

# From growth to integration: how Europe's wind industry is entering a new phase

With repowering gaining pace and digital systems advancing, Europe's wind industry is entering an era shaped by scale, integration and resilience. Husum Wind, Germany's leading industry event, taking place from 16th to 19th September, offers insights into how Europe's wind sector is turning maturity into momentum.

In 1989, Husum Wind first took place in a cattle hall on Germany's stormy North Sea coast. At the time, wind energy was a fringe technology, championed by idealists and engineers operating on the edge of the power sector. That first edition, with just a few dozen exhibitors, captured the pioneering spirit of a technology on the cusp of relevance.

Today, wind energy is anything but marginal. In Germany alone, it supplies over a quarter of electricity. Across Europe, it underpins decarbonisation strategies, powers green hydrogen ambitions and increasingly serves as a pillar of energy security.

But with growth comes complexity. The challenges facing the industry in 2025 are no longer about proving viability. They are about making a distributed, digital and demand-driven system work in real time. This is the landscape that Husum Wind 2025 captures, as a showcase of innovation and a platform for solving the operational challenges of the industry.

## Repowering takes centre stage

In Northern Germany, it is now quite common to see older turbines, some no taller than 80 metres. Many of them were built and installed during the pioneering days, in a different regulatory and technical era. Now, they are being replaced by modern turbines that generate five times the energy with greater efficiency and less noise.

Repowering has become a defining theme of the market. In Germany alone, more than 16 GW of installed turbines are over 20 years old. Policy incentives, including simplified permitting and guaranteed grid access, are turning repowering into a core business model. According to the German Wind Energy Association (BWE), over 30% of newly approved turbines in 2024 are repowering projects. Yet the process is far from straightforward. Legacy permits, community negotiations, dismantling logistics and substation upgrades all add layers of complexity.

At Husum Wind, this complexity is front and centre, not just in the hardware, but in the











diversity of actors involved. Blade recyclers, crane operators, planning consultants and hybrid project developers all share space on the show floor, reflecting how broad and integrated the repowering value chain has become.

#### Permitting progress, but with uneven gains

Permitting bottlenecks have long been one of the most persistent barriers to wind energy deployment in Europe. In Germany, recent reforms have made a tangible difference. Average approval times for onshore projects are now around 18 months, aided by streamlined digital processes and expanded staffing at permitting authorities.

But progress is uneven. While some federal states issue permits in under a year, others still take 24 months or more. Elsewhere in Europe, in Austria, southern Italy and parts of Eastern Europe, planning delays and legal appeals continue to slow development. This disparity is a focal point at Husum Wind 2025. Panel sessions and policy forums will feature regional comparisons, lessons learned and developer experiences from across the continent. The tone is cautiously optimistic: the machinery of permitting is improving, but it remains a critical area of reform.

#### Grid bottlenecks reshape deployment

With permitting finally improving, a new challenge is taking centre stage: grid access. In wind-rich regions like northern Germany, the Netherlands and southern Sweden, transmission lines are at or near capacity. Grid congestion is leading to increased curtailment, and project delivery timelines increasingly depend not on turbine availability, but on transformer procurement and substation build-outs.

This reality is forcing the sector to adapt. Hybrid projects with co-located storage, dynamic grid modelling, and flexible inverters are becoming standard features. Meanwhile, developers and operators are investing in tools for grid visibility, real-time monitoring and predictive curtailment forecasting.

At Husum Wind, grid operators and software firms are no longer peripheral exhibitors, they are central players. From control room visualisation tools to automated grid balancing solutions, the focus is shifting from generation to integration.

#### Digitalisation becomes the default

As Europe's fleet of turbines matures, digitalisation is no longer optional. Predictive maintenance, AI-based diagnostics, and condition monitoring are critical to ensuring

uptime and optimising performance. Asset owners managing diverse fleets with turbines from different OEMs and generations, now rely on interoperable platforms to extract value and reduce costs.

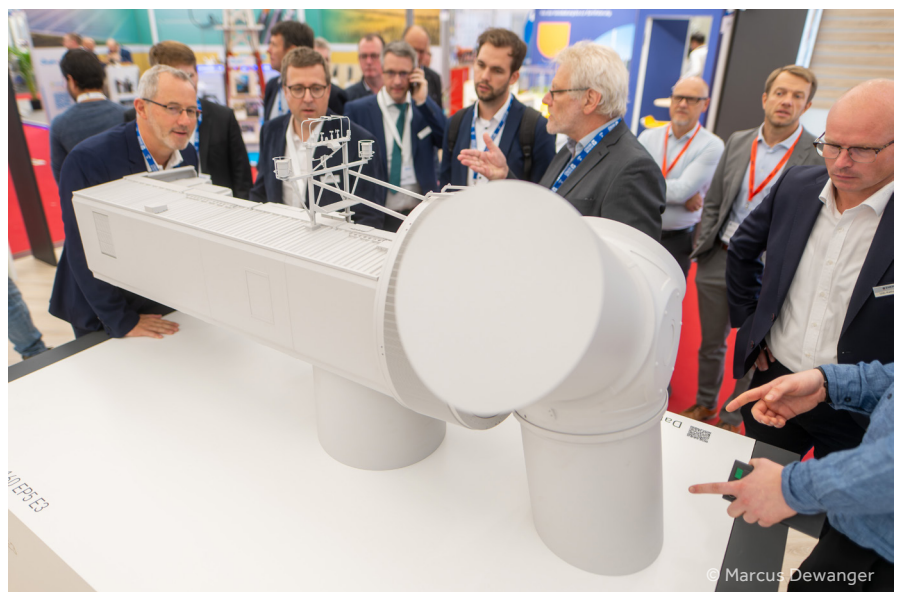
This shift is clearly reflected in the new Digital+ Area at Husum Wind 2025. More than 40 companies will showcase SCADA systems, cybersecurity tools, data integration platforms and digital twins, not as future trends, but as tools already deployed in the field.

One key challenge remains interoperability. With so many systems, protocols and legacy assets in operation, the ability to integrate and scale digital solutions is becoming a competitive differentiator. The conversations at Husum Wind will reflect this: practical, technical and focused on solving deployment pain points.

#### Green hydrogen: from vision to reality

Green hydrogen is finally entering the implementation phase. Across northern Germany, Denmark and the Netherlands, more than 60 electrolysis projects are in development, many designed to use wind energy as the primary input. Initiatives like Westküste100 and AquaVentus are exploring integrated energy systems: connecting offshore wind to electrolyzers, to storage, to hydrogen pipelines and industrial off-takers.

Still, challenges remain. Grid integration, offtake certainty and regulatory frameworks are all works in progress. Husum Wind responds with a dedicated Hydrogen Area in Hall 2. Visitors can explore electrolysis solutions, ammonia conversion systems and project showcases from early movers. The emphasis is on what works now and what still needs policy support to scale effectively.



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## Labour shortages hit hard

If there is one constraint shared across all markets, it's workforce availability. Germany's wind sector lost over 40,000 jobs between 2017 and 2019 due to policy uncertainty. Now, with growth back on track, the skills pipeline is lagging behind. Technicians, engineers, project planners and digital specialists are in high demand but short supply.

This is no longer just an HR issue, it's a threat to timelines, safety and the broader energy transition. To respond, companies are investing in training partnerships, reskilling initiatives and international talent recruitment. At Husum Wind, the WINDCareer offers two full days of engagement between companies, students, job seekers and vocational institutes. It's a rare forum where operational teams, HR managers and apprentices can meet, making the human side of wind energy visible and actionable.

## Cross-border thinking becomes operational

Wind energy may be deployed nationally, but its challenges are regional. Coordinated offshore grid planning, cross-border hydrogen corridors, and joint training initiatives are all shaping the European energy landscape.

Denmark's role as the official partner country of Husum Wind 2025 underscores this trend. The German-Danish Dialogue will include opening panels, expert forums and excursions to joint flagship projects, while more than 60 Danish companies are set to showcase innovations in turbine production, offshore development, storage and services. Danish and German companies already collaborate on turbine components, logistics and entire hydrogen infrastructure systems, including shared pipeline developments.

This form of international cooperation is rooted in tangible systems integration rather

than abstract ambition. It is becoming essential as Europe builds a resilient, interconnected renewable energy backbone.

## A fair that reflects the market

As Europe's wind industry matures, it is also diversifying. The stakes are higher, the systems more integrated, and the value chains more specialised. Wind energy in 2025 is about far more than megawatt targets. It's about operational detail, technical coordination and system-level integration. From predictive analytics to repowering logistics, from hydrogen scaling to workforce development, the fair captures a moment where the wind industry is no longer just expanding, it is learning to integrate.

HUSUM WIND 2025 takes place from 16th to 19th September in Husum, Germany.

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