

# ABO Wind | Renewables on the rise

April 5th, 2024

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## Executive Summary

- ABO Wind dates back to 1996. The two entrepreneurs, Dr. Jochen Ahn and Matthias Bockholt, founded the Wiesbaden-based company 28 years ago to promote the expansion of renewable energy. ABO Wind initially focused on the development and construction of wind farms in Germany. In the past years, the company has added three business areas to its Wind business: Solar, Battery and Green Hydrogen.
- Due to the discontinuation of Russian gas supplies to Europe, the International Energy Agency (IEA) 2022 has increased its forecast for the expansion of renewable energy by 30% or to 7,300 GW by 2028. However, if this growth trajectory is maintained, capacity would only increase 2.5-fold by the end of the decade. The COP28 climate conference calls for a tripling of the 2022 capacities to more than 11,000 GW by 2030, as otherwise net zero will not be reached by 2050.
- In 2023, the expansion of renewable energy worldwide increased by almost 50% to 510 GW, the strongest growth rate in the past two decades. Growth was particularly strong in China, but significant increases in capacity were also recorded in Europe in 2023, driven by the Ukraine conflict, as well as in the USA and Brazil. However, these countries could not keep pace with the growth rates in China. The Chinese renewable capacities are likely to double by 2028 compared to five years ago.
- Due to its long-standing expertise, ABO Wind is one of the market leaders in the development and construction of renewable energy projects. Since its foundation in the mid-nineties, the company has built almost 900 of them, with a total of 5.3 GW in references. In addition to the services mentioned above, the company provides operational management and maintenance as well. Moreover, the repowering of ageing wind farms is also part of ABO Wind's business model, as is the sale of power purchase agreements. The ABO Wind pipeline is well filled with more than 23 GW of wind, solar and battery projects for the coming years. In addition, about 20 GW of green hydrogen projects are planned. The projects in the pipeline can be found in 16 countries worldwide.
- For fiscal 2023 ABO Wind recorded a total turnover of EUR 396.3 m and an EBIT of EUR 42.6 m. Overall, this resulted in a net profit of EUR 27.2 m, the best result since the foundation of the company. ABO Wind intends to double its net profit by 2027.

## Overview of Key Financial Figures (in TEUR)

	2020	2021	2022	2023
Revenue	149,155	127,109	231,658	299,865
Increase in stocks of finished goods and work in progress	20,206	60,346	76,434	96,603
<b>Total Output</b>	<b>169,361</b>	<b>187,455</b>	<b>308,092</b>	<b>396,288</b>
<b>Operating Income</b>	<b>20,705</b>	<b>20,963</b>	<b>38,238</b>	<b>41,771</b>
<b>Net Income</b>	<b>13,120</b>	<b>13,804</b>	<b>24,577</b>	<b>27,223</b>
Balance sheet total	249,262	297,060	451,264	493,945
<b>Cash flow from operating activities</b>	<b>42,473</b>	<b>-50,736</b>	<b>-13,850</b>	<b>-62,997</b>
Equity ratio	56.2 %	50.4 %	37.7 %	39.0 %

Sources: ABO Wind, Metzler Research



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## SWOT-Analysis

Strengths/Opportunities	Threats/Weaknesses
<ul style="list-style-type: none"> <li>■ Market leadership in the construction of wind parks &amp; renewable energy projects</li> <li>■ Coverage of the entire value chain from securing land &amp; development to operations management and maintenance as a service</li> <li>■ Many years of experience/expertise of more than 25 years, also globally</li> <li>■ Diversification of the business model through new core business areas such as solar, battery, and green hydrogen</li> <li>■ Ukraine conflict has further fueled demand for renewable energies, "climate change" is gaining in importance</li> </ul>	<ul style="list-style-type: none"> <li>■ The formerly strongly regulated market has become significantly more liberal → market structure in transition</li> <li>■ Approvals for new projects continue to take a long time</li> <li>■ Increased costs and the lack of state subsidies (including EEG) make projects economically unviable. The rising interest rate environment adds to that.</li> <li>■ Higher competition for grid connections with complex approval processes</li> </ul>

Source: Metzler Research

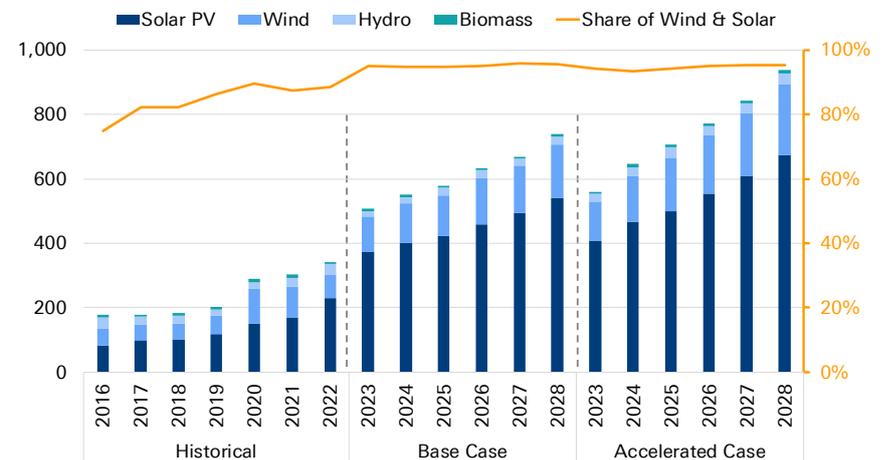
## Renewable energy - the industry in detail

In order to comply with the Paris Climate Agreement and limit the global warming to 1.5°C, renewable energy must play a significant role. The COP 28 UN Climate Change Conference in Dubai set a target of tripling renewable energy capacity by 2030. According to the IEA (International Energy Agency), under current regulatory and market conditions, renewables capacity will increase to around 7,300 GW by 2028. If this growth path were to continue at the same rate until 2030, it would represent only a 2.5-fold increase. The measures needed to achieve the tripling target still vary from country to country. In developing countries in particular, implementation would need to be accelerated. However, with the outbreak of war in Ukraine and the lack of gas supplies from Russia, the expansion of renewable energy has regained momentum.

The IEA estimates that renewables capacity additions will reach 507 GW in 2023, almost 50% more than in 2022. With ongoing policy support in more than 130 countries, the growth trend is expected to shift further significantly. Renewable energy capacity additions will continue to grow over the next five years, with solar PV and wind accounting for a record 96% of this growth, as their generation costs are lower than both fossil and non-fossil alternatives in most countries.

## Energy Transition in Action: Solar and Wind on the Rise until 2028

Renewable electricity capacity additions by technology and segment



Sources: IEA, Metzler Research

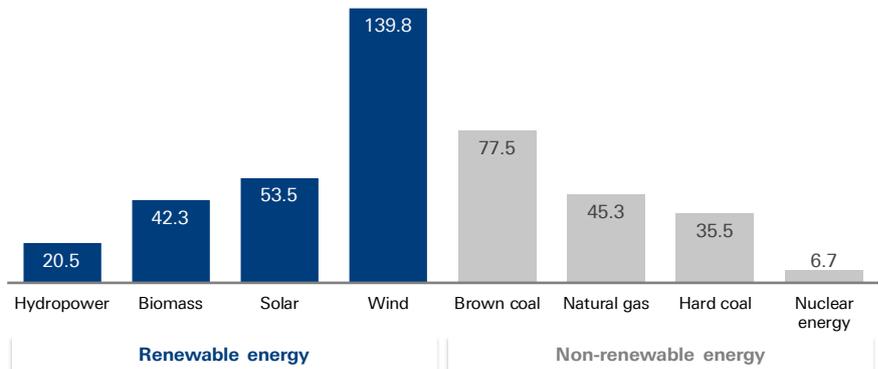
However, the deployment of renewable energy is proving to be much more difficult and time-consuming than expected. This is due to factors such as higher construction costs, higher interest rates and lengthy approval processes. In Germany, for example, it takes six years on average from the start of planning to the final commissioning of a wind farm.

By 2030, 80% of Germany's gross electricity consumption is expected to come from renewable energy sources, and by 2035 almost all of the electricity consumed shall be green. This is set out in the Renewable Energy Sources Act (EEG, in German: Erneuerbare-Energien-Gesetz), which was last updated in 2023. The US and UK are also aiming for a near carbon-neutral electricity supply by 2035.

Not only the supply of, but also the demand for renewable energy has increased in recent years, partly due to the lack of gas supplies from Russia. According to the Federal Environment Agency, more than half of the electricity generated in Germany in 2023 came from sustainable energy sources. To be precise, 51.8%. While wind was the biggest contributor with more than 140 TWh, photovoltaic systems were able to supply just over 60 TWh. The share of hydropower (19.5 TWh) was relatively small, followed by biomass (42.3 TWh). However, it should be noted that wind conditions in particular were much better in 2023 than in previous years. For solar energy, the deterioration in weather conditions was offset by an increase in installed photovoltaic capacity.

### Renewable energy sources supplied more than 50% of electricity

Net public power generation in (TWh) in 2023

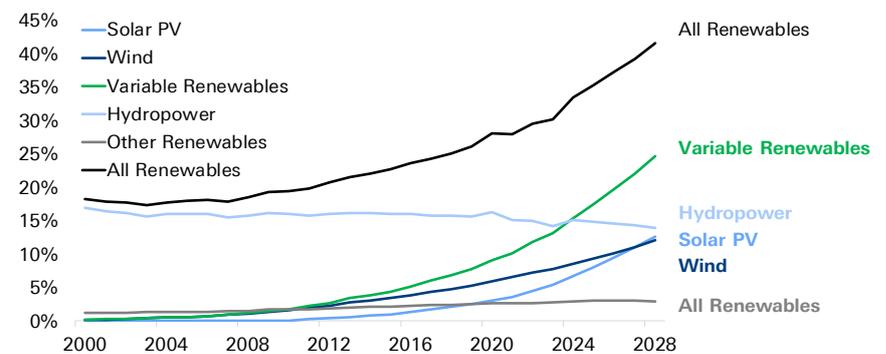


Sources: Fraunhofer, Metzler Research

When it comes to renewables, the IEA's Renewables 2023 report shows that global renewable energy capacity grew by almost 50% last year. This is the highest growth rate in the last two decades. Although record figures were reported in Europe, the US and Brazil, the increase was particularly strong in China. Globally, solar and photovoltaics especially saw significant capacity growth. These accounted for around three quarters of the additional global capacity.

### Development of energy sources in the renewable sector (2000-2028)

Share of electricity generation from renewable energy by technology in %



Sources: IEA, Metzler Research

## Wind Energy

Wind power has played an important role in the world's electricity generation for some time now and is continuously growing. In Germany, wind power is currently the dominant energy source. According to the IEA's baseline scenario, global wind capacity additions are expected to increase from 900 GW per year today to 1,715 GW by 2028. From 2025 onwards, wind power is also expected to generate more electricity than nuclear power.

### Wind energy in Germany

The German Wind Energy Association (Bundesverband WindEnergie) reports a total onshore wind capacity of 61 GW in 2023. This is expected to increase to 115

GW by 2030. A total of 28,667 onshore wind turbines have been installed in Germany to date. Looking at the numbers, there was a relatively high annual increase of more than 1,000 turbines per year until 2017. However, this trend has slowed down since 2018. In 2023, only 745 new wind turbines with a total capacity of 3.6 GW were installed. Around a third of the new turbines were installed as part of repowering projects, i.e. existing wind farms were upgraded with more modern and powerful turbines. In 2023, 423 wind turbines with an average age of 22 years are expected to be decommissioned. Most of these should be replaced by new ones through repowering projects in the coming years. In general, turbines installed in 2003 and those older than 22 years have lost their EEG eligibility. As a result, a total of 1,615 wind turbines are now in operation without being eligible for remuneration under the Renewable Energy Sources Act (EEG).

### Expansion of onshore wind: Development and targets until 2030

Installed capacity for electricity generation from onshore wind in (GW)



Sources: Umweltbundesamt, Metzler Research

In 2023, 1,382 wind turbines with a total capacity of 7,504 MW have been approved in Germany. 50% of these have received EEG remuneration. The approval period for onshore wind farms ranges from two to nine years. The number of approvals has increased significantly since last year. It rose by 73% and is the highest since 2016.

According to the EEG 2023, wind energy capacity should increase to 69 GW by the end of this year and to grow to 115 GW by 2030. Furthermore, the onshore wind energy strategy adopted by the German Federal Ministry of Economics and Technology last May foresees an increase to 160 GW by 2035.

### Remuneration for onshore wind under the EEG

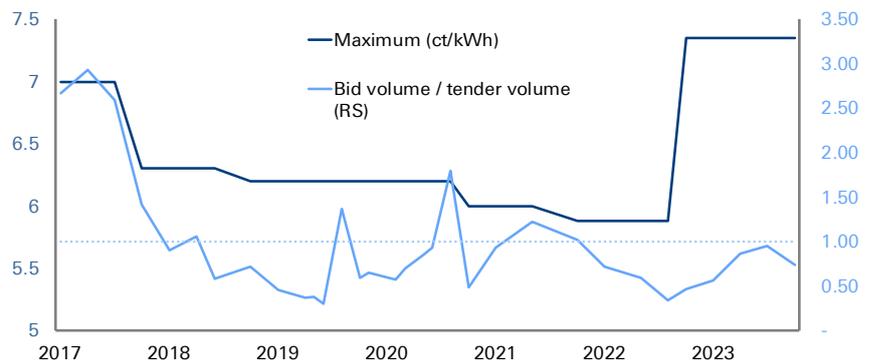
For onshore wind turbines with an installed capacity of more than 1,000 kW that have already been granted a permit under the Federal Immission Control Act (BImSchG), the operator can market its production directly at rates determined by auction. The difference between the accepted bid price and the average monthly spot market price for electricity is known as the market premium, which the wind farm operator receives. The market premium paid is based on the value of the bid (Gebotswert) in cents per kWh for a specified amount of electricity generated (Gebotsmenge) in kW.

The renewable energy auctions are organised quarterly by the Bundesnetzagentur, which sets price ceilings for the bids. All bids that meet the requirements of the EEG are awarded remunerations if the total volume tendered is not reached. If the total bid volume exceeds the tender volume, the lowest bids are awarded first. If the plant is not commissioned within 36 months of the contract being awarded, the plant loses its eligibility.

The ceiling for the 2023 onshore wind auction was 7.35 ct/kWh, which remained unchanged for the February 2024 round. Bid volumes declined in 2022, mainly due to increased construction and financing costs. This is one of the reasons for the current higher tariff.

**Turnaround in the wind market: increase in remuneration rates since 2022**

Remuneration rates by the Bundesnetzagentur for onshore wind and difference between tender volume and bid volume



Sources: Bundesnetzagentur, Metzler Research

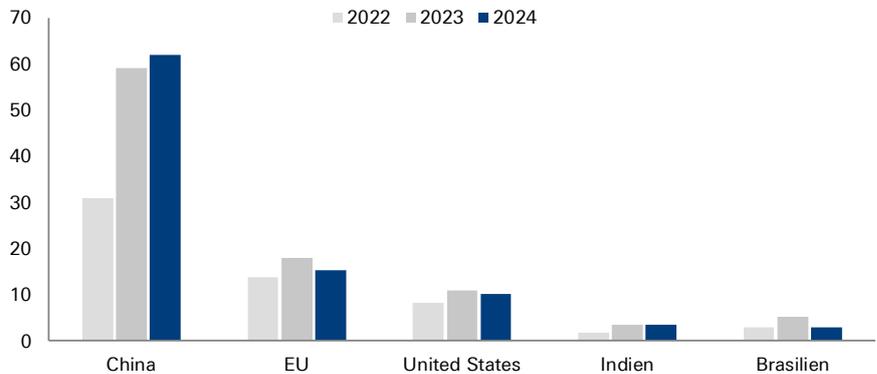
**Wind energy globally**

Worldwide, newly installed wind capacity fell to 75 GW in 2022, almost a third lower than the peak in 2020, but still higher than before 2020. After two years of decline, new onshore wind capacity is expected to increase by 70% in 2023. This is due to the commissioning of projects in China that have been delayed due to Covid-19 restrictions. According to the IEA's STEPS scenario, capacity additions will rise to 175 GW per year by the end of the decade as technology continues to improve and costs fall. By 2025, the agency expects wind power to overtake nuclear power at 1,255 GW.

China is the world leader in wind power. The country has a total capacity of 365,432 MW, followed by the US with 144,000 MW and Germany with 67,000 MW. China also leads in terms of newly installed capacity. It accounted for 60% of the global new capacity additions in 2022. China will therefore continue to play a crucial role in the future, as it is expected to account for around 40% of the cumulative global increase in wind power capacity between 2023 and 2050.

## Wind energy back on track

Additions of onshore wind energy capacities by country or region 2022-2024 (in GW)



Sources: IEA - Renewable Energy Market Update, Metzler Research

## Solar

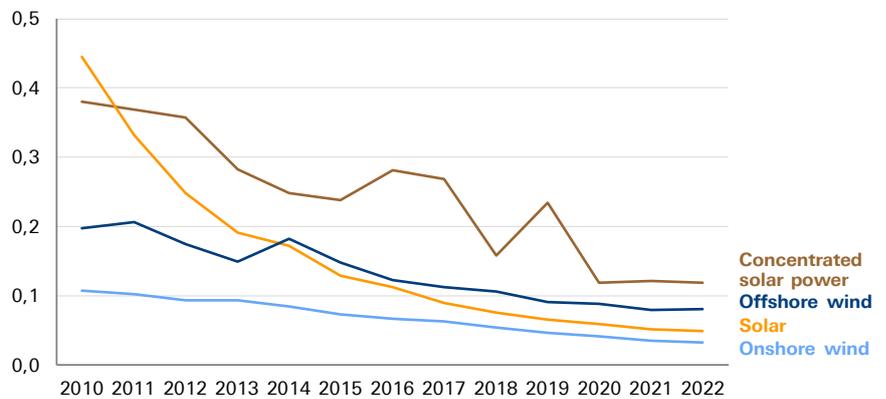
"The sun doesn't send us a bill" is one of the most commonly used phrases when it comes to solar power generation. The sun is the largest source of energy, capable of meeting more than 10,000 times the world's energy needs. So even in times of increasing energy consumption, solar energy would be able to meet demand without running out of supply. The problem is that solar power is less efficient depending on location, weather, time of day and season. It also takes up more space.

Photovoltaic systems use monocrystalline or polycrystalline solar cells. These, which are made of semiconductors, use sunlight to move electrodes that generate electricity.

In the past, the development of solar farms was slowed by high costs that threatened the economic viability of projects. However, these costs are now falling significantly and are at a similar level to onshore wind. Nevertheless, the rise in commodity prices in 2022 has had a negative impact on the price trend, although this also applies to other renewable energy sources. Overall, the fall in prices last year was still greater than the rise in the previous two years.

**Solar and wind energy have seen remarkable cost deflation**

2022; USD/kWh



Sources: IRENA, Metzler Research

According to the IEA, the construction of solar power plants will increase significantly in the coming years. By the end of 2023, photovoltaics are expected to account for three-quarters of global renewable energy additions. Overall, annual solar capacity additions will rise to nearly 540 GW by 2028.

In 2022, the growth rates of solar PV exceeded those of wind for the first time. In total, photovoltaics reached almost 1,300 TWh, an increase of 270 TWh compared to the previous year. Reasons for this significant growth include increasing political support, massive improvements in the global supply chains and the greater economic attractiveness of PV systems. The US, the EU, India, and China in particular, have increased government support for solar installations, which is likely to further accelerate expansion.

Electricity from photovoltaic systems is also incentivised by the government. As with wind energy, this is regulated by the EEG. Photovoltaic systems with a capacity of more than 1 MW must take part in renewable energy auctions organised by the Bundesnetzagentur if they want to be subsidised. These auctions determine the remuneration rate. For the auctions in March 2024, the price ceiling has been set at 7.37 ct/kWh. This applies to newly commissioned ground-mounted solar installations with a capacity of more than 1 MW. To be eligible, a PV system must also be installed on 'low quality ground'. Ground-mounted PV projects with a capacity of more than 20 MW are currently not eligible for the EEG support. They must negotiate their tariffs on energy exchanges or through power purchase agreements.

In 2023, PV systems in Germany are expected to produce 59.9 TWh of electricity, of which 53.5 TWh will be fed into the public grid and 6.4 TWh will be consumed directly. In November 2023, the installed PV capacity in the country was 80.7 GW, an increase of 13.2 GW compared to the previous year. At this year's renewable energy auctions, the highest acceptable bid for solar PV would be 7.37 cents per kWh.

## Batteries

Electricity generation from wind farms and photovoltaic systems is highly dependent on weather conditions, the time of day and season. As a result, the amount of electricity fed into the grid varies greatly and can lead to shortages and fluctuations. The need for day/night balancing could be met, for example, by electricity storage systems. For example, excess electricity generated when conditions are favourable can be stored in batteries for later use. When demand increases, electricity from the batteries is released back into the grid to prevent shortages. The first battery power plant that can absorb excess electricity from the grid was commissioned in Germany in 2014.

According to calculations by Fraunhofer ISE, large-scale battery storage systems with a capacity of 100 GW will be needed by 2030 to balance the amount of electricity in the grid and meet electricity demand. By 2045, the storage requirement is expected to rise to 180 GW. According to the study, the most suitable sites for large-scale battery installations are those of the legacy power stations that will become redundant as nuclear and coal power are phased out. These could meet up to 65% of Germany's storage needs by 2030. However, the geographical location of the plants is problematic, as much more wind power is generated in the north, where there is less storage space. In addition to the geographical issue, the extra storage needs will have to be met by new-build capacity.

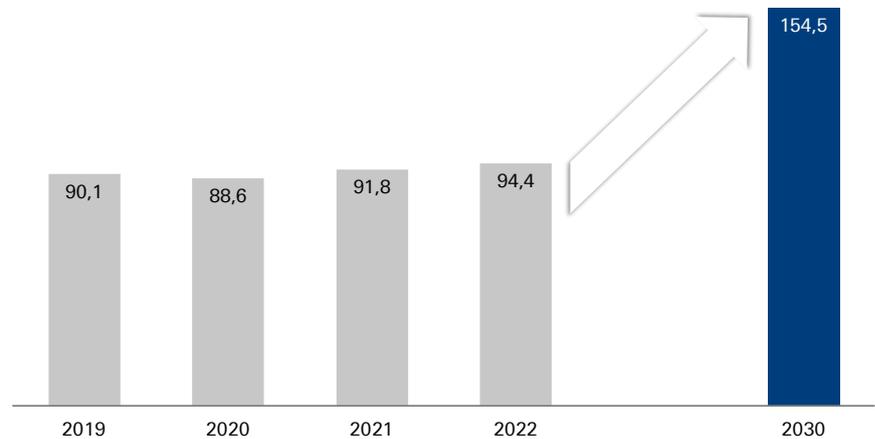
## Hydrogen

"Water is the coal of the future" - a 19th century observation by Jules Verne that is more relevant today than ever. Hydrogen is the most abundant element on Earth and the main constituent of water. When hydrogen reacts with oxygen to form water, energy is released. The most common method of producing hydrogen is electrolysis. In this process, electrical energy is used to split water ( $H_2O$ ) into hydrogen ( $H_2$ ) and oxygen ( $O_2$ ). Hydrogen produced by electrolysis of water using renewable energy sources such as wind or solar power is known as green hydrogen. This method has the potential to produce low-carbon or even carbon-free hydrogen.

It is important to note that hydrogen can also be produced by other means, such as steam reforming of natural gas or gasification of biomass. However, these involve the emission of  $CO_2$ , which is why the resulting hydrogen is referred to as 'grey' rather than 'green' hydrogen. The production of hydrogen today is mainly based on fossil fuels. According to the IEA, 70% of the energy used to produce hydrogen in 2022 is from natural gas. Currently, only 1% of the hydrogen produced has a low emissions profile. Achieving net-zero emissions will require the rapid deployment of green hydrogen. In its scenario, the IEA expects hydrogen production to increase by more than 60% by 2030, with more than half of the production (around 80 Mt out of 155 Mt) being green hydrogen.

## Hydrogen: expected growth by 2030

Global hydrogen production in line with the net zero scenario (in Mt)



Sources: IEA - Global Hydrogen Review 2023, Metzler Research

Last year, the German government updated its National Hydrogen Strategy. It sees green hydrogen as an important building block in achieving the goal of carbon neutrality by 2045, as renewable energy can be easily stored and transported in the form of hydrogen. In its strategy, the government plans to expand capacity to 10 GW by 2030 and to build a hydrogen network of more than 1,800 km of pipelines by 2027/2028. Across Europe this will be around 4,500 km.

Governments around the world are stepping up their efforts to promote hydrogen technologies. Last year, the EU Clean Hydrogen Partnership announced a EUR 195 m package to support renewable hydrogen production, storage and transport projects. In the US, the Department of Energy has launched a USD 750 m R&D programme for clean hydrogen technologies.

## Regulation in Germany

Several legislative changes have been made in recent years to encourage the expansion of renewable energy in Germany. The most notable of these are the Onshore Wind Energy Act (Wind-an-Land) and the Wind Energy Area Requirements Act (Windenergieflächenbedarfsgesetz). The Renewable Energy Sources Act (EEG), first introduced in 2000, has also been updated.

The aim of the EEG is to promote renewable energy to make the electricity supply sustainable and climate-neutral in the long term. The Act aims to ensure that 80% of gross electricity consumption is generated from renewable sources by 2030. In addition, producers are guaranteed a fixed remuneration, usually for 20 years, which is determined by auctions organised by the Bundesnetzagentur. The Act also regulates that preference must be given to electricity from renewable sources over electricity from conventional ones.

The Onshore Wind Energy Act, which came into force in 2023, sets targets for the federal states in terms of the area of land to be made available for the expansion of wind energy. To date, only 0.8% of land has been designated for onshore wind farms, but only 0.5% is actually available. By the end of 2032, the law stipulates that 2% of the federal territory should be designated for wind energy, with an interim target of 1.4% by 2027.

The Federal Nature Conservation Act has also been amended to shorten approval procedures. Species protection assessments are now carried out according to uniform national standards.

The quarterly EEG auctions saw a significant price adjustment last year. Besides the rise in electricity prices, this was caused by the fact that new plants were loss-making at the low subsidy rates. The reason for this were higher construction costs and the increased interest rate environment.

## ABO Wind's company strategy

The roots of ABO Wind AG go back to 1996. The Wiesbaden-based company was founded by Dr Jochen Ahn and Matthias Bockholt under the name Ahn & Bockholt Planungsgesellschaft zur Nutzung der Windkraft & anderer regenerativer Energien. The company was renamed ABO Wind in 2000 with the aim of supporting the energy transition and mitigating climate change.

The company initially focused on the construction of wind farms, but the business model has diversified over the years to include other renewable energy projects.

### ABO Wind: Diversified business model for renewable energy

ABO Wind			
Wind	Solar	Battery	Hydrogen
<ul style="list-style-type: none"> <li>■ Covering the entire value chain, incl. operation &amp; service contracts</li> <li>■ Over 800 wind turbines already realized</li> <li>■ Current pipeline: 14,500 MW</li> </ul>	<ul style="list-style-type: none"> <li>■ Second most important pillar of the business</li> <li>■ Focus on photovoltaic systems in Germany and globally (&gt;5MW)</li> <li>■ Over 1,000 MW already realized</li> <li>■ Current pipeline: over 7,500 MW</li> </ul>	<ul style="list-style-type: none"> <li>■ Integration of energy storage systems in solar and wind parks → Hybrid project</li> <li>■ Over 100 MW already installed</li> <li>■ Current Pipeline: 1,100 MW</li> </ul>	<ul style="list-style-type: none"> <li>■ Newest business unit</li> <li>■ Implementation of the first project</li> <li>■ Currently projects with more than 20 GW in the pipeline</li> </ul>

Sources: ABO Wind, Metzler Research

Due to the diversification into other renewable energy sources, the company decided last year to rename itself ABO Energy. The formal procedure is scheduled to take place in May 2024. This was approved at the Annual General Meeting in October 2023 with a majority of 87%. At the same time a change of the legal form from an AG to a KGaA is envisaged.

Besides wind farms, the company has also specialised in solar farms, hybrid energy systems, batteries and storage systems and green hydrogen over the years, as mentioned above. Solar was added to the core business in 2016, the first battery project was launched in 2020 and the first hybrid project (a combination of different technologies) in 2021. ABO Wind's activities cover the entire value chain when it comes to projects for the abovementioned energy sources.

In addition to site and impact assessments, planning and permitting, ABO Wind also facilitates financing, construction and grid connection. Operational management and post-commissioning services are also offered. The renewable projects are not intended to remain on the balance sheet of ABO Wind, thus will be sold at latest upon completion. ABO Wind designs and builds renewable plants for its own account or in partnership with energy suppliers, but never as a service. ABO Wind sometimes carries out entire project developments from start to finish, but it sometimes realizes only parts of projects or sells individual project rights or portfolios.

A special purpose vehicle (SPV) is established for the development of a project. We use a wind farm project as an example. As a first step, ABO Wind performs the development work for the respective project. The costs incurred are

recognized on the balance sheet as work-in-progress by the parent company. The development and construction services represent equity at the SPV after the successful completion. As soon as the wind farm project is ready for construction - in Germany this would be the case when the BImSchG authorisation has been secured - ABO Wind invoices the SPV. In this context, ABO Wind also recognises revenue and reduces work-in-progress. At the same time, the item receivables from affiliated companies increases.

ABO Wind can provide the SPV with a shareholder loan to accelerate the ordering of the turbines and the subsequent construction of the wind farm. As soon as the project is ready for construction, project financing can also be obtained from external banks. If ABO Wind conducts the subsequent construction, these services will be invoiced in stages. However, revenue is not recognized until the project's completion. The construction work is, as above, reflected in work-in-progress. The actual flow of liquidity to ABO Wind only takes place when the wind farm is disposed. However, partial payments can be made beforehand, financed by the external loan from a bank.

Project stages	Impact on ABO Wind
<p><b>Project start</b></p> <p>ABO Wind provides 'Planning and development activities' to the SPV.</p>	<p>The development costs incurred are capitalised as work-in-progress. This is not yet recognised as revenue, but increases the total output.</p>
<p><b>Project ready for construction</b></p> <p>ABO Wind provides an 'Invoice for the planning &amp; development services provided' to the SPV.</p>	<p>The work-in-progress is reversed at the same time as revenue is recognised. The amount due from the SPV is recorded as receivables from related parties.</p>
<p><b>Construction of the wind farm</b></p> <p>ABO Wind provides an 'Invoice for the construction services' to the SPV. 'External project financing' is also provided to the SPV.</p>	<p>Construction is initially capitalised as work in progress. Sales are recognised upon completion. Thanks to external project financing, some invoices can be settled before the sale to an investor.</p>
<p><b>Sale to an investor</b></p> <p>An 'Investor' provides 'Liquidity' to ABO Wind and becomes the 'New owner' of the SPV.</p>	<p>As liquidity is transferred to ABO Wind, the receivables from affiliated companies are reversed.</p>

Sources: ABO Wind, Metzler Research

In total, ABO Wind has completed the planning and construction works for wind & solar farms as well as battery storage systems with an output of more than 2,400 MW since its foundation. In addition, projects of around 3 GW were sold before completion, i.e. with project rights. In the first half of 2023, for example, the rights for two Spanish wind farms were sold. In most cases, such a sale will lead to ABO Wind finalising the projects on behalf of the new owner.

Since 2021, ABO Wind has also offered various models for structuring an electricity supply contract, so-called Power Purchase Agreement (PPA). This is of particular interest to large customers who want to secure a long-term supply of electricity from renewables without being exposed to volatile market prices. There are various options here, including the purchase of electricity from an existing ABO Wind project that is currently under development or ABO Wind is developing a new project on the company's site. PPAs have been agreed for a total of 14 projects.

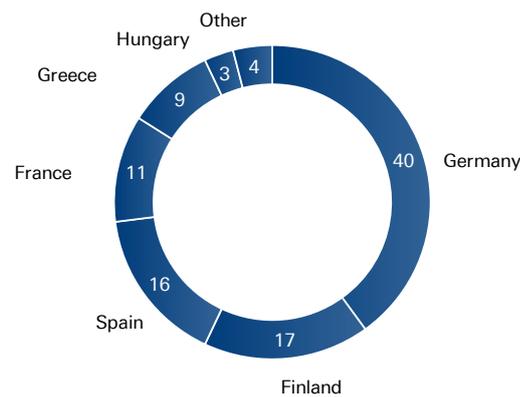
An additional business division focuses on the repowering business. This involves the modernization or the replacement of existing wind turbines in order to improve their efficiency, so a significantly higher electricity output can usually be achieved. In Germany after 20 years the federal remuneration (EEG-Förderung) expires, but can be re-awarded after repowering. However, this is not offered as a service; instead, the wind farms are purchased by ABO Wind, modernised and then sold again, potentially to the previous investor.

Initially focused on the German market, ABO Wind took its first step towards internationalisation in 2001. From 2017 on, the internationalization of the business model intensified. Nowadays, ABO Wind's projects can be found across 16 countries worldwide. The majority of sales takes place outside Germany, and this was also the case in the previous year 2023. Nevertheless, Germany remains the most important market with 40% of sales.

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### Germany is the largest contributor to ABO Wind's revenues

Sales by country, 2023, in %



Sources: ABO Wind, Metzler Research

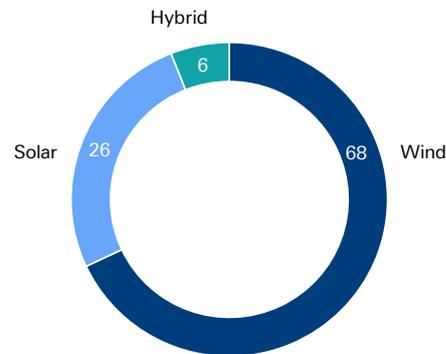
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In 2022, wind farms contributed 88% towards sales. The contribution from solar projects amounted to 10%, with only 2% attributable to hybrid projects. Last year, the earnings contribution from solar projects increased significantly. More than a quarter of sales were generated with solar projects (26%), while wind projects continued to account for the majority (68%). The share of hybrid projects also made a significantly greater contribution to revenue at 6%, a trend that ABO Wind foresees to continue in the coming years.

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### Wind energy remains vital for ABO Wind's performance

Revenues by technology, 2023



Sources: ABO Wind, Metzler Research

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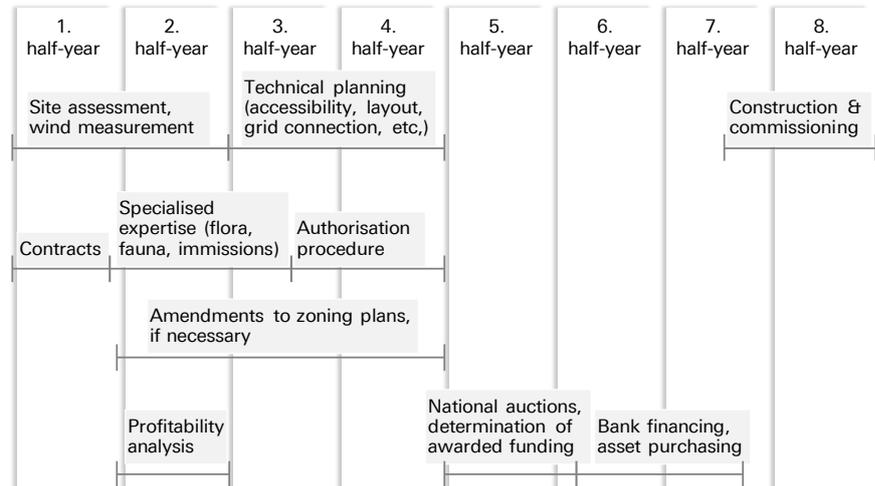
According to the company, wind is likely to remain the major sales contributor for the foreseeable future, as it currently delivers the highest margin. There are already signs of saturation in some photovoltaic markets (e.g. Spain), which is why the electricity prices achieved at peak production times are no longer profitable. In the two other, more future-oriented areas (battery and hydrogen), uncertainty is still fairly high, but ABO Wind wants to establish itself as an early mover here. However, the regulatory framework is not as advanced as for wind and solar energy. In addition, demand for battery projects is still comparatively low. ABO Wind sees both business areas as complementary. For example, the production of green hydrogen would make sense when electricity prices are too low. Or if a solar park is equipped with batteries, the project could be eligible for so called Innovationsausschreibungen aimed at improving the utilisation of the grid infrastructure as well as the stabilization of the electricity grid.

### Business Line Wind

Since its foundation, the company has installed more than 800 wind turbines with a total capacity of around 2.1 GW. More than half of these projects are located in Germany. A project typically takes four to five years to complete.

## Example of a wind farm development by ABO Wind

### Wind farm timeline



Sources: ABO Wind, Metzler Research

The turnkey construction of a wind farm including its development has been ABO Wind's primary business case in the past. Depending on the financial year, around half of the sales are generated with the planning of projects or the sale of project rights, i.e. when a project has been developed so that it is technically ready for construction by obtaining a building permit in accordance with the Federal Immission Control Act (BImSchG). And, in the case of Germany, the EEG remuneration has usually also been successfully granted. Construction is often carried out by ABO Wind after the planning stage, so that the project is only sold as a turnkey project. This is usually the case in countries such as Germany and France, while in South Africa and Argentina, for example, only project rights are sold. In addition to the aforementioned activities, ABO Wind also offers operational management and maintenance for wind turbines.

In this regard, ABO Wind currently manages 594 wind turbines with a total of 1,646 MW, spread across Germany, France, Finland, Ireland, and Poland. There are service contracts for 389 wind turbines.

Once a wind turbine reaches a certain age, the question also arises whether the turbine should be dismantled or repowered. ABO Wind is also active in this business area.

The company forecasts new business of 2 GW per year for the financial years 2022 to 2024. Wind power accounted for half of the projects with a total of 1 GW in 2022. The wind pipeline consists of 14.5 GW of projects, meaning that wind will remain the core business line in the coming years.

## Business Line Solar

ABO Wind launched the Solar division in 2016 and has already installed almost 1,000 MW of capacity since then. The pipeline of projects amounts to more than 7,000 MW. Compared to wind, the project duration of PV projects is shorter. ABO Wind also covers the entire value chain of a PV project development as well as the operational management of a solar park. Currently, 18 solar farms are managed here.

After initially planning and constructing mainly smaller photovoltaic projects up to 750 KW in Germany, the focus has now shifted to larger projects. The largest solar park to date, with 50 MW, is currently undergoing turnkey construction in Spain.

### Example of a solar farm development by ABO Wind

#### Solar park development

Project Development	Technical Planning	Financing	Purchasing	Construction	Service & Maintenance
Land acquisition	Preliminary planning	Financing	Contract negotiations	Construction management and supervision	Technical operations management
Approvals (land, grid connection)	Detailed planning and scheduling	Participation in auctions	Audits of suppliers	Quality control	Management & controlling
Preparation & Documentation		Conclusion of Power Purchase Agreements (PPA)		Construction of substations Grid connection	Maintenance

Sources: ABO Wind, Metzler Research

## Business Line Battery

At ABO Wind, electricity storage systems complement the existing solar and wind energy projects and can help to both stabilise the electricity grid as well as the supply of green energy.

In the battery storage business, ABO Wind takes on all tasks, from project planning to the installation of the storage facility. ABO Wind is focussing on two alternatives here. Firstly, a hybrid project, i.e. the combination of wind, solar and battery storage systems at one location. This allows the volatile energy output resulting from the renewable energy farm to be reduced and made more base-load capable, thus smoothing out any fluctuations. On the other hand, ABO Wind also installs stand-alone batteries that can absorb surplus electricity from the grid and release it in case of a shortfall. This optimises the utilisation of the grid infrastructure and stabilises the electricity grid.

ABO Wind has already implemented several hybrid projects and is one of the market leaders in this field. In addition, three stand-alone batteries with a total output of 44 MW, or a capacity of 55 MWh, were installed in Germany in 2023. A total of 100 MW has already been installed and more than 1,000 MW are currently under development.

## Business Line Hydrogen

ABO Wind carried out its first activities and feasibility studies for the electrolysis of hydrogen and mobility 10 years ago.

According to the company, it is currently working on various integrated projects involving photovoltaics, wind and green hydrogen. The total project volume amounts to more than 20 GW in countries such as Canada, South Africa, Argentina, and Germany. In Germany, a pilot project with 5 MW was launched in 2023. In Hünfeld-Michelsrombach, the company is planning its first wind farm, the

electricity from which will power an electrolyser, which will then enable the production of green hydrogen, which can be used at the local power plant. This green hydrogen will then provide power at the local filling station for lorries and buses. The finalisation of the project is scheduled for Q1 2025, with construction due to start in May 2024.

## Pipeline of Projects

The pipeline is divided into three different phases. In the first phase, the land for the projects has been secured and the approval process is underway. In the second phase, the approval has been obtained and the development is now being finalised. The third phase begins with the construction of the plant and ends with its completion.

There is currently more than 23,000 MW of capacity in 16 countries at various stages of development. Most of the projects are currently in phase 1. Finland has the largest geographical share of the pipeline with 5,300 MW, followed by South Africa with 5,000 MW and Germany with 3,900 MW. In South Africa, however, projects are only being developed, not built.

ABO Wind buys and sells projects in each of the three phases. The company often continues to manage the projects even after they have been sold.

### Pipeline of Projects (Wind, Solar, Battery)

#### Project-Pipeline

	Phase 1*	Phase 2**	Phase 3***	Total
Germany	3,500	200	200	3,900
France	1,400	140	60	1,600
Finland	5,110	70	120	5,300
United Kingdom	610	20	20	650
South Africa	2,500	2,500	–	5,000
Argentina	600	700	–	1,300
Spain	400	650	50	1,100
Greece	250	700	–	950
Canada	1,000	–	–	1,000
Columbia	160	500	40	700
Ireland	410	140	–	550
Poland	650	–	–	650
Hungary	100	25	75	200
Tunisia	40	10	–	50
Netherlands	100	–	–	100
Tanzania	50	–	–	50
<b>Total</b>	<b>16,880</b>	<b>5,655</b>	<b>565</b>	<b>23,100</b>

\* Land secured, approval in progress \*\* Approval obtained, construction in progress \*\*\* Implementation underway  
Sources: ABO Wind, Metzler Research

In terms of energy type, the pipeline is comprised of more than 60 % wind energy, more than 30 % solar energy and less than 10 % battery storage.

## Company Strategy 2027 & Change of Legal Form

Last year, ABO Wind presented its 2027 growth strategy. The main objective is to increase the company's total output (revenue plus the change in inventories of finished goods and work in progress) to EUR 600 m. At the same time, net profit is forecasted to reach EUR 50 m by 2027, a doubling compared to the 2022 financial year. Realised capacities are also set to increase by 100%. This would be 700 MW p.a. in development and 500 MW p.a. in construction. ABO Wind plans to expand its pipeline in all four technology fields.

Last year, the company initiated a change of legal form to a partnership limited by shares (KGaA), which is to be registered in the commercial register in May 2024. This was approved by 87% of shareholders at the Extraordinary General Meeting in October last year.

Currently, the two founding families each hold a 26% stake in the company. The founders, Dr Jochen Ahn and Matthias Bockholt, will become general partners with the change in legal form, meaning they will retain their influence over the company. This would also be the case if the family's share falls below 50% as a result of future capital increases.

ABO Wind expects the change in legal form to bring new perspectives. The capital base could be strengthened through equity increases, but due to the recent share price performance, the Executive Board declared in December that these plans would be postponed for the time being.

In November, the resolutions passed at the AGM were challenged by minority shareholders. At the end of February 2024, the Frankfurt Higher Regional Court issued a release order regarding the change of legal form, whereupon the shareholders withdrew their action for annulment. The final change of legal form is now due to take place in May.

## Company Structure

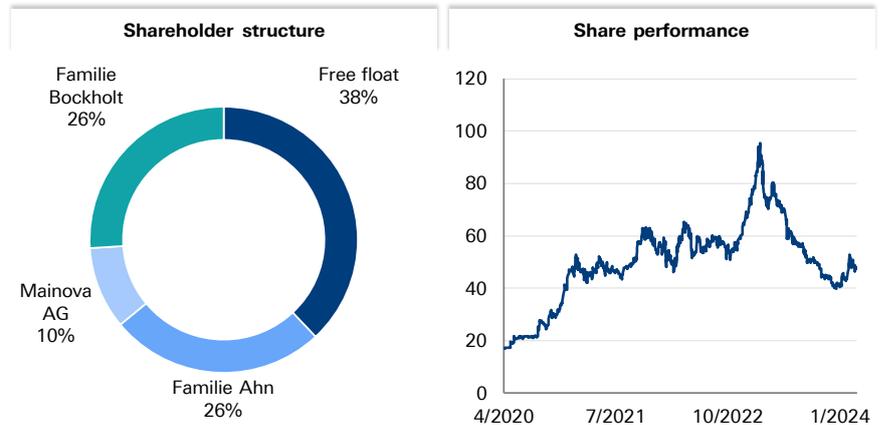
The company has various subsidiaries that are fully consolidated. For example, the Colombian subsidiary was added in 2023. ABO Wind Service GmbH was merged with ABO Wind Technik GmbH and renamed. It now operates under the name ABO Energy Services GmbH.

In total, the parent company and 16 subsidiaries are included in the consolidated financial statements of ABO Wind. Not included are those subsidiaries that are held solely for the purpose of resale and those that are not material for the presentation of a true and fair view of the assets, liabilities, financial position and profit or loss.

## The Company's Stock & Corporate Actions

ABO Wind was converted into a stock corporation in 2000. This was also the first time that external investors outside the family were brought on board. Off-market trading began in 2012, at which point equity totaled around EUR 7.2 m. The share was traded off-market until 2019 and was only included in Xetra trading in 2020 in order to improve the tradability and liquidity of the share.

### Founding families hold majority stake in ABO Wind

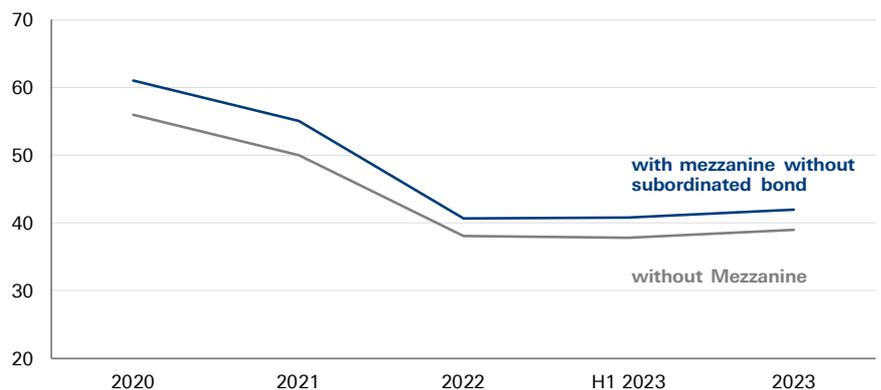


Sources: ABO Wind, Bloomberg, Metzler Research

Since 2000, there have been several capital increases to strengthen the company's balance sheet. The most recent capital increase took place in 2020, which brought the equity to EUR 9.2 m. Around 38% of the share capital is in free float, with the two owner families each holding 26%. A further 10% is held by Mainova, which became a shareholder in 2012. Previously, the municipal utility was a strategic partner of the company. The equity ratio has deteriorated in recent years due to the higher liabilities and the resulting larger balance sheet. In our calculation of the equity ratio including mezzanine capital, which we discuss below, we have not included the EUR 42m subordinated bond.

### Decline in equity ratio due to increase in liabilities

Equity ratio with and without mezzanine capital in %



Sources: ABO Wind, Metzler Research

The shareholders regularly receive a share of ABO Wind AG's profits in the form of dividends. The Executive Board proposes to distribute a dividend of EUR 0.60 per share from the FY 23 net profit. This represents an increase of EUR 0.06 compared to the previous financial year and EUR 0.11 more than in 2021. With a net profit per share of EUR 2.95, the payout ratio of 20.3% is at a similarly high level

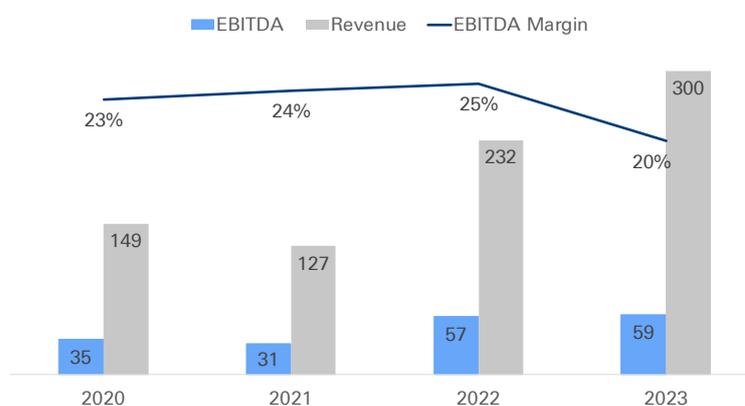
as in the previous financial year. In 2021, however, the ratio was significantly higher at 32.7%. In the long term, a payout of around a quarter to a third of profits is targeted.

## Operating Performance

ABO Wind's operating results increased steadily in recent years. Since its establishment 28 years ago, ABO Wind has never reported a loss. In 2016, the profit threshold of EUR 10 m was reached for the first time, and in 2022 the company generated a net profit of EUR 24.6 m, earning a profit above the EUR 20 m level. In 2023, profits surpassed those of 2022 with a net income increase of more than 10%.

### Momentum: rising revenues and EBITDA from 2020 to 2023

Revenues and EBITDA in EUR m, EBITDA margin in %



Sources: ABO Wind, Metzler Research

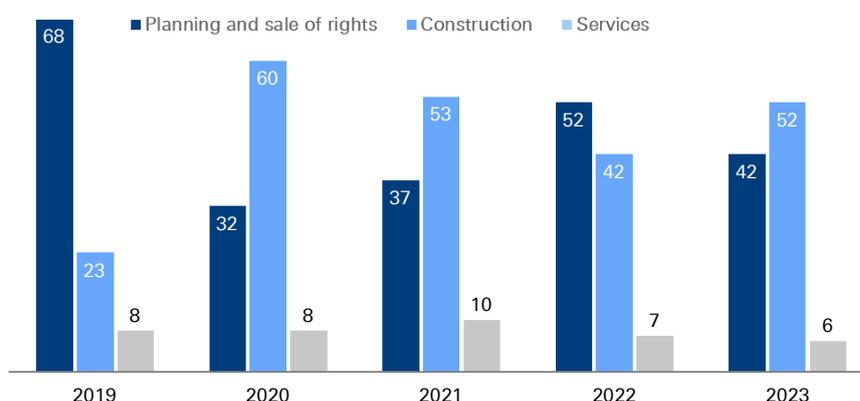
### Performance 2023

ABO Wind reports a gross performance, which is made up of revenue plus the change in inventories of finished goods and work in progress. This amounted to EUR 396.3 m in 2023, the best result in the company's history. Compared to the previous year, this is an increase of 28.6%.

Sales of EUR 299.7 m were achieved in 2023, an increase of 29%. Around 43% of revenue was generated with "Planning Services & Sales of Rights", while more than half was attributable to the building of renewable energy projects (52%). In 2023, only EUR 17.8 m or around 6% of revenue was earned from service activities. In the previous year, the main sales contribution came from "Planning Services & Sales of Rights".

## Growth in the construction

### Revenues by area of activity



Sources: ABO Wind, Metzler Research

In geographical terms, around 40% of sales were realised in Germany, which is around 5 percentage points more than in the previous year. Finland accounted for the second-largest share of sales with 17%, followed by Spain with 16%.

2023 EBITDA amounted to EUR 59.4 m, which represents an increase of 4%. The EBITDA margin fell below the 20% mark. In addition to significantly higher personnel expenses (EUR 98.2 m vs. EUR 77.7 m in the previous year), the cost of materials ratio also increased. It amounted to 53.1% in 2023, compared to 48.3% in 2022. As described above, this is due to the higher proportion of construction services, which were more expensive. This is the reason why EBITDA was only slightly higher.

Depreciation and amortisation stood at EUR 16.7 m in the 2023 financial year, of which EUR 12.4 m is attributable to specific valuation allowances. This relates to projects under development whose realisation is no longer economically viable. Most of the write-downs relate to projects in France (EUR 3.2 m) and Germany (EUR 2.7 m). Higher costs were also observed for debt. Interest expenses climbed by almost 30% to EUR 7.3 m, which is primarily due to the increase in liabilities.

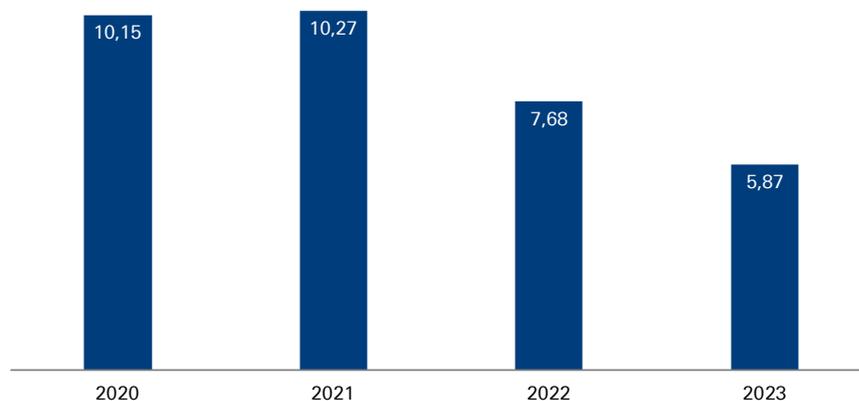
Net profit for the past financial year was a record EUR 27.2 m. This means that the result is once again above the original guidance of EUR 22 to 26 m. Net income climbed by 10.8% compared to 2022.

Operating cash flow was negative again in 2023 and totaled around EUR -63 m. This was caused by the significant increase in inventories of almost EUR 84 m and a decrease of EUR 12.7 m in trade payables. This is due to the expansion of the pipeline and a higher number of projects in the construction phase. There was also an increase in construction and personnel costs. Cash flow from operating activities had been negative in the two previous years, with the company only reporting a positive result in 2020. Due to the negative operating cash flow, the free cash flow is currently also negative.

The interest coverage ratio, measured EBIT over interest expense, was 5.9 times at the end of 2023. In previous years, this had been much higher; the decline is primarily attributable to the significant rise in financial liabilities and the interest payments associated with them. In 2022, liabilities to banks rose by almost EUR 100 m, while a further increase of EUR 20 m to EUR 157 m was observed in 2023.

### Declining interest coverage ratio

Interest and other expenses vs. EBIT



Sources: ABO Wind, Metzler Research

### Outlook

ABO Wind plans to generate at least 2 GW of new business per year in the next three years. In 2023, this level was exceeded with 3.1 GW in Europe alone, plus 1.2 GW outside Europe. For the years 2024 to 2026, ABO Wind is forecasting to complete volume of 150 to 350 MW per year from the Phase I + II Pipeline. Moreover, the completed construction output is expected to reach 250 MW p.a., particularly in Europe.

According to ABO Wind, the current financial year is progressing according to plan, but individual delays in the supply chains could result in projects not being realised this year but in the next one. Overall, ABO Wind expects total output in 2024 to be 10 to 30% higher than in the previous year. Group net profit is expected to be in the range of EUR 25 to 31 m.

### Financial Liabilities & Mezzanine Funds

Liabilities totaled EUR 241.9 m at the end of 2023. Of this amount, EUR 18.5 m relates to trade payables and EUR 5 m to liabilities to affiliated companies or companies in which an equity investment is held. The largest item refers to liabilities to banks (EUR 157 m), which also includes the promissory note.

In addition to the liabilities visible on the balance sheet, the company also has guarantee and credit lines totaling EUR 477.7 m, of which EUR 293 m had not been utilised as of December 2023.

ABO Wind was already active on the debt capital markets in 2021 and 2022. In 2021, a green subordinated corporate bond was offered, which could have been subscribed until January 2022. The total volume of the bond is EUR 42.6 m, with half of the nominal amount to be repaid in 2029. The second repayment will take place in 2030. The interest rate of the bond is 3.5% p.a. ABO Wind cited the simultaneous realisation of several larger wind and solar parks as the reason for the issuance.

A promissory note was also placed in 2022. The issued volume of the instrument amounted to EUR 70 m, while originally a volume of EUR 50 m had been planned. The note is divided into three maturity tranches with terms of three, five and seven years. The instruments are recognised in the balance sheet under

liabilities to banks. This item increased in the past financial year due to new loans. At the end of December, liabilities to banks were reported at EUR 157.4 m, a boost of EUR 20 m compared to the previous year.

The liabilities to banks are subject to covenants relating to the leverage ratio as well as the equity ratio on an adjusted basis. Accordingly, the equity ratio (adjusted) must be at least 30 %. However, it should be noted that ABO Wind's definition of equity also includes subordinated loans, profit participation rights (mezzanine funds) and shareholder loans. With regard to leverage, ABO Wind is committed to a maximum ratio of net debt to EBITDA of 3.50x. In accordance with the above definition of equity, subordinated loans are also not included in the calculation of net debt.

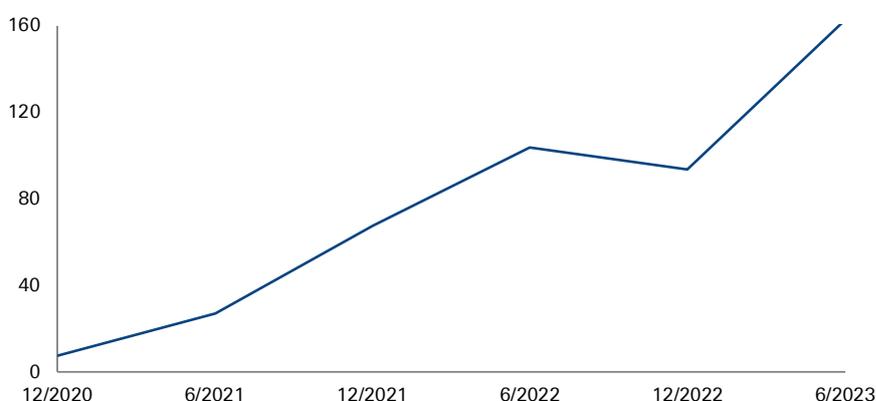
ABO Wind has also issued participation certificates totaling EUR 13.7 m, which are managed as mezzanine capital. The certificates, which generally have a term of 5 years, are issued via two subsidiaries - ABO Wind Mezzanine I and ABO Wind Mezzanine II. The total issue volumes generally range from EUR 5 to 10 m. This practice has been in place since 2009/2010 and the instruments have been renegotiated several times to date. The issue volume of ABO Wind Mezzanine I amounts to EUR 8.5 m as of December 2023, with an annual interest rate of 4.3%. In addition, there is EUR 5.2 m from ABO Wind Mezzanine II with a current interest rate of 4%. ABO Wind AG has issued a guarantee to the holders of participation certificates for the interest obligations of the two mezzanine companies. Interest is paid annually. Both mezzanine companies grant loans to the special purpose vehicles of ABO Wind.

The participation certificates of ABO Wind Mezzanine I have a maturity until 2025, at which point a new interest rate will be offered to investors, who can then decide on a prolongation.

The leverage ratio, defined as the ratio of net debt to EBITDA, was 3.5 times at the end of 2023. Compared to previous years, it was still below or close to 3 times. The reason for the increase is the stronger rise in net debt compared to EBITDA.

### Increase in net debt due to higher bank liabilities

Net debt in EUR m



Sources: ABO Wind, Metzler Research

## Management

2023 saw several changes to the Management Board, including the departure of the founder Matthias Bockholt at the end of July. The other founder, Dr Jochen Ahn, remains a member of the Management Board. His appointment expires at the end of 2024, after which he will not be available for another term. However, as shareholders of the general partner of the future ABO Energy KGaA, the two founders will continue to have significant influence. To ensure the continuity of business development beyond the departure of the two founders, the Supervisory Board initiated a comprehensive reorganisation of the Board of Directors in June 2022. In the course of this, three long-standing employees, Susanne von Mutius, Alexander Reinicke and Matthias Hollmann, took up positions on the ABO Wind Managing Board on 1 August 2022. Susanne von Mutius is responsible for project financing and sales in several core markets. The technical departments and the purchasing of wind turbines, solar modules and components will be managed by Matthias Hollmann. Alexander Reinicke is responsible for corporate finance, controlling, human resources and administration. In addition, Dr Karsten Schlageter has taken over the position of Spokesman of the Managing Board, with effect from 1 August 2023. In the run-up to the restructuring, the contract of the former CEO Andreas Höllinger was terminated by mutual agreement on 31 July 2022. The reason for this was a divergence regarding the future strategic positioning of the company. From 1 April 2024, Dr Thomas Treiling will join the Managing Board and gradually take over responsibility for the areas of business and project development in Germany and France (wind & solar), IT and energy markets and sales from Jochen Ahn. The long-standing employee has been a General Manager since 2018 and was previously responsible for the development of wind power and photovoltaic projects in Germany.

## ESG-Report & Sustainability

The company's core business focuses on the development of renewable energy projects and thus on activities that contribute to the sustainability goals of the United Nations. ABO Wind explicitly mentions the following climate goals: SDG 7 Affordable and clean energy, SDG 12 Responsible consumption and production, SDG 6 Clean water and sanitation, SDG 13 Climate action, SDG 15 Life on land, SDG 3 Good health and well-being, SDG 9 Industry, innovation, infrastructure, SDG 11 Sustainable cities and communities.

ABO Wind has also been committed to making a positive contribution to climate protection for many years, which is why it actively addresses the implementation of ESG aspects in its daily work.

Since 2016, ABO Wind has been a member of the ESG initiative ÖKOPROFIT, which is officially part of the energy efficiency and climate protection network of the German Ministry for Economic Affairs and Climate Protection. As part of the initiative, measures for corporate environmental and climate protection are developed and a carbon footprint is estimated. In this context, the company has optimised its environmentally and climate-relevant processes and driven forward the reduction of greenhouse gases. Among other things, the site in Wiesbaden has its own e-charging stations as well as a battery storage system. Employees also receive an environmental bonus if they travel to work in a sustainable way.

## Peer Comparison

We consider ABO Wind's industry peers to be the following companies:

PNE is a German wind farm developer and operator based in Cuxhaven. The company plans, builds and operates wind farm projects on land (onshore) and at sea (offshore). The constructed wind farms are generally sold on a turnkey basis, but services such as wind farm management, maintenance and service are also offered. In addition to wind energy, photovoltaics and battery storage are part of the PNE portfolio, too. As part of its strategic development, the company operates its own renewable energy plants with a nominal output of around 370 MW.

SOWITEC is another German project developer for renewable energy in the wind and solar sectors. The Sonnenbühl-based company is active in 14 countries and focuses on high-growth emerging and developing countries such as Brazil, Argentina, Colombia, Mexico etc. To date, the company has projects with around 3 GW in operation. The Danish wind turbine manufacturer Vestas holds a 25% stake in SOWITEC since 2019.

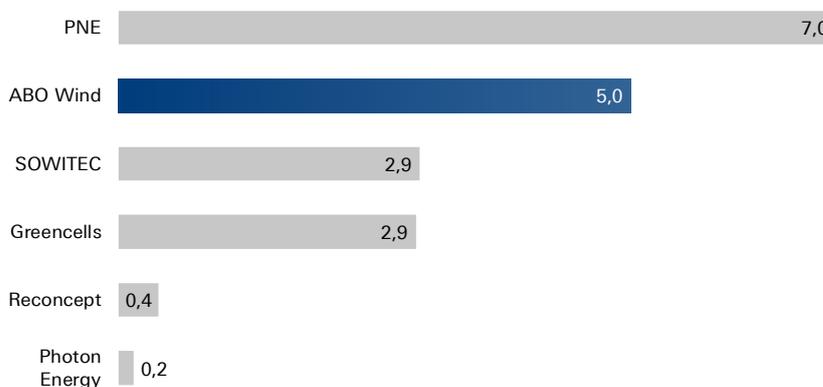
Photon Energy Group is a Netherlands-based solar energy and water treatment group that covers the entire life cycle of its technologies. The company's own power plant portfolio comprises a total capacity of 131.1 MWp. In addition, Photon Energy offers operation and maintenance services for power plants and manages a total capacity of 700 MWp worldwide in this context. The Photon Water segment provides comprehensive solutions for clean water. The company's most important markets include Poland, Australia, the Czech Republic and Romania.

Greencells GmbH, with its international subsidiaries and sister companies in the Greencells Group, is a European specialist in the realisation of solar farms. The group has an installed capacity of more than 2.9 GWp in over 25 countries. In addition to the EPC business (engineering, procurement, construction), the group also offers operation and maintenance services for existing plants.

Reconcept realises wind and solar parks in Germany, Finland and Canada. In the latter country, the company is active in generating energy from the movement of the tides. Since 1998, the company has invested in projects with a nominal output of 385 MW. In addition to project development in the field of renewable energy, Reconcept provides and manages sustainable investments. The company offers investors the opportunity to invest in project developments via green bonds.

### ABO Wind: A strong player in project development

#### Completed projects in GW



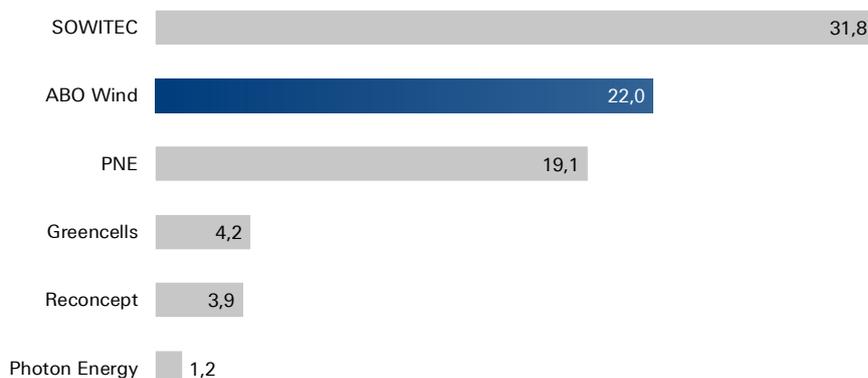
Sources: Company data, Metzler Research

We use the most recently published figures. However, 2023 data is available only for Reconcept, ABO Wind and PNE. For all other companies, only 2022 financial statements are published so far.

Compared to its competitors, ABO Wind ranks second in terms of currently developed and installed capacities as well as future projects. The leader, PNE, has realised more than 1,700 onshore wind turbines, which is almost 60% of the total installed 7 GW (the rest is offshore). In contrast, Reconcept, which has a much smaller balance sheet, has only developed 0.4 GW in the renewable energy sector with around 240 projects to date. In terms of capacity, Photon Energy's portfolio of 97 solar power plants is the smallest. Although Photon recorded the largest capacity expansion (+35.4 MW) in its history in 2023, its electricity generation capacity at the end of last year was only 127.3 MWp.

### ABO Wind: Strong project pipeline

#### Pipeline projects in GW



Sources: Company data, Metzler Research

Regarding future projects, SOWITEC has the ambitious pipeline to date. The company, which focuses on Latin America, has 8,740 MW of wind and 8,000 MW of solar projects under development in Brazil. In Argentina, where only one project has been realised to date, the company is aiming to build a further 3.5 GW, primarily with wind projects. Other countries with planned activities include Mexico and Peru. In Germany, where 31 projects with a total output of 115 MW have been finalised, the company only expects a further 70 MW.

As detailed above, ABO Wind currently has 23,100 MW of projects in the pipeline. In addition, there are 20 GW with hydrogen.

PNE's project pipeline has also grown significantly and is three times the current installed capacity. In addition, the company is planning investments totalling more than EUR 1.6 bn by 2027 and expects the project pipeline in the areas of onshore and offshore wind energy as well as photovoltaics to grow to 20 GW (2023: 19,1 GW).

Photon Energy focuses on the expansion of its own portfolio. This is driven by a growing pipeline of PV projects currently totalling EUR 1.2 bn, which are being developed internally or through acquisitions, and a network of co-developers. According to the company's forecast, the pipeline is set to increase further to 1.5 GWp in the foreseeable future.

The two largest companies in our sample, ABO Wind and PNE, are the only ones that have been able to consistently report sales in the triple-digit million and annual net profits in the double-digit million range in recent years. However, for

2023 PNE reported a loss -9,6 m. Following a significant increase in the number of completed projects in 2021, Greencells has also achieved a turnover of over EUR 100 m in the past two years. The company expects to exceed the EUR 200 m mark in 2023. Reconcept, on the other hand, has by far the lowest turnover with a single-digit million figure. Although the "pure" sales of the owner-managed company are far from those of its competitors, the company's (operating) profit is higher than its sales figures due to various disposals (sale of the solar division) or performance-related additional remuneration ("earn-outs") in recent year, resulting in other operating income.

### Key figures in comparison

in EUR m

	Revenue	EBITDA	Balance Sheet Total	Equity ratio	Net debt
ABO Wind	299.7	59.4	493.9	39%	204.7
PNE	121.0	39.9	1101.7	219%	521.1
Greencells	158.9	10.8	112.2	13%	46.1
SOWITEC	16.7	5.6	109.6	73%	27.8
Reconcept	3.4	6.5	45.0	17%	30.0
Photon Energy	95.1	24.3	253.8	28%	134.6

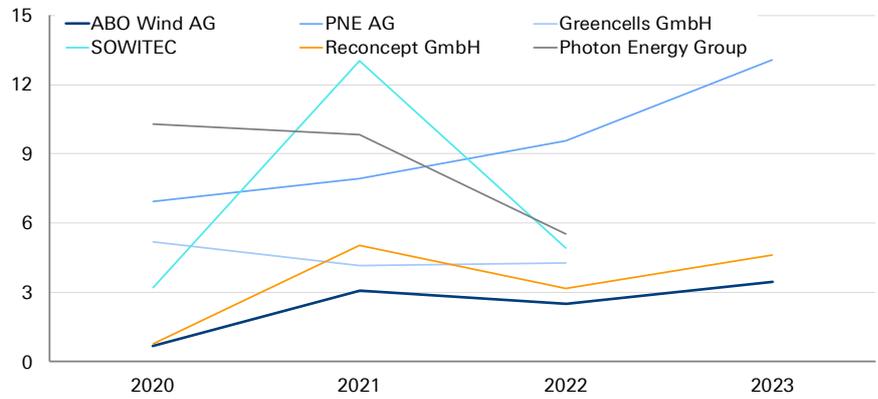
Sources: Company data, Metzler Research - ABO Wind, PNE & Reconcept figures from 2023, all other figures 2022

Another outlier in terms of operating profit, albeit on the negative side, is Greencells. The company has incurred significant costs over the past three years, resulting in a single-digit EBITDA margin. The other companies in our sample achieved an average operating margin of 25%-30% in the period 2020-2022/23. SOWITEC's figures are somewhat volatile as the company had high other operating expenses in 2021, including a write-off of a receivable/loan.

It is not surprising that the largest companies also have the highest absolute level of net debt (EUR 200 m at ABO Wind and EUR 521 m at PNE). However, due to higher revenues and higher EBITDA, the Wiesbaden-based company manages to present the lowest ratio of net debt to EBITDA, while PNE has the highest leverage of around 13x at the end of 2022.

**ABO Wind impresses with low leverage**

Net debt / EBITDA



Sources: Company data, Metzler Research

Although ABO Wind's interest coverage ratio has almost halved over the past four years, it is still more than 2.5 times higher (10x in 2022 and 8.2x in 2023) than that of the other companies, which had an average value of 2.8x at the end of 2022.

In terms of capital structure, Greencells and Reconcept have the lowest equity ratios (approx. 15%). The other companies reported ratios twice as high, with SOWITEC leading this category with 70%+.

## Appendix

### Income Statement

in k EUR	2020	2021	2022	2023
<b>Sales revenue</b>	149,155	127,109	231,658	299,685
<b>Increase in finished goods and work in progress</b>	20,206	60,346	76,434	96,603
<b>Other capitalised assets</b>	169,361	187,455	308,092	396,288
<b>Other operating income</b>	6,362	5,141	5,111	10,479
<b>Cost of materials</b>	-72,592	-78,280	-148,807	-210,278
Cost of auxiliary and operating materials and goods purchased	-2,421	-2,745	-3,954	-5,132
Cost of purchased services	-70,171	-75,535	-144,853	-205,146
<b>Personnel expenses</b>	-50,776	-63,397	-77,730	-98,187
Salaries and wages	-42,267	-52,295	-64,259	-81,432
Social security and other pension costs	-8,509	-11,102	-13,472	-16,755
<b>Depreciation</b>	-12,303	-8,031	-13,847	-16,701
of intangible fixed assets and tangible assets	-1,649	-1,929	-3,002	-4,312
of fixed current assets, where these exceed the usual depreciation in the company	-10,653	-6,102	-10,846	-12,389
<b>Other operating expenses</b>	-17,593	-20,440	-29,694	-38,965
<b>Income from equity interests</b>	43	13	1,036	1,835
<b>Other interest and similar income</b>	718	938	2,551	5,869
<b>Depreciation of financial assets and securities held as current assets</b>	-300	-255	-2,861	-1,307
<b>Interest and similar expenses</b>	-2,216	-2,182	-5,613	-7,262
<b>Result from ordinary business activities</b>	20,705	20,963	38,238	41,771
<b>Taxes on income and profit</b>	-6,919	-6,681	-13,031	-13,716
<b>Other taxes</b>	-670	-471	-631	-832
<b>Net earnings</b>	13,116	13,810	24,576	27,223
<b>Non-controlling interests</b>	4	-6	13	29
<b>Consolidated net profit</b>	13,120	13,804	24,590	27,252

Sources: ABO Wind, Metzler Research

**Balance Sheet**

in k EUR	2020	2021	2022	2023
<b>Assets</b>				
<b>Fixed assets</b>	<b>12,501</b>	<b>14,451</b>	<b>13,642</b>	<b>13,961</b>
<b>Intangible assets</b>	<b>1,116</b>	<b>1,474</b>	<b>1,574</b>	<b>1,125</b>
<b>Tangible fixed assets</b>	<b>5,653</b>	<b>7,234</b>	<b>9,043</b>	<b>10,071</b>
Land and buildings	321	321	420	420
Technical equipment and machinery	614	636	470	98
Other fixed assets, factory and office equipment	4,617	5,995	7,465	8,596
Advance payments and assets under construction	101	282	687	956
<b>Financial assets</b>	<b>5,732</b>	<b>5,743</b>	<b>3,026</b>	<b>2,765</b>
Shares in affiliated companies	375	483	512	309
Loans to affiliated companies	4,266	4,226	1,535	1,535
Investments	460	460	460	460
Loans to companies in which the company has a participating interest	631	575	518	462
<b>Current assets</b>	<b>234,903</b>	<b>279,044</b>	<b>432,992</b>	<b>475,465</b>
Inventories	<b>64,398</b>	<b>133,019</b>	<b>124,152</b>	<b>208,109</b>
Work in progress	109,639	163,879	229,102	313,533
Finished goods and goods for resale	1,398	2,512	3,397	4,424
Advance payments	6,260	11,827	17,212	40,280
Down payments received	-52,899	-45,199	-125,560	-150,128
<b>Receivables and other assets</b>	<b>108,376</b>	<b>115,869</b>	<b>212,990</b>	<b>220,674</b>
Trade accounts receivable	34,020	10,860	26,502	47,177
Receivables from affiliated companies	62,379	89,998	172,743	158,138
Receivables from companies in which the company has a participating interest		149		
Other assets	11,977	14,862	13,745	15,359
<b>Securities</b>	<b>9,331</b>	<b>11,684</b>	<b>8,775</b>	<b>9,512</b>
Shares in affiliated companies	7,080	9,139	4,000	2,700
Other investments	2,251	2,545	4,775	6,812
<b>Cash in hand and bank balances</b>	<b>52,798</b>	<b>18,472</b>	<b>87,075</b>	<b>37,170</b>
<b>Deferred income</b>	<b>469</b>	<b>699</b>	<b>1,176</b>	<b>1,995</b>
<b>Deferred taxes</b>	<b>1,389</b>	<b>2,866</b>	<b>3,453</b>	<b>2,524</b>
<b>Balance sheet total</b>	<b>249,262</b>	<b>297,060</b>	<b>451,264</b>	<b>493,945</b>
<b>Liabilities and shareholders' equity</b>				
<b>Equity capital</b>	<b>140,116</b>	<b>149,863</b>	<b>170,057</b>	<b>192,772</b>
<b>Subscribed capital</b>	<b>9,221</b>	<b>9,221</b>	<b>9,221</b>	<b>9,221</b>
<b>Consolidated capital reserve</b>	<b>45,490</b>	<b>45,490</b>	<b>45,490</b>	<b>45,490</b>
<b>Consolidated retained earnings</b>	<b>72,551</b>	<b>81,525</b>	<b>90,811</b>	<b>110,639</b>
Legal reserve	490	490	490	490
Other revenue reserves	72,061	81,035	90,321	110,149
<b>Change in equity resulting from currency translation</b>	<b>-297</b>	<b>-217</b>	<b>-90</b>	<b>149</b>
<b>Consolidated net income</b>	<b>13,120</b>	<b>13,804</b>	<b>24,590</b>	<b>27,252</b>
<b>Non-controlling interests</b>	<b>30</b>	<b>41</b>	<b>36</b>	<b>21</b>
<b>Mezzanine Capital</b>	<b>12,590</b>	<b>13,669</b>	<b>13,412</b>	<b>13,680</b>
<b>Provisions</b>	<b>19,634</b>	<b>21,355</b>	<b>36,695</b>	<b>44,090</b>
Tax provisions	5,954	3,037	8,715	11,015
Other provisions	13,680	18,318	27,980	33,075
<b>Liabilities</b>	<b>76,921</b>	<b>112,171</b>	<b>229,705</b>	<b>241,869</b>
Debenture loans	0	40,338	42,636	42,636
Bank loans and overdrafts	60,256	45,609	137,944	157,443
Trade accounts payable	7,081	14,034	19,081	18,454
Liabilities to affiliated companies	2,359	2,949	4,682	5,041
Liabilities to companies in which the company has a participating interest				
Other liabilities	7,225	9,241	25,362	18,295
<b>Accrued expenses and deferred income</b>	<b>1</b>	<b>1</b>	<b>1,394</b>	<b>1,191</b>
Deferred tax assets				343
<b>Balance sheet total</b>	<b>249,262</b>	<b>297,060</b>	<b>451,264</b>	<b>493,945</b>

Sources: ABO Wind, Metzler Research

## Cashflow-Statement

in k EUR	2020	2021	2022	2023
<b>Operating activities</b>				
Result for the period	13,120	13,810	24,576	27,223
Depreciation/reversals of fixed assets	1,649	1,929	5,692	4,512
Increase/decrease in reserves	-9,758	4,486	9,727	4,886
Other non-cash expenses/income		0	0	0
Increase/decrease in inventories	15,773	-67,428	8,770	-83,952
Increase/decrease in trade accounts receivable and other assets which are not classified as investment or financing activities	10,585	1,830	-83,266	-8,836
Increase/decrease in trade accounts payable and other liabilities which are not classified as investment or financing activities	2,054	-2,957	12,773	-12,676
Profit/loss from disposal of fixed assets	-44	-49	-142	-42
Interest expense	2,216	2,182	5,613	7,262
Interest income	-718	-938	-2,551	-5,869
Other income from investments	-43	-13	-1,036	-1,835
Income tax expenditures/receipts	6,919	6,681	13,031	13,716
Income tax payments	720	-10,269	-7,037	-7,385
<b>Cash flow from operating activities</b>	<b>42,473</b>	<b>-50,736</b>	<b>-13,850</b>	<b>-62,997</b>
<b>Investment activities</b>				
Proceeds from the disposal of property, plant and equipment items	7	151	247	431
Expenditure for investments in property, plant and equipment	-1,774	-2,941	-4,597	-4,549
Proceeds from the disposal of intangible assets		311	2	0
Expenditure for investments in intangible assets	-173	-375	-654	-809
Proceeds from the disposal of financial assets	2,256	101	57	57
Expenditure for investments in financial assets	-4,288	-113	-30	0
Proceeds from acquisition of consolidated companies and other business units			58	0
Expenditure from acquisition of consolidated companies and other business units		-1,801	57	0
Interest received	338	796	1,694	4,877
Dividends received	43	13	1,036	1,835
<b>Cashflow from Investment activities</b>	<b>-3,591</b>	<b>-3,858</b>	<b>-2,130</b>	<b>1,842</b>
<b>Financing activities</b>				
Proceeds from equity injections (capital increases, sale of treasury shares, etc.)	27,145	0	0	0
Payments to company owners and minority shareholders (dividends, acquisition of treasury shares, equity repayments, other distributions)	-3,558	-4,149	-4,518	-4,979
Proceeds from the issue of bonds and (financing) loans raised	22,000	52,420	122,309	42,108
Proceeds from the repayment of bonds and (financing) loans	-38,575	-25,655	-27,934	-22,005
Interest paid	-2,573	-2,328	-5,650	-5,059
<b>Cashflow from Financing activities</b>	<b>4,438</b>	<b>20,287</b>	<b>84,207</b>	<b>10,065</b>
<b>Net change in cash and cash equivalents</b>	<b>43,320</b>	<b>34,307</b>	<b>68,228</b>	<b>-51,090</b>
Currency, consolidated companies, and valuation-related changes in cash and cash equivalents	-170	19	375	1,185
Cash and cash equivalents at start of the period	9,648	52,798	18,472	87,075
<b>Cash and cash equivalents at the end of the period</b>	<b>52,798</b>	<b>18,472</b>	<b>87,075</b>	<b>37,170</b>

Sources: ABO Wind, Metzler Research

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