazil, the U.S, China, India and Germany, next to its headquarters in Denmark.

Vestas' operations are divided into the following two business segments: Power solutions (87% of total revenue in 2016), hereafter called wind turbine segment, and Service (13% of total revenue in 2016), hereafter called service segment. The split between manufacturing and services is common in the industry, as main competitors like Siemens Gamesa and Xiangjiang Goldwind have similar revenue splits (89.8% and 85.8% vs 10.2% and 14.2% in FY2016). The primary activity of Vestas' wind turbine segment is the turbine manufacturing business, covering all types of wind and site specifications with its product portfolio for onshore wind power. Vestas' service segment comprises the sale of onshore wind service contracts, which are divided into the following four areas: maintenance partnering, parts & repair offerings, fleet optimisation solutions and data & consultancy services. Offshore wind turbines and services are produced and provided via the joint venture with MHI since 2014.

In terms of customers, most clients are utilities (32%) and independent power producers (30%) followed by developers (16%) and others (22%)[1]. No single customer accounted for more than 10% of the total revenues in 2016 and 2015.

Graph 2: Vestas' Fixed Costs Development



Sources: Company Information and Own Calculations.

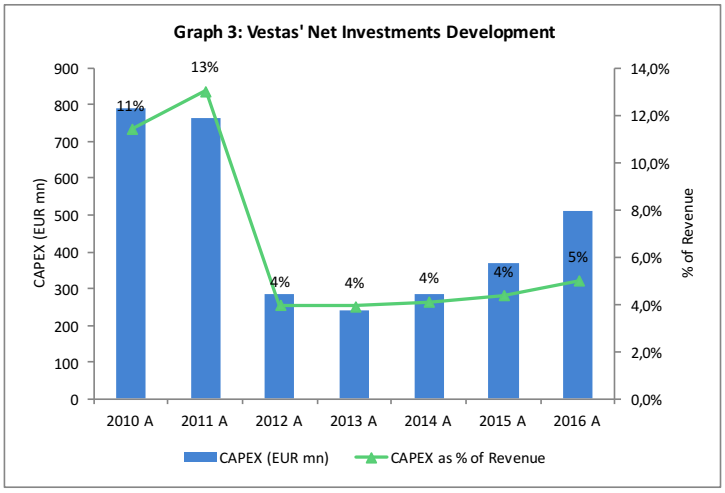
Restructuring in 2012 and 2013

Vestas went through an intensive turnaround in 2012 and 2013, changing its operating business model, as it had overcapacity issues in combination with a heavy and rigid manufacturing structure. A less favourable environment following the financial crisis made this apparent: the EBIT margin dropped significantly starting in 2009 and reaching a first negative value in 2011.

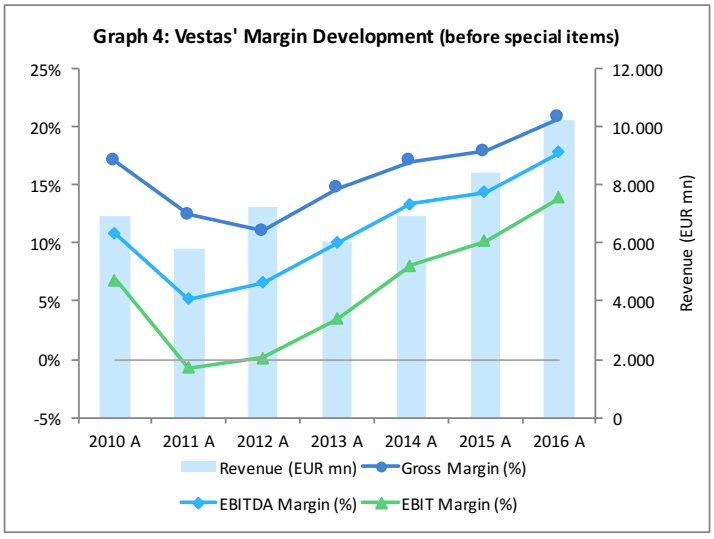
Thus, the following changes were undertaken:

[1] 2016 figures.

- **Fixed cost reductions**: Offices were closed and support functions were transferred to shared service centres, as for example R&D facilities in Denmark were consolidated. Amongst others, this allowed Vestas to reduce its headcount by 32% from 22,721 in 2011 to 15,497 by the end of 2013. Over the period of the restructuring (2011-2013) ca. 500mn€ of fixed costs were saved of which >70% from the headcount reduction and <30% from divestments. The fixed costs shown in graph 2 comprise distribution, research and development and administration costs excluding depreciation and amortization[2].



Sources: Company Information and Own Calculations.



Sources: Company Information and Own Calculations.

- **Reassessment of production capacity and manufacturing locations**: Vestas reduced the number of production sites from 31 to 19, to optimise capacity utilisation, while keeping its global footprint. Factories in stagnant markets with (too) high capacity (mainly in Europe) were divested. Simultaneously, the use of standardised components was increased, which allowed a streamlining of the remaining production, a further reduction of manufacturing costs, and a lower need for future investments. Capital expenditure (CAPEX) requirements were reduced substantially (cf. graph 3).

- **Outsourcing**: In line with the divestment of production facilities, Vestas transformed its production process away from a vertical integration model, where almost all the components for the wind turbines were produced in-house, to a more outsourcing based model, where non-key components are sourced from trusted sub-suppliers (for example the hub, main shaft and frame). The sourcing from sub-suppliers allows for a higher flexibility in the utilization of the own production capacity and a higher flexibility of costs, contributing to improved gross margins (cf. graph 4).

- **Refocus of research and development to lower investments:** Concerning R&D, Vestas changed its focus on further improvements of existing platforms instead of investing in costly new technologies. This not only cut costs, but also

[2] Please note that part of the cost savings took place in the production costs.

reduced the required investments for new wind turbine variants, as well as the time-to-market. Additionally, the formation of the joint venture for offshore wind energy with MHI, finalised in 2014, lowered R&D cost requirements for Vestas, as the expensive development of the game-changing V164-8.0 MW turbine, was transferred to the JV.

- **Implementation of make-to-order principle:** Vestas shifted to a just-in-time production, to reduce its component inventories. Amongst others, this helped to improve the working capital management (cf. table 1). One sign that this shift was successful is that, in combination with the outsourcing, the 20% drop of deliveries in 2013, did not hit Vestas' margins, but thanks to the restructuring they were improved (see graph 4).

Table 1: Vestas' Net Working Capital Development

	2011 A	2012 A	2013 A	2014 A	2015 A	2016 A
Avg. Days Investory	159	114	85	80	82	71
Avg. Days Work. Cap. (Assets)	258	198	168	161	160	143
Avg. Days Work. Cap. (Liabilities)	239	163	170	189	196	189
Working Capital Ratio	1,08	1,22	0,98	0,86	0,81	0,76

Sources: Company Information and Own Calculations.

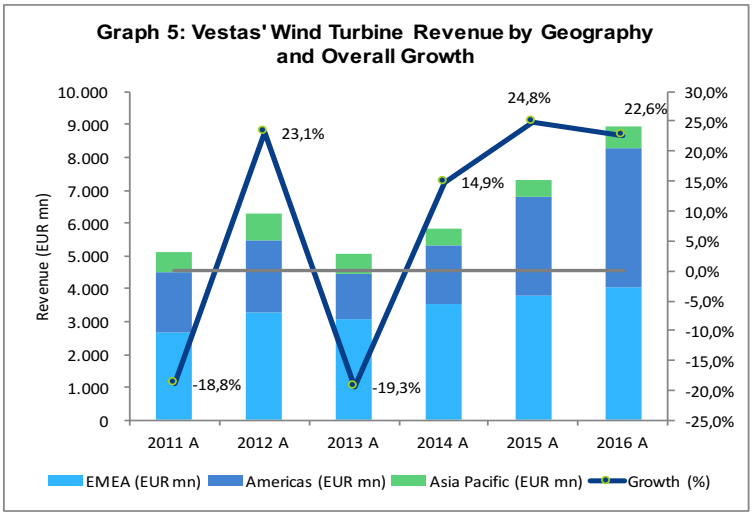
- **Changes in the management:** During the turnaround, the chief financial officer as well as the chief executive officer (CEO) was replaced. CEO Anders Runevad has led Vestas' operations since 2013.

Throughout the turnaround period and beyond, Vestas has managed to keep its leading position concerning the quality, technology and safety of its products. One indicator for this is the lost production factor, which is consistently kept under 2% since 2013. After the turnaround, Vestas operating business model is more lean, scalable, flexible and agile.

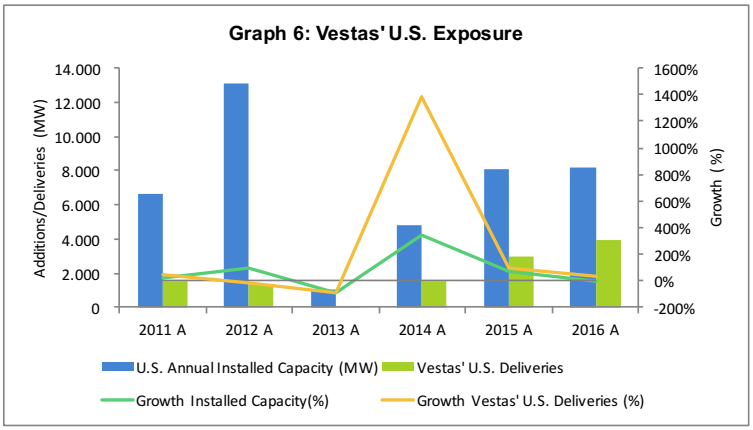
Vestas kept the cost control a priority focus also after the successful turnaround years, with a continuation of their site simplification program as well as the further use of shared services. The success can be seen in graph 2, as the fixed costs as a percentage of revenues steadily decreased. The cost savings process is still ongoing, as for example, in December 2017, Vestas announced the consolidation of the Northern and Central European sales business units, with effect as of January 2018, to create a simpler and more agile structure for this maturing market, according to chief sales officer Juan Araluce[3]. This is also a reaction to the increased pressure on margins, due to price pressure, and shows that Vestas is reacting to the new market circumstances.

[3] SeeNews Renewables Article, December 14, 2017; https://renewablesnow.com/news/vestas-to-combine-sales-units-for-central-and-northern-europe-594562/

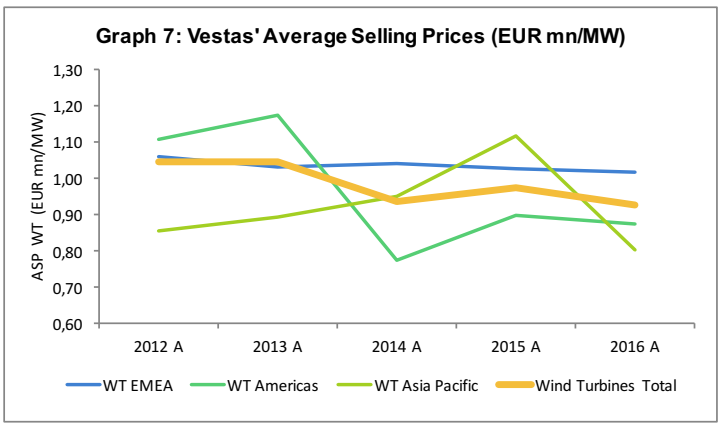
Power Solutions – Vestas' Wind Turbine Segment



Sources: Company Information, GWEC 2016 and Own Calculations.



Sources: Company Information, GWEC 2016 and Own Calculations.



Sources: Company Information and Own Calculations.

Historical Performance

In the wind turbine segment Vestas' operations are spread globally, to mitigate the risk of regional installation volatility due to changes in the investment environment (mainly political reasons, will be elaborated further in a subsequent section). Yet, Vestas has a high exposure to the U.S. and the EMEA (Europe, Middle East and Africa) region (cf. graph 5 and 6).

The main revenue drivers are the MW sales in terms of deliveries and the average selling price (ASP) per MW delivered.

Vestas' MW sales have been negatively impacted in the past by the following: i) regulatory changes/uncertainty as for instance in the U.S. in 2013 (cf. graph 6), ii) relatively low exposure to the Indian market (emerging market with a high growth rate) iii) unfavourable investment environment during the financial and sovereign debt crisis (2008-2011).

The MW sales have been positively impacted by: i) uptake of U.S. market growth after 2013, ii) the German Energiewende, ii) a generally positive investment environment, with low interest rates and favourable policy trends worldwide caused by pollution issues and climate change awareness.

The revenue (in EUR mn) has also been impacted by the development of the ASP, which depends mainly on the regional mix (see graph 7) but also on the sales-mix of wind turbine types, and the scope and uniqueness of the offerings. Additionally, it is dependent on the level of competition in the market (price pressure).

Thus, the main drivers behind the MW sales in terms of deliveries and the ASP are the growth of annual installations of wind energy, the

political frameworks/subsidy schemes for wind energy and the competitive situation in the market.

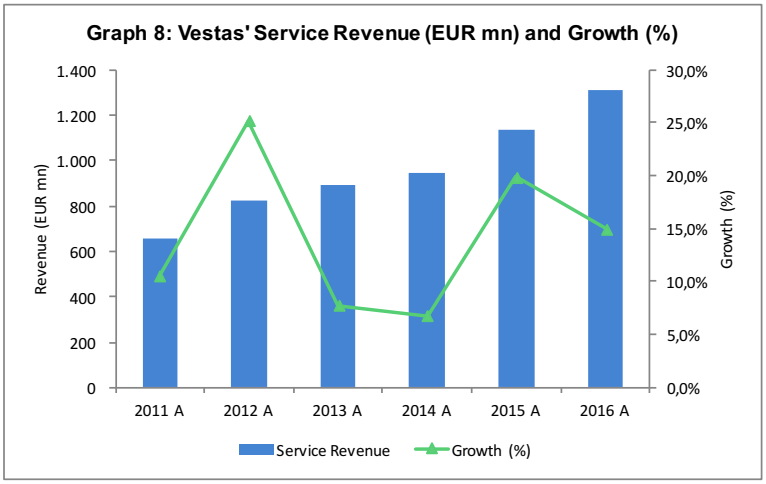
Strategy

The wind turbine segment offers a product portfolio, which covers a wide range of wind turbines across all wind classes. Vestas' onshore product portfolio ranges around machines with 2-megawatt and 3-megawatt platforms. The design of the turbines is modular, which allows for standardized components to be used, helping to keep costs under control, while simultaneously allowing Vestas to provide optimal solutions for any site specification across the world. Vestas focuses on the technological evolution of these well proven performing platforms with a market driven R&D strategy, instead of creating new clean-sheet products, keeping their operational and financial risk low (unfamiliar machines have very high operational and financial risks). However, to not miss out, Vestas is involved in the development of new breakthrough technology through a number of collaborations. For example, with Northvolt, Vestas is working on the development of battery storage solutions for wind energy in a joint R&D and product development partnership. Additionally, Vestas continuously improves the performance and range of its product portfolio. For example, the V150-4.2 MW turbine delivers a 21% increase in the annual energy production when compared to the previous V136-3.45 MW, and achieves a lower sound power lever. The new model is an updated version of its 3MW platform, which now has a nameplate capacity of 4.2 MW.

Services – Vestas' O&M Segment

Historical Performance

Graph 8: Vestas' Service Revenue (EUR mn) and Growth (%)

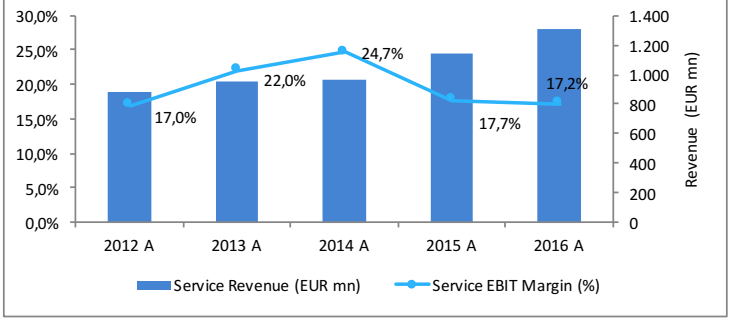


Sources: Company Information and Own Calculations.

In the service segment, revenue growth (see graph 8) has proven more stable in the past compared to the wind turbine segment, with an exception in 2014, when the offshore services were transferred to the joint venture with MHI. In 2015 and 2016, Vestas acquired UpWind in the U.S. and Availon in Germany, to increase its exposure in these geographies and to increase its base of multi-brand services, as it recognised the growth opportunity in serving non-Vestas turbines, which correspond to 86% of overall installed wind turbines worldwide. Yet, so far, as Vestas sells approximately 70% of its wind turbines with a

service contract, this is the main driver of growth for the total capacity under service (MW). The EBIT has seen a slight negative trend, as competition in this market segment has increased. Increasing competition might be a reason for a less favourable average selling price in 2016 (down to 0.0184 m€ /MW from 0.0202 in 2014) and the lower EBIT margin (see graph 9), but also integration costs of the two acquisitions that Vestas made in the service segment might be a contributing factor. The backlog has seen a steady increase, indicating further revenue growth/stability.

Graph 9: Vestas' Service Revenue and EBIT Margin Development



Sources: Company Information and Own Calculations.

Strategy

Vestas' service offering is divided into the following four areas: maintenance partnering, parts & repair offerings, fleet optimisation solutions and data & consultancy services. Vestas offers warranties that last for up to five years in certain cases and afterwards service contracts with an average duration of 6 years, with varying length depending on the type of service purchased. The majority of the wind turbines are sold with service agreements, which usually run for five to twenty years. The service segment therefore provides stable revenues, compared to the more cyclical business of the wind turbine sales. Thanks to the vast installed base and data processing and analytics competencies, Vestas holds the wind market's largest wind data library, and thus has a unique position in the service segment. Data analysis is already being used to optimise O&M and Vestas plans to further keep using it for developing new, value creating service solutions. It is also successfully using the knowledge, to keep the quality and performance of its wind turbines high, as can be seen when looking at the lost production factor, which is consistently kept under 2% since 2013.

The Wind Energy Market

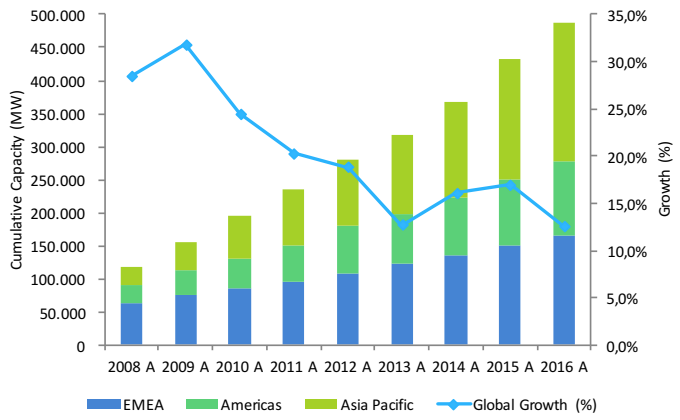
Wind as Part of the Energy Market

The wind energy market is part of the overall energy market. In the energy market, power sources range from conventional energy such as oil, gas, coal, and nuclear, to alternative energy such as wind, hydro, geothermal, solar PV et cetera. In the last decade, the global energy market has undergone fundamental changes. During the last five to ten years, investment in low-carbon, renewable and more efficient technologies has started to tangibly impact the competitive landscape. In

2015, capacity additions from renewables surpassed those of conventional energy for the first time[4]. The pace at which clean energy solutions have been shifted to, accelerated much faster than anticipated in recent years. Especially wind and solar parks have become increasingly competitive. With the LCOE for wind and solar in certain favourable regions/locations being below the LCOE of traditional power sources, such as fossil fuels, they are now the cheapest way of adding new capacity to the power grid in those regions. However, in the overall picture, so far renewables still remain small: the share of renewables like wind and solar only reached 2.8% of global energy consumption in 2015[5].

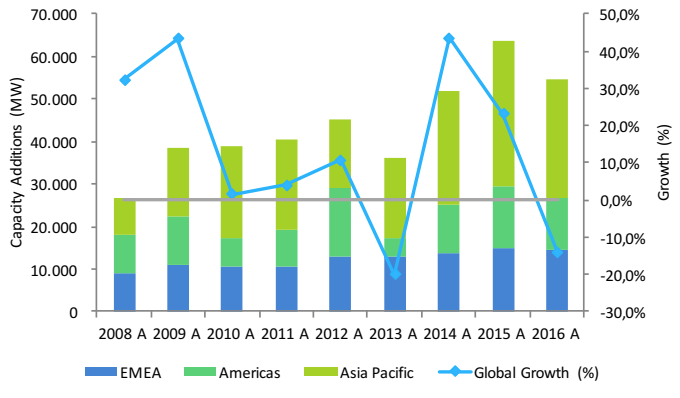
Global Trends and Developments

Graph 10: Global Cumulative Installed Capacity (MW)



Source: GWEC 2016.

Graph 11: Global Annual Installed Capacity (MW)



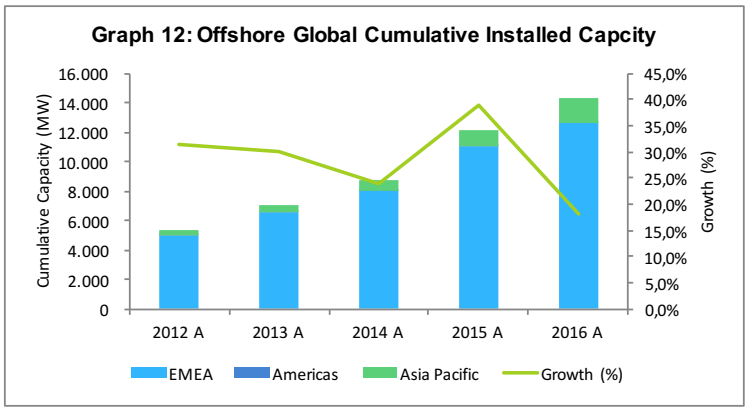
Source: GWEC 2016.

The **global wind market** has seen constant growth over the last two decades in terms of cumulative installed capacity (cf. graph 10). It has turned into a mature market with a well-developed global supply chain. The main markets for wind energy are China, the U.S. and Europe. In recent years, emerging markets such as India started to play significant roles as well. Annual installations have grown almost every year, with exceptions in 2013 and 2016 (cf. graph 11). The global setback in growth of annual installations of -20% year-on-year (y-o-y) in 2013 was primarily driven by the U.S. market, which saw a 92% year-on-year decline in annual installations. The decline in the U.S. was caused by uncertainty in the last quarter of 2012 concerning the extension of the Production Tax Credit (PTC) policy[6]. In 2016, annual global installations declined by 14.1% y-o-y, due to slowing growth across all geographies. China was the market that contributed most to this, due to grid congestion problems. A general decline or rather slowdown in growth is expected to continue, as the market becomes more mature and a peak in global new installed capacity seems to be reached (at least concerning onshore wind). In general, most of the

[4] cf. IEA 2016, and FT Pilita Clark, May 18, 2017

[5] cf. BP Statistical Report 2016

[6] The PTC is the policy through which renewable energy has been promoted in the U.S. by the federal government since 1992. https://energy.gov/savings/renewable-electricity-production-tax-credit-ptc



Source: GWEC 2016.

growth and capacity additions in the global wind market came from onshore wind in the past. As Vestas' main business is concerned with the onshore wind market, the onshore market will be discussed in further detail by geographies in a subsequent section.

Concerning the offshore wind market, only in the last five to ten years has **offshore wind** seen an uptake in capacity growth (see graph 12). This happened, amongst others, because China began installing offshore wind parks in 2010. In 2016, offshore installations are mainly present in the northern European countries (big players are the UK, Germany and Denmark with cumulative installed capacity of 5.1GW, 4.1 GW and 1.2 GW respectively), Asia (China 1.6 GW and Japan 0.06 GW) and since 2016 the US, with .03 GW installed capacity. The offshore market is expected to grow at a much higher pace than the onshore market, as recent breakthroughs in technology helped to drive down costs and as the offshore area in general has higher wind speeds and thus higher energy production possibilities. In Europe, the tender procedure of new capacity is done through auction based mechanisms, and in 2017 high competition between utilities (e.g. between Dong and Vattenfall[7]) has led to record low winning bids, of zero subsidies (with projects due in 2024). The expectation of further technological improvement has supported these bids: the trend of larger wind turbines in the offshore segment has solidified by the release of Vestas' 8 MW platform based V164 turbine, which recently was updated to 9.5 MW as nominal production capacity. Also, the market leader in the offshore segment, Siemens Gamesa is currently working on an 8 MW platform based offshore model, and Senvion is developing a 10 MW + machine. We forecast the offshore market to grow mainly in Northern Europe, the U.S. and China to a cumulative installed capacity of 63 GW in 2024, i.e. capacity additions of ca. 50 GW over the next eight years, whit a growth on average by 22.9%. As Vestas' main business is focused on the onshore market, the offshore market plays a role for the joint venture with Mitsubishi Heavy Industries.

The **service market** within the wind industry is dependent on the cumulative installed capacity. The service market is expected to grow by 9 % per year over the next 10 years, according to a recent market report[8]. The manufacturer warranty of more and more wind turbines is expiring, as these warranties typically last a

[7] https://www.offshorewind.biz/2016/10/17/the-big-league-offering-lowest-offshore-wind-prices-interview-with-vattenfall/
[8] MAKE Consulting: Global Wind Turbine O&M, 22.12.2016

maximum of 5 years and the installed global wind turbine fleet has more than doubled over the past six years, from 238 gigawatts in 2011 to 487 gigawatts by the end of 2016 (cf. graph 10). Thus, since warranties are starting to expire, new service opportunities are expected to unfold. The competition in this market segment is increasing, as more utilities companies choose to build their own in-house service capacities while at the same time new independent service providers enter the market.

Drivers

The most important factors that drive the wind energy market in terms of annual installed capacity growth are in general politics and costs of investment/energy production. A commonly used measure to economically assess for the overall costs of different energy sources is the levelised cost of energy/electricity (LCOE) The LCOE is commonly derived by a simple discounted cash flow method, as can be seen in Annex, graph 17. The LCOE of wind depends mainly on the total capital costs, i.e. the cost of the wind park installation, and the energy production, i.e. the efficiency of wind turbines, measured by the capacity factor, as fuel costs are low-to-zero and operating and maintenance costs are small compared to the capital expenditures. The total wind park installation costs depend on the project size, the turbine costs, the existing wind resource (speed and occurrence), the difficulty of the terrain, the transportation costs, and the local labour costs. These factors differ from project to project, and this is the reason why regional differences in the LCOE of onshore wind exist.

The most important specific drivers for the wind market identified will be discussed in more detail below:

- **Technological advancement** is identified as one key driver. Technological improvement is responsible for increased capacity factors[9], which in the past were achieved for example by the introduction of higher hub heights or rotor diameters[10]. A study found that for example in Denmark the capacity factor increased from 10 % in 1980 to 24 % in 2013[11]. Capacity factors vary with the location and site specifications of wind installations, mainly due to the existing wind resources. Potential for future improvements through technological advancement is seen in the continuing trend of larger turbines, which allow for economies of scale, further advancement of blades, which allow for higher

[9] The capacity factor (CF) represents the ratio between the average delivered power of a wind turbine and the theoretical maximum power (Boccard, 2008).
[10] cf. WEResources, World Energy Council, 2016, p.24
[11] cf. Chabot, 2013, available at https://www.erneuerbareenergien.de/files/smfiledata/3/1/7/2/7/1/V2BC37NhCFWindDK.pdf

electricity output and advancements of towers, which allow the reaching of higher average wind speeds[12]. Different approaches for the forecasting of future cost reductions exists. A recent survey, led by the Lawrence Berkley National Laboratory amongst leading experts in the wind market unifies and compares the different results, and found that cost reductions for onshore wind energy of around 24% by 2030 are anticipated due to technological advancement under a "best guess" or median scenario[13]. Another reason for technological improvement to be a key driver is that due to it, adaptations for efficient installations in high and low wind speed sites were enabled, allowing for installations in previously unsuited (low wind speed) areas. This is especially important for the wind markets in some European countries, where by now high onshore wind sites are fully utilized, and thus only lower wind sites provide space for capacity additions (e.g. in Germany[14]).

- The **turbine costs** are identified as another important driver, as they directly contribute to the LCOE. According to IRENA[15], turbine costs (including electrical infrastructure and transportation) account for up to 84 % of the capital costs of wind energy. Historic cost developments show that turbine costs are dependent on commodity prices (copper, steel, cement, rare earth magnets), the size of the wind turbines (as larger wind turbines are initially more expensive due to their size), supply capacity (versus demand) and consequently competition amongst OEMs, inflation dependent costs of civil engineering and technological advancement. In the recent years, the decline of commodity prices because of the financial crisis as well as higher supply due to capacity increases in China and India has led to a decrease of turbine costs of approximately 30 to 40 % since in 2009, according to the World Energy Council[16]. From a technological point, according to IRENA, there is potential for further cost reductions for wind turbines, namely concerning the turbine and nacelle parts, the towers and the blades. However, wind project developers are more concerned with the decrease of LCOE than only the cost of capital expenditure, i.e. the price of the wind turbines, as the focus of OEMs on the steady decrease in LCOE for onshore wind reflects[17]. Yet, since the CAPEX impact the LCOE, they are still an important driver and imply a constant pressure on prices for OEMs like Vestas.

[12] cf. Power to Change 2025, IRENA 2016, p. 60
[13] cf. http://newscenter.lbl.gov/2016/09/13/experts-anticipate-significant-continued-reductions-wind-energy-costs/
[14] European Onshore Wind Outlook 2020, Qvartz 2016
[15] cf. Renewable Power Generation Costs in 2014, IRENA 2015, p.56
[16] cf. WEResources, World Energy Council, 2016, p. 21f
[17] cf. WEResources, World Energy Council, 2016, p. 24

- Another key driver for renewable energy installations is the existence of supportive **governmental policies** and frameworks. In general, the most significant impacts on a global basis have agreements such as the Paris Agreement at COP21 from 2016 and its predecessors, due to their global presence, when they are transferred and implemented by the governments of the participants to the single countries. As recent market events (and studies, for example by Eryilmaz and Holmans, 2015) have shown, uncertainty about the extension of supportive governmental programs such as the Production Tax Credits (PTC) in the U.S. led to steep declines of annual installed capacity, i.e. had a severe impact on the market development. And even though it has been commented that due to the decreased costs for onshore wind high politically set incentives for new installations are no longer necessary, the economic attractiveness of onshore wind in most markets still heavily depends on corresponding regulatory frameworks and the design of markets[18].
- The **cost of capital** is another important driver for the LCOE. The impact it can have on the LCOE is significant, as shown in a sensitivity analysis by IRENA. For example, at a WACC of 10 %, the LCOE of onshore wind is 78% higher than at a WACC of 2.5 %[19]. The WACC is dependent on the mix between equity and debt used to finance new wind installations. This mix, as well as the specific costs of debt and equity vary amongst countries and individual projects, as they are associated with different risks. A stable regulatory and political framework tends to reduce the perceived risk of renewable energy projects, and thus lowers the required rate of return[20]. Additionally, the current low yield environment is a favourable driver for the wind market.
- Another driver related to the potential to further reduce LCOE is firstly, the more widely use of **wind farm best practices** in the development and installation of wind parks[21]. And secondly, **lean and highly competitive supply chains** are to have a similar effect, amongst others, due to economies of scale.
- **World energy demand** and the demand for clean energy, due to environmental concerns, air pollution problems and so on, are important drivers for the wind market, as they impact the development of governmental support systems and energy legislation. This is coupled to the willingness of

[18] cf. World Energy Outlook, IEA 2016, p.53
[19] cf. Power to Change 2025, IRENA 2016, p.69
[20] cf. Power to Change 2025, IRENA 2016, p.25
[21] cf. Power to Change 2025, IRENA 2016, p.59

end-consumers to pay more in the short term to establish the renewable energy system and thus relies on the support of the population (at least in democratic countries). The current political sentiment in most western countries is to fight against climate change and pollution, promoting clean energy solutions[22]. However, this can change quickly due to changes in government or macroeconomic reasons, such as the level of economic activity.

- The development of **storage possibilities** is another important driver for the wind energy market. Due to the stochastic nature of wind, ensuring stable electricity supply becomes demanding when wind energy becomes a significant contributor to the energy mix in the grid. Storage would allow to even out the intrinsic fluctuations of wind power generation. The recent uptake in the electric car industry has led to improvements in the batteries, which are helpful for the development of storage for wind parks. The expected growth of electric car demand, induced by political support, might drive this development further down the road[23].

Competitive Landscape

The global wind turbine producers market is led by European (including Vestas, Siemens Gamesa, Nordex, Enercon), Chinese (including Xinjiang Goldwind, Guodian, Ming Yang and Envision) and U.S. based (including General Electric) OEMs. The top ten players in 2016 covered approximately 75% of the global market, with Vestas in a leading position, as mentioned earlier, with 17.7% market share (cf. graph 1). The Chinese players mainly operate exclusively within China, yet, some are planning international expansion to markets such as India in the future. Guodian for instance, is already present in the U.S. market, even though only to a very small extend. Among Vestas' main competitors in its core markets, which are the U.S., EMEA and China, are usually Siemens Gamesa, GE and Goldwind. The industry rivalry is very high, with an intensifying price competition under way. Quality and ongoing improvement of the wind turbines is crucial to stay competitive. However, among the top players (excluding China), product differentiation is not very big. Thus, the decision making of clients is often based on factors such as local presence, implying typically more competitive costs, fast delivery and better service, post-installation service or guarantees.

The competitive landscape changed over the last years, as the market has seen consolidation amongst top players (Siemens merged with Gamesa, Nordex with

[22] cf. https://www.ft.com/content/c4a6f996-e003-11e7-a8a4-0a1e63a52f9c?segmentId=31267036-d221-9c5d-02f6-e1b25288af8d

[23] cf. Global Trends in Renewable Energy Investment 2017, Frankfurt School-UNEP Centre/BNEF 2017, p.19

Acciona). However, so far, these mergers did not create value for shareholders, but destroyed it, as can be seen by the one year price return of -35% by Siemens Gamesa and -55% by Nordex compared to -8% by Vestas.

The competitive landscape concerning the service segment is further segmented, as not only wind OEMs offer service solutions, but also independent service providers, and utilities have also started to build up their own service capacities.

In the offshore segment, Vestas' main competitor Siemens Gamesa leads the market in this segment in 2016 with a 64% market share. Vestas has a market share of 15%, followed by Senvion (7%), Areva (5%) and others, which include Sinovel, Dongfang Electric, Goldwind and GE, according to Bloomberg data.

Wind Markets by Geography

North America

In the northern American region, the U.S. plays a pivotal role. The U.S. remains the second biggest global market in terms of annual installed capacity after China in 2016 (8.1 GW and 23.4 GW respectively). It has been Vestas single biggest market for the past five years, with the exception of FY 2013. The percentage of U.S. deliveries of total deliveries has built up from 18% in FY 2012 to 41% in FY 2016. This gives Vestas a high exposure to the U.S. market (cf. graph 6).

The U.S. wind market has developed into a mature market with a well-established supply chain and a well-balanced demand and supply situation. In 2016, wind has become the biggest source of renewable electric capacity, surpassing hydropower. Due to the recently passed tax reform, under the Republicans, some uncertainty concerning the further political support for renewable energy emerged. There are currently the following support policies in place: on the state level, the aforementioned PTCs as well as ITCs (Investment Tax Credits)[24], which were lastly extended in December 2015. The PTCs are set to gradually expire until 2020, and remained unchanged under the final passed version of the tax reform. Yet, during the finalisation of the reform, there was a discussion about cutting the inflation adjustment of the PTCs, and retroactively changing the eligibility criteria, which created substantial uncertainty in the market[25]. Vestas' share price for example interim dropped by as much as 20%, after the company adjusted its outlook downwards for the financial year 2017 during its third quarter results

[24] https://energy.gov/savings/business-energy-investment-tax-credit-itc
[25] https://www.bloomberg.com/news/articles/2017-11-03/gop-s-cruel-and-unusual-tax-plan-cuts-wind-forecast-in-half

presentation, mainly due to the uncertainty in the U.S.. In the past PTC uncertainty had sever impacts on the U.S. market: in cases where the PTC was allowed to expire or when the extension of the program happened late, the national capacity additions were subsequently about 70 to 92 % lower (cf. Eryilmaz and Homans, 2016). The uncertainty about the PTC is settled now, however, the two months of uncertainty may have had an impact on the sales and order inflow. Additionally, it still remains unclear in how far the tax reform will have an impact of the tax equity market. Renewable energy project developers sell parts of the projects' tax credit to corporations, which could in the past apply the credits to their own tax bills[26]. Under the Base Erosion and Anti Abuse Tax provision, the amount of tax deductions was limited and there were fears that this would void the need of companies for tax credits from investments in wind energy. The final version of the reform, which got passed on the 20th of December, includes a last-minute clause, which still allows 80% of investments in PTCs to be accepted as a deduction. It remains to be seen whether the tax credit market is going to be affected, which may take some time to become evident. The tax credits play an important role in the financing of wind projects, as they cover about one third of the initial investment costs and thus significantly lower the cost of investment (cf. Linn and Richardson, 2013).

It should be kept in mind, that the recent developments concerning the tax reform have rather short-term implications. The phasing out of the subsidy was planned for 2020 already under the previously existing tax scheme. For the longer term, the break-even of the unsubsidised cost of wind energy with conventional energy sources is the pivotal factor that impacts the development of the U.S. wind market. According to Lazard's LCOE Version 11.0, onshore wind is already competitive (without subsidies) with traditional fossil fuel energy sources in some states like Texas, with LCOE from 30-50 USD/MWh. For the whole U.S. market natural gas is seen as the pivotal competitor to wind energy, as the natural resources are significant in the U.S. and LCOE is 42-78 USD/MWh (Lazard Version 11.0). Recent estimates by the US Energy Information Agency suggest, that the overall U.S. onshore wind LCOE could break even with the LCOE of natural gas in 2022 on an unsubsidized level. We expect the growth of annual installation to continue at around 10% until 2020, with onshore wind being a competitive alternative for fossil fuel sources. After 2020, we expect a drop of growth rates after the expiration of the PTC in 2021 and 2022 and a subsequent recovery, with an average growth of 1.6% from 2021 to 2024.

[26] https://www.bloomberg.com/news/articles/2017-12-01/a-12-billion-clean-energy-tool-that-u-s-tax-reform-could-kill

Concerning the rest of North America, namely Canada and Mexico, the Canadian market is expected to grow modestly with 0.7 to 1GW/year according to GWEC (2016), coming down from peak levels in the six previous years around 1/1.5 GW. Vestas deliveries have declined accordingly, from peaks of 7.3% in 2012 to 0.2% in 2016, averaging 3% of deliveries in the last five years for Canada. Mexico is expected to grow, as there was a new energy reform and government targets introduced. In the past, Vestas deliveries in Mexico were volatile, ranging from zero to 3% of deliveries over the last five years, averaging 1.7%.

Taking all this into consideration, we forecast annual onshore installations to be 108.8 GW in total until 2024 for North America, with an average growth of 7.9%.

Latin America

Concerning the rest of the Americas, the deliveries contributed on average 7.3% over the past five years to the total deliveries of Vestas. The market in this region is still under development with rather young supply chains, however, getting more substantial thanks to the Paris Agreement at COP21 in 2016.

In Latin America, Brazil is the most important market, with an installed capacity of 10.7 GW in 2016. In 2016, due to political turbulences, all auctions for new capacity additions were cancelled. New installations in 2016 were around 2 GW and expected to remain on a similar level for 2017, according to the Global Wind Energy Council (GWEC). Recent announcements from the country's Ministry of Mines and Energy suggest that new transmission auctions were held in December 2017.[27] With the recent recovery of the Brazilian market, robust growth prospects in Argentina and Chile, and new climate targets in Caribbean countries under way, we forecast 43.7 GW of overall new onshore capacity until 2024, with annual installations growing 11.2% on average for the Latin American Region.

EMEA

EMEA is together with the Americas Vestas most important market. The share of total deliveries is on average 51 % over the last five years. As Europe is substantially different than the Middle East and Africa, the two regions will be discussed separately.

Europe, similarly to the U.S. is mostly a mature onshore wind market. In general, the most important market dynamics come from the renewable energy goals set by the EU, which then are adapted by the member countries. Until 2020 Europe is

[27] https://www.windpowermonthly.com/article/1443890/dates-set-brazilian-auctions

in line with its targets, supported by the generally good economic environment. That is, around 57 GW onshore additions are expected until 2020.

In one of the most important markets, namely Germany, some turbulence has manifested during 2017, due to the shift to auction based systems after the introduction of the reformed renewable energy law "EEG". In the first auctions, unusual high percentages of the MW up for auction were community wins. However, the auction rules were adapted, after industry and developers expressed concern over the feasibility and irregularities of the civic wind parks that won the bids, as other than professional project developers the community bidders were not required to have a building permit to participate in the auction.[28] As Germany is an important market for Vestas, with the share of deliveries ranging between 10 and 18% in the past five years, this is an important development to keep an eye on. However, the shift towards auction based mechanisms is also present in other European countries, as for instance in Spain, the UK and Italy already, and until the beginning of 2017, all European Union countries had to adapt their policies to market-based incentives for onshore wind, due to an EU Commission directive. Thus, it is expected that the shift will create some more price pressure in most of the area of Europe. One exception is for example Turkey (non-EU), which is not expected to change its feed-in-tariff policy framework concerning wind energy before 2020[29]. As most of the high wind resource sites across Europe have been exploited, the growth of annual onshore installations in Europe is expected to slow down significantly, with an average of 0% until 2024.

Concerning the Middle East and Africa, there is a project pipeline that suggests 9 GW of capacity additions until 2020 (12.9 GW until 2024). Due to its small so far cumulative installed base (3.9 GW in the end of 2016), it does not play a major role in the development of the wind market, yet high growth rates are achievable. Almost 100% of the so far installed capacity is spread over only ten countries, with South Africa in the lead. Vestas already has a strong market presence in South Africa and should be able to benefit from a potential uptake. However, the region remains volatile due to political risks and negligible in terms of delivery contribution (on average <2% of deliveries in the last five years). We expect the driving force behind this region to be South Africa, the Maghreb countries and the Middle East, which shows sustainability ambitions to start moving away from its dependency on oil.

[28] http://www.spiegel.de/wirtschaft/unternehmen/windparks-firmen-tarnen-sich-als-buergergesellschaften-a-1152947.html
[29] European Onshore Wind Outlook 2020, Qvartz 2016

All in all, the estimated capacity additions of onshore wind in EMEA are 104.9 GW until 2024, with an average growth of 5.3% in the annual installations, mainly driven by the Middle East and Africa.

Asia Pacific

The Asian wind market is dominated by the People's Republic of China, which holds 169 GW of the overall 204 GW installed capacity of the Asia and Pacific region. Vestas' deliveries averaged 10.7% of total deliveries in the last five years for the whole region and 6% of the total for China.

China has some specific market conditions, as its wind market is dominated by local Chinese suppliers, which tend to be at least partially owned by Chinese utilities. For example, the market leader Goldwind is owned by 17% by the Chinese utility company Xinjiang Wind Energy Co., Ltd and also is partially state owned (China State-Owned Asset Supervision & Administration Company holds 13%). This makes the competitive landscape different from the rest of the world. For almost all of the new installed capacity, wind turbines are sourced from local wind turbine OEMs, giving little possibilities for international turbine producers. On the other hand, Chinese OEMs almost exclusively serve the home market and are not present in the rest of the world as suppliers. As mentioned earlier, this dynamic is about to slowly shift, as well proven Chinese suppliers start to expand internationally to offset their high exposure to local market developments, for example towards India and the U.S.[30].

In terms of the overall Chinese market size with annual onshore installations of 21.1 GW, Vestas presence seems infinitesimal small, with deliveries of 490 MW in 2016. However, it is significant for Vestas (5 % of the total 2016 deliveries), which has managed to expand its order intake recently (from 399 MW in 2016 to 758 MW in 2017).

The Chinese market is expected to install a higher level in 2017 compared to 2016, as a reduction in the feed-in-tariffs is imminent for 2018 and it is expected that developers want to benefit from the higher levels before they are reduced. Following that, the annual capacity additions are expected to remain stable, as demand growth is expected to flatten, solar installations are expected to increase, and due to grid congestions problems that slowed growth in 2016 and are only partially solved so far. China has a five-year-plan for energy in place until 2020, which foresees an installed wind capacity of 210 GW as a target.

[30] http://www.renewableenergyworld.com/articles/2016/07/the-global-wind-market-china-versus-the-world.html

The rest of Asia Pacific is dominated more and more by India, which shows a high potential for market growth (capacity additions of 2 to 3 GW in the last years, and a cumulative capacity of 28.7 GW in 2016). The main market players in India are Suzlon, Siemens Gamesa, Inox and others. Due to the shift to competitive auctions for new capacity there was a stall in the market in the first half of 2017, which negatively impacted the OEMs with a high exposure. The market is expected to adapt to the new mechanism and recover quickly. Vestas plans to expand its so far rather small presence there (66 MW of deliveries in 2016), which can be already observed by an announced order intake of 470 MW in 2017 from India.

Other significant countries in the Asian region are Japan, South Korea and Australia. New emerging markets like Pakistan, the Philippines and Vietnam are expected to contribute to the growth in this region as well, induced by the Pairs Agreement of 2016 and the downturn trend of costs.

It is further noteworthy to mention that Vestas secured its first order of 50 MW for Russia in November 2017. So far, a professional wind market in Russia is as good as non-existent. However, according to a government decree, installations of 3.35 GW are planned until 2024, which could open Russia as a new growth market[31]. Vestas has entered a framework agreement with OOO Fortum Energy to start the establishment of a local supply chain in the region around Rostov and Ulyanovsk, north and east of Moscow. This offers new diversification and growth opportunities for Vestas in the medium to long term.

The Asia Pacific region as a whole is expected to see new installations of 233.3 GW until 2024, with an average growth rate of annual installations of 3%.

Financials

FY17-24 Forecast and Long Term Estimates

Sales: In terms of the **Wind turbines** segment, we estimate Vestas' sales in terms of MW delivered to grow on average by 3.4% until 2024. We estimate that Vestas will have annual deliveries of 11.6 GW on average until 2024, with a peak towards 2020 and 2021, due to the phasing out of the PTC in the U.S., and a subsequent drop, but a slight recovery to an average level of 12.4 GW in the terminal year 2024.

[31] Perspectives of the wind energy market in Russia, Gsänger and Denisov 2017

We estimated the level of deliveries in the Americas is 5.7 GW on average until 2024, taking into account a market share of 29.8%. Vestas market share in the Americas in 2016 was 36.6%. However, in the years before it was never higher than 23.2 %, which is why we think it is unsustainably high, also taking into consideration that the now stronger Euro might have a negative impact on the U.S. sales. We therefore base the forecast on an average market share of 29.8% (weighted average of the 2016 market share and the average market share of 2011-2016).

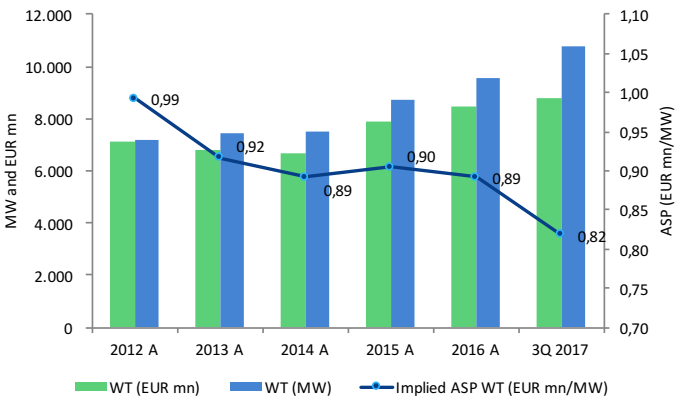
For EMEA, we estimate average deliveries of 5 GW until 2024, with a market share of 37.9 %, following the same average calculation as for the Americas. Vestas market share in EMEA has grown from 22.6 % in 2011 over 30.7 % in 2014 to 42.9% in 2016. We believe it is sensible to choose an average for the projections, because in the past the market share fluctuated a lot from year to year.

In the Asia Pacific Region, Vestas deliveries are expected to be around 0.9 GW on average. Vestas' market share over the past ranged from 6.2 % in 2012 to 1.3% in 2015. In 2016, it was 3 %. We thus follow the same reasoning as for the other regions to use the special weighted average, which in this case is 3.5%.

In general, it has to be kept in mind that turbine sales are seasonal, with revenue in terms of deliveries building up typically in the second half of the calendar year, which in Vestas case corresponds to the financial year, but sometimes also shifting from one year to another, due to unforeseen complications. The installations are dependent on weather conditions, which is the main reason for the volatility. Furthermore, the single countries contributions (except for Vestas main markets, like the U.S.) vary greatly over the years and will continue to do so in the future, creating additional volatility. We therefore did not estimate specific levels for deliveries for the single countries, but the overall market growth of the regions Americas, EMEA and Asia Pacific and developed the MW deliveries by applying Vestas' market share in the respective geographies. As the market shares also fluctuate, based on the underlying country mix in the different years, we use the aforementioned average, to account for the variability.

We assume that the average selling prices will continue to decrease. The backlog in terms of MW increased steadily over the past years, however in terms of vaue in million Euros it did not increase at the same pace, implying lower average selling prices (cf. graph 13). In the 3rd quarter of 2017, the order intake (on a rolling basis) of Vestas has an implied average selling price of 0.82 mn€/MW, compared to an implied ASP of wind turbines of 0.92mn€/MW from the 2016A revenue reported. Since typically the average selling price in the order intake is lower than the one implied in the reported revenue for the project segment, and the backlog to sales

Graph 13: Vestas' Wind Turbine Backlog Development
(on a rolling basis)



Sources: Company Information and Own Calculations.

is on average 1.06 over the past three years, meaning that it takes more than a year from an order to be delivered and materialize in revenue, we expect the decrease in the ASP of revenues to show more gradually and with a lag in time compared to the order intake.

We estimate the average selling to decrease by 2.9% in 2017 and 4.9% in 2018, with higher decreases in Asia and EMEA (5%), due to the oversupply in the Chinese market and the increased price pressure from the introduction of the auctions in EMEA, than in the Americas (3% decrease, in line with the decrease during the past year and due to the dominance of the U.S., where no auctions are to be introduced). We assume that this trend will persist in 2018, as the current situation suggests, that a price war[32] is going on, induced by the competitive auctions. Subsequently we forecast an annual decrease by 1% in each region until 2020, and a stabilization thereafter, as we assume that Vestas will be able to counter fight the price erosion by increasing its products' attractiveness further. This leads to average selling prices of 0.90 mn€/MW in 2017, 0.84 mn€/MW by 2020 and 0.83 mn€/MW by 2022. Due to regional differences in prices, the overall ASP also depends on the deliveries mix of the different regions.

All in all, this means that we expect wind turbine revenues to grow to 10.3bn€ in 2024 compared to 8.9bn€ in 2016. The wind turbine revenue will decrease in terms of its share of total revenue, from 87.2 % in 2016 to 81.1 % in 2024. As the service segment provides more attractive margins, we expect Vestas to increase its share in the revenue mix to 18.9 % in 2024, from 12.8 % in 2016. Detailed forecast statements can be seen in the Annex (graph 14-16).

In terms of **Service** revenues, we forecast an average growth of 7.9% until 2024. We forecast that 70% of deliveries will result in service contracts, following company information about this, and thus, see an increase in MW under service up to 136 GW in 2024 from 71 GW in 2016, growing on average by 8.5% per year. We think this is a reasonable assumption, as Vestas organic growth in the service segment was 8% in 2016, and due to Vestas net cash position of € 3.3bn, it is possible that Vestas will follow to pursue additional opportunistic service acquisitions in local markets. Also, as the service market is expect to keep growing as mentioned earlier by 9%, we see Vestas able to keep up with this trend. The

[32] http://energywatch.eu/secure/EnergyNews/Renewables/article10118873.ece

average selling price per MW under service is expected to decrease by 0.5% per year, as we expect that the downward trend observed in the past will continue, due to an increasing price pressure.

EBIT: We do not expect that Vestas can keep up with an EBIT margin of 13.9 % in 2016, which is high over the industry median of 7.8% in 2016 for the Bloomberg WINDV Index, which includes Vestas and its main competitors. We estimate Vestas EBIT to decline from 12% in 2017 to 7% in 2024. The decline is mainly caused by the wind turbine segment and comes from i) the higher price competition in the wind turbine segment and the corresponding lower average selling price, ii) a slower decrease in costs, as we do not assume that Vestas is able to reduce its already light cost base much further in the short term, and iii) a continuing decline in the average selling price of the service segment, due to the higher competition, which will lead to a decline of the service gross margin from 25.5% in 2016 to 22.4% in 2024.

Valuation

DCF

As Vestas reportedly changed its reporting for the different business segments over the past six years, and it does not disclose information concerning the split of costs, capital expenditures, and more importantly the depreciation and amortisation between the two business segments, we used a simple discounted cash flow (DCF) valuation model and forwent to do a sum of the parts, as we did not see it adding substantial value to our valuation.

We derived our valuation from an 8 year DCF model 2017E-2024E assuming a WACC of 7.31% (see table 2 for calculation) and a nominal long-term growth of 1.6%.

As the risk-free rate, the ten-year German BUND is taken at the current level of 0.50% on 22nd December 2017, to match the cash flows in Euro. The market risk premium is chosen at 6%, based on the McKinsey Books' recommendation. The long-term growth rate is chosen as 1.6%, as it is a nominal growth rate, to adjust for inflation (as according to the World Bank global inflation was 1.6% in 2016 and we assume the long-term risk-free rate to remain low, we also chose to have this low inflation adjustment). We do not estimate, that the company will organically grow in the long-term any further, as the market is limited and new installations will

Table 2: Cost of Capital

Vestas' Cost of Capital	
Risk Free Rate	0,5%
Market Risk Premium	6,0%
Levered Beta	1,25
Cost of Debt	2,9%
D/(D+E)	12,0%
Corporate Tax Rate	22,0%
WACC	7,31%

Source: Bloomberg and Own Calculations

be more and more replaced by repowering installation, i.e. the overall level of installations is expected to remain constant over the long-term.

We also conducted a sensitivity analysis, shown in table 3, concerning the ASP of the wind turbines and the long-term growth rate. It demonstrates the range of real doubt. We see a chance that Vestas will be able to maintain the ASP in the wind turbine segment on a steady level after 2017 or 2018, due to increases in the quality and performance of the wind turbines. We also see a chance that prices will continue to decline after 2020, due to continuing price pressure, if for example the Chinese OEMs improve their quality enough to compete with European and American market leaders in the markets outside of China. The sensitivity analysis concerning the long-term growth rate takes into consideration, that the wind market might grow on higher levels in the long-term, rather than stabilizing, due to new technological developments. However, we do not estimate the chance for such a long-term trend to be very high, as visibility remains low and thus believe a 2% rate is reasonable as a maximum. On the other hand, we estimate the long-term growth rate not to drop under 1%, as it is a nominal growth rate and we do see any reason that the long-term growth prospects are more negative for the wind energy sector or that inflation will be substantially lower than the general level of inflation.

Table 3: ASP Scenario Analysis

	Target Price (EUR/Share)	Target Price (DKR/share)	**Upside to Base Case**	Upside to Current Share Price
ASP remains stable after 2017	102	758	**50,8%**	73,0%
ASP remains stable after 2018	79	583	**15,9%**	33,0%
ASP continues to drop after 2020	49	365	**-27,3%**	-16,6%
Sensitivity Analysis / g				
1,0%	64	476	**-5,3%**	8,6%
1,2%	65	484	**-3,7%**	10,5%
1,4%	67	493	**-1,9%**	12,6%
1,6%	68	503	**0,0%**	14,7%
1,8%	69	513	**2,0%**	17,1%
2,0%	71	524	**4,2%**	19,6%
EUR/DKR FX RATE	7,4			
Current Share Price	438			

Source: Own Calculations

As in the past, the growth prospects for the wind market were repeatedly over- and underestimated, we conduct a sensitivity analysis concerning the different forecast scenarios for the wind market, as seen in table 4.

Table 4: Market Development Scenario Analysis

	Target Price (EUR/share)	Target Price (DKR/share)	**Upside to Base Case**	Upside to Current Share Price	Vestas' Average Deliveries (GW)
New Policies	53	391	**-22,3%**	-10,8%	7,3
GWEC specific 2021	68	503	**0,0%**	14,7%	11,6
Moderate Scenario	78	574	**14,2%**	31,1%	12,4
Advanced	84	621	**23,6%**	41,8%	16
EUR/DKR FX RATE	7,4				
Current Share Price	438				

Source: Own Calculations

We see a small chance for the wind market to take up further to higher growth levels, if governments implement more serious incentives to counter fight climate change and decarbonise the electricity market, resulting in the Moderate or Advanced Scenario. The latter would result in materially higher annual installations reaching more than 100 GW already in 2020 and growth rates of on average 13.4% until 2024, which we guess to be unlikely to occur. There is also the possibility that less favourable developments lead to lower growth rates than in our base case, if political sentiment changes and no new support for wind energy above current levels is enacted, resulting in the New Policies Scenario. This might happen if the global economy discontinues its current growth path or citizens are unwilling to pay for further subsidies and evoke changes in governments.

Appendix

Financial Statements

Graph 14: Vestas' Reformulated Income Statement

Income Statement (EUR mn)	2015 A	2016 A	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E
Revenue	**8.423**	**10.237**	**10.926**	**10.355**	**10.757**	**12.395**	**12.605**	**11.959**	**12.175**	**12.730**
COGS	-6.785	-7.935	-8.693	-8.586	-8.907	-10.329	-10.468	-9.937	-10.161	-10.625
Gross Profit	**1.638**	**2.302**	**2.233**	**1.769**	**1.850**	**2.066**	**2.137**	**2.023**	**2.014**	**2.105**
Gross Margin (%)	*19,4%*	*22,5%*	*20,4%*	*17,1%*	*17,2%*	*16,7%*	*17,0%*	*16,9%*	*16,5%*	*16,5%*
R&D Costs	-29	-63	-67	-64	-66	-76	-78	-74	-75	-78
Distribution Costs	-157	-169	-180	-171	-178	-205	-208	-197	-201	-210
Administration Costs	-240	-244	-260	-247	-256	-295	-300	-285	-290	-303
EBITDA	**1.212**	**1.826**	**1.725**	**1.287**	**1.350**	**1.490**	**1.551**	**1.467**	**1.448**	**1.513**
D&A	-305	-405	-408	-443	-480	-519	-560	-558	-601	-640
EBIT before Special Items	**860**	**1.421**	**1.316**	**844**	**871**	**970**	**991**	**909**	**847**	**873**
EBIT Margin (%)	*10,2%*	*13,9%*	*12,0%*	*8,2%*	*8,1%*	*7,8%*	*7,9%*	*7,6%*	*7,0%*	*6,9%*
Special Items	46	0	0	0	0	0	0	0	0	0
EBIT after special items	906	1.421	1.316	844	871	970	991	909	847	873
Taxes on operating income	-244	-329	-290	-186	-192	-213	-218	-200	-186	-192
EBIT after tax	662	1.092	1.027	658	679	757	773	709	661	681
Net Fin. Profit before Tax	-15	-33	0	1	4	7	10	68	73	78
Net Fin. Profit after Tax	-11	-26	0	1	3	5	8	53	57	61
Income /(loss) from Investments in Associates and JV	34	-101	-42	-25	-6	-4	33	-10	30	40
Net Profit of the Year	**685**	**965**	**985**	**634**	**676**	**758**	**814**	**752**	**748**	**782**
Net Profit Margin (%)	*8,1%*	*9,4%*	*9,0%*	*6,1%*	*6,3%*	*6,1%*	*6,5%*	*6,3%*	*6,1%*	*6,1%*

Source: Own Calculations and Company Information

Graph 15: Vestas Reformulated Balance Sheet

Balance Sheet (EUR mn)	2015 A	2016 A	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E
Operating Current Assets	3.690	4.019	4.636	4.393	4.564	5.259	5.348	5.074	5.166	4.965
Operating Current Liabilities	4.534	5.305	5.729	5.430	5.641	6.500	6.610	6.271	6.384	6.178
Provisions	315	334	365	373	438	588	628	595	618	712
Fixed Assets	1.966	2.157	2.281	2.365	2.464	2.570	2.624	2.670	2.692	2.688
Invested Capital	711	120	384	569	597	415	432	591	575	588
Non-Operating Assets	477	504	381	344	347	376	413	390	424	462
Non-Operating Liabilities	20	34	36	34	36	41	42	40	40	35
Total Funds Invested	1.168	590	728	879	908	749	803	941	959	1.015
Financial debts	495	496	496	496	496	496	496	500	500	500
Excess Cash	2.226	2.895	2.838	3.038	3.486	4.167	4.696	5.082	5.583	6.074
Marketable Securities	0	201	219	207	215	248	252	239	243	255
Common Shareholders' Equity	2.899	3.190	3.289	3.627	4.113	4.669	5.255	5.763	6.285	6.843
Total Assets	**8.587**	**9.931**	**10.517**	**10.504**	**11.238**	**12.802**	**13.518**	**13.632**	**14.288**	**14.612**
Equity	**2.899**	**3.190**	**3.289**	**3.627**	**4.113**	**4.669**	**5.255**	**5.763**	**6.285**	**6.843**
Total Liabilities	**5.688**	**6.741**	**7.229**	**6.877**	**7.125**	**8.134**	**8.263**	**7.869**	**8.002**	**7.769**

Source: Own Calculations and Company Information

Graph 16: Vestas Cash Flow and DCF Calculation

Cash Flow Calculation (EUR mn)	2015 A	2016 A	2017 E	2018 E	2019 E	2020 E	2021 E	2022 E	2023 E	2024 E
EBIT	906	1.421	1.316	844	871	970	991	909	847	873
(-) Taxes on EBIT	-244	-329	-290	-186	-192	-213	-218	-200	-186	-192
(+) D&A	305	405	408	443	480	519	560	558	601	640
(-) Change in NWC	329	442	-192	-57	40	164	21	-65	22	-6
(+) Change in Provisions	65	150	40	-33	23	94	12	-37	12	-2
(-) CAPEX	-481	-596	-532	-528	-579	-625	-614	-603	-623	-637
(-) Change in Net Other Operating Assets	37	190	13	-11	7	30	4	-12	4	-9
Free Cash Flow	926	1.695	763	473	651	939	756	550	677	668
(+) Income (Loss) from Investments in Associates	34	-101	-42	-25	-6	-4	33	-10	30	40
(-) Change in Net Non-Op Assets	66	-90	125	35	-1	-24	-37	21	-34	-43
Non-Operating Free Cash Flow	100	-191	83	10	-7	-28	-4	11	-4	-2
FCF to Firm (EUR mn)	1.026	1.504	847	483	644	911	752	561	673	665
Terminal Value as of Dec. 2018				7.757						
NPV of FCF to 2024				3.332						
Present Value of Firm				**11.089**						
Net Cash (Debt)				3.412						
Miscellaneous financial assets (investments in JV)				134						
Equity Value				**14.634**						
Number of Shares				215						
Estimated Equity Value per Share (EUR/Share)				**68**						
EUR/DKK Foreign Exchange Rate				7,4						
Estimated Equity Value per Share (DKK/Share)				**503**						
Current Share Price (DKR)				438						
Upside to Current Price				14,7%						

Source: Own Calculations and Company Information

Graph 17: Exemplary LCOE Calculation as done by IRENA (2016) in Power to Change 2025, p.24

$$LCOE = \frac{\sum_{t=1}^{n} \frac{I_t + M_t + F_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}}$$

with:

LCOE = the average lifetime levelised cost of electricity generation;

I_t = investment expenditure in year t;

M_t =operations and maintenance expenditures in year t;

F_t = fuel expenditure in year t;

E_t = electricity generation in year t;

r = discount rate;

n =lifetime of the system.

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Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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