Siemens & Vestas

Powering a Greener Future

M&A Case

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Table of Abbreviations

Abbreviation	Explanation	Abbreviation	Explanation
AI	Artificial Intelligence	GW	Giga Watt
ASP	Average Selling Price	HKD	Hong Kong Dollar
BoD	Board of Director	IRR	Internal Rate of Return
CAGR	Compound Annual Growth Rate	kEUR	Kilo Euro
CAPEX	Capital Expenditures	kDKK	Kilo Danish Krone
CFRP	Carbon Fiber Reinforced Polymer	LCOE	Levelized Cost of Energy
CGT	Capital Gains Tax	M&A	Mergers & Acquisitions
CO2	Carbon Dioxide	mEUR	Million Euro
CNY	Chinese Yuan	MWH	MegaWatt hours
DCF	Discounted Cash Flow	NOPAT	Net Operating Profit After Tax
D/E	Debt-to-Equity	NWC	Net Working Capital
DKK	Danish Krone	NPV	Net Present Value
EBIT	Earnings Before Intrest & Tax	OEDC	The organization for Economic Cooperation and Development
EMEA	Europe, Middle East & Africa	PV	Present Value
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization	P/E	Price-to-Earnings
EV	Enterprise Value	PPE	Property, Plant, and Equipment
EU	European Union	P&L	Profit & Loss
FCF	Free Cash Flow	REE	Rare Earth Elements
FX	Foreign Exchange	R&D	Research & Development
GRFP	Glass-Fiber Reinforced Plastic	S&P	Standard & Poor's
GHG	Greenhouse Gas	USD	United States Dollar

EXECUTIVE SUMMARY

Executive Summary

Siemens AG should not acquire Vestas

Vestas

- Siemens will face regulatory risk under European Union competition law, as the acquisition of Vestas will make Siemens become monopolistic market position
- Vestas' enterprise value is around 13% of Siemens' enterprise value. And it would be a substantial investment on acquiring Vestas
- Siemens intends to focus on digitalization in long-term strategy, so the acquisition of Vestas will not perfectly match its strategy as Vestas is more specialized in wind energy.

KK Wind Solutions

- Siemens should acquire KK Wind Energy Solutions
- KK Wind Solutions aligns with Siemens' long-term strategy in digitalization, which could help Siemens become front runners in the wind industry.
- KK Wind solutions has synergies, both in their service portfolio, as well as their global geographical presence in key locations.
- Financially, KK Wind Solutions is more feasible to acquire than Vestas

INTRODUCTION

02

Siemens is interested in acquiring **Vestas, a Danish company that specializes in renewable energy solutions.**

Siemens AG operates as a technology company worldwide. It was founded in 1847 and is headquartered in Munich and Berlin, Germany. The company operates in a wide variety of industries, including energy, IT, and medical technology.

We will primarily focus on the wind energy related segments of the Siemens AG.

We will analyse the synergies in value creation, potential benefits, and drawbacks of the acquisition and compare Vestas to other possible targets to determine the best course of action for Siemens.

About Siemens AG

Munich, Germany

Siemens AG is a global company that operates in a broad range of industries, with the following divisions:

Service & Governance	Portfolio companies:	Business
• Siemens Financial Services	• Large Drives Applications	• Digital Industries*
• Global Business Services	• Siemens Logistics	• Smart Infrastructure*
• Siemens Real Estate	• Sykatec	• Mobility
• Next47		• Siemens Healthineers
		• Siemens Advanta

***Digital industries**, and **Smart infrastructure** would be the two most relevant divisions when looking at synergies between Siemens AG and a potential merge with Vestas.*

History & present time

Energy has been the core of Siemens since 1866. In 2020 Siemens Energy was spun off as a completely independent company from the Siemens group, consisting of the former Gas & Energy + Siemens Gamesa Renewable Energy. *(Siemens group currently owns 35% of Siemens Energy).*

In January 2023, Siemens is committed to reducing its stake in Siemens Energy but will do so gradually, including the ownership of Siemens Gamesa Renewable Energy, because shareholders believe that a focused technology group will be more valuable than a conglomerate.

Key information

In 2023 Siemens AG does not manufacture wind turbines, however, they do offer the following products targeted at the wind power industry:
Digitalization, Power transmission, and distribution, Turbine and windfarm management, Industrial communication, Turbine automation, security and protection, Cloud-based condition monitoring. Auxiliaries, Energy finance.

Industrial communication

Efficient communication and data exchange between different systems and devices in wind farms. The portfolio includes switches, routers, gateways, and software solutions that offer reliable and secure communication, optimized performance.

Cloud based condition monitoring

Comprehensive suite of software tools and services that aim to optimize the efficiency, reliability, and performance of wind turbines. Includes advanced analytics, remote monitoring, and control capabilities that allow operators to maximize energy output and minimize maintenance costs.

Digitalization

Designed to remotely monitor the health and performance of wind turbines. The system collects and analyses data in real-time, providing operators with insights to optimize maintenance and reduce downtime.

Energy finance

provides flexible financing options, such as leasing and loans, to help customers acquire Siemens products and services while reducing upfront costs and improving cash flow.

In short, these services provide optimization of availability and efficiency, software solutions, and protection against natural forces such as lightning and extreme weather for wind farms and turbines.

2017
Siemens buys Gamesa.

2020
Siemens AG spun off its 'Gas and Energy department' and divested its 59% stake in Siemens Gamesa Renewable Energy. This becomes Siemens Energy.
Siemens Energy secures in a 92.72% position in Siemens Gamesa

Q1 2023
Siemens shareholders want the company to sell its stake in Siemens Energy to simplify its structure and focus on technology. Siemens will reduce its stake gradually.
Siemens Gamesa will delist in order to fully integrate with Siemens Energy AG.

About Vestas A/S

Aalborg, Denmark

Vestas is the worlds largest producer of wind turbines with +164 GW installed across the globe, and +144GW under service.

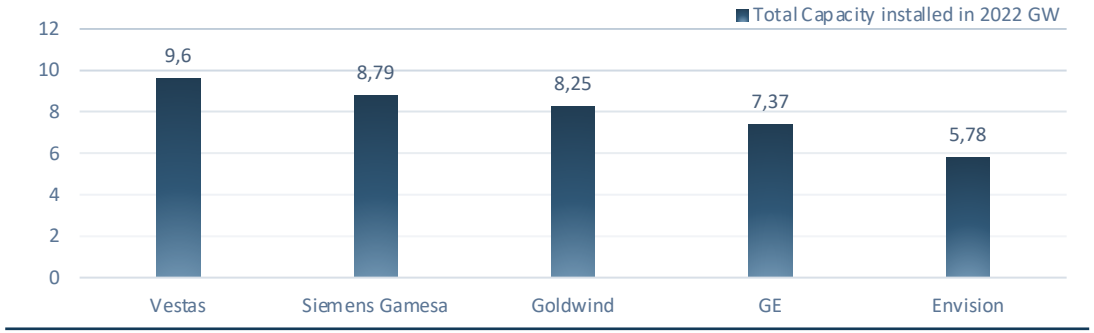


Chart of the top 5 competitors compared to Vestas. The top five turbine manufacturers together accounts for >50% of the wind turbine market .

- Industry-leading smart data capabilities to interpret, forecast, and exploit wind resources and deliver wind power solutions
- Over 29 000 employees worldwide. Vestas has a strong position in a safe and inclusive work environment.
- Mainly positioned in the Onshore turbines market, but also focuses on growth in the Offshore market.

Key Information

Vestas has sustainability as a core value and was ranked 2nd most sustainable company globally 2022 by Corporate Knights. As part of their strategy they have defined **4 sustainability targets:**

Employees

Becoming the safest, most inclusive & socially responsible company in the energy industry

Circularity

Producing zero-waste wind turbines by 2040. Vestas has developed a circularity solution to end landfill for wind turbine rotors

Energy transition

Leading the transition towards a world powered by sustainable energy.

Carbon footprint

Achieve carbon neutrality by 2030 without carbon offsets

Financial targets

- Vestas has ambitions to outgrow the market (Revenue)
- >10% EBIT Margin
- Achieve positive Free Cash flow
- 20% Return on capital employed

Sources: (Jesse,2022),(Vestas,2022)

Wind energy market overview

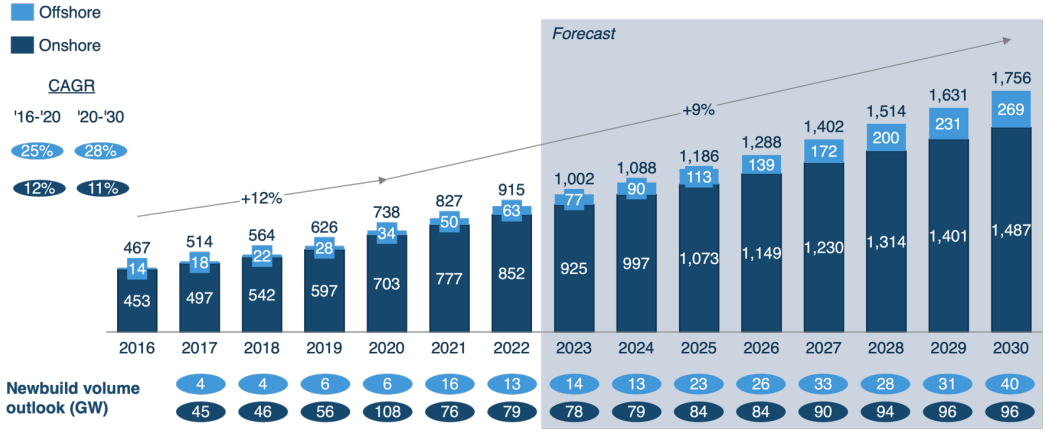
The wind and energy market generates amongst the **highest return**, and is about to become more proficient and **necessary in the future**.

Market overview

- The total market size value in 2022 was **100.66 billion** euros.
- The **Asia-Pacific** is the largest market for installed wind power and has the highest revenue share, although Europe is the most significant region.
- According to GlobeNewswire, the **Wind Energy Market** is expected to grow at an impressive **9.40% CAGR**
- The current **top 5** players in the Wind Energy Market are **Vestas**, Siemens Gamesa, Goldwind, GE, and Envision

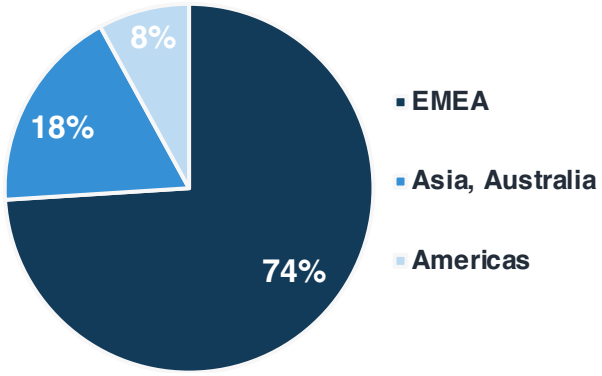
Wind & energy segment revenues forecast

Global historical & our forecasted cumulative installed capacity, 2016-29 (GW)



Note: Positive forward movement of the industry and market with sustainability and ESG becoming a heavy target for the future. The global pandemic also had little impact on the industry displaying the strength in the supply chain. Source: Wood Mackenzie, GWEC, team Yellowstone analysis.

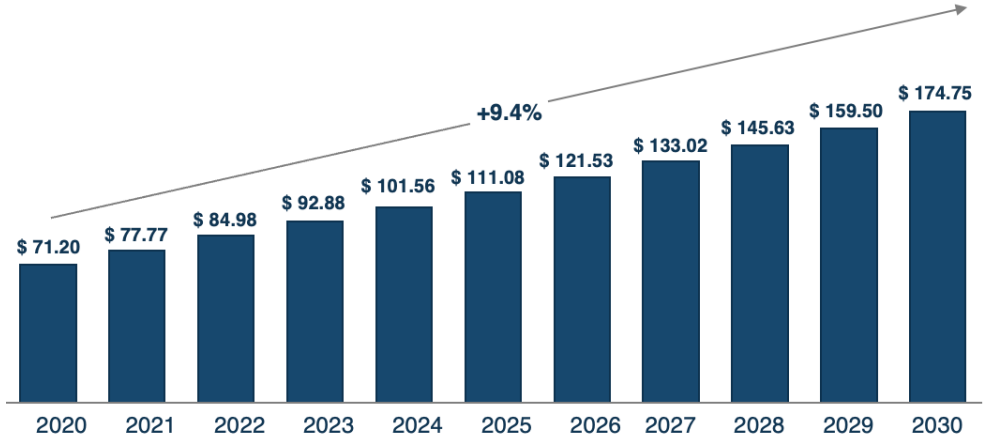
Wind segment by Geographical Region



Top players and brands in the market

GE Renewable Energy
上海电气 SHANGHAI ELECTRIC
ENVISION
GOLDWIND
MINGYANG SMART ENERGY 明阳智能
Vestas
SIEMENS Gamesa RENEWABLE ENERGY
MITSUBISHI HEAVY INDUSTRIES

Global Wind Energy Market Value 2020 to 2030 (USD Billion)

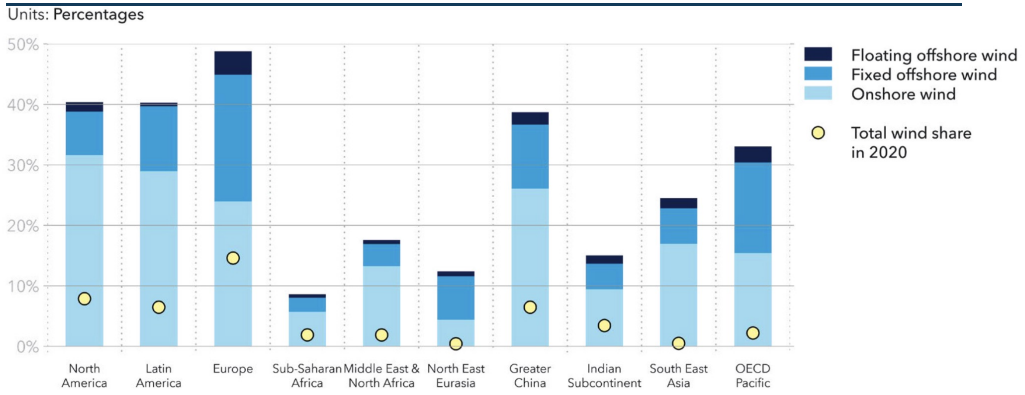


Source: Precedence Research 2021

Wind – Short term outlook

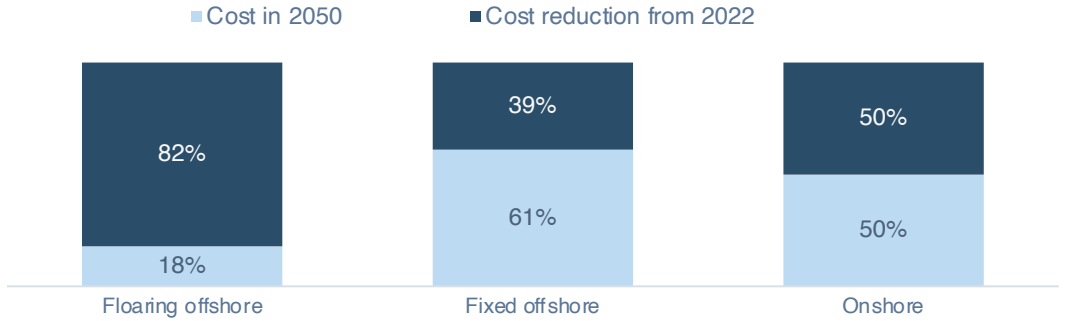
- According to market predictions, there will be a decline in demand for onshore wind power in 2023. However, a new growth phase is expected in 2024, driven by the growing demand for renewable energy, electrification, and energy independence.
- Demand for **offshore** wind power is expected to decline slightly until 2025 before strictly increasing and gaining more market share by 2050. The growth of floating offshore wind power is expected to be especially significant.
- **The Ukraine-Russia war and pandemic** have impacted the supply chain and disrupted the energy market, especially in Europe.
    - Short-term lower transition due to higher costs of critical minerals and supply chain challenges
    - Higher gas prices and policy support will hasten the energy transition. Europe will accelerate the energy transition, focusing on renewables and energy independence.
    - Not expected to have a long-term effect.

Share of wind in electricity generation in 2050 by region

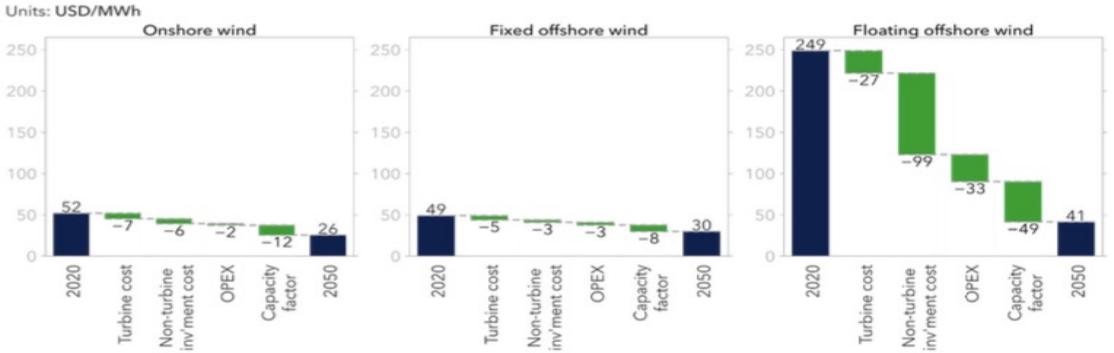


Wind – Long term outlook

- By 2050, wind power will provide almost 50% of on-grid electricity in Europe, 40% in North America and Latin America, and >33% of electricity generation in Greater China.
- Onshore wind is expected to be the most used form of wind energy until 2050
- The share of offshore wind in total wind electricity generation will steadily increase globally from 8% in 2020 to 34% in 2050, 6% of which will be floating offshore.
- By 2050, Europe and OECD Pacific will be the key regions where offshore wind generates more energy than onshore wind.
- Wind energy installation costs are expected to decrease drastically in the next 30 years.



Drivers of change for the global average levelized cost of wind between 2020 and 2050



Sources: (DNV,2022), (Statista,2022), (Vestas,2022)

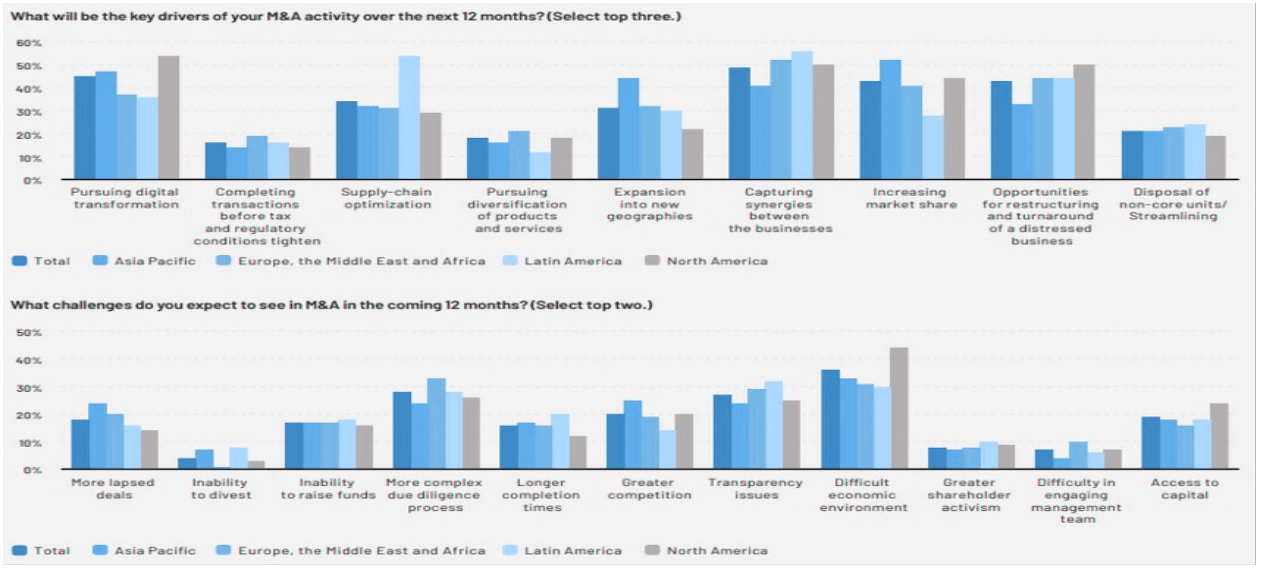
M&A Outlook 2023

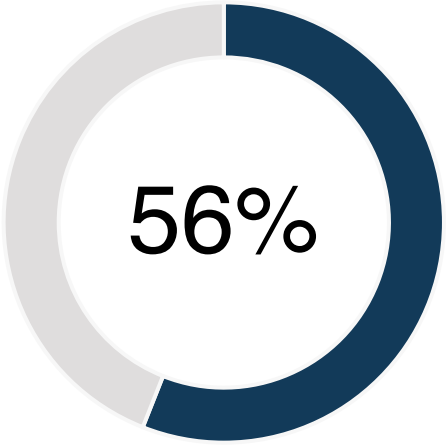
Increase in M&A Activity Over the Next Twelve Months

There was a decrease in mergers and acquisitions from 2021 to 2022. This can be due to the uncertainties that the economic market was facing. The decrease could have also been a natural result of the fact that M&A activity was at an all time high in 2021. Even though we saw a negative growth in M&A activity in 2022, several dealmaker in EMEA expect to see an increase in M&A activity in 2023.

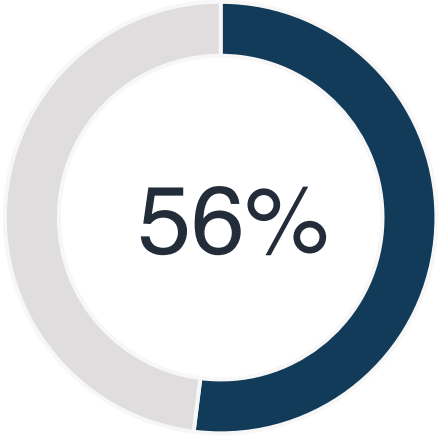
M&A dealers also expect to spend more time on ESG factors during due diligence. This highlights the growing importance of ESG and its impact in the financial market.

The positive growth in M&A activity can be good for Siemens if they want to acquire Vestas, as it indicates a growth in the economy which in turn creates less uncertainty for them.

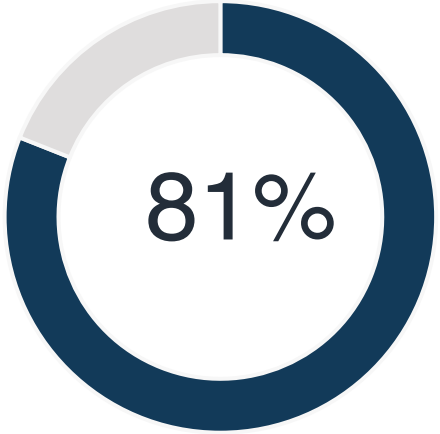




EMEA dealmakers who expect M&A activity to increase in the next 12 months



EMEA dealmakers who see the need to capture synergies as a likely driver of their M&A activity over the next 12 months



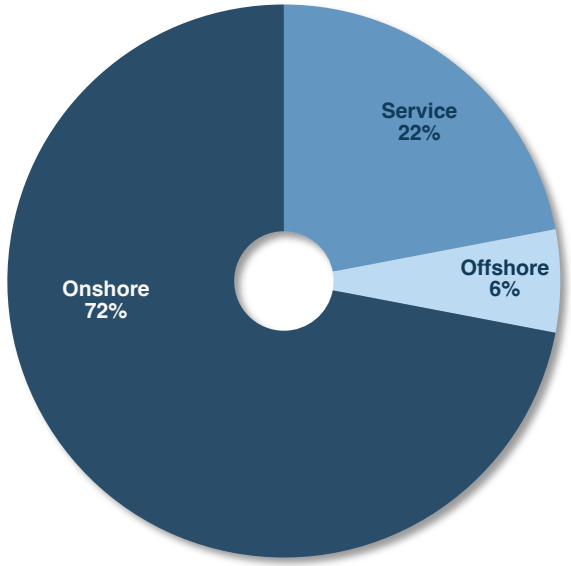
EMEA dealmakers expect to spend more time over the next three years scrutinizing ESG factors during due diligence

Source: (intralinks,2023)

03

COMPANY ANALYSIS

Vestas´s position in different markets by revenue 2022



Offshore

Vestas offers four different offshore turbine models and has installed over 8 GW of capacity across 48 projects worldwide. Expected decline in Onshore activity.

Onshore

Vestas has 3 categories within onshore turbines:

- EnVentus
- 4MW platform
- 2MW platform

Business area growth expectations

Onshore

Market expectation 2022-25
New installations (GW)*

CAGR:

↑8-10%

Restarting growth
- Declining activity expected in 2023
- Increase in 2024 and 2025 driven by the USA, Europe, and Africa

Offshore

Market expectation 2022-25
New installations (GW)*

CAGR:

↑35-40%

Global expansion
- Strong expansion in Europe and new markets such as the USA and South Korea and broader Asia Pacific
- Growth to accelerate post 2024

Service

Market expectation 2022-25
New installations (GW)*

CAGR:

↑8-10%

Solid growth
- Solid growth from high base
- Power price increases and electricity shortage to drive higher need for output optimisation

Development

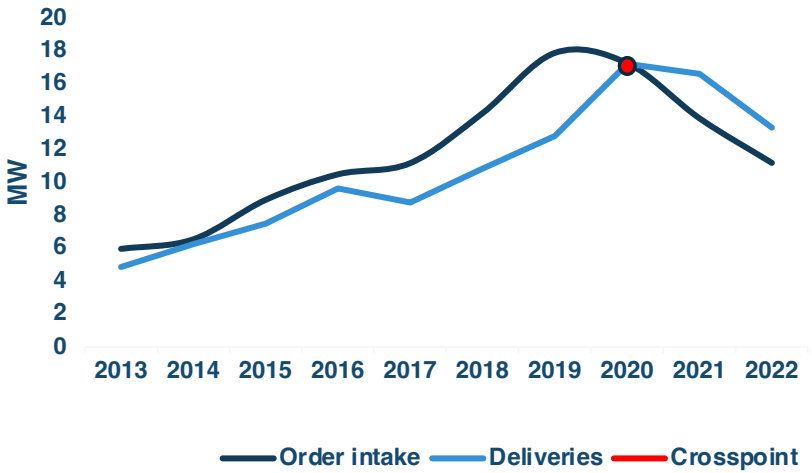
Vestas' expectation 2022-25
Order intake generated (GW)

CAGR:

>10%

Foundation in place
- Ambition in Development to outgrow the total onshore market in firm order intake generated
- Own developed projects to further leverage side deals

Order intake and deliveries crosspoint



Source: (Vestas, 2022)

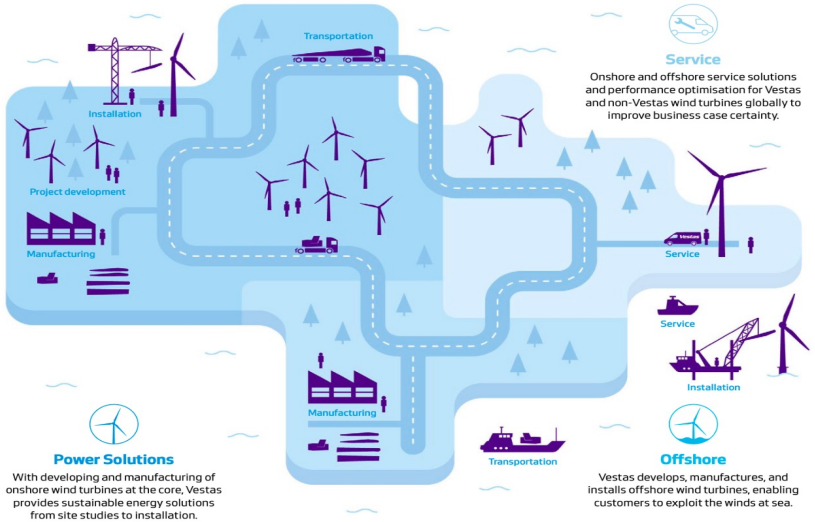
Strong expansion in Europe and new markets in Offshore activity

Solid growth in service sector

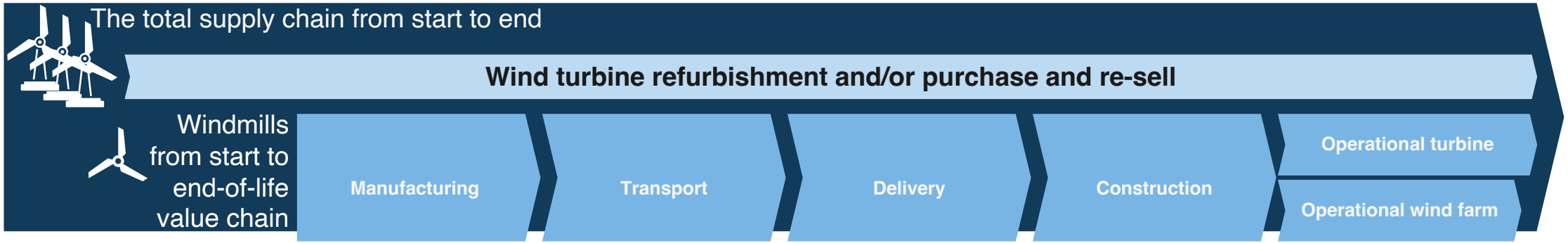
Uncertainty negatively impacted both deliveries and order intake in 2022 the war in Ukraine, (inflation)

Ease towards the end of 2022 attributed to strong average selling prices and legislative action

Energy prices drove up demand in service business



Supply chain



Contributing companies the supplychain

Component suppliers

SCHAEFFLER

CS WIND

BAETTR

ZF

winergy

Vestas operates manufacturing facilities in Europe, Asia, and America.

They manufacture blades, control & generators, nacelles, generators, spare parts & repairs

ArcelorMittal

aeris

WINDAR renovables

On all transportation, Vestas has entered a strategic partnership with Maersk on all containerised transport

MAERSK

Deliveries for the Power Solutions segment are included in deliveries, and deducted from the wind turbine backlog when the related revenue is categorized

DSV

Steelhead America is Vesta´s development arm, and the worlds largest wind turbine manufacturer.

Vestas designs, manufacture, install, and service wind turbines across the globe.

MAX BÖGL
Fortschritt baut man aus Ideen.

STEELHEAD a Vestas company

After construction Vestas contribute and use data to interpret, forecast and exploit wind resources to deliver best-in-class wind power solutions.

Complexity at a glance 2022

A global value chain

57.200 unique materials from **13.000** suppliers totaling **275.000** shipments to **62** factories (own and 3rd party) producing main components to projects in **21** countries leading to **26.000** main crane lifts and finally delivery of **3.300** turbines!

Source: European Technology and Innovation Platform (ETIP) on wind energy, windeurope.org

Suppliers

Supplier	Industry
Aeris	Wind blade manufacturing
Arcelormittal	Steel manufacturing
Baettr	Wind turbine manufacturing
BMS Heavy Cranes	Heavy crane manufacturing
CS Wind	Wind turbine tower manufacturing
DSV	Transport and logistics
FairWind	Wind industry services
GRI	Information and PR
GW compos	Composite materials manufacturing
Hempel	Coatings supplier
Hine group	hydraulic systems, components, and cooling solutions
KK Wind Solutions	Wind power solutions
Max Bögl	Construction
Neolon	Composite materials manufacturing
Rollix	Bearings
Schaeffler	Bearings and power transmission
Siemens Energy	Energy
Titan Wind Energy	Wind turbine manufacturing
TMB	Composite materials manufacturing
TPI	Wind turbine manufacturing
Wheels India Limited	Automotive parts
Windar	Wind turbine manufacturing
Winergy	Gearboxes for wind turbines
Ymer Technology	Composite materials manufacturing
ZF	Design, development and manufacturing of gearboxes
Zhenshi Holding Group	Composite materials manufacturing

Vestas

Customers

Challenges:

- COVID-19 disruptions, geopolitical uncertainties.

Risks:

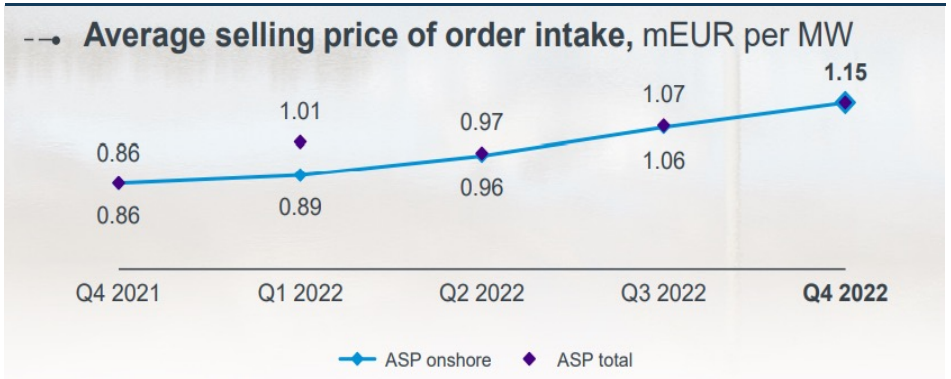
- Global container shortages, port congestion, increased trade barriers, shortages or delays of goods for the manufacture, delivery, and installation of wind turbine projects

Solutions:

- Develop partnerships
- Strengthen resilience through proactive risk management, comprehensive quality assurance and integrated mitigation planning.
- Use the current lower growth market conditions as an opportunity to prepare for the expected high growth Onshore and Offshore over the coming years.
- Move from quality control to quality assurance, focus on maturing processes
- Industrialise the supply chain through modularisation and optimizing how products are designed and produced

Source:(Vestas,2021)

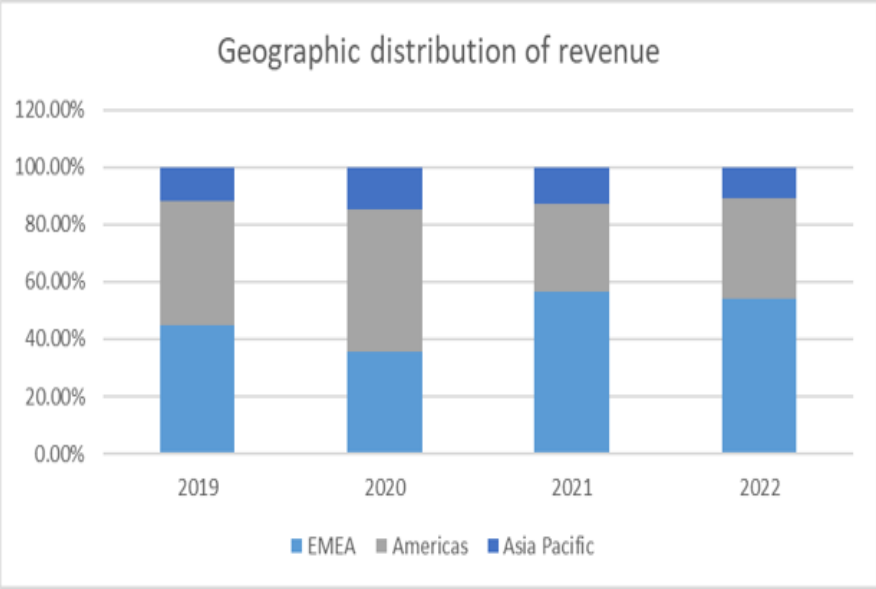
Price Strategy



Source: (Vestas, 2022)

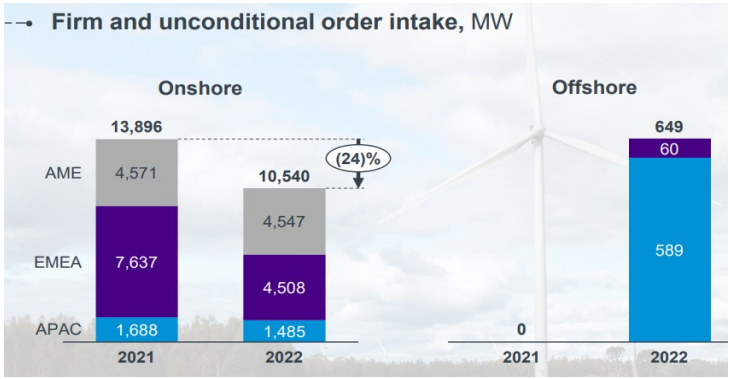
- Consistent discipline pricing strategy
- The ASP has increased ca. 61.97% from Q4 2020 to Q4 2022
- Increase ASP to mitigate cost inflation and to secure a higher share of the increasing value
- Price leadership allows Vestas to achieve its financial flexibility to invest heavily in R&D

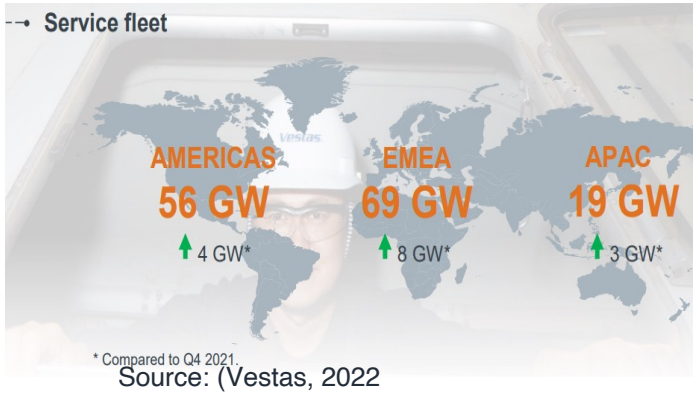
Customer Profile



Source: (Vestas, 2022), Own Team Analysis

Products & Service





Source: (Vestas, 2022

- Order intake in 2022 was EUR 11.9bn vs EUR 11.6bn in 2021
- All regions have contributed with a strong end to the year capturing 11.2 GW of order intake
- Service continues to prove its importance in periods with high power prices transactional sales and high repower activities level in 2022, which focuses on ageing assets and repowering solutions

The downside of windmills recycling system

And the **challenges** facing the end-of-life windmill blades

The challenge of **recovering** composite waste material is not limited to wind value chain only

Today's primary destination for end-of-life wind blades is disposal

Most common destinations today

- **Landfill**: blades are sectioned into suitable dimensions and placed in regional landfills
- **Incineration**: blade sections are incinerated (~800°C) for energy recovery
- **Repair / re-blading**: repairing interventions for same function in site or for 2nd market
- **Recycling**: mechanical, thermal, thermo-chemical processes to recover materials
- **Occasional solutions**: e.g. large sections used in architecture or as construction elements

Recycling expected to increase supported by regulation, public opinion and market conditions (e.g., landfill and incineration constraints)

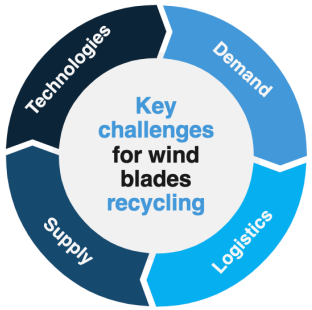
Multiple challenges to wind turbine recycling exist

Technological challenges

- Separation and recovery of composite materials poses significant challenges, for wind as well as for other sectors
- Technologies exist, but are still at their infancy (especially for recycled fibers)
- Cheaper alternatives (landfill, incineration) continue to prevail, unless future supportive regulation

Supply still local / at early stage

- Supply for wind farms dismantlement services still at early stages and available in EU mainly (Germany, Spain, Netherlands in particular) but with local/regional scale
- Specialized players in composite waste recycling are being developed but are below critical mass



Demand not yet developed

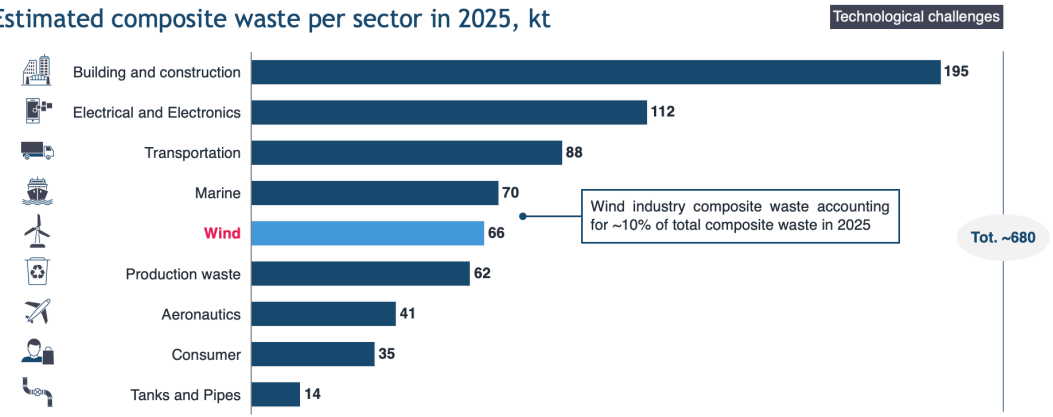
- Potential uses of recycled materials in various industries depending on output type, but limited industrial level applications available as of now
- Recycled outputs not always cost competitive vs virgin materials
- Companies choices and regulation could play a role in future demand development

Logistics complexity

- Voluminous materials requiring on site cutting and multiple trips to be removed from site, depending on size
- Troublesome transportation depending on localization and distances between wind farms and recovery sites
- Sporadic decommissioning make it difficult to have stable flows of blades in the same geography

End-of-life management is **dominated** by **landfill and incineration**

Estimated composite waste per sector in 2025, kt



Source: European Technology and Innovation Platform (ETIP) on wind energy

The **unfortunate reality** is that the blades create landfills

Source: Images of Google & Bloomberg

ESG Due Diligence (1/3)

Company	ESG Score			ESG Disclosure Score	Sustainalytics Risk Score	S&P Global ESG Rank	Total GHG/Sales
	E	S	G				
Median	3	3.66	6.08	61.445	25.02	67	6.55
Vestas vs Median	*Median*	*Above Median*	*Above Median*	*Above Median*	*Above Median*	*Above Median*	*Median*
Vestas	3	4.94	6.43	62.07	18.71	98	6.55
Siemens Gamesa	5.04	3.66	6.08	63.98	15.12	99	2.13
GE	3.56	7.33	7.35	60.82	40.28	46	22.48
Goldwind	3	1.6	5.42	N/a	26.83	67	27.99
Nordex	3	1.1	5.67	51.24	25.02	65	2.3

Source: (Bloomberg, 2022), Own Team Analysis

Vestas consistently generates great performance on ESG aspects by comparing its ESG score, ESG disclosure score, risk score, S&P global ESG rank and Total GHG/Sales with its peers, which is predicted that its effort and improvement on ESG aspects will be continued in the future.

ESG Due Diligence (2/3)

Source: (Bloomberg,2022), (Vestas,2022), Own Team Analysis

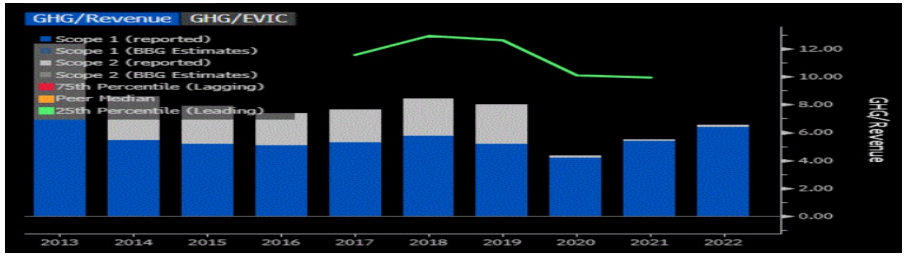
Enviroment

Vestas aims to meet higher environmental standards and to realize a transition to a climate neutrality in its value chain by its key technology. Vestas shows its ambition to achieve carbon neutrality by 2030 in its own operations and simultaneously achieve carbon emissions reduction from its supply chain by 45% per MWh produced and shipped .Key achievements in Environment sector:

- Vestas has reduced emissions from its own operations by 12% since 2019
- The carbon footprint of electricity from Vestas' turbines has significantly reduced
- Vestas has built partnership with steel suppliers and has explored alternatives to steel through investment in Modvion to reach its emission reduction target on scope 3
- Vestas has become the first organization to release its circularity roadmap in the wind industry in 2021 to reach its ambition of producing zero-waste wind turbines by 2040

Vestas Wind Systems' Enviromental Score of 3 is leading among its peers. (Bloomberg)

Enviromental	Pillar	100%	3.00	*Above Median*
Enviromental Supply Chain Management	Issue	58.4%	3.00	*Lagging*
Ecological Impact	Issue	41.6%	3.00	*Leading*

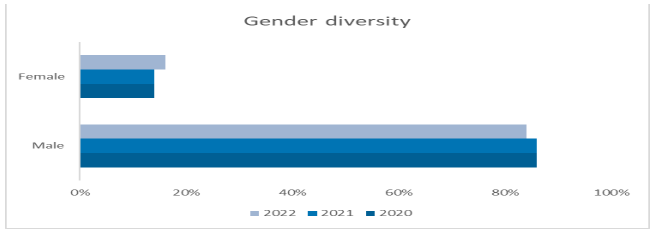


Social

- Vestas has conducted its second HRA (Human Right Assessment) and has made some improvements in HRA since 2018, including Policy improvements, due diligence processes and grievance and remedy
- In 2022, Vestas has conducted over 3000 due diligence assessments for potential suppliers and has commissioned 28 sustainability Audits from third parties and has conducted 55 onsite supplier assessments by Vestas' teams
- Vestas has relatively low female employees and has not achieved large improvement in gender diversity from 2018 to 2022, but the female gender ratio is supposed to 30% by 2030 addressed by Vestas
- Vestas' Lost Time Injuries in 2022 was 1.2, which increased 20% compared to 1.1 last year, but Vestas still achieved large decrease Rate of LTI since 2005, which was 33.8.

Vestas Wind Systems' Social Score of 4.94 is leading among its peers. (Bloomberg)

Social	Pillar	100%	4.94	*Leading*
Occupational Health & Safety Management	Issue	58.4%	6.55	*Leading*
Community Rights & Relations	Issue	41.6%	3.00	*Leading*



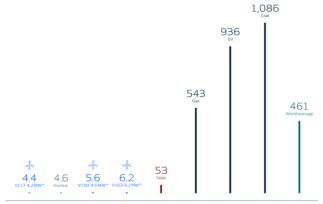
Emissions

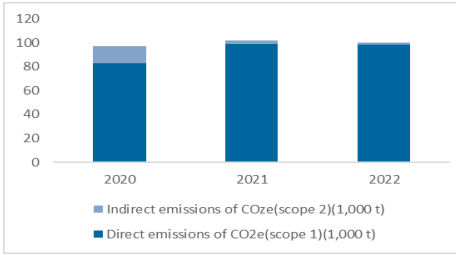
In total 8.28 million tonnes CO2 emitted in 2022

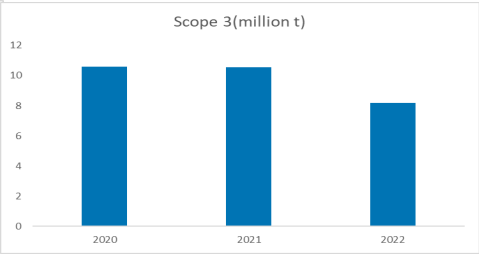
- *408m tonnes expected to be avoided over the lifetime of turbines produced in 2022*

55% (26tonnes) of waste disposal was recycled in 2022.

- 38% was incinerated







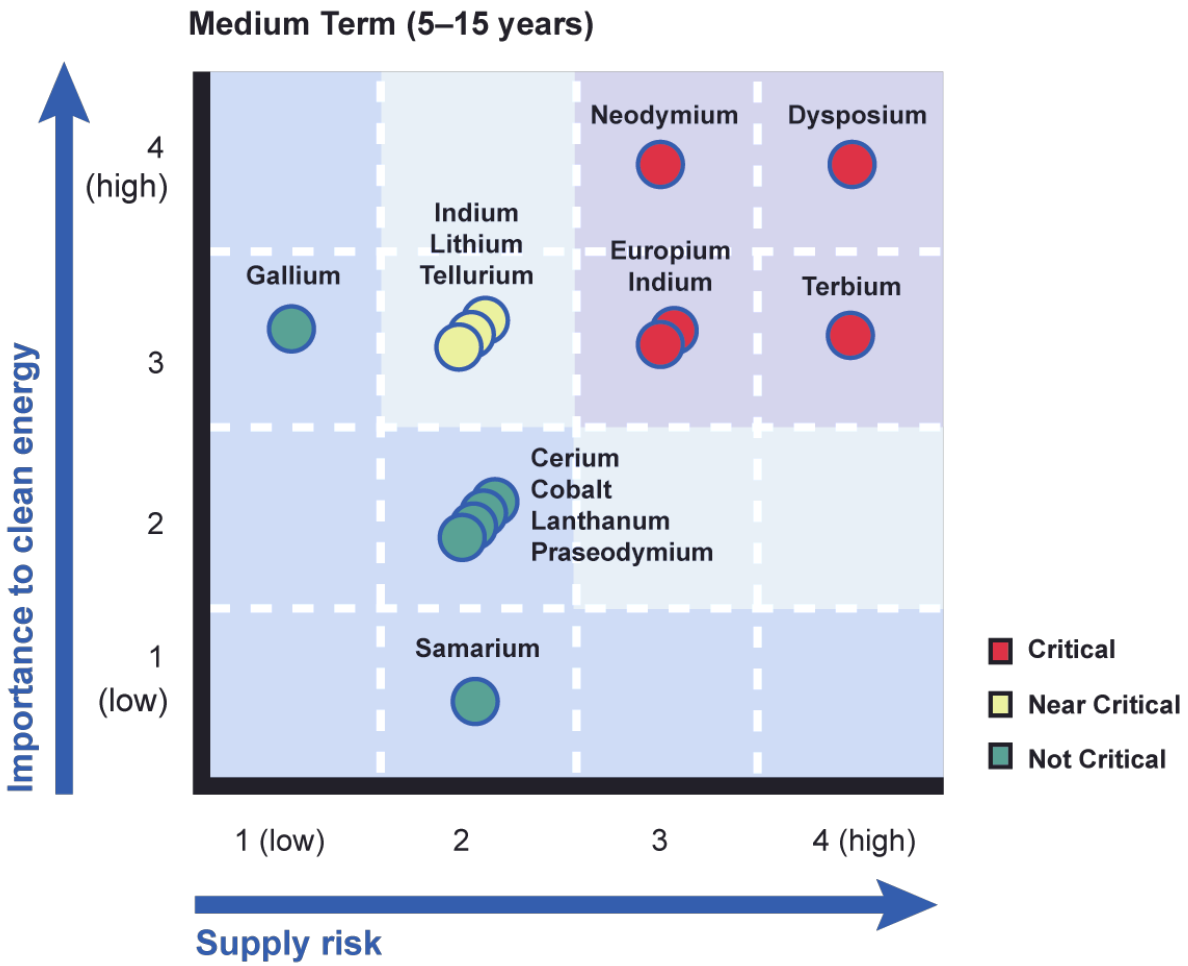
ESG Due Diligence (3/3)

Rare Earth Elements (REEs) are essential for the production of turbines. Vestas does not source these materials directly but rather through suppliers. However, there is a risk of buying from unsustainable manufacturers or conflict minerals, which are minerals mined in conditions of armed conflict and human rights abuses. To mitigate this risk, Vestas has introduced a program aimed at increasing the transparency of its supply chain for REEs.

The program focuses on responsible sourcing practices to ensure that the materials used in their turbines do not contribute to human rights abuses or conflict. By tracing the supply chain of its REEs, Vestas can identify any high-risk smelters and avoid sourcing materials from them.

In addition, Vestas has adopted technologies that require fewer rare earth minerals in their turbines, and their newest turbine model, the EnVentus, has eliminated the use of heavy rare earth minerals entirely.

China controls large parts of the REE production in the world, this should be considered a risk factor as they are vulnerable to geopolitical conflicts, although it is not something vestas controls directly.



Sources: (Vestas, 2022), (JRC, 2022), (*ENVS 202, 2023)*

Positive – Wind energy

Financially supportive policies and growing awareness of the impact of conventional energy sources on the environment and climate have driven the uptake of wind power.

Onshore wind is expected to be more cautiously supported in the future in some high-income countries where the industry has reached a high maturity level, and conflicts over wind turbine locations loom.

For offshore wind, strengthened support is expected in countries with limited land areas, bypassing community opposition. By 2050, Europe and OECD Pacific will be the key regions where offshore wind generates more energy than onshore wind.

Negative - Wind energy

Negative effects on nature and surroundings:
Windmills can affect and disrupt wildlife. Birds and bats, in particular, can fly into the turbine blades. Fire and leaked lubricating fuels are rare but relevant risk factors. As well as some react to sound- and visual pollution as they are also negative aspects.

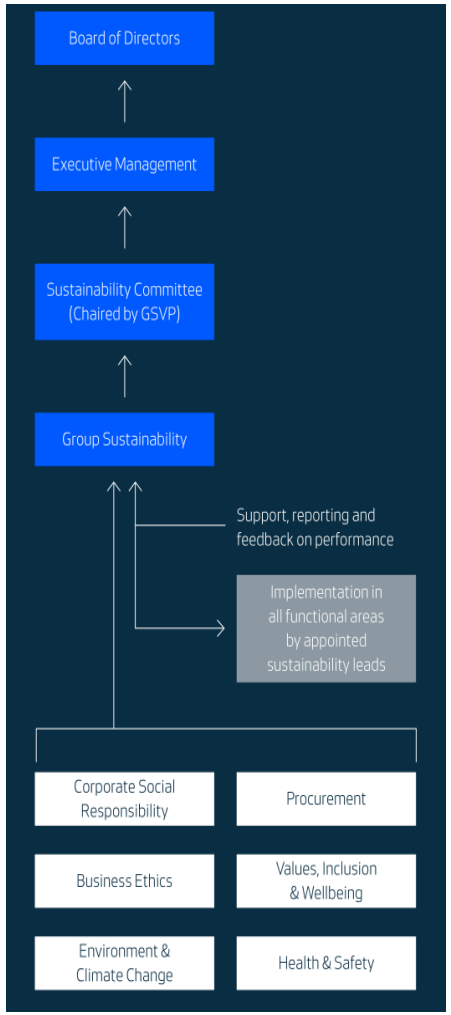
Rare earth metals dependency:
REE metals, such as neodymium, are often used in producing wind turbines' permanent magnets. These metals are in high demand, but China primarily controls their production. The mining process for these minerals is known for being environmentally damaging and unethical.

Waste:
Wind turbine blades currently have a lifetime of about 20 years and are difficult to recycle. Turbine blades are set to account for 43 million tonnes of waste in 2050, according to a 2017 University of Cambridge study. Most edges end up in landfills because they are hard to recycle.

Intermittent source of energy:
Wind energy production is dependent on weather conditions, thus less reliable than more stable sources such as gas, coal, nuclear, and more.

Complex maintenance:
Developing and managing wind farms involves various complex and interrelated factors. Maintenance and operations account for up to 30% of the overall costs of offshore wind farms. Offshore is even more challenging than onshore.

Governance



Governance Score: Vestas has an outstanding governance performance and was assigned a high score **6.43/10** by Bloomberg.

Vestas has published codes of conduct for both employees and suppliers.

These codes encourage integrity, accountability, transparency, and environmental responsibility.

Vestas is also proactively working to prevent human rights violations, slavery, and corruption.

Vestas Wind Systems A/S's Governance Score of 6.43 is Leading among its peers.

Governance	Pillar	100.00%	6.43	Leading
Board Composition	Theme	35.00%	4.74	Below Median
Director Roles	Issue	25.00%	2.64	10.00 Lagging
Diversity	Issue	25.00%	6.43	10.00 Leading
Independence	Issue	25.00%	6.05	10.00 Leading
Refreshment	Issue	25.00%	4.26	10.00 Below Median
Executive Compensation	Theme	24.94%	6.40	Leading
Incentive Structure	Issue	33.33%	7.24	10.00 Above Median
Pay Governance	Issue	33.33%	8.76	10.00 Leading
Pay for Performance	Issue	33.33%	3.70	10.00 Below Median
Shareholder Rights	Theme	24.94%	8.08	Leading
Shareholder Policies	Issue	75.00%	7.48	10.00 Above Median
Director Voting	Issue	25.00%	10.00	10.00 Leading
Audit	Theme	15.12%	8.13	Above Median
Audit Committee	Issue	40.00%	10.00	10.00 Leading
External Auditor	Issue	40.00%	5.65	10.00 Below Median
Audit Outcome	Issue	20.00%	10.00	10.00 Above Median

Vestas Wind Systems A/S	Siemens AG	Siemens Gamesa Renewable Energy SA	A.P. Møller-Mærsk A/S
ESG RISK RATING	ESG RISK RATING	ESG RISK RATING	ESG RISK RATING
18.7 Low	**30.1 High**	**15.2 Low**	**17.0 Low**
Negl **Low** Med High Severe	Negl Low Med **High** Severe	Negl **Low** Med High Severe	Negl **Low** Med High Severe
EXPOSURE	EXPOSURE	EXPOSURE	EXPOSURE
Medium	**High**	**Medium**	**Low**
Low **Med** High	Low Med **High**	Low **Med** High	**Low** Med High
MANAGEMENT	MANAGEMENT	MANAGEMENT	MANAGEMENT
Strong	**Strong**	**Strong**	**Strong**
Weak Avg. **Strong**	Weak Avg. **Strong**	Weak Avg. **Strong**	Weak Avg. **Strong**
TOP MATERIAL ESG ISSUES	TOP MATERIAL ESG ISSUES	TOP MATERIAL ESG ISSUES	TOP MATERIAL ESG ISSUES
Corporate Governance	Corporate Governance	Corporate Governance	Corporate Governance
Product Governance	Business Ethics	Product Governance	Carbon - Own Operations
Business Ethics	Product Governance	Business Ethics	Emissions, Effluents and Waste
Human Capital	Emissions, Effluents and Waste	Human Capital	Occupational Health and Safety
CONTROVERSY RATING	CONTROVERSY RATING	CONTROVERSY RATING	CONTROVERSY RATING
2 **Moderate**	3 **Significant**	3 **Significant**	3 **Significant**

Source: (Bloomberg, 2022), (Vestas, 2022), (Sustainalytics, 2022)

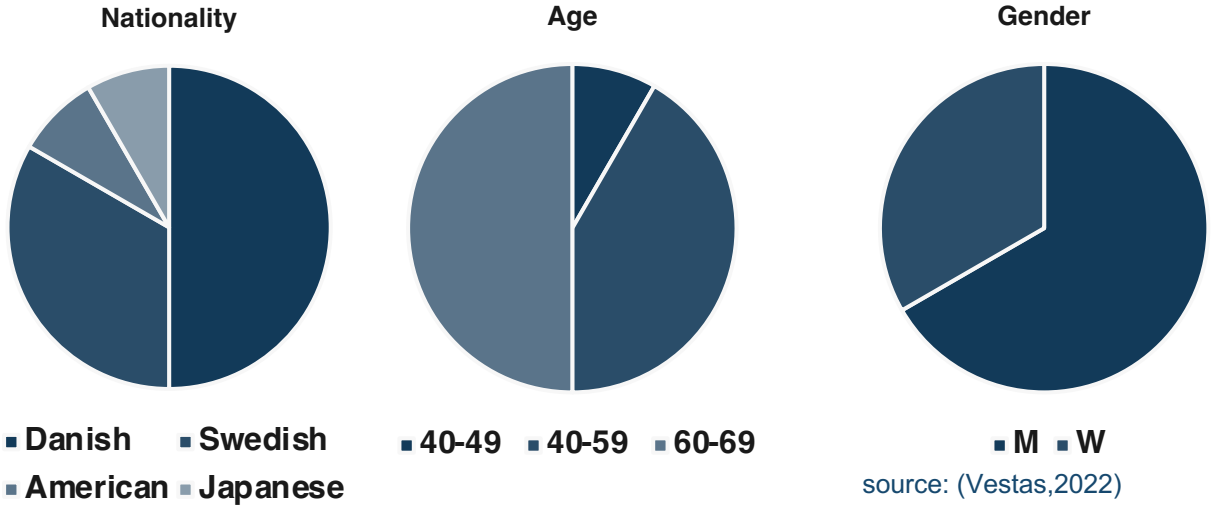
Organizational structure

- Vestas' organisation is structured in a two-dimensional matrix with Seven Global Function areas which are headed by members of the Executive Management team, who ensure Vestas' all-round operational and organisational performance and Five Regions represent the other dimension.
- The Board of Directors is responsible for the overall and strategic management of Vestas' affairs, and ensure proper organisation of Vestas' business in accordance with the Articles of Association and applicable law.
- The Board has established and approved overall policies, procedures, and controls in key areas in cooperation with Executive Management team, especially in relation to financial reporting.
- Executive Management team is responsible for the day-to-day management of Vestas', observing the guidelines and recommendations issued by the Board and is responsible for presenting proposals for Vestas' overall objectives, strategies and action plans as well as proposals for the overall operating, investment, financing, and liquidity budgets to the Board.

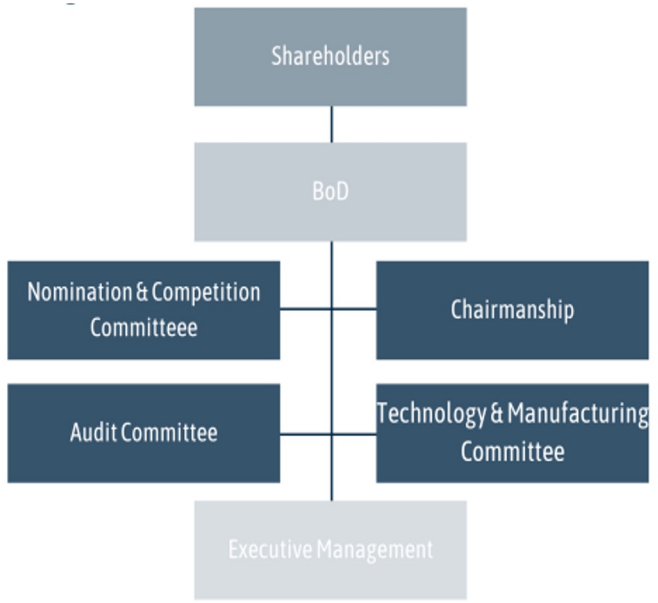
Profile of Management & Board of Directors

- BoD: Consist of **12 members**, of whom 8 were elected by the shareholders at the Annual General Meeting and 4 were elected by the Danish-based employees. The external members serve a one-year term and may be reelected, while the employee representatives serve a four-year term and may be reelected.
- **Diversity** in BoD: In 2022, Vestas has reached almost equal gender distribution among all board members with 41.7% in Women and 58.3% in Men, which has improved a lot compared to last year. However, we would suggest to improve the diversity in nationalities of board members as these 4 employee representatives are all from Danish and majority of 8 members elected by the shareholders are from Danish and Swedish.
- Executive Management team: Consists of the **President** & **Chief Executive Officer** (CEO) and **seven** executives.

Board distribution of age, nationality and gender



source: (Vestas,2022)



source:(Vestas,2022),(CFA,2020)

Major shareholders breakdown

0.06%	% of Shares Held by All Insider
46.99%	% of Shares Held by Institutions
47.02%	% of Float Held by Institutions
590	Number of Institutions Holding Shares

Major shareholder:
BlackRock Inc, Wilmington, DE U.S.A. holds exceeds 5 percent of the share capital

Treasury shares:
On 31 December 2022, Vestas Wind Systems A/S held a total of 3,689,702 treasury shares, corresponding to 1.8 percent of the share capital, which will be used to cover long-term incentive awards.

Share price:
share prices reached to highest in 08 Jan 2021, which was 321, and the latest price was 203.95 in 03 Mar 2023

Shareholder pattern

Source:(Yahoo! Finance, 2022), (Vestas,2022)

Basic data	
Stock exchange	Nasdaq Copenhagen
Stock exchange quotation	1998
ISIN code	DK0061539921
Ticker symbol	VWS
Share capital	DKK 201,973,452
Nominal denomination	DKK 0.20
Number of shares	1,009,867,260
Share classes	One share class
Voting rights	One share carries 20 votes
Free float	100 per cent free float
Trading lot (minimum)	None, one share is tradable

	2022	2021*	2020	2019	2018
Profit for the year (mEUR)	(1,572)	143	771	700	683
Cash flow from investing activities before acquisitions of subsidiaries and financial investments (mEUR)	758	773	687**	729	603
Dividend (mEUR)	-	50	230	211	205
Dividend per share (EUR)	0.00	0.05	1.14	1.06	1.00

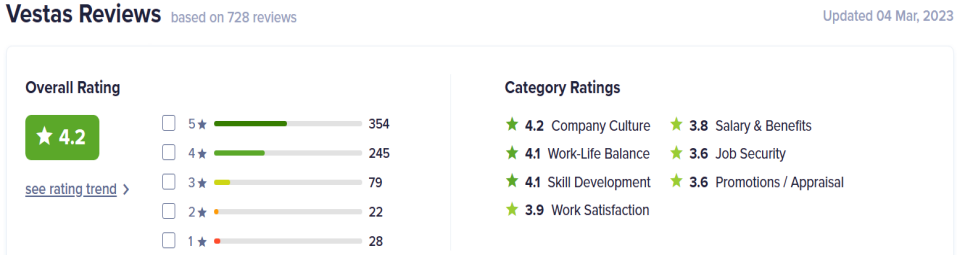
Employee profile

Staff costs

mEUR	2022	2021
Staff costs are specified as follows:		
Wages and salaries, etc.	1,581	1,395
Share-based payment, refer to note 1.5	7	13
Pension schemes, defined contribution schemes	94	85
Other social security costs	198	187
Total	**1,880**	**1,680**
Average number of employees	28,779	29,164
Number of employees as at 31 December	28,438	29,427

Board of Directors and Executive Management

mEUR	2022	2021
Staff costs attributable to:		
Board of Directors		
Board remuneration	1	1
Total	**1**	**1**
Executive Management		
Wages and bonus	7	7
Share-based payment	2	6
Total	**9**	**13**



Source: (Vestas, 2022), (Glassdoor, 2022), (Indeed, 2022), (Ambitionbox, 2022)

Employees + Quality, health, safety environment

Vestas has 28,779 employees in 2022 and total staff costs have increased 11.9% compared to 2021

It is found that Vestas has relatively low employee satisfaction, where Vestas should improve it.

- Looking at employee satisfaction across 4 different providers of eployee satisfaction they score a total of 3.8, 3.3, 4.2, and 3.1 out of 5.
- Conducting a weighted analysis in which the 3.8 has 877 reviews, the 3.3 has 1661, 4.2 has 733 and the 3.1 has 624 we can do a weighted average and end up with a average satisfaction score of 3.65/5
- Overall Vestas 3.6/5

Tech & Law risk analysis

Cyber security

- Hackers targeted Vestas' internal file-sharing systems in a **ransomware attack in 2021**, and sensitive personal information about employees and applicants was leaked. Information include data such as
  - *Contact info*
  - *CV*
  - *Pictures*
  - *Contracts*
  - *Bank account details*
  - *Tax information*
  - *Identification documents*
  - *Medical information*

Potential legal risk

Bind contracts: Binding contracts concerning purchase of PPE to be delivered in 2023 and future periods at a value of **EUR 91m**.

Commitments: Commitments to invest in funds managed by Copenhagen Infrastructure Partners P/S and undrawn commitments amounted to **EUR 182m**.

Lawsuits: Potential financial impact on Vestas due to the lawsuits in relation to a framework agreement could be a financial impact on Vestas.

Warranty provisions: The warranty costs in 2022 amounted to **EUR 930m** net of supplier claims, 2.0 percentage points above the warranty ratio in 2021 due to external cost inflation and supply chain disruptions and a few select cases.

Potential Tax risk: Vestas operates in a complex multinational tax environment and is part in tax cases with domestic and foreign tax authorities. Vestas has recognised provisions in respect of uncertain tax positions and has recognised write-downs on deferred tax assets related to the uncertainty about potential future utilisation of these tax assets.

The EC Merger Regulation: if the merger makes the company to a **dominant position** that would significantly impede effective competition in common market may face the risk of being declared incompatible with the common market.

Source: (Power Technology, 2021), (Vestas, 2021), (Vestas,2022), (Official Journal of the European Union, 2004)

R&D

Vestas has developed a circular solution to eliminate landfills for wind turbine rotors. New recycling technology can disassemble and reuse previously unrecyclable turbine blades, reducing waste in landfills and active windfarms.

AI controlled systems

Vestas Wind Systems has used Microsoft Azure computing & Azure Machine Learning to generate more energy from their wind turbines through **wakesteering** which is systems controlled by artificial intelligence.

By using wakesteering, high-performance computing, and their successful use of ai in partnership with Microsoft and minds.ai, they have managed by optimization to generate more energy from the wind turbines.

The state of AI shows accourding to McKinsey that the adoptation has **more than doubled** since 2017.

In conclusion, ai is on the move and has a good upwards trend considering the data from the McKinsey survey.

Source: (Technollogy Record,2022), (IEA,2021), (*Microsoft News Centre Europe,2022), (builtin, 2022), (M*ckinsey,2022)

FINANCIAL DUE DILIGENCE

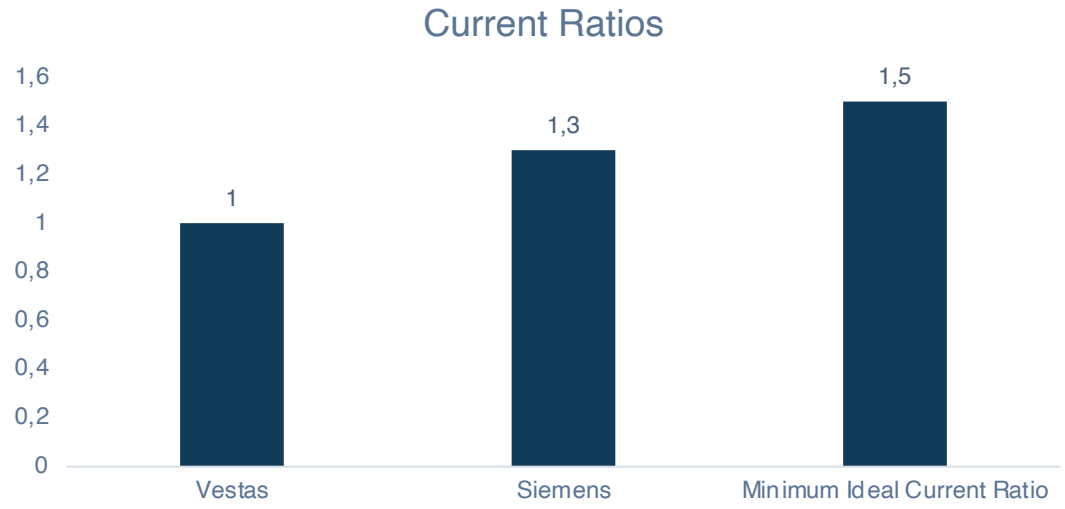
Financial ratios comparison – Vestas & Siemens

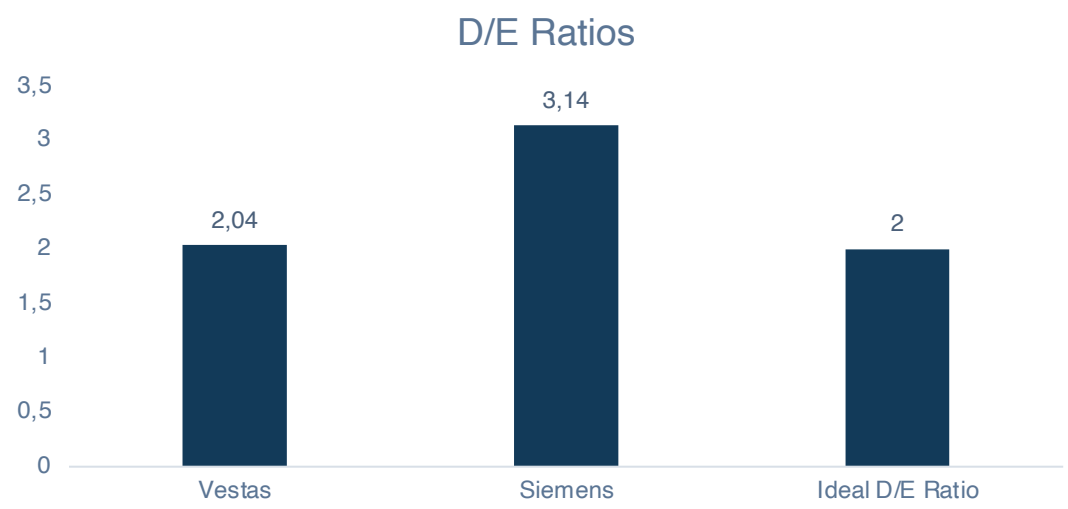
Analysis of Vestas and Siemens´s **financial** performance by using financial ratios

Financial ratios are a vital part of any financial analysis as it shows the companies' performance and makes it easier to compare companies to each other. Here we are comparing Siemens to Vestas to gain a better understanding of whether an acquisition would be feasible or not.

(Values in mEUR)			Operating margin	Profitability		Short-term solvency	Long-term solvency	
Company	Country	Enterprise Value	EBIT Margin	EBITDA Margin	Net Margin	Current Ratio	D/E Ratio	Equity/Assets Ratio
Siemens	Germany	130 090	10.4%	14.6%	10.8%	1.3	2.04	35.3%
Vestas	Denmark	17 295	2.1%	8.4%	1.1%	1.01	3.14	24.2%

- Siemens has a **current ratio of 1.3**, which is lower than the **ideal current ratio of 1.5 to 3**. It is however higher than Vestas' current ratio, so an acquisition could still be possible, albeit difficult.
- Both Siemens and Vestas has a quite high D/E ratio, indicating that an acquisition financed by debt would not be ideal as it would only increase this ratio even further
- Vestas' enterprise value is around **13%** of Siemens' enterprise value. Thus, if Siemens were to acquire Vestas it would be a substantial investment.





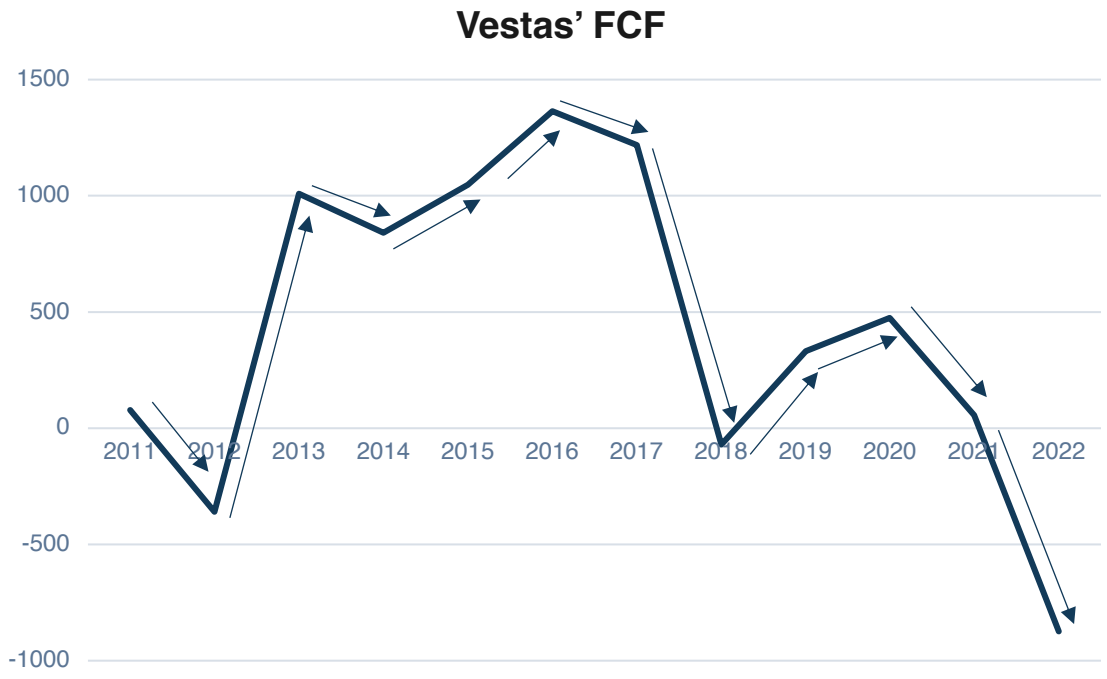
Source: (MarketScreener, 2023)

Financial Risks – Cyclical Industry

Overview of **wind industry´s cyclic nature** and how it affects Vestas´s financial performance.

Wind Industry´s Cyclic Nature

The wind industry is a cyclical industry, which is characterized by fluctuations in profitability and demand. Investing in a cyclical industry can have a significant financial risk as it creates uncertainty, and it highly relies on trends. Additionally, due to cyclical industries being volatile in nature, it might be challenging to predict long term financial performance. Given the current macroeconomic trends that we are facing today, it would be more strategic for Siemens to invest in a stable industry.



Vestas Stock Price

Connecting Wind Industry´s Cyclic Nature to Vestas´Financial Performance

The fact that the wind industry is a cyclical industry could explain why Vestas' free cash flow has fluctuated in the past. From the years 2011 to 2022, their free cash flow ranges from **1 363 mEUR** to **-874 mUER**.

Vestas' stock price has also been affected by the wind industry's cyclical nature. However, it increased significantly in 2020.

Source: (Google Finance, 2023)

Financial Risks – FX Risk

There is **no projected long-term FX gains** for Vestas and FX risk during the acquisition cycle which is acceptable.

Siemens AG is traded in Euros, and Vestas is traded in Danish krones. To evaluate the foreign exchange risk, both historical long-term and short-term Danish krone to Euro exchange rate changes are reviewed. Long-term historical data helps us forecast the potential long-term FX gains or losses of the acquisition and short-term historical data within one year helps us forecast the currency risk on the two ends of the possible acquisition.

The five-year trend shows that the Danish krone has a stable exchange rate to euros, despite two random shocks that were recovered in a short-term. Spanning a 5-year period, the rate of change is as low as 0.22%. Therefore, we do not project that there will be significant FX gain that needs to be considered in our acquisition proposal.

A normal acquisition can commonly take 4-6 months (Harroch, R,2018). Spanning the most recent 6 months, the biggest rate of change is 0.37%, which means a worst case of 217 mil of change based on our calculated valuation. In 2021 (Siemens), Siemens AG had a FX gain of 310 mil. Therefore, we assume that this FX risk is acceptable and managable.

Source: (Google Finance, 2023), (Forbes, 2023)

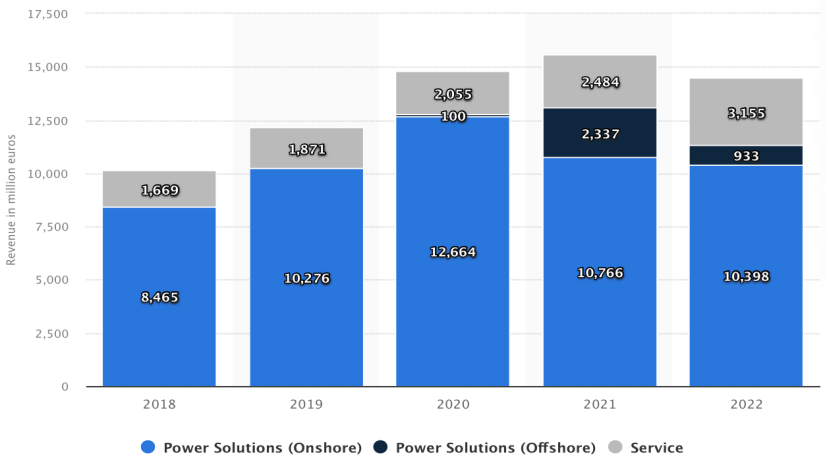
Multiples Valuation - Vestas

Selection of **comparable companies** for multiples valuation.

To value Vestas based on financial multiples, finding comparable companies that share the same growth rate and risk are an essential step. We try to realize this by first researching Vestas' revenue sources by segment, then finding competitive players in the same wind turbine industry, and finally filter out some comparables based on market focuses.

The graph on the right shows the revenue sources of Vestas from 2018 to 2022. Up to 2022, onshore power solutions remain as the highest source of revenue with service offerings having a larger and larger share of revenue year after year. With regards to offshore power solutions, there is no notable pattern of its change.

6 comparables were selected with at least 4 presences in the 5 market focuses: onshore power solutions, offshore power solutions, installation, commissioning, and maintenance.



Focus/Company	Titan Wind Energy	Siemens Gamesa	Goldwind	GE	Nordex	Shanghai Electric
Onshore	●	●	●	●	●	●
Offshore	●	●	●	●		●
Installation	●	●	●	●	●	●
Commissioning	●	●	●	●	●	●
Maintenance	●	●	●	●	●	●

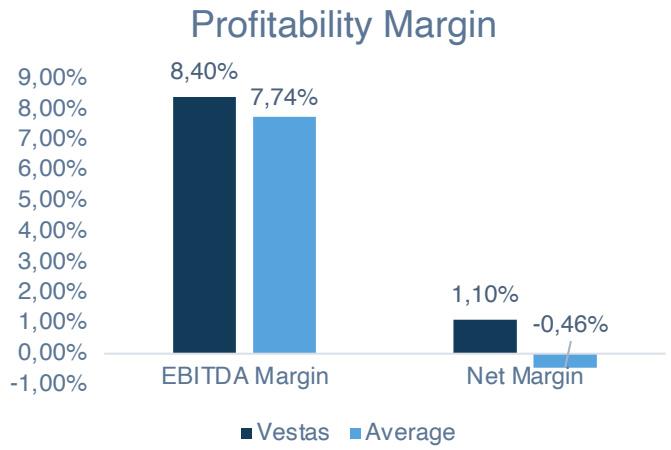
Source: (Statista, 2022)

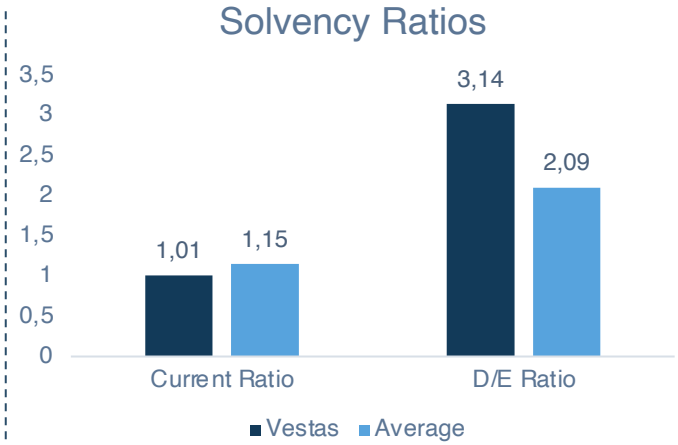
Financial ratios comparison – Vestas & comparable companies

Overall, Vestas seems to be **under-performing** in ¾ of the financial health measures compared with the comparable companies.

Company	2021 Country	Currency	Enterprise Value, m	Operating margin EBIT Margin	Profitability EBITDA Margin	Net Margin	Short-term solvency Current Ratio	Long-term sustainability D/E Ratio	Equity/Assets Ratio
Vestas	Denmark	EUR	17 295	2.1%	8.4%	1.1%	1.01	3.14	24.2%
Titan Wind Energy	China	CNY	38 907	18.3%	22.39%	16.0%	1.49	1	49.5%
Siemens Gamesa	Spain	EUR	15 182	-0.94%	4.22%	-6.15%	0.91	0.58	63.1%
Goldwind	China	CNY	86 519	8.57%	12.97%	6.84%	1.19	2.27	30.5%
GE	USA	USD	123 111	7.79%	11.85%	-9.11%	1.17	3.98	20.1%
Nordex	Germany	EUR	1 535	-1.97%	0.97%	-4.23%	1.07	2.87	25.9%
Shanghai Electric	China	HKD	88 887	-8.29%	-6.61%	-7.64%	1.24	0.82	19.3%
Average				3.65%	7.74%	-0.46%	1.15	2.09	33.2%

- Vestas has an EBIT Margin lower than comparables' average, meaning it is below-average in managing costs.
- An EBITDA Margin and a net magin larger than the average, meaning it is above-average in profitability. However, the net margin is as low as 1.1%, meaning a slight increase in operating costs or marketplace competition could plunge the company into red.
- A current ratio lower than the average, meaning it is below-average in its ability to meet short term debt obligations.
- A D/E ratio higher than the average and an Equity/Assets ratio below the average, meaning it has a below-average position in long-term sustainability of its business, including long-term solvency and investor interests.

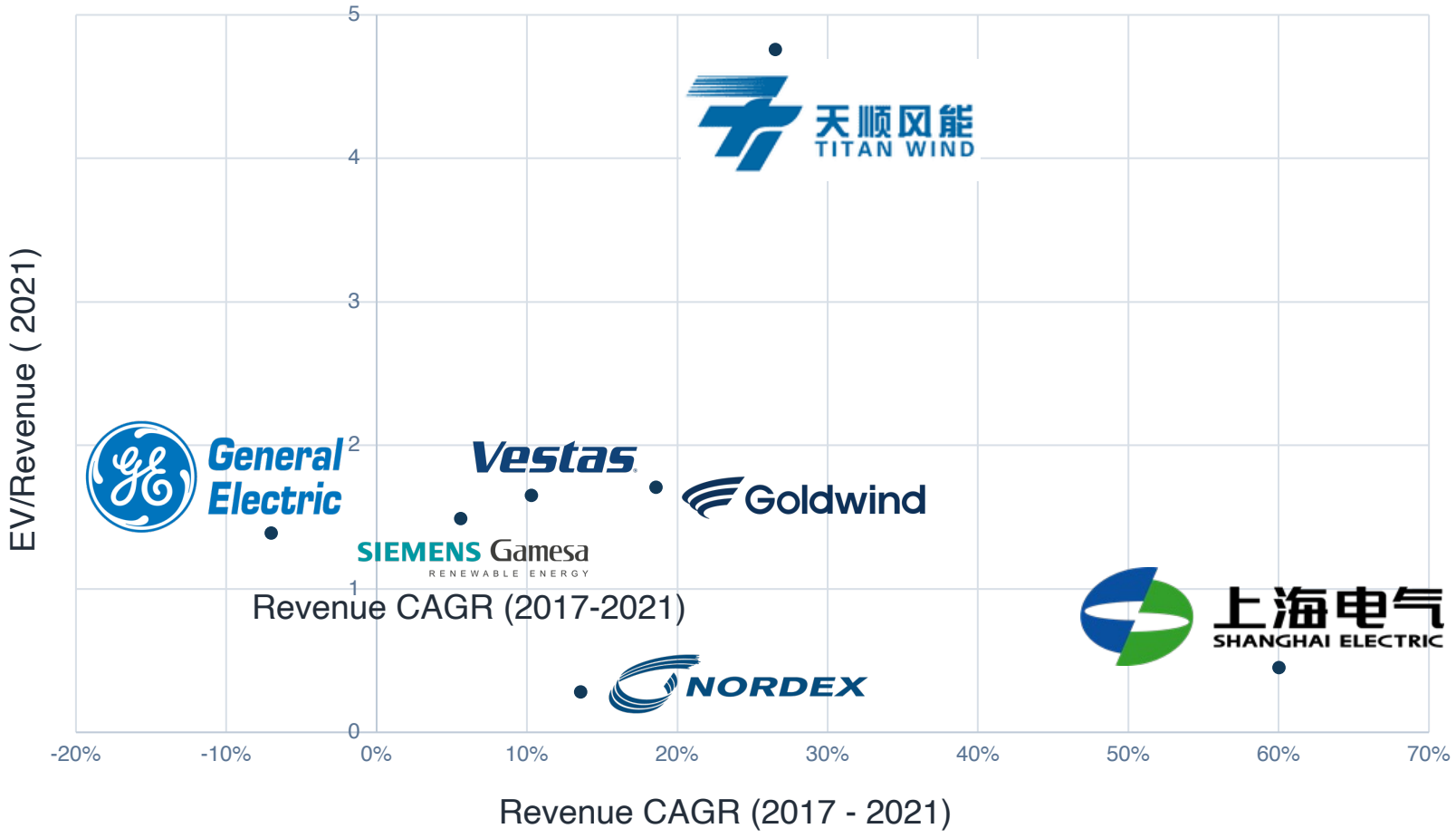




Source: (Yahoo Finance, 2022)

EVSales vs. Sales CAGR - Vestas & comparable companies

Multiples and **Revenue CAGR Comparison** amongst Vestas´comparable companies



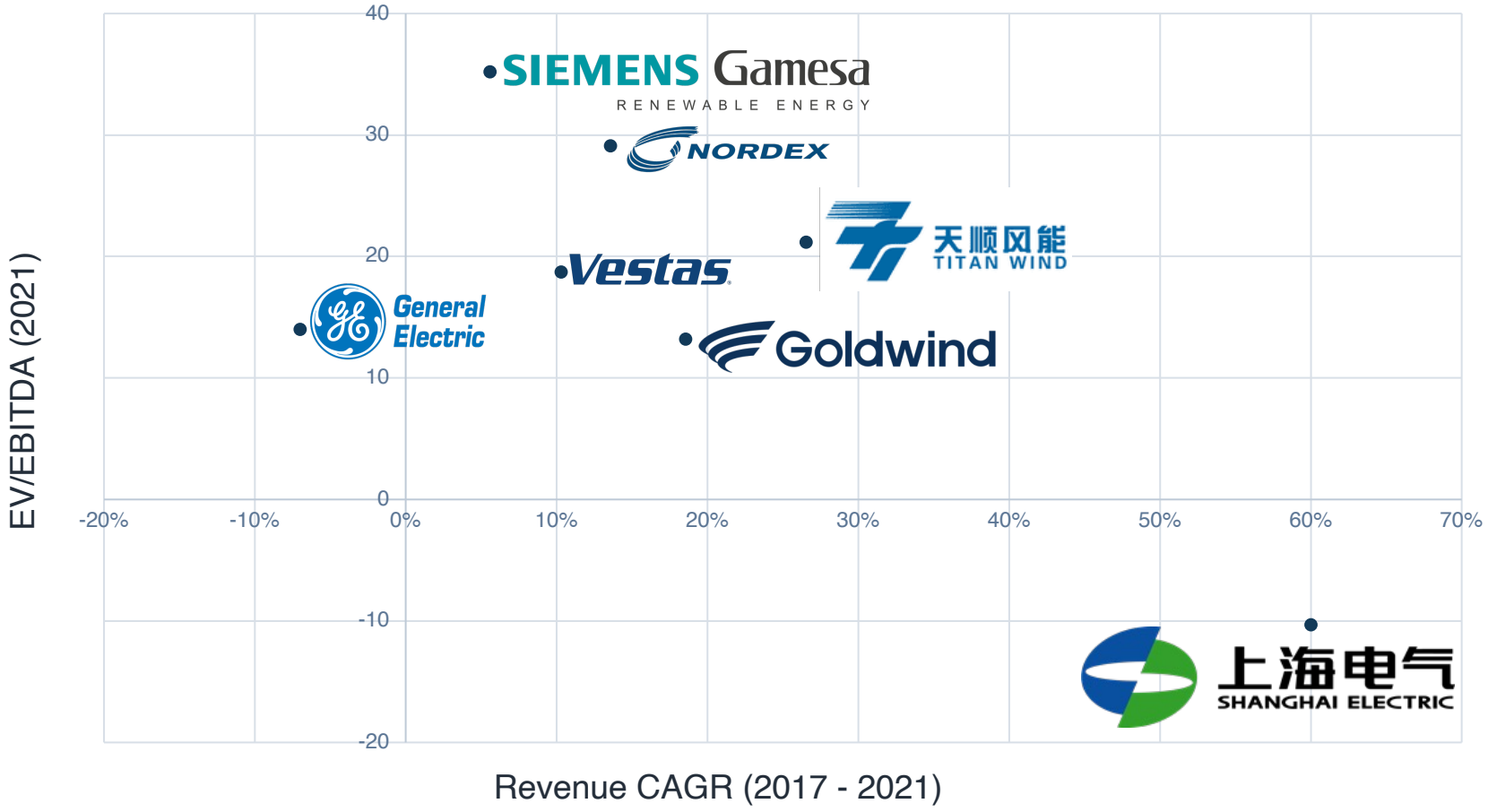
Takeaways

- Vestas' 2021 current traded EV/Revenue ratio is at 1.65 and very close to that of 1/2 of the comparable companies. It means that Vestas seems to be fairly valued.
- Based on Vestas' Revenue CAGR (2017 – 2021), the company has a below-average growth rate in revenue, with the most comparable company being Nordex.

Source: Own Team Analysis, Orbit Database (2023)

EVSales vs. Sales CAGR - Vestas & comparable companies

Multiples and **Revenue CAGR Comparison** amongst Vestas´comparable companies



Takeaways

- Overall, Vestas' EV/EBITDA seems to be traded at average at 18.7 amongst the comparables, which further confirms that Vestas seems to be fairly valued by the market. However, if we see Shanghai Electric as an outlier, Vestas is undervalued compared to the remaining comparable companies.
- Vestas has a below-average CAGR (2017 – 2021) in revenue, with the most comparable company being Nordex.
- Shanghai Electric may be discarded when calculating the EV/EBITDA multiple for valuation of Vestas.

Source: Own Team Analysis, (Orbit Database, 2023)

Multiples Valuation Results - Vestas

Based on **comparable** companies´multiples, **Vestas´implied share price is ~ 137 DKK**

					Revenue multiples	Earnings multiples	Book value multiples
	Headquarter	Currency	Market Cap (B)	EV (B)	EV/Revenue	EV/EBITDA	Price/Book
Titan wind energy	Taicang, China	CNY	34.91	38.91	4.76x	21.20x	4.49x
Siemens Gamesa	Biscay, Spain	EUR	14.98	15.18	1.49x	35.20x	3.36x
Goldwind	Beijing, China	CNY	66.44	86.51	1.71x	13.20x	1.96x
GE	Boston, U.S.	USD	103.70	123.11	1.39x	14.00x	2.54x
Nordex	Hamburg, Germany	EUR	2.23	1.54	0.28x	29.10x	2.10x
Shanghai Electric	Shanghai, China	CNY	67.80	88.89	0.68x	-10.30x	0.52x
High					4.76x	35.20x	4,49x
Low					0.28x	-10.30x	0.52x
Mean					1.72x	22.54x (Ex. Shanghai Electric)	2.50x
Median					1,44x	17.60x	2.32x

While Chinese OEMs constitute half of the chosen comparables to Vestas, they are not significantly different in their multiples and therefore would not be categorized as separate ones in our valuation. Also, as Vestas is a market leader with technological advantages in the wind turbine industry, which entails both value and growth, we set the mean values as the multiples for the valuation of Vestas.

Revenue Multiple Valuation	
EV/Sales	1.72
Sales	15587
EV (E)	26784
Debt	14951
Market Value of Equity (E)	11833
# of shares	1005
Stock Price (E)	12

Earnings Multiple Valuation	
EV/EBITDA	23
EBITDA	1237
EV (E)	29550
Debt	14951
Market Value of Equity (E)	14599
# of shares	1005
Stock price (E)	15

Book Value Mutiple Valuation	
Price/Book	2.50
Book Value of Equity	11879
Market Value of Equity (E)	29637
# of shares	1005
Stock price (E)	29
Debt	14951
EV (E)	44588

Average	
EV (E), mEUR	33641
Market Value of Equity (E), mEUR	12770
Implied Share Price, EUR	19
Implied Share Price, DKK	137

Source: (MarketScreener, 2023)

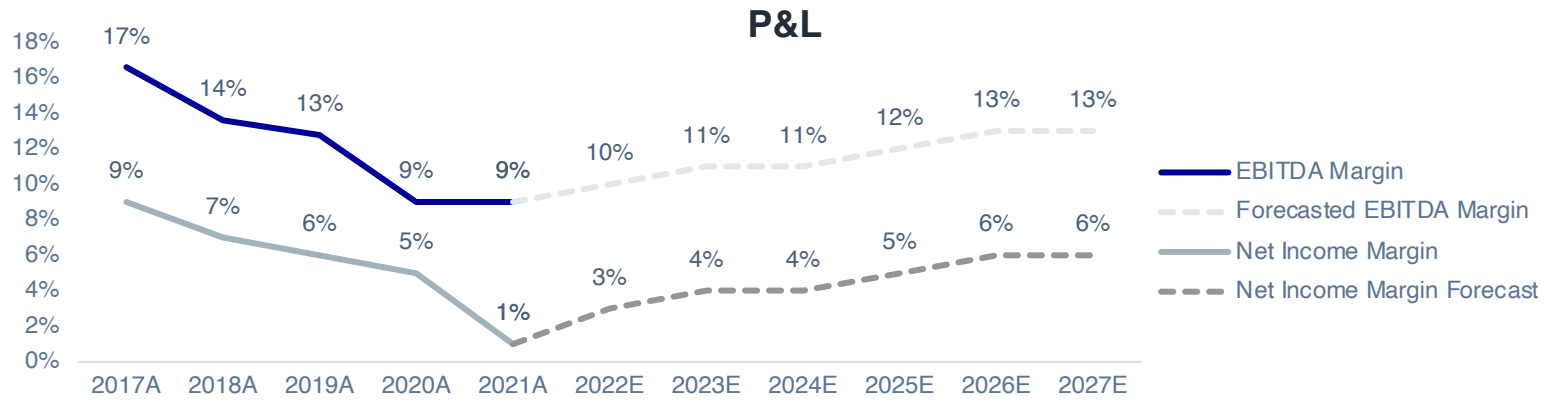
DCF Valuation - Financial Forecasting

A Forecast of **revenue** and **operating** margins for Vestas

Vestas Revenue Forecast

- Vestas' revenue is expected to grow at a steady rate over the next few years. This expectation comes from the growing trend of wind turbines.
- As time passes, it is anticipated that expenses will gradually stabilize, whereas the EBIT will demonstrate a progressive increase in growth.
- Onshore market expectation 2022-2025: CAGR 8% - 10%
- Offshore market expectation 2022-2025: CAGR 35% - 40%
- Service market expectation 2022-2025: CAGR 8% - 10%

Revenue Forecast



EBITDA Margin and Net Income Margin Growth

As with revenue, the EBITDA margin and net income margin are expected to grow over the coming years.

This growth is driven by an increase in need for sustainable energy.

CAGR EBITDA Margin 2021 – 2027: 13.25%

CAGR Net Income Margin 2021 – 2017: 4.86%

Source: (Vestas, 2022)

DCF Valuation Results - Vestas

Based on its **projected** DCF, **Vestas´implied share price is ~ 296 DKK**

Revenue CAGR 2017-2021: 12%
Revenue CAGR 2021-2027: 14%

Discounted Cash Flow (mEUR)	2022E	2023E	2024E	2025E	2026E	2027E
Revenue	**16 678**	**18 179**	**20 179**	**23 206**	**26 919**	**32 302**
Growth rate %	7 %	9 %	11 %	15 %	16 %	20 %
Costs	-15 511	-16 725	-18 363	-20 885	-23 958	-28 749
Costs margin %	-93 %	-92 %	-91 %	-90 %	-89 %	-89 %
EBITDA	**1 668**	**2 000**	**2 220**	**2 785**	**3 499**	**4 199**
EBITDA Margin%	10 %	11 %	11 %	12 %	13 %	13 %
EBIT	**667**	**1 091**	**1 211**	**1 624**	**2 423**	**2 907**
EBIT Margin %	4 %	6 %	6 %	7 %	9 %	9 %
Net Income	**500**	**727**	**807**	**1 160**	**1 615**	**1 938**
Net Income Margin %	3 %	4 %	4 %	5 %	6 %	6 %
NOPAT	**348**	**452**	**678**	**881**	**1 234**	**1 727**
Depreciation & Amortisation	1 097	1 316	1 579	1 895	2 274	2 729
Change in Net Working Capital	-124	-175	-81	-275	-111	-100
CAPEX	-885	-929	-1 022	-1 145	-1 293	-1 462
Unlevered Free Cash Flow	**436**	**664**	**1 154**	**1 357**	**2 104**	**2 895**
PV FCF	404	570	919	1 001	1 438	1 834

Terminal Value	
Terminal Cash Flow, mEUR	2 895
WACC	7.90 %
Terminal Growth Rate	2.50 %
Terminal Value, mEUR	54 947

Exit Multiple

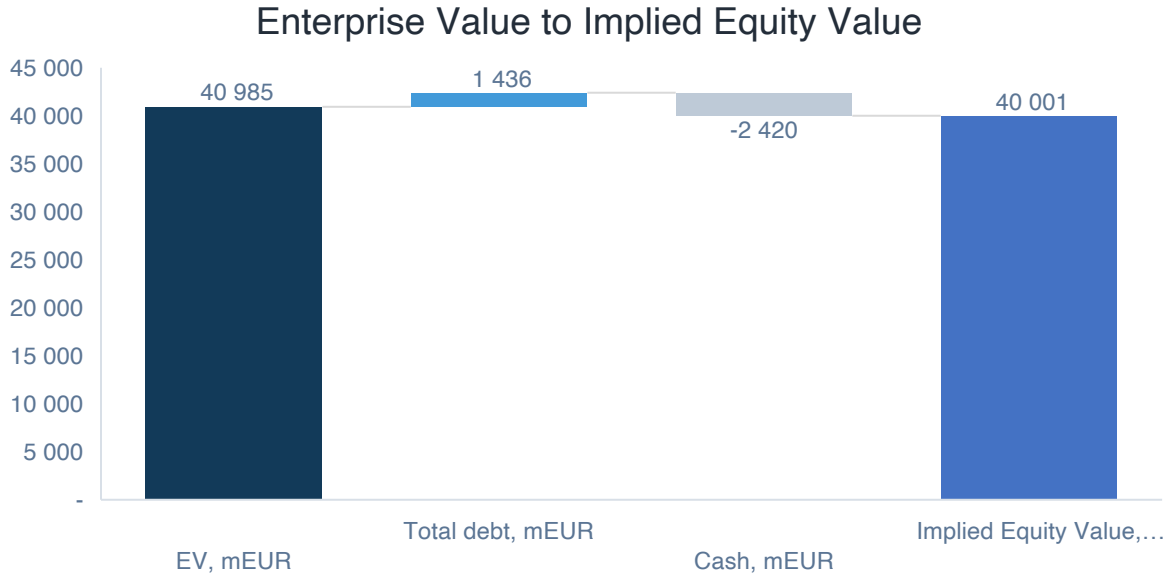
The terminal value of 54 947 mEUR gives an exit multiple of 13.08

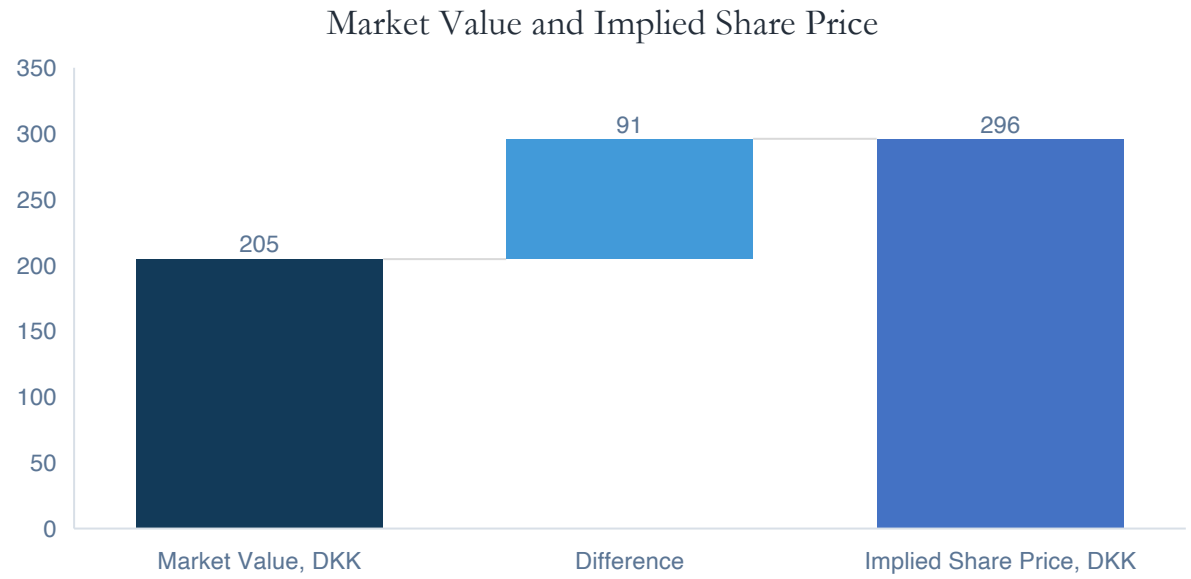
Target Price	
PV of FCF, mEUR	6 167
PV of Terminal Value, mEUR	34 819
EV (E), mEUR	40 985
Total debt, mEUR	1 436
Cash, mEUR	2 420
Market Value of Equity (E), mEUR	40 001
Number of Shares Outstanding, m	1 010
Implied Share Price, EUR	40
Implied Share Price, DKK	296

Source: Own Team Analysis

Sensitivity Analysis

An implied share price that is higher than the market value implies that Vestas' shares are currently underpriced. Thus, according to the sensitivity analysis, investing in Vestas would be financially beneficial when looking at a long-term investment. However, it is important to note that this does not take into account the financial risks involved in acquiring Vestas.





Enterprise Value

Terminal Growth Rate

WACC	2 %	2.30 %	2.50 %	2.70 %
7.5 %	36 738	38 650	40 053	41 572
7.7 %	35 255	37 015	38 302	39 691
7.9 %	33 873	35 498	36 682	37 956
8.0 %	33 218	34 780	35 917	37 139

Implied Share Price

Terminal Growth Rate

WACC	2 %	2.30 %	2.50 %	2.70 %
7.5 %	265	279	289	300
7.7 %	254	267	276	287
7.9 %	243	256	264	274
8.0 %	239	250	259	268

Source: Own Team Analysis

Possible Synergies Overview between Siemens & Vestas

Type of Synergy	Benefit	Reasoning	Duration
Operational Synergies	• Combining marketing and sales efforts could result in reduced costs and increased market share • Lower production costs and increased efficiency • Combined company could eliminate redundancies and streamline operations, resulting in reduced overhead costs	Siemens acquiring Vestas could lead to economies of scale in manufacturing, purchasing, and logistics.	1-3 yrs
Research & Development Synergies	• Increase in innovation • Broad range of knowledge and expertise	Given that Siemens and Vestas both invest significantly in research and development, they could combine their expertise and become the frontrunners for innovation in the wind industry	1-3 yrs
Strategic Synergies	• Competitive advantage if they were to combine ESG strategies • Better ESG score for Siemens	Vestas scores better than Siemens on ESG factors. Thus, from an ESG perspective, acquiring Vestas could be strategically beneficial for Siemens.	> 5 yrs
Intellectual Property (Patents)	• They could lead advancements in the wind industry • More revenue opportunties, and licensing	If Siemens were to acquire Vestas, then they would have around 16 800 patents in the wind industry	> 5 yrs
Negotiation Power	• They have strong bargaining power • They can drive the price in the market	Siemens acquiring Vestas would make them the largest player in the wind industry. This gives them a larger bargaining power with both customers and suppliers.	1-5 yrs
Capex Synergies	• Reduced Capex • Increased Free Cash Flow	KK Wind Solutions can benefit from Siemens' investments that were historically overlapped in the short-term.	1-2 yrs

Source: Own Team Analysis

DCF with Synergies Valuation Results - Vestas

Vestas´**implied** share price with synergies is ~ **336 DKK**.

Revenue CAGR 2017-2021: 12%
Revenue CAGR 2021-2027: 17%

(in mEUR)	2022E	2023E	2024E	2025E	2026E	2027E
Revenue	17 146	19 203	21 892	25 613	30 480	37 185
Growth rate %	10 %	12 %	14 %	17 %	19 %	22 %
Costs	-14402	-15939	-17951	-20491	-23774	-27889
Costs margin %	-84 %	-83 %	-82 %	-80 %	-78 %	-75 %
EBITDA	2057	2496	3065	3842	4877	6321
EBITDA Margin%	12 %	13 %	14 %	15 %	16 %	17 %
EBIT	1 029	1 344	1 532	2 049	3 048	3 719
EBIT Margin %	6 %	7 %	7 %	8 %	10 %	10 %
Net Income	857	1152	1313	1793	2438	2975
Net Income Margin %	5 %	6 %	6 %	7 %	8 %	8 %
NOPAT	379	531	796	1035	1449	2029
Depreciation & Amortisation	1051	1209	1579	1895	2274	2729
Change in Net Working Capital	-124	-175	-81	-275	-111	-100
CAPEX	-1020	-1040	-1216	-1362	-1539	-1739
Investment on improving diversity	-168	-170	-170	-172	-172	-172
Unlevered Free Cash Flow	286	524	1079	1294	2074	2919
PV FCF	266	454	868	969	1444	1892

Terminal Value	
Terminal Cash Flow, mEUR	2919
WACC	7.50 %
Terminal Growth Rate	2.70 %
Terminal Value, mEUR	62 459

Exit Multiple

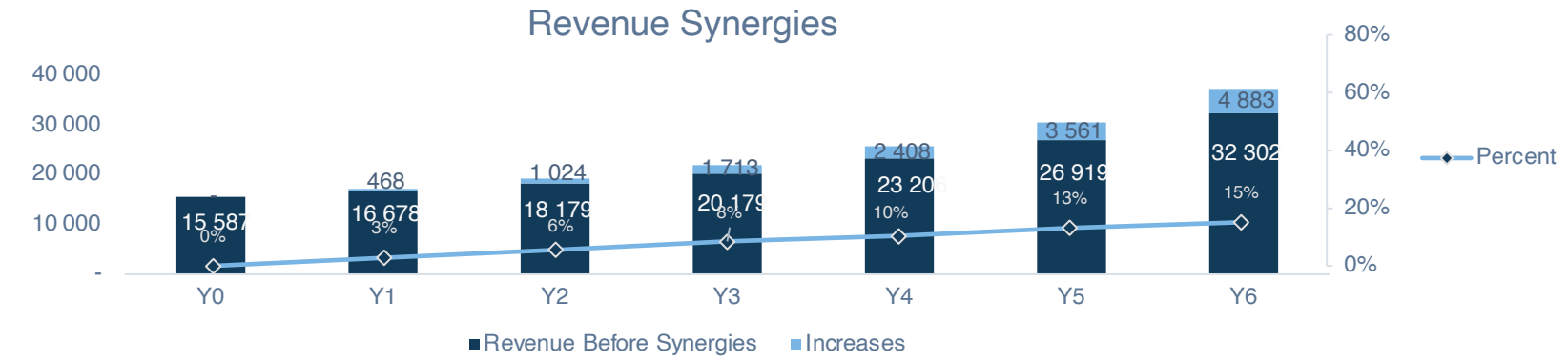
The terminal value of 62 459 mEUR gives an exit multiple of 9.88

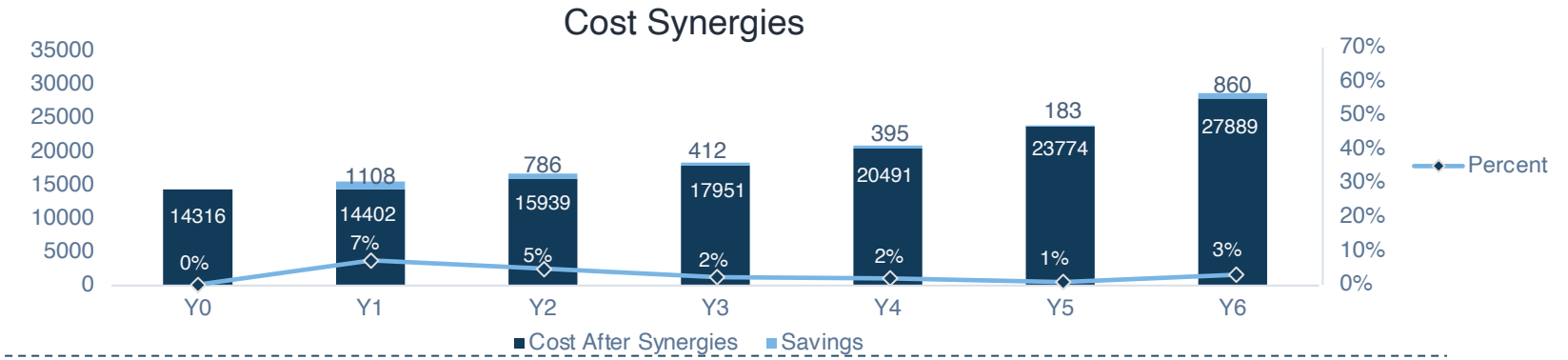
Target Price	
PV of FCF, mEUR	5893
PV of Terminal Value, mEUR	40 471
EV, mEUR	46 364
Total debt, mEUR	1436
Cash, mEUR	-2420
Implied Equity Value, mEUR	45 380
Number of Shares Outstanding, m	1005
Implied Share Price, EUR	45
Implied Share Price, DKK	336

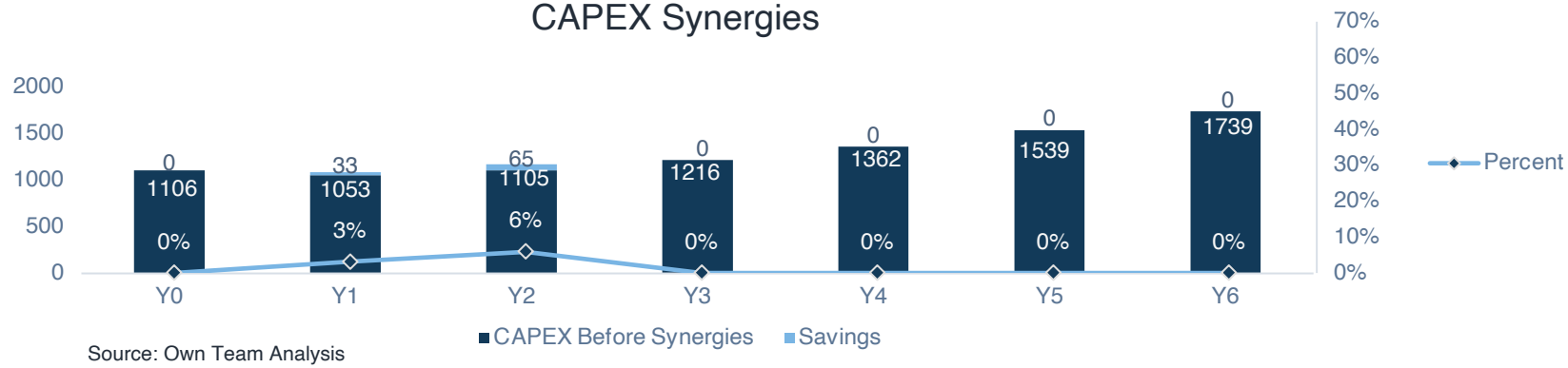
Source: Own Team Analysis

Quantified Synergies - Vestas

NPV of **possible** synergies is **22.25 mEUR**.







Source: Own Team Analysis

Revenue Synergies

- The revenue synergies grow steadily over the coming years
- It will take time before Vestas is fully integrated into Siemens' organisation. Hence, it is assumed that it will take time before revenue growth fully matures

NPV: 7.68 mEUR

Cost Synergies

- Cost synergies are expected to be at its highest during the first years of the acquisition, and that it will stabilize over time

NPV: 14.01 mEUR

CAPEX Synergies

- CAPEX is expected to become lower the first years of the acquisition as several resources can be combined

NPV: 560 kEUR

Sum NPV: 22.25 mEUR

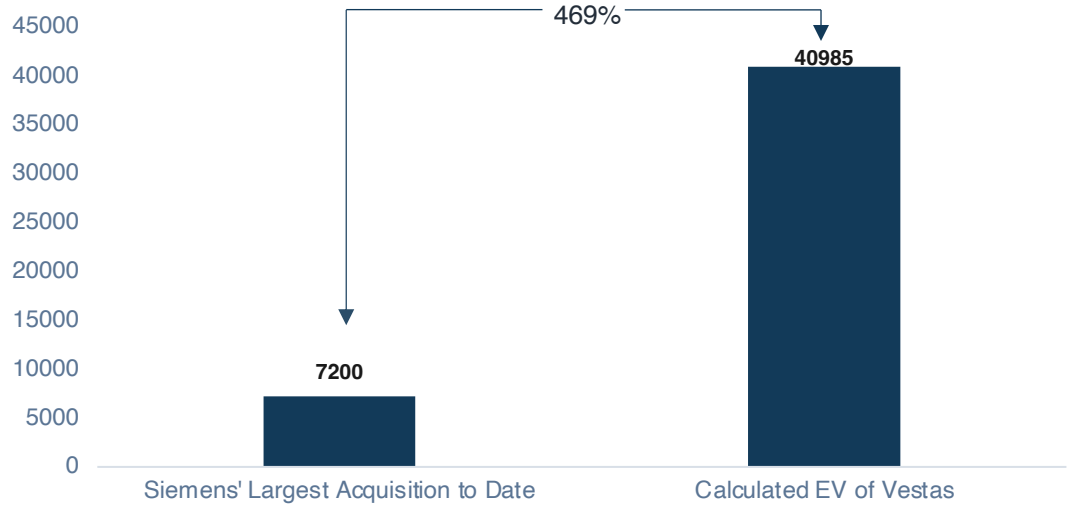
Feasibility – Siemens´Past Acquisitions

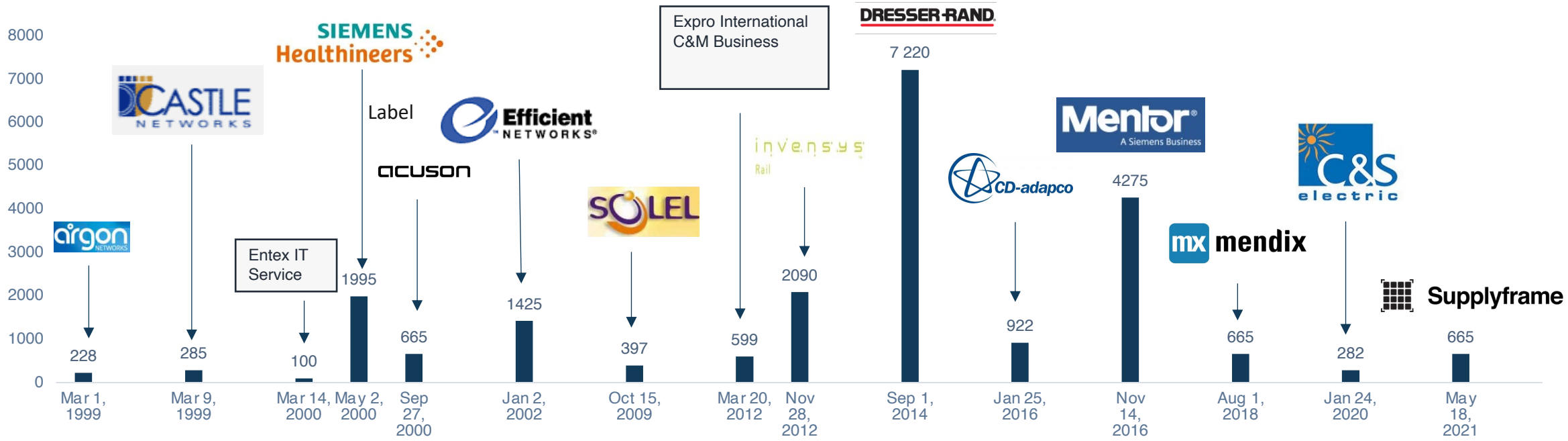
Siemens´**largest** acquisition to date is **7.200 mEUR**, which is **significantly larger than Vestas´EV**.

Looking Back

In order to grasp whether acquiring Vestas is feasible or not, it would be beneficial to look at Siemens' past acquisitions. By looking into Siemens' previous acquisitions, we get a better idea of the type of companies Siemens have deemed feasible in the past, and we get a better idea of the price range they might go for.

Siemens has acquired almost **80** companies in total. Their largest acquisition to date is the acquisition of Dresser-Rand, a manufacturing and engineering company, for **7 200 mEUR.**





Source: (crunchbase, 2023)

Feasibility – Tax Regulations

When acquiring a company, it is important to examine the applicable tax legislation to ensure financially sound decisions. In Germany, a share purchase transaction typically triggers two main types of taxes: transfer tax (Grunderwerbsteuer) and capital gains tax (Kapitalertragsteuer).

Transfer Tax

- In a share purchase transaction, the buyer is not acquiring any physical property, but rather is acquiring ownership of the shares in the target company
- No transfer tax is usually payable on the share purchase transaction itself
- Transfer tax may be triggered if the target company owns real estate in Germany, in which case the transfer of the shares may be subject to transfer tax at a rate of up to **6.5%** of the fair market value of the real estate

Capital Gains Tax (CGT)

- Capital gains tax is a tax on the profit made from the sale of an asset, in this case, the shares in the target company.
- The capital gains tax rate is currently **15.8%** of **5%** of the profit from the sale of an asset, but it may be reduced or eliminated under certain circumstances, such as if the buyer holds the shares for a certain period of time or if the seller is a tax resident of a country that has a double tax treaty with Germany, which is the case between Germany and Denmark

It's important to note that there may be additional taxes and fees that could apply to a share purchase transaction in Germany, depending on the specific circumstances of the transaction. These could include income tax, value-added tax (VAT), and various administrative fees.

The double tax treaty (DTT) between Germany and Denmark can have implications for the CGT when a German company is purchasing 100% of the shares of a Danish company.

Under the DTT, capital gains arising from the sale of shares in a Danish company by a German company may be subject to tax in Denmark, as Denmark has the primary taxing right on such gains. However, the DTT provides for a credit mechanism to avoid double taxation, which means that the German company may be able to offset any Danish CGT paid against its German tax liability on the same gains.

Regulation	Risk	Reasoning
Transfer Tax		This regulation is only a risk if Vestas has real estate in Germany. Since Vestas does have real estate in Germany, this would be an additional cost for Siemens.
Capital Gains Tax		The CGT regulation applies when shares are sold. Thus, it is not a current risk, but a long-term risk that needs to be accounted for.

Source: (PwC, 2022)

Feasibility – Financing the Acquisition

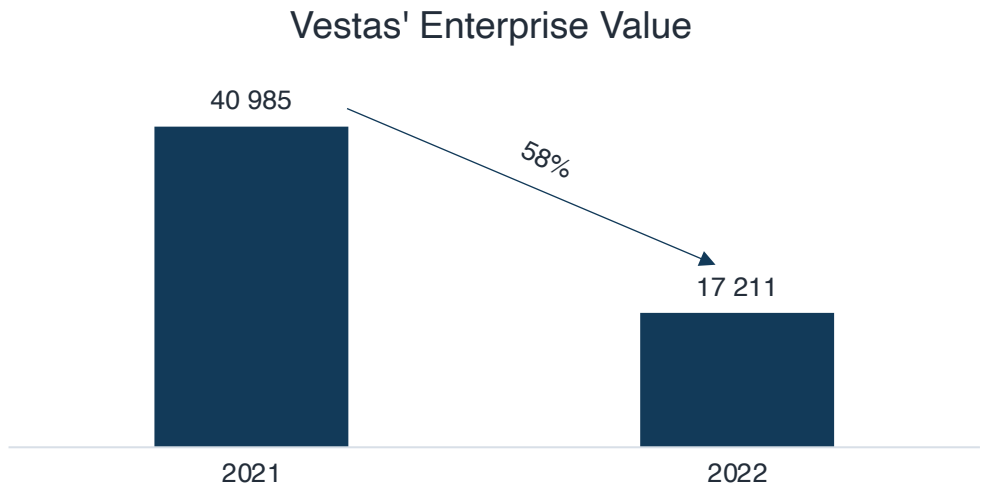
Overview of how Siemens can finance the acquisition

Price of Acquisition

Our calculated ***enterprise value of Vestas in 2021 is 40 985 mEUR***. Vestas had a negative net profit in 2022. This was highly impacted by cost inflation and supply chain disruptions. There can be several reasons for this negative growth, such as the war and the covid pandemic. This negative growth makes it easier for Siemens to acquire Vestas, as their current enterprise value is significantly lower than the enterprise value we have calculated - which is based on Vestas' financials in 2021.

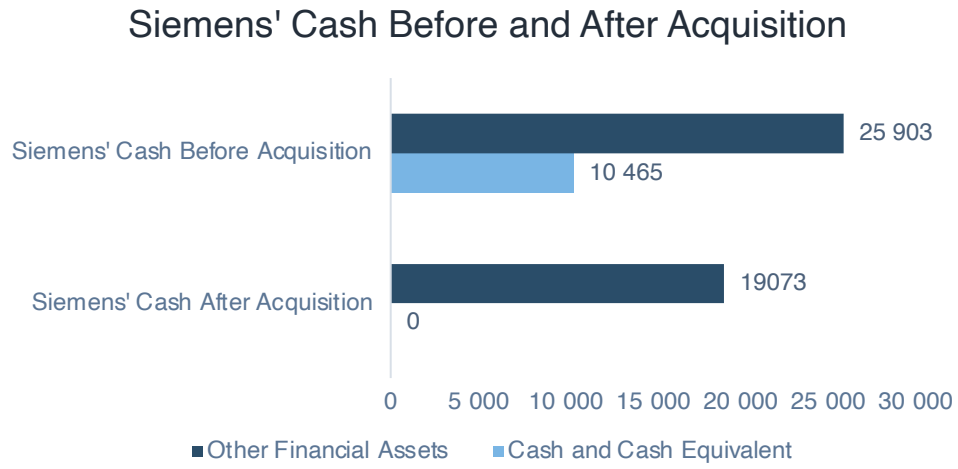
We calculated ***Vestas' enterprise value in 2022 to be 17 295 mEUR***. This is **58%** lower than their enterprise value in 2021, making it more feasible for Siemens to acquire Vestas. Although this value is significantly lower in 2022 than 2021, it is still more than twice the size of Siemens' largest acquisition to date.

As shown on the table**, Siemens does have the financials to pay for the acquisition by cash**. However, it is important to note that it might be challenging to convince Vestas' current shareholders to sell their shares. Thus, Siemens will have to provide an attractive offering. Moreover, even though Siemens technically has the financial ability to pay for the acquisition, it would take a large financial toll on the company.



Siemens' Cash and Equities

mEUR	Sep 30 2022
Cash and Cash Equivalents	10 465
Other Financial Assets	25 903



Conclusion

Although Siemens technically has the financial ability to acquire Vestas, they would either have to tap into their long-term investment or take up a loan in order to finance the transaction. Using long-term investments could be difficult as it is not easily available. Additionally, taking up a loan could put a financial strain on Siemens as their D/E ratio is higher than ideal.

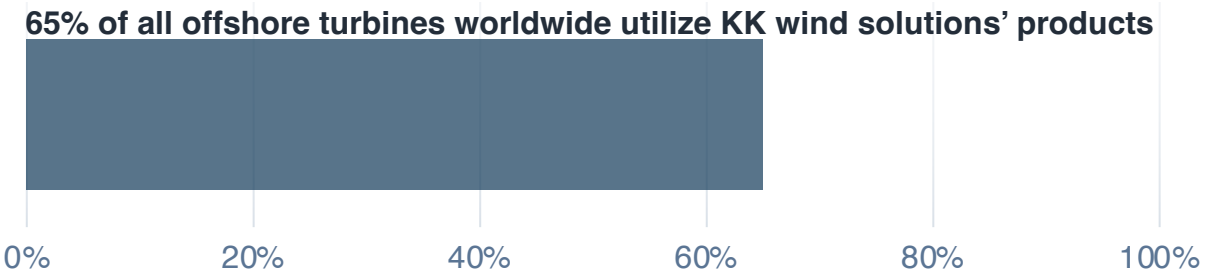
Source: (Vestas,2022), Own Team Analysis

ALTERNATIVE SOLUTION

KK Wind Solutions

Ikast, Denmark

- Specializes in electrical and digital solutions for the wind industry.
- Owned by A.P Møller foundation
- Has collaborated with Siemens since 1990
- Strong position in the offshore wind industry.
- Recently aquired Vestas' converter and controls business



	Digitalization	Turbine automation	Turbine protection	Turbine management	Industrial communication	Cloud based monitoring	Auxiliaries	Energy finance
Siemens AG	✓	✓	✓	✓	✓	✓	✓	✓
KKWS	✓	✓	✓	✓	✓	✓	✓	✗

Expertise in electrical systems

KK Wind Solutions has a strong expertise in developing and producing electrical systems for wind turbines. This includes generators, converters, transformers, and control systems that help to maximize the performance and efficiency of wind turbines.

Innovative solutions

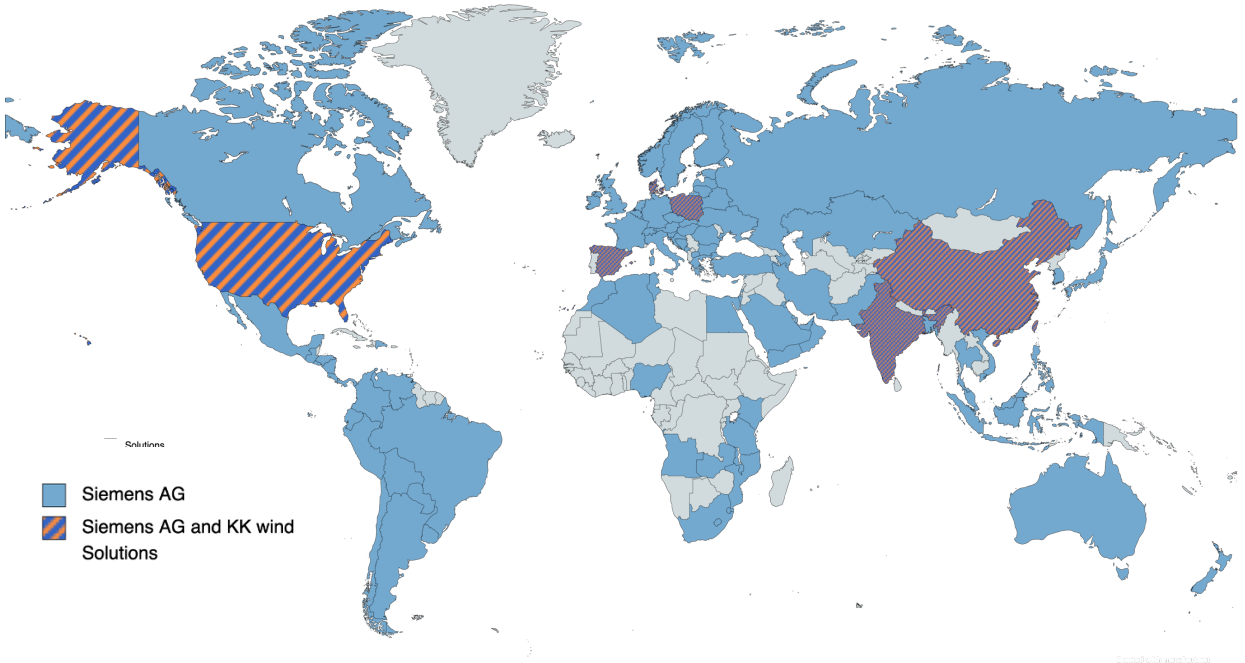
KK wind is committed to driving innovation in the renewable energy sector, and is constantly developing new solutions and technologies to improve the performance, reliability, and sustainability of wind power.

Sustainability

KK Wind Solutions is committed to sustainable development, and seeks to minimize the environmental impact of its operations.

Global presence:

A global presence makes the company attractive to the biggest players in the wind industry



Source: (KK Wind Solutions, 2023), (Siemens, 2023), Own Team Analysis

DCF Valuation – KK Wind Solutions

KK Wind Solutions´**DCF value is estimated at 698 mEUR**.

Net Profit CAGR 2016/17 - 2021: 5%
Net Profit CAGR 2021 – 2027E: 5%

Discounted Cash Flow (dDKK)	2016/17	2018	2019	2020	2021	2022E	2023E	2024E	2025E	2026E	2027E
Net Profit/Loss	124545	106516	137258	179 945	154 156	135 657	176 354	223 970	197 094	216 803	255 828
Growth rate %		-14%	29%	31%	-14%	-12%	30%	27%	-12%	10%	18%
Interests				5839	10525	6837	8888	11288	9934	10927	12894
Interest/Net Profit ratio				3.24%	6.83%	5.04%	5.04%	5.04%	5.04%	5.04%	5.04%
Amortization					7386	8863	10636	12763	15316	18379	22054
Depreciation					5546	6655	7986	9583	11500	13800	16560
Unlevered Free Cash Flow					177 613	158 013	203 865	257 605	233 843	259 909	307 336
PV FCF						141083	162520	183358	148611	147479	174391

Terminal Cash Flow, kDKK	307336
WACC	12.00%
Terminal Growth Rate	8.00%
Terminal Value, kDKK	8 298 076
PV of FCF, kDKK	957442
PV of Terminal Value, kDKK	4 204 064
Enterprise Value, kDKK	5161506
Enterprise Value, mEUR	698

There is limited information about KK Wind Solutions' specific income structure, which might be due to that the company is non-listed. Therefore, we value KK Solutions based on 5 available critical variables shown above that contribute to the future FCFs.

A higher discount rate, 12%, is applied to KK Wind Solutions than to Vestas due to the large variation of revenues from 2016/17 to 2021. Also, it is forecasted that the net profit CAGR will stay the same in the period of 2021 to 2027 due to the offsets from growth until 2024 and slowdown after 2024. Interest expenses are forecasted to grow at the constant 5% rate.

From 2020 to 2021, KK Wind Solutions has increased its development projects in progress from 67578 to 110550, which is corresponds to an increase of 73%. Therefore, we assume the amortization increases by 20 % per year.

Source: (PwC,2022), Own Team Analysis

Possible Synergies Overview

KK Wind Solutions & Siemens.

Type of Synergy	Benefit	Reasoning	Duration
Extended Service Offerings	• Wider range of service offerings • Better quality in the services they offer	KK Wind Solutions and Siemens could leverage each other's strong service offerings o expand and improve the quality of their services	> 5 yrs
Short-term Tech Synergies	• Post-merger integration is more likely to be succesful	They both use Outlook as e-mail provider and Amazon as e-mail delivery. Therefore, it will be a smoother transition for the employees	1-2 yrs
Long-term Tech Synergies	• Digitalisation • Optimization • Consolidation • Streamlining	KK Wind Solutions is an engineer-heavy company that gives possibilities through innovation in their systems that Siemens can copy, consolidate, streamline, and implement for themself.	> 5 yrs
Research & Development Synergies	• Increase in innovation • Broad range of knowledge and expertise	Given that Siemens and KK Wind Solutions both invest significantly in research and development, they could combine their expertise and become the frontrunners for innovation in the wind industry	1-3 yrs
Supply Chain Synergies	• Optimized supply chain management • Reduce cost in supply chain	Siemens operates in the countries that KK Wind Solutions operates in, which presents an opportunity to reduce costs and optimize supply chain management	> 5 yrs
NWC Synergies	• Reduced net working capital • Increased Free Cash Flow	KK Wind Solutions can synthesize its operations with Siemens and reduce the need for net working capital to keep its operations.	> 5 yrs
Capex Synergies	• Reduced Capex • Increased Free Cash Flow	KK Wind Solutions can benefit from Siemens' investments that were historically overlapped in the short-term.	1-2 yrs

Source: Own Team Analysis

DCF with Synergies Valuation – KK Wind Solutions

KK Wind Solutions´**DCF with synergies value is estimated at 1061 mEUR**.

Net Profit CAGR 2016/17 - 2021: 5%
Net Profit CAGR 2021 - 2027E: 9%

Discounted Cash Flow (kDKK)	2016/17	2018	2019	2020	2021	2022E	2023E	2024E	2025E	2026E	2027E
Net Profit/Loss	124545	106516	137258	179 945	154 156	143 365	187 808	242 273	218 045	248 572	303 258
Growth rate %		-14%	29%	31%	-14%	-7%	31%	29%	-10%	14%	22%
Interests				5839	10525	7226	9466	12211	10989	12528	15284
Interest/Net Profit ratio				3.24%	6.83%	5.04%	5.04%	5.04%	5.04%	5.04%	5.04%
Amortization					7386	8863	10636	12763	15316	18379	22054
Depreciation					5546	6101	6711	9583	11500	13800	16560
Net Working Capital (Reduction)						-2900	1824	3165	2950	2898	2800
CAPEX (Reduction)						4199	3876	0	0	0	0
Unlevered Free Cash Flow					177 613	166 853	220 320	279 995	258 801	296 177	359 956
PV FCF						149644	177217	201988	167443	171861	208870

Terminal Cash Flow, kDKK	359956
WACC	11.50%
Terminal Growth Rate	8.50%
Terminal Value, kDKK	13 018 425
PV of FCF, kDKK	1077022
PV of Terminal Value, kDKK	6 774 999
Enterprise Value, kDKK	7852021
Enterprise Value, mEUR	1061

With all the revenue increase and cost savings synergies and a mediocre scenario assumed, KK Wind Solutions' net profit CAGR is forecasted to increase from 5% to 9%.

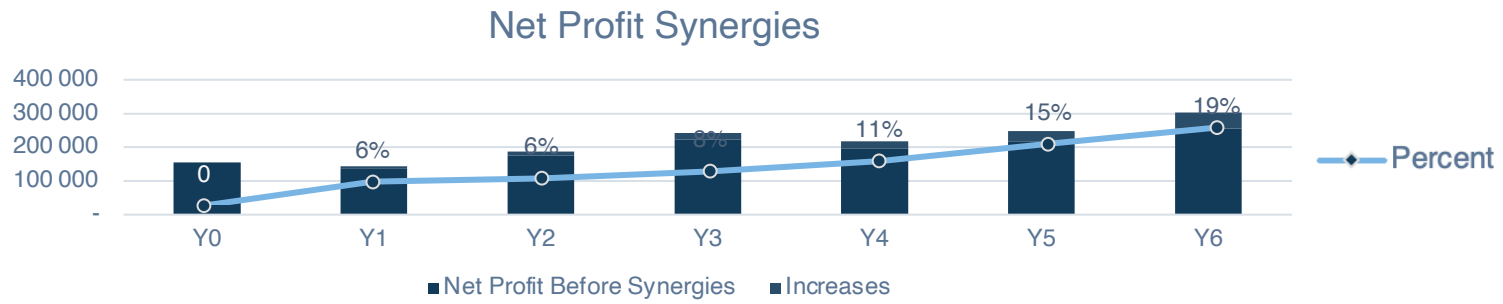
Capex synergies has also a positive effect on the FCFs because KK Wind Solutions and Siemens are very likely to share investments and save capital expenditures for KK, especially in the short-term.

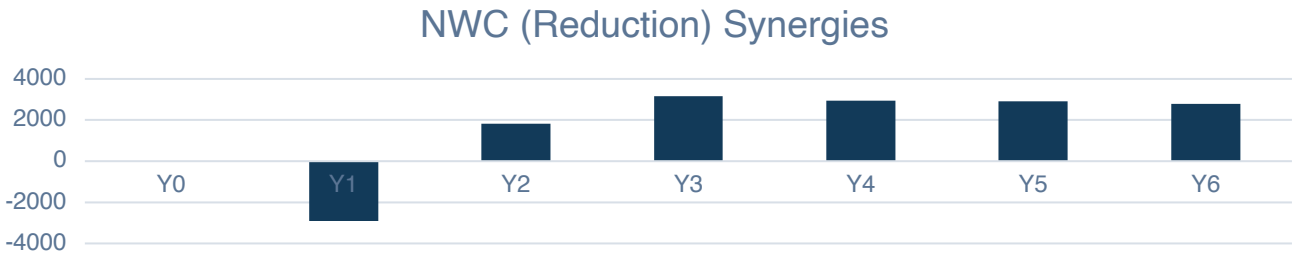
Net Working Capital may increase in the first year due to the increased operating capital needed for integration. However, after first year when the integration of the two companies is mature, it is projected that KK Wind Solutions will benefit from the reduced net working capital needed for operations.

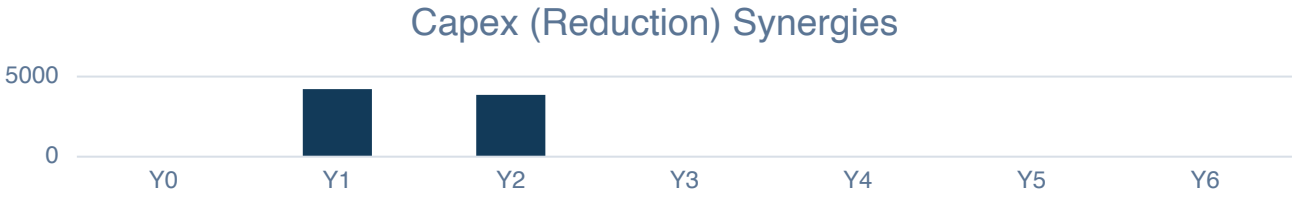
Source: Own Team Analysis

Quantified synergies

Overview of **how** synergies would affect **net profit, NWC and Capex** for KK Wind Solutions **if an acquisition takes place**, numbers in kDKK







Net Profit Synergies

- The revenue synergies will have a steadily growing positive impact in the FCF in the near future. However,
- it will take time before KK Wind Solutions is fully integrated into Siemens' operations. Hence, it is assumed that it will take time before revenue growth fully matures.

NPV: 10 mEUR

NWC Synergies

- The net working capital synergies will reduce the FCF in the first year by a reasonable amount.
- However, in the coming years after integration, it will have a stable positive impact on the FCF.

NPV: 0.75 mEUR

Capex Synergies

- The capex synergies are expected to have positive FCF in the first two coming years due to possible shared investments.
- In the long term, the Capex will stay the same and has no significant effect on FCFs.

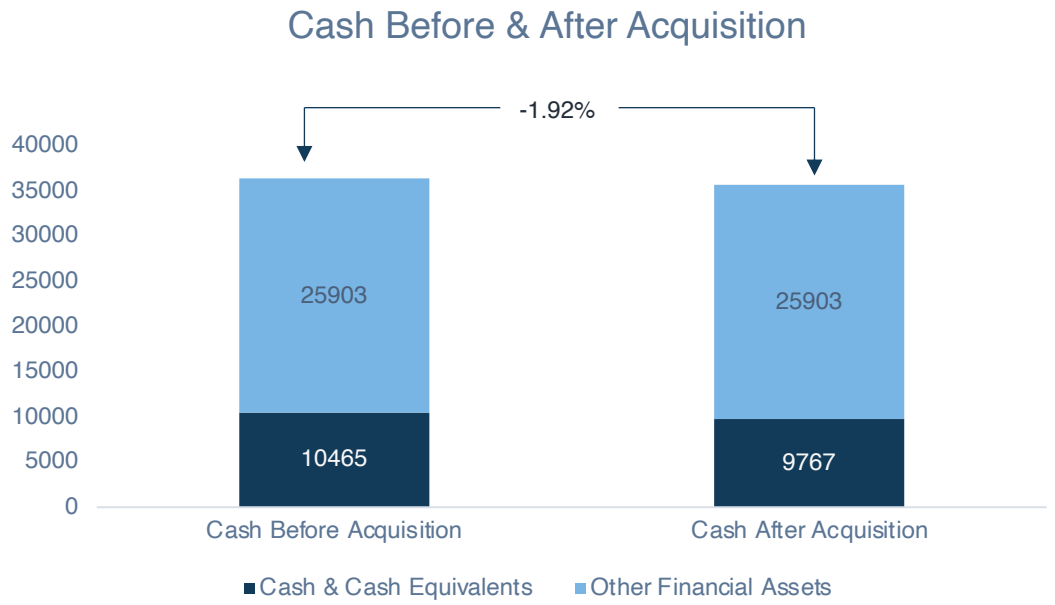
NPV: 0.83 mEUR

Sum NPV: 11.58 mEUR

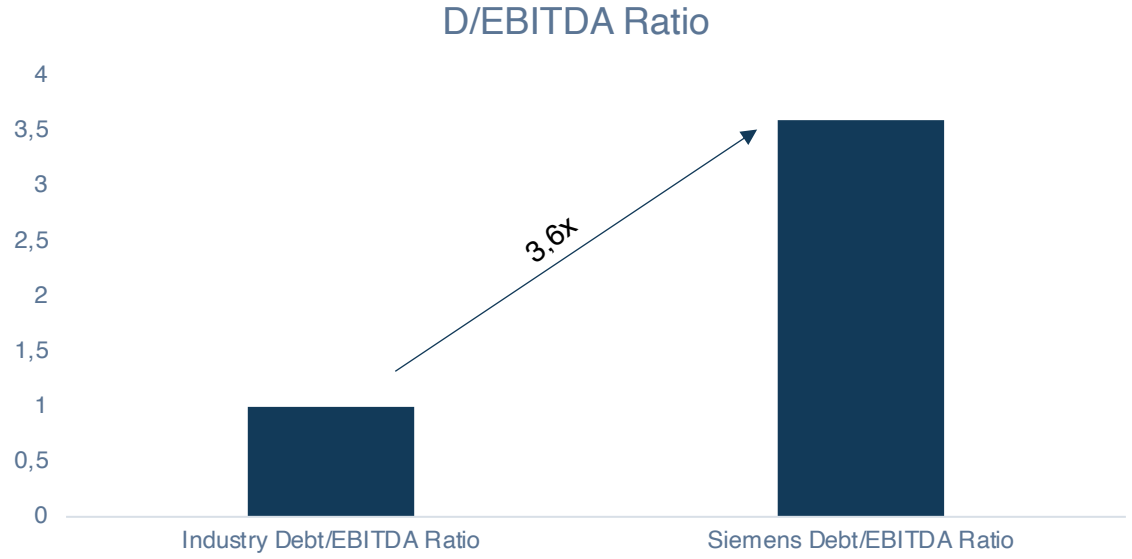
Source: Own Team Analysis

Leveraging Siemens' Cash and Assets

- In 2022, Siemens reportedly had 10 465 mEUR in cash and cash equivalence, and 25 903 mEUR in other financial assets. Therefore, ***Siemens' total cash is 36 359 mEUR***
- Given that ***KK Wind Solutions' enterprise value is 698 mEUR,*** Siemens is more than capable of acquiring 100% of KK Wind Solutions with cash
- This is beneficial since Siemens has a relatively high Debt/EBITDA ratio compared to the industry's Debt/EBITDA ratio. Therefore, debt financing would not be an ideal solution for Siemens.
- Expected IRR of the acquisition is 22%



Source: Own Team Analysis



Sensitivity Analysis of IRR

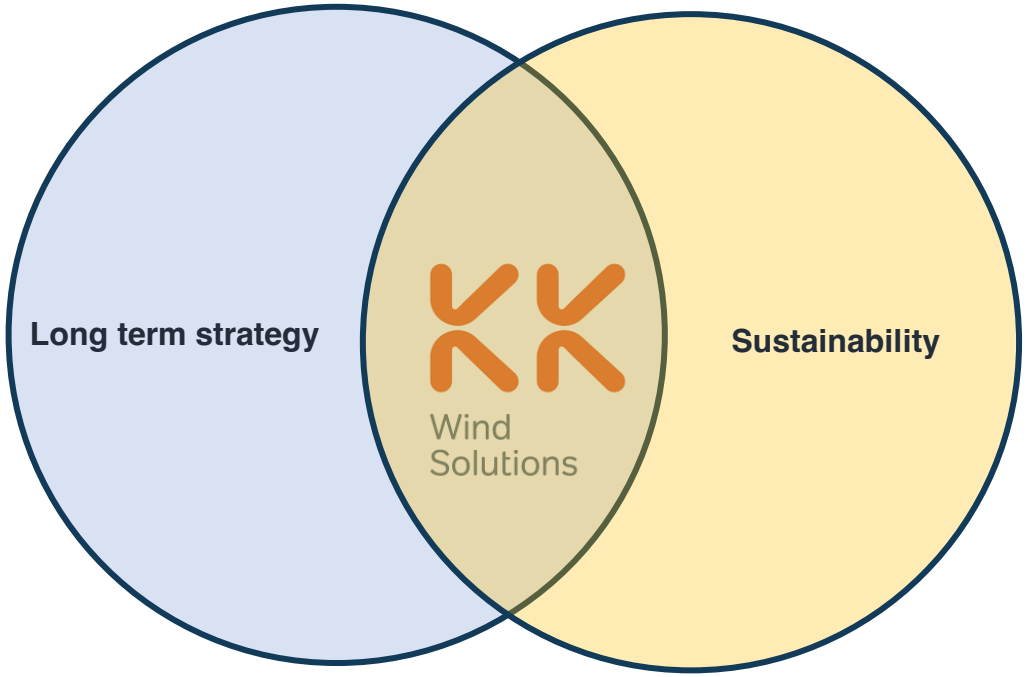
Terminal Growth Rate

WACC	5 %	6 %	7 %	8 %	9 %
10 %	26 %	19 %	11 %	0 %	-15 %
11 %	34 %	28 %	21 %	12 %	1 %
12 %	42 %	36 %	30 %	22 %	14 %
13 %	49 %	44 %	38 %	31 %	24 %
14 %	56 %	51 %	46 %	40 %	33 %

CONCLUSION

Conclusion

- Siemens AG's long-term strategy is to exit wind turbine manufacturing and focus on delivering monitoring and digitalization services to the wind energy market. Therefore, we do not recommend acquiring Vestas.
- However, the recent sale of Vestas' controllers and converter business to KK Wind Solutions would be of interest and aligned with the long-term strategy.
- It would also complement Siemens AG's need for a more sustainable business portfolio.
- KK Wind solutions has synergies both in their service portfolio, as well as their global geographical presence in key locations.
- Financially KK Wind Solutions are more feasible to acquire than Vestas.
- The wind industry has become a victim of its own success in the continued decline in LCOE, cost reduction is a challenge for both Siemens and Vestas.
- Price sensitivity in the wind supply chain, also Siemens and Vestas have different price strategies



Siemens should not acquire Vestas

1. Not compliant with EU regulations

If Siemens were to acquire Vestas, it is assumed that they would have a market position higher than 50%. This is not compliant with EU's market competition regulation. Therefore, it is assumed that this acquisition would not be approved by the EU.

2. Vestas' value is too high

Vestas' enterprise value is more than double the price of Siemens' largest acquisition to date. Acquiring Vestas would take a large financial toll on Siemens.

3. Does not align with Siemens' long-term strategic goal

Siemens wants to have a stronger focus on digitalisation, an aspect that Vestas is lacking. Additionally, Siemens selling their shares in Siemens Gamesa – Vestas' largest competitor, could indicate that Siemens does not want to stay in this market any longer.

An alternative investment for Siemens is KK Wind Solutions

1. Compliant with EU regulations

Siemens and KK Wind Power Solutions would not be greater than 50%. Therefore, it would be compliant with EU's TFEU 102 regulation.

2. KK Wind Solution's value is within Siemens' price range

Siemens has the financial capacity to acquire 100% of KK Wind Solution by cash, and would not have to resort to debt financing

3. Aligns with Siemens' long-term strategic goal

KK Wind Solutions could help Siemens become frontrunners of digitalisation in the wind industry, which in turn can make them frontrunners in the renewable energy industry.

Bibliography (1/5)

- A Simple Model. (2022) Private Equity: Types of Due Diligence | A Simple Model. [online] Available at: https://www.asimplemodel.com/insights/private-equity-types-of-due-diligence.
- Alex. (2022). *Global Wind Report 2022*. [online]Available at: https://gwec.net/global-wind-report-2022/.
- Alex. (2022). *GWECs Global Offshore Wind Report 2022*. [online]Available at: https://gwec.net/gwecs-global-offshore-wind-report/.
- Ambitionbox. (2023) *Vestas*. [online] Available at:https://www.ambitionbox.com/reviews/vestas-reviews
- Bloomberg.(2022). Vestas ESG Solutions. Retrieved March 5, 2023, from https://www.bloomberg.com/
- CFA. (2020). CFA Institute Research Challenge hosted by CFA Society Denmark CFA Society Norway Team A-BI Norwegian Business School.[online]Available at: https://www.cfainstitute.org/-/media/documents/support/research-challenge/challenge/rc-2021-winning-report-bi-norwegian-business-school.pdf
- *China Wrestles with the Toxic Aftermath of Rare Earth Mining* (2019). [online] Available at: https://e360.yale.edu/features/china-wrestles-with-the-toxic-aftermath-of-rare-earth-mining.
- Chambers, A. (2022) *Vestas uses artificial intelligence to harness more wind energy*.[online] Available at: https://www.technologyrecord.com/Article/vestas-uses-artificial-intelligence-to-harness-more-wind-energy-129367.
- Contrive Datum Insights Pvt Ltd. (2023) *Top News: Wind Energy Market is expected to grow at a 9.4% CAGR & is Expected to cross 174.75 billion by year 2030 | Data by Contrive Datum Insights Pvt Ltd.* [online]Available at: https://www.globenewswire.com/en/news-release/2023/01/06/2584179/0/en/Top-News-Wind-Energy-Market-is-expected-to-grow-at-a-9-4-CAGR-is-Expected-to-cross-174-75-billion-by-year-2030-Data-by-Contrive-Datum-Insights-Pvt-Ltd.html.
- Crunchbase. (2023). [online]Available at: https://www.crunchbase.com/search/acquisitions/field/organizations/num_acquisitions/siemens?fbclid=IwAR3SNxB0wTfAHQYfBFvYO1HyZQsjQiVSzjR1KRla7Nfp7XH_7YLAqunmKmg
- Davidson, R. (2014) *Wind manufacturers act to defend intellectual property rights*. [online]Available at: https://www.windpowermonthly.com/article/1114292/wind-manufacturers-act-defend-intellectual-property-rights.
- Dias, P.A. *et al.* (2021) "THE ROLE OF RARE EARTH ELEMENTS IN WIND ENERGY AND ELECTRIC MOBILITY An analysis of future supply/demand...," *ResearchGate* [Preprint]. Available at: https://doi.org/10.2760/303258.
- *DNV.* (2020) "Download our Energy Transition Outlook 2022 - DNV." [online]Available at: https://www.dnv.com/energy-transition-outlook/download.html?utm_source=Google&utm_medium=Search&utm_campaign=eto22&gclid=Cj0KCQiAx6ugBhCcARIsAGNmMbj-O_esD_7kgZqk3YF9e-brf6FANjECpNc_Gh1SpetaZm7jvik304MaAnfbEALw_wcB.
- *Extraordinary General Meeting of Siemens Gamesa approves delisting.* (2023). [online] Available at: https://press.siemens-energy.com/global/en/pressrelease/extraordinary-general-meeting-siemens-gamesa-approves-delisting.
- *ENVS 202.* (2023). [online]Available at: http://homework.uoregon.edu/pub/class/es202/out202/metals.html.
- Falkenstein, S. (2021) *M&A and Tech Synergies: Recipes to Add Value*. [online] Available at: https://riveron.com/posts/ma-and-tech-synergies/.
- *Fines / Penalties - General Data Protection Regulation (GDPR)* (2021). [online] Available at: https://gdpr-info.eu/issues/fines-penalties/.
- Ford, W. (2022). *Operational challenges in the wind industry*.[online] Available at: https://www.visavi.com/articles/operational-challenges-in-the-wind-industry.
- Glassdoor. (2023) *Vestas*. [online]Available at: https://www.glassdoor.com/Reviews/Vestas-Wind-Systems-Reviews-E26454.htm

Bibliography (2/5)

- Gordon, P. (2019) *Siemens to sell majority in power and gas businesses*. [online] Available at: https://www.smart-energy.com/renewable-energy/siemens-to-sell-majority-in-power-and-gas-businesses/.
- Google Finance. (2023, March). Vestas Wind Systems A/S. Google Finance. Retrieved March 11, 2023, from https://www.google.com/finance/quote/VWS:CPH?hl=en&fbclid=IwAR3QV1AE49ENn7W1ZE6j6jfLvHcqVzhE7kuyYmnJvghQjmB9TMVwRI--4OI&window=MAX
- Google Finance. (2023). [online] Available at:https://www.google.com/finance/quote/DKK-NOK?sa=X&ved=2ahUKEwiRksK8h9b9AhViQfEDHd1ACSgQmY0JegQICBAd
- *Gear or No Gear, Not a Battle* (2023). [online]Available at: https://www.windtech-international.com/windtech-future/gear-or-no-gear-not-a-battle.
- Harroch, R. (2018). *What You Need To Know About Mergers & Acquisitions: 12 Key Considerations When Selling Your Company*. [online]Available at: https://www.forbes.com/sites/allbusiness/2018/08/27/mergers-and-acquisitions-key-considerations-when-selling-your-company/?sh=706eefa74102.
- *How one of the world's largest wind companies is using AI to capture more energy - Microsoft News Centre Europe* (2022). [online] Available at: https://news.microsoft.com/europe/features/winds-of-change-how-one-of-the-worlds-largest-wind-companies-is-using-ai-to-capture-more-energy/.
- IEA. (October 2021). Net Zero by 2050: A Roadmap for the Global Energy Sector. Retrieved March 10, 2023, from https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf
- Intralinks.(2023). 2023 EMEA M&A Report. Dealmakers Sentiment. [online]Available at:https://www3.intralinks.com/rs/414-BKN-706/images/SS%26C-Intralinks-2023-EMEA-M%26A-Dealmakers-Sentiment-Report.pdf?fbclid=IwAR2eGkFsAD8lhg3gkvTeIr80kYM05GiIIVbvzCQ1aVW2GN5g5VGlmanXkas
- Jesse. (2022). *Global Wind Turbine Industry Factsheet 2022: Top 10 Largest Wind Turbine Manufacturers*. [online]Available at: https://blog.bizvibe.com/blog/energy-and-fuels/top-10-wind-turbine-manufacturers-world.
- KK Wind Solutions A/S. (2021). Annual report 2021.[online]Available at:https://www.kkwindsolutions.com/Files//Files/CSR_Reports/Sustainability%20Report%202021.pdf
- KK Wind Solutions A/S. (2021). Sustainability report 2021.[online]Available at:https://regnskaber.cvrapi.dk/61764752/amNsb3VkczovLzAzLzIlLzE2L2YzLzY5L2IzZmYtNGM4MS1hNjljLTk3NGZjZjM3ZjliYg.pdf
- *KK Wind Solutions - Semiconductors - Overview, Competitors, and Employees.* (2023). [online]Available at: https://www.apollo.io/companies/KK-WindSolutions/54a129c469702d9b8b56d001?chart=count.
- Mackenzie, W. (2021) *Global wind turbine market: state of play*. [online]Available at: https://www.woodmac.com/news/opinion/global-wind-turbine-market-state-of-play/.
- MarketScreener. (2022) *Stock Market Quotes and News: Equities, Indexes, Commodities, Forex on MarketScreener.com*. [online]Available at: https://www.marketscreener.com/?fbclid=IwAR1bkdL_liu24hQSe6SXjbXNmhHv60oV2puwQwDsyFZQSp5LzHOC9S_D1gk.
- Minds.ai. (2022) *minds.ai - Augmentation without disruption.* [online]Available at: https://minds.ai/.
- *Moody's downgrades Vestas to Baa2, changes outlook to stable from negative* (2023). [online]Available at: https://www.moodys.com/research/Moodys-downgrades-Vestas-to-Baa2-changes-outlook-to-stable-from--PR_473921.
- *Net Zero by 2050 – Analysis - IEA* (2021). Available at: https://www.iea.org/reports/net-zero-by-2050.

Bibliography (3/5)

- Official Journal of the European Union.(2004). COUNCIL REGULATION (EC)No 139/2004 of 20 January 2004 on the control of concentrations between undertakings (the EC Merger Regulation) (Text with EEA relevance). [online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004R0139&from=EN
- Orbis. (2023). [online] Available at:https://orbis-r1-bvdinfo-com.ezproxy.library.bi.no/version-20230116-3408-5/Orbis/1/Companies/Report
- *Our Manufacturing Sites* (2023). [online] Available at: https://www.siemens-healthineers.com/en-uk/about/factories.
- *Production.* (2023). [online] Available at: https://www.vestas.com/en/about/our-locations/production.
- *Precedence Research.* (2023) "Artificial Intelligence (AI) Market Size, Growth, Report 2022-2030." [online]Available at: https://www.precedenceresearch.com/artificial-intelligence-market.
- Power Technology. (2021). Hackers leak personal information of Vestas staff. [online] Available at: https://www.power-technology.com/news/company-news/vestas-hack-leaked-information-hackers/
- PWC.(2022). Germany - Corporate - Income determination. [online] Available at: https://taxsummaries.pwc.com/germany/corporate/income-determination?fbclid=IwAR2DqIvRtmyM9kL4G7NSJ5y21hzd8z8QuyETbSsX36zpTgoAwoMgimf7cZ0
- Reuters. (2021) *Hackers make some Vestas' data public after ransomware attack*. [online]Available at: https://www.reuters.com/business/energy/hackers-make-some-vestas-data-public-after-ransomware-attack-2021-12-09/.
- Reuters. (2023) *Siemens investors push for simpler group structure to unlock value*. [online] Available at: https://www.reuters.com/markets/europe/siemens-investors-push-simpler-group-structure-unlock-value-2023-02-09/.
- Siemens AG. (2020). Annual report 2020. [online] Available at: https://assets.new.siemens.com/siemens/assets/api/uuid:42d56a66-890b-4fd4-8e05-efd819e77c69/siemens-sag2020-E.pdf
- Siemens AG. (2021). Annual report 2021. [online] Available at: https://new.siemens.com/content/dam/internet/siemens-com/global/company/investor-relations/application-pages/report/report4you_en/assets/pdfs/Siemens_Report_FY2021.pdf?ste_sid=00000000000042e39d64b716ff032717827f
- Siemens AG. (2022). Annual report 2022. [online] Available at: https://www.siemens.com/applications/b09c49eb-3a14-73b3-9f71-e30e3c2dfdbd/s3_assets/pdfs/en/Siemens_Report_FY2022.pdf?ste_sid=00000000000042e39d64b716ff032717827f
- Siemens AG. (2020). Sustainability report 2020. [online] Available at:https://assets.new.siemens.com/siemens/assets/api/uuid:d3a32709-674e-4d3f-92a3-8261402fb27d/Siemens-AG-NB-EN.pdf
- Siemens AG. (2021). Sustainability report 2021. [online] Available at: https://assets.new.siemens.com/siemens/assets/api/uuid:4806da09-01c7-40b1-af91-99af4b726653/sustainability2021-en.pdf
- Siemens AG. (2022). Sustainability report 2022. [online] Available at: https://assets.new.siemens.com/siemens/assets/api/uuid:c1088e4f-4d7f-4fa5-8e8e-33398ecf5361/sustainability-report-fy2022.pdf
- *Siemens - Machinery - Overview, Competitors, and Employees* (2023). [online] Available at: https://www.apollo.io/companies/Siemens/5f818b1439273d00bef0a981?chart=count.
- Simley, E. *et al.* (2021) "Wake Steering Wind Farm Control With Preview Wind Direction Information," *Advances in Computing and Communications* [Preprint]. Available at: https://doi.org/10.23919/acc50511.2021.9483008.

Bibliography (4/5)

- *Statista.* (2023) “Topic: Global wind energy,” 9 February. [online]Available at: https://www.statista.com/topics/4564/global-wind-energy/#editorsPicks.
- Statista (2023) *Vestas’ revenue FY 2014-2022, by segment*. [online]Available at: https://www.statista.com/statistics/513992/global-revenue-of-vestas-by-sales/.
- SiemensGamesa. (2021). Annual Report 2021. [online]Available at: https://www.siemensgamesa.com/en-int/-/media/siemensgamesa/downloads/en/investors-and-shareholders/annual-reports/2021/siemens-gamesa-renewable-energy-annual-report-2021-en.pdf
- *Summary of Wind Power Interactions with Wildlife - Renewable Energy Wildlife Institute* (2023). [online] Available at: https://rewi.org/resources/summary-of-wind-power-interactions-with-wildlife/.
- Technician, M. (2023) *Vestas*. [online] Available at: https://www.indeed.com/cmp/Vestas/reviews.
- Team, I. (2022) “What Is a Good Debt-to-Equity Ratio and Why It Matters,” *Investopedia*, 3 March. [online]Available at: https://www.investopedia.com/ask/answers/040915/what-considered-good-net-debttoequity-ratio.asp.
- Thomas, M. (2022) *The Future of AI: How Artificial Intelligence Will Change the World*. [online]Available at: https://builtin.com/artificial-intelligence/artificial-intelligence-future.
- *The state of AI in 2022—and a half decade in review (2022). [online] Available at:* https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2022-and-a-half-decade-in-review#/.
- *The state of AI in 2022—and a half decade in review* (2022). [online] Available at: https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai-in-2022-and-a-half-decade-in-review#/.
- Uk, G. (2021). *The Critical Role of Magnets In Wind Turbines* -. [online] Available at: https://www.goudsmit.co.uk/the-critical-role-of-magnets-in-wind-turbines/.
- Vestas Wind Systems A/S. (2020). Annual report 2020.[online]Available at: https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/financial/2020/210210_01_Annual_Report_2020.pdf.coredownload.inline.pdf
- Vestas Wind Systems A/S. (2021). Annual report 2021.[online] Available at: https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/financial/2021/vestas-annual-report-2021.pdf.coredownload.inline.pdf
- Vestas Wind Systems A/S. (2022). Annual report 2022.[online] Available at:https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/financial/2022/Vestas%20Annual%20Report%202022.pdf.coredownload.inline.pdf
- Vestas Wind Systems A/S. (2020). Sustainability report 2020.[online] Available at:https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/financial/2020/Sustainability_Report_2020.pdf.coredownload.inline.pdf
- Vestas Wind Systems A/S. (2021). Sustainability report 2021.[online] Available at: https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/financial/2021/Sustainability_Report_2021.pdf.coredownload.inline.pdf

Bibliography (5/5)

- Vestas Wind Systems A/S. (2022). Sustainability report 2022. [online] Available at:https://www.vestas.com/content/dam/vestas-com/global/en/sustainability/reports-and-ratings/sustainability-reports/sustainability-report-2022.pdf.coredownload.inline.pdf
- Vestas (2022) *Vestas named most sustainable company in the world*. [online] Available at: https://www.vestas.com/en/media/company-news/2022/vestas-named-most-sustainable-company-in-the-world-c3488428.
- Vestas Wind Systems A/S. (2023). FULL YEAR 2022. [online] Available at: https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/financial/2022/2022%20FY%20Investor%20presentation.pdf.coredownload.inline.pdf
- Vestas Wind Systems A/S. (2021). Capital Markets Day. [online] Available at: https://www.vestas.com/content/dam/vestas-com/global/en/investor/reports-and-presentations/presentations/capital-markets-day-/Vestas_CMD_2021.pdf.coredownload.inline.pdf
- Vestas (2021) *Third update on cyber incident*. [online] Available at: https://www.vestas.com/en/media/company-news/2021/third-update-on-cyber-incident-c3466518.
- *Vestas Employment and Reviews | SimplyHired.* (2023). [online] Available at: https://www.simplyhired.com/company/Vestas.
- *Vestas secures top spot in wind turbine suppliers league* (2022). [online] Available at: https://energydigital.com/renewable-energy/vestas-secures-top-spot-in-wind-turbine-suppliers-league.
- Vestas Wind Systems A/S. (2013). Life Cycle Assessment. [online] Available at: https://www.vestas.com/content/dam/vestas-com/global/en/sustainability/environment/SiteLCA.pdf.coredownload.inline.pdf
- Vestas Wind Systems A/S. (2022). Vestas Conflicts Minerals Policy. [online] Available at: https://www.vestas.com/content/dam/vestas-com/global/en/sustainability/policies/Vestas%20Conflict%20Minerals%20Policy.pdf.coredownload.inline.pdf
- *Wind energy and the environment - U.S. Energy Information Administration (EIA)* (2022). [online] Available at: https://www.eia.gov/energyexplained/wind/wind-energy-and-the-environment.php.
- *Wind Turbine Electrical Systems - KK Wind Solutions* (2023). [online] Available at: https://www.kkwindsolutions.com/.
- *Wind Turbine Manufacturing | Vestas* (2023). [online] Available at: https://us.vestas.com/en-us/manufacturing.
- *Wind Turbine Services | Vestas* (2023). [online] Available at: https://www.vestas.com/en/services.
- Wen, E.F. (2021). *China's current power crisis could represent an opportunity for the wind industry*. [online] Available at: https://gwec.net/chinas-current-power-crisis-could-represent-an-opportunity-for-the-wind-industry/.
- Yahoo!(2023,March,8). Vestas Wind Systems A/S (VWS.CO) Stock Price, News, Quote & History. Yahoo! Finance. Retrieved March 10, 2023, from https://finance.yahoo.com/quote/VWS.CO?p=VWS.CO