



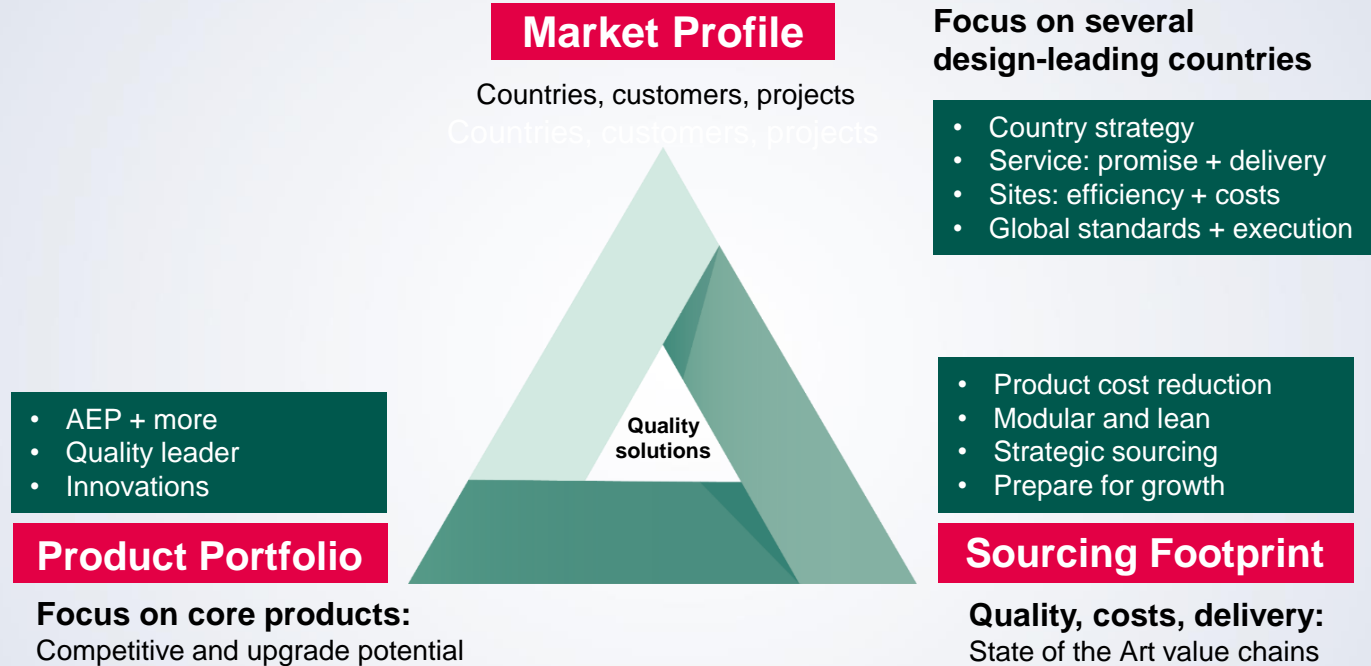
TÜREK 2023

November 2023 | Istanbul

Ulrich Schulze Südhoff – ENERCON CCO



FOCUS: GOOD BUSINESS @ENERCON



DIFFERENTIATION TO THE COMPETITION

ENERCON's differentiation



1

Focused offer - ENERCON addresses medium-sized customers in selected focus countries with a modular offer



2

Customers as a holistic partner - ENERCON meets customers at eye level and addresses their needs with holistic solutions (turbine + financing/PPA, support with permits, grid connections).



3

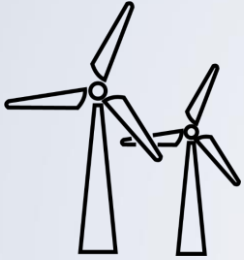
Quality - ENERCON offers outstanding product quality through direct drive and a first-class complete range of services.



4

Agility - ENERCON differentiates itself through simple and fair contracts and fast business processing, which makes business easy for the customer

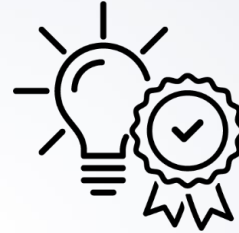
OUR AMBITION



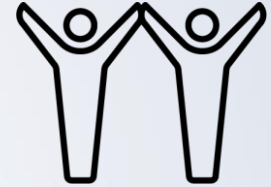
**4 - 5
GW**



**10 %
EBIT**



**Quality +
solutions**



**Winning
team**

ENERCON

FOCUS: Importance of the Turkish Market

Argumentation for the industrialisation in Türkiye and the extension of the EU Supply Chain with Türkiye

- Türkiye is one of the biggest wind market in Europe
- Türkiye is a stable and reliable supply chain hub with high qualified labour for local and international projects since 2000.
- De-risking supply chain through nearshoring to European market
- Europe needs Turkish production capacities to get relevant scale for future increasing demands
- Strategic supply chain location for future markets in Europe, Middle East and Africa

FOCUS: Importance of the Turkish Market

Required political support for the sustainable and growing supply chain in Türkiye

- Increasing and acceleration of annual installation capacities with annual installation capacity target up to 3 GW:
 - Focus on extension of existing WPP (awarding more extension capacities) to accelerate the annual caps
 - Redefinition of technical (e.g. ratio of storage size) and commercial (FiT and local content bonus) conditions for battery storage linked WPP volumes
 - Announcement of new YEKA tenders (volume, conditions, etc.)
- Declaration of Wind Energy Sector as Economic Strategic Sector with definition of new incentives to reduce the production cost (competitiveness) e.g. with attractive financing conditions for manufacturer (beside of existing TR Exim Export Credits) (equity support, interest free period, extension of existing incentives, etc.) and optimization of industry clustering program
- Optimization of Custom Union TR&EU with preferential agreement specifically for wind energy
- Redefinition of the export financing support structure - Inclusion of Turkish supply chain portion to the ECA

Enercon broader picture

- **Strong global growth for onshore wind; order intake positive, but projects only now profitable**
- **OEMs just recovering ... continued policy support needed** for faster permitting, transportation permits; European value creation has a value to be considered in market design to strengthen EU suppliers for an independent, resilient supply chain in Europe and for a level playing field compared to US and China
- **Markets are bullish. Need to build up production capacities now.** Europe develops to a ~ 30 GW market p.a. new installs, Türkiye to 3 GW. Plus Middle East, Africa etc coming. Resilient and quality supply networks to be built out now.
- **Enercon can differentiate** with Quality and Customer Solutions (including Planning, Site-Lay-Out, EPC, Financing/PPA support specifically by smaller/medium sized developers to get projects profitable and marketable, in times of higher interest rates and high land lease rates) in focused markets with strong supply chain close to the markets
- **Enercon's** focused on products (138 – 175), countries and matching supply chain footprint.
- Focus of OEMs on LCOE reduction through a stabilizing and de-risking supply chains, scaling (number of turbines, not MW), learning curve effects and standardization/modularization, not necessarily larger turbines. Innovation race led to quality issues, loss of profits due to high R&D cost, diluted scaling effects.
- **Technology focus of the market, as of the current literature***: further improvements in rotor blade aerodynamics and controls, aerodynamic brakes that will lead to increased power generation efficiency. Improvements in system maintenance and early diagnosis and predictive analytics, AI-powered blade & tower surface detection will reduce wind turbine downtime and increase system reliability and availability. The manufacture of wind turbines with larger dimensions presents problems of transportation and assembly, which are being addressed by manufacturing the blades into segments. Significant capacity is planned for the production of “green” hydrogen by electrolysis from water. First-generation wind turbines are nearing the end of their service life, so strategies are being developed to repower them, extend their life or dismantle and recycle them. Sustainability will play a major role in turbine design and development.

* Haces-Fernandez, F.;Cruz-Mendoza, M.; Li, H. Onshore Wind Farm Development: Technologies and Layouts. *Energies* **2022**, 15, 2381. <https://doi.org/10.3390/en15072381>

Enercon broader picture

- **Enercons product strategy**
- **1. Focus on selected products and markets:**
 - Reduced complexity in portfolio to stabilize supply chain and R&D team
 - One platform approach, modularization of main components (e.g. e-nacelle EP3/EP5 -> one box for all types, faster serial implementation in production, shorter time to market, cost reduction)
 - Standardization of technology (e.g. control system, yield optimized modes...)
- **2. Competitive Products**
 - Products must support positive business case for both Customer AND Enercon. If product is not competitive a phase out must be considered.
 - Standard turbine offerings with basic configurations (further options on customer demand and subject to costs, e.g. yield optimized modes, site specific configuration...)
 - Consolidated portfolio: E-138 EP3, E-160 EP5, E-175 EP5
- **3. Quality:**
 - **ENERCON is aiming to achieve previous quality levels (e.g. E82). Quality doesn't always come very fast and at lowest costs.**
 - **“ENERCON Quality” as success factor and differentiator/USP in competition**
 - How do we reach this?
 - Close collaboration of engineering with suppliers and own production so safeguard ramp-up of new products and serial implementation
 - Involving customers and project partners in planning at early stage
 - Site Assessment and designing of windfarm layout
 - Active risk management
 - Courage “to say no”

Back-Up: Supply Chain Türkiye

Building up a supply chain for onshore wind in Turkey offers various opportunities, leveraging the country's strategic geographic position, growing local market, and skilled workforce. Here are some key areas of opportunity:

1. **Component Manufacturing**: There is potential to establish manufacturing facilities for turbine components such as blades, towers, and nacelles. This can be supported by Turkey's strong background in heavy industry and manufacturing.
2. **Raw Materials Supply**: Turkey has a wealth of raw materials like steel and composites that are essential for turbine manufacturing. Developing a supply chain around these resources can reduce costs and lead times.
3. **Engineering and Design Services**: Leveraging Turkey's pool of engineers and technical experts, companies can offer design, engineering, and consultancy services for wind projects both domestically and internationally.
4. **Logistics and Transportation**: Turkey's geographical position at the crossroads of Europe and Asia makes it an ideal logistics hub. Companies can specialize in the transportation and logistics of large wind turbine components.
5. **Operation and Maintenance Services**: There is a growing market for companies that can provide operation and maintenance (O&M) services for wind farms, ensuring their efficient and reliable performance.
6. **Research and Development (R&D)**: Establishing R&D centers focusing on innovations in wind technology can help develop more efficient turbines tailored to local conditions and can serve the global market.
7. **Training and Certification**: With the growing wind sector, there's a demand for certified professionals. Establishing training and certification programs can support workforce development.
8. **Local Partnerships and Joint Ventures**: Foreign companies can enter the Turkish market through partnerships or joint ventures with local firms, benefiting from local expertise and networks.
9. **Supply Chain Digitization**: There is an opportunity to implement digital tools and platforms to optimize supply chain management, improve efficiency, and reduce costs.
10. **Recycling and Decommissioning**: As the first generation of wind turbines reach the end of their life, services for recycling and decommissioning will become increasingly important.

These opportunities, however, come with challenges such as navigating local regulations, ensuring quality standards, and developing infrastructure. A successful supply chain strategy would require a deep understanding of the local market, strategic partnerships, and a commitment to sustainability and innovation.

Back-up: Technology Development

****Advantages of Larger Turbines:****

1. ****Higher Energy Output****: Larger turbines with bigger rotors can capture more wind and thus generate more electricity, improving the energy yield of a wind farm.
2. ****Economies of Scale****: Larger turbines can mean fewer turbines are needed to produce the same amount of power, leading to savings in infrastructure, maintenance, and land use.
3. ****Lower Levelized Cost of Energy (LCOE)****: Thanks to their higher efficiency and economies of scale, larger turbines can lead to a lower cost of energy, making wind power more competitive.
4. ****Improved Viability in Low-Wind Sites****: Larger rotors and higher hub heights allow turbines to access steadier and stronger winds at higher altitudes, making previously uneconomical sites viable.

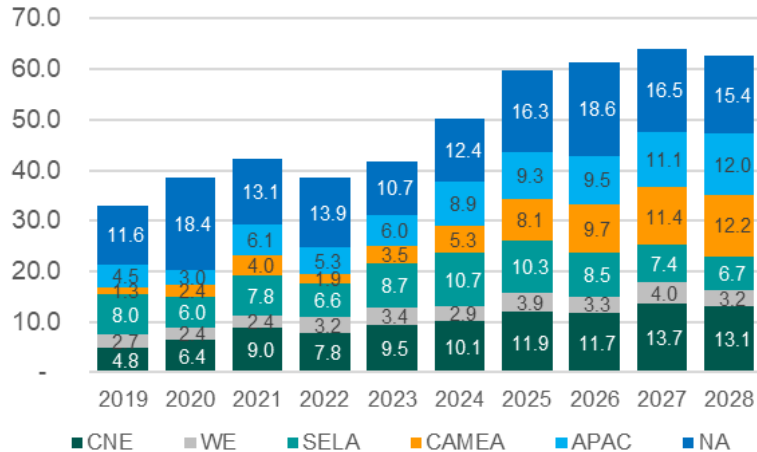
****Disadvantages of Larger Turbines:****

1. ****Logistical Challenges****: Larger components are more difficult to transport and install, especially in areas with challenging terrain or inadequate infrastructure.
2. ****Increased Loads and Stress****: Larger turbines experience greater mechanical and structural stress, which can lead to more maintenance and potentially shorter lifespans.
3. ****Visual and Environmental Impact****: Larger turbines can have a more significant visual impact on the landscape and potentially greater effects on wildlife, leading to more opposition from local communities.
4. ****Technological Complexity****: As turbines grow in size, they become more technologically complex, which can raise costs and introduce new maintenance challenges.
5. ****Regulatory and Grid Integration Hurdles****: Larger turbines might face stricter regulatory challenges and may require grid upgrades to handle the increased power output.

The onshore wind industry is likely to continue exploring larger turbines, but the pace and extent will depend on how well these challenges can be managed. The industry might reach a point of diminishing returns where the disadvantages outweigh the advantages, and optimal turbine sizes might stabilize. Moreover, innovations in materials, design, and technology may help mitigate some of the disadvantages associated with larger turbines.

Back-Up: Markets

ONSHORE MARKET OUTLOOK (GW/yr)



CAGR	
2024	2030
NA	4%
APAC	7%
CAMEA	13%
SELA	(5%)
WE	(1%)
CNE	5%

Most realistic growth scenario

THANK YOU FOR YOUR ATTENTION!



ENERCON
ENERGY FOR THE WORLD

ENERCON GmbH

Dreekamp 5 | D-26605 Aurich

Phone: +49 4941 927-0 | Fax: +49 4941 927-109