

# Wind Power Development & Production Centre



# NORTH DENMARK

## - The Powerful Wind Hub

North Denmark is rich in wind resources, both in terms of naturally occurring windy sites onshore and offshore that are perfect for installing wind turbines as well as a large cluster of companies specialising in wind with years of extensive know-how and accumulated knowledge and innovation.

For suppliers of large turbine components, working from North Denmark is the obvious choice. As turbines and their components get bigger, there is a growing need for excellent infrastructure to facilitate relocation of materials. The Port of Aalborg offers an outstanding environment to accommodate this. One of these accommodations is a road which has been established to facilitate transportation of turbine blades from a large production site to the port. There are more than 150 companies in the wind cluster,

including one of the world's largest blade factories. North Denmark also houses a national wind power test centre, making the area one of the leading wind power hubs in Denmark and in Europe, the perfect location for companies and research centres affiliated with the wind power industry.

The local work force is tailor made for the wind power industry. Knowledge and experience from the region's traditional ship building industry has been refined, innovated and brought into the 21st century's wind power industry. The work force of the future has been secured, as Aalborg University educates world class engineers and researchers specialised in the energy sector. Tech College and other learning institutions ensure there is enough skilled labour to accommodate the rising demand for trained personnel.





## Partners

ARBEJDSMILJØEksperten has several years of experience in consulting as well as organising courses in areas such as:

- Organisations, people and relationships – culture, communication and conflict resolutions
- Occupational Health and Safety – Ergonomics, physical, chemical and biological safety and health
- Health – greater job satisfaction and wellbeing
- Industrial Environment – environmental approvals, management of wastewater emissions and air discharge

Barsmark has specialised in developing, planning and selling niche products for the construction, transport and wind turbine industries. The product range consists of composite materials, facade systems, insulation materials and acoustic panels. COMPOSITES are specialised in developing, producing and selling materials made from recycled production material from the wind turbine, plastic and glass industries. The processing of composite materials for refrigerated trailers, wind turbines, windows, doors and other applications have been gathered in our subsidiary, SUNBY ApS.

Bladt Industries is an international steel contractor specialising in large-scale and highly complex steel structures. The company operates in three key areas of business, providing steel solutions for the wind and renewable energy sector, for the oil and gas industry and for infrastructural projects. The product range includes foundations and substations for offshore wind turbine projects, suction anchors, topsides and jackets for oil and gas projects as well as buildings, bridges and harbour structures for infrastructural projects.

Blue Water Shipping is an international provider of transport and logistics. Blue Water Shipping offers freight solutions by road, rail, sea and air through offices worldwide as well as a solid network of agents and partners. To complete the supply chain, Blue Water Shipping provides a wide range of value added services such as customised, integrated IT solutions. Blue Water is a specialist in freight forwarders within the business areas of Wind Logistics, Oil, Gas & Industrial Projects, Port Operations, General Cargo, Reefer Logistics & Marine Logistics. The Danish-owned company has 950 employees at 53 offices in 25 countries.

BM2 Industri is an order-producing, medium-sized precision engineering company offering machining of work pieces tailored to customers' needs. BM2 Industri specialises in machining in the form of CNC turning, milling, drilling and boring of large work pieces and components. High-tech production machinery is applied incorporating CNC turning centres and dividing tables for machining work pieces of tolerances down to 1/100 mm. BM2 Industri seeks cooperation with turbine manufacturers and sub suppliers to the wind power industries in need of having large work pieces and components machined to customer specification.

Boewind's main areas of work are research into green energy, mainly using sea waves for producing electricity, accumulation of electricity and coastal protection. Boewind has obtained three patents: one for a hydraulic water ram (sea wave driven), one in the area of coastal protection and one in power accumulation. The company has so far been unable to raise capital for building prototypes and is awaiting opportunities for collaboration with other skilled companies.

Dan-Iso manufactures insulation material from polyurethane for technical insulation and is one of the leading manufacturers of insulation shells in Europe for industries such as district heating, refrigeration, oil and offshore, industrial insulation and the wind industry. Competences include special cutting and gluing jobs, product development in close cooperation with customers and security of supply and flexibility. Dan-Iso's products are customised and manufactured according to customer requirements.

Danish Marine & Offshore Group is a non-profit, member-based organisation created in 2001. The association has nearly 100 members supplying to the offshore oil, gas, wind and marine industries. The main objective of DMOG is to create a platform for cooperation and knowledge exchange as well as to promote Danish export of offshore oil, gas, wind and marine products.



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Dansk Folkevind works with the establishment of large land wind farms of 30 MW and up. The farms are established in collaboration with local farmers, municipalities, electricity and heating companies. The aim is that a large proportion of the shares in the farms come into citizen ownership through provisions in national legislation and through specific marketing.

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Dezide Wind Advisor can help your technical service organisation become more efficient by sharing knowledge on how to best troubleshoot technical problems. Dezide provides market leading knowledge management tools for optimising technical troubleshooting processes in the wind industry. Users are guided through troubleshooting processes in a structured and optimal way. Dezide's intelligent guides use self-learning and self-optimising technology based on artificial intelligence. The entire service workflow can be optimised by equipping all participants with tools giving access to the same shared updated knowledge base, including end-customer engineers, hotline staff and field engineers.

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The DHL Industrial Projects Division is specialised in oversized cargo, freight forwarding and international logistical services to the renewable energy industry - from transporting nacelles, blades, towers or any other major wind turbine component half way around the world to ensuring that urgent delivery of a replacement part minimises downtime. The company's leading position in the field of international logistics provides customers with access to over 600 specialists in 60 offices worldwide. The Industrial Projects Division supplies end-to-end logistics solutions, visibility, competitive pricing and an advantage in securing capacity.

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DWC is located in Oestervraa, Denmark. The company was founded in 1996 and is today one of the leading suppliers and manufactures of anemometers and wind vanes, mainly for the wind turbine industry. DWC has designed a reliable instrument that is easy to customise to any brand in the wind turbine industry. DWC wind systems are used by leading wind turbines manufactures, energy companies and service companies.

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Danish Wind Energy Group - part of the Danish Export Association. Danish Wind Energy Group organises joint export activities such as national pavilions for Danish suppliers to the international wind industry in order to optimise their export. The wind network consists of component, system and logistics suppliers as well as companies within consulting and education. The DWEG is your shortcut to high-class Danish wind suppliers.

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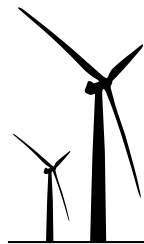
Elektromarine provides all aspects of industrial automation solutions including design, engineering, installation & documentation and subsequent around-the-clock-service. The company offers as part or total supplier. Elektromarine provides junction boxes or panels as well as development, production, installation and commissioning of complete systems. The factory is located in Skagen, Denmark, where control and distribution boards are designed, produced and tested. Core competencies include the design and production of control and distribution panels for the offshore, marine and industrial sectors as well as panels for EX-zones and PLC systems.

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Faurcon is a mechanical engineering consulting company. Faurcon are specialists in finite element analysis and capable of delivering everything from simple one component linear elastic analysis to multicomponent highly non-linear analysis. The materials can be metals, composites, rubber, rock or combinations hereof, and material tests can be carried out to enhance the accuracy if needed. FaurCon has experience with wind turbine design from previous work on main shafts, main bearing housings, main frames, towers etc., both in relation to extreme and fatigue loadings. The company also delivers structural calculations for certification of wind turbine components.

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Haabendal Management supports ambitious companies in the areas of change management and sustainable growth. With Haabendal Management as your partner, you have secured your company's success in tomorrow's market conditions. Haabendal Management assists your company in reaching the highest possible level of efficiency and thereby becoming best in class within your area of business.



## Partners

Integrate offers specialised consulting and training courses related to quality and performance improvements in production and logistics businesses. Throughout the last couple of years, Integrate has focused on the automotive and wind industries, involving the entire company and supply chain to create a world class performance culture through a structured five step model based on continuous improvement, achieving short and long term benefits such as significantly reducing costs, boosting efficiency and improving quality.

KONGSTAD Management was established in 2009 as a full-service consultancy company specialised in optimising sales for clients wishing to export to new markets or initiate sales to existing market segments. Assignments are carried out through market strategies, action plans and physical sales. KONGSTAD Management is closely connected to the lines of business that the company works for and has developed special expertise in establishing sales results for companies that are sub suppliers to the renewable energy sector.

Liftra has been specialising in lifting and transport equipment for wind turbine components since 2003. The company employs 35 engineers in Denmark, Spain, China, Germany and the USA. The engineers' combined efforts form a great knowledge base of wind turbine components and handling of these. The products range from single highly specialised lifting yokes - over serial production of davit cranes and tower stacking frames - to major development projects.

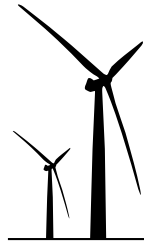
Nordjysk Elhandel (NEAS) is an independent energy trading and management company specialised in trading and production management of wind power generation on market terms. The company has activities in several European markets including Germany, Sweden and the UK. NEAS provides turbine owners, developers and investors in wind power with expert production management services to maximise the value of their wind power generation. NEAS provides BRP (Balance Responsible Party) services and trading services for a portfolio of more than 2,500 MW installed wind power capacity.

In cooperation with industrial and OEM customers, Novenco designs and develops customer specific solutions for controlling air quality in different kinds of environments. The company provides fan solutions for drying and cooling to many different industries such as wood production, wind power and freeze drying of food. Novenco develops the solution in cooperation with the customer in order to ensure maximum cost efficiency and productivity.

Sander Plast is located in Nibe, North Denmark, and is a part of the strong regional resource pool that directly supports the wind power sector. For the past 12 years, Sander Plast has been a leader in wind turbines, namely by developing, designing and producing high quality performance components such as Vortex generators. Sander Plast also provides components that support the construction of wind power turbine blades from the very beginning.

Since 2003, Scancon Encoders has specialised in manufacturing compact Explosion Proof encoders as well as small micro encoders with very high pulse per turn. Over the past few years, Scancon has taken a leading position amongst EX and ATEX encoders worldwide, from oil, gas and mining industries to shipping and wind power, including generators. Scancon Encoders come in many shapes and versions to fit all kinds of automation machinery. Custom designed solutions are also one of Scancon Encoders' core competencies. All products are manufactured in Denmark with IECEx-certification and ISO9001 TUV-Nord quality control and exported to more than 75 countries worldwide.

Serman & Tipsmark develop, design and manufacture complete hydraulic system solutions for test systems, production tools, transport solutions, lubrication or pitch control. The company is a supplier to manufacturers and installers of wind turbines both onshore and offshore. The competency platform includes the ability to combine hydraulic, mechanical and electrical system solutions. Serman & Tipsmark can solve any kind of trouble shooting and repair job in Denmark or abroad and has a comprehensive agency group of leading suppliers of hydraulic components.



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SUNBY has specialised in developing, producing and selling energy-efficient and eco-friendly semi-manufactured components to the construction, wind energy and transport businesses. More and stricter demands are made regarding energy efficiency and environmental concerns in all types of industries, and it can be difficult to create constructions that meet these new demands. This is why SUNBY has worked on developing energy-efficient semi-manufactured components using materials made from recycled polyurethane, fibre glass or other plastic materials. Recycled materials help the environment and display a responsible business model, which today can help build a competitive edge.

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Thy WindPower was established in 2010 by Leif Pinholt, Flemming Groenkjær and Bent Groenkjaer. Leif Pinholt has worked in the wind turbine industry since 1985, primarily restoring and exporting second hand wind turbines from Denmark to other countries. Flemming Groenkjaer and Bent Groenkjaer are the 3rd generation owners of Groenkjaers Maskinvaerksted, a medium-sized machine factory established in 1927. In the late 1970s, Flemming Groenkjaer developed the first THYmølle wind turbine, a 7.5 kW turbine with a 12 m lattice tower. Later, an 11 kW turbine was added. Today, some turbines from 1984 and 1985 are still in operation in Thy.

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TransElectro has more than 30 years of experience as a supplier to the wind energy sector. The company designs, develops and manufactures a wide range of standard and customer specific inductive components such as EI transformers, PCB mounted transformers and Toroidal Transformers up to 10 kVA, distribution & power transformers, current transformers, energy measurement transformers and transducer heads, chokes and air coils for electronics as well as power supplies. TransElectro is present worldwide.

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VB Enterprise has more than 20 years of experience within the wind energy industry and works closely with the world's leading manufacturers and suppliers of wind turbines and other power generating plants. Connection and servicing of wind turbines is a specialty, and VB Enterprise is the approved operator for more than 250 wind turbines in Denmark, servicing a further 500 throughout Europe. VB Enterprise has a staff of competent, committed and highly responsible personnel. All technicians are qualified electricians and have received thorough training to enable them to undertake onshore and offshore work.

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# HUB NORTH

## - North Denmark's Wind Power Business Cluster

**Hub North is a business network dedicated to the further development of the North Danish wind power cluster. Important goals are to encourage cooperation between international players and North Danish wind companies and to strengthen the international profile.**

Members of Hub North are all affiliated with the wind power industry, either directly or by acting as sub suppliers to manufacturers. The network also includes academic institutions as well as interest groups. By cooperating on specific projects to reach shared goals, the companies benefit from each other's experience and know-how to the benefit of everyone involved. This ensures a higher level of innovation and promotes the development of new ideas in the region.

Hub North's overall mission is to unite, develop, promote and strengthen the North Danish wind industry. This includes working to improve the framework conditions for wind companies in North Denmark through political lobbying.

Strengthening the international profile of the North Danish wind cluster is also an essential part of Hub North's work. By attracting international companies and investors to the region, Hub North will enable companies in the region to promote their products in Denmark and abroad.

Hub North works closely with The Port of Aalborg, The North Denmark Region, Aalborg University, Invest in Denmark, The City of Aalborg and The Confederation of Danish Industry in North Denmark.



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