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World Wind Energy Association



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Presented by:



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2015 Small Wind World Report Summary

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14th World Wind Energy Conference & Exhibition

Innovation for 100% Renewable Energy
In Harmony with the Environment

26-28 October, 2015 – Jerusalem, Israel

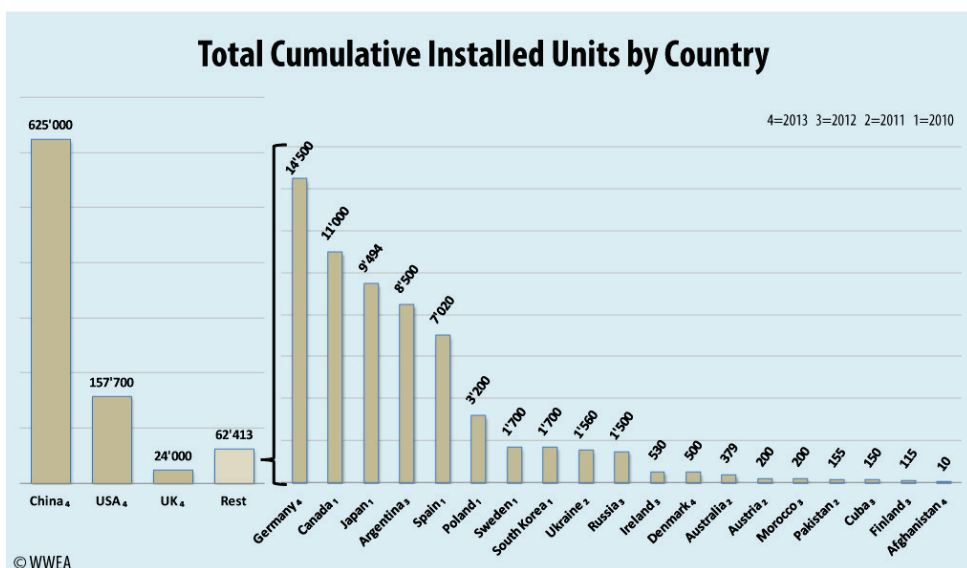
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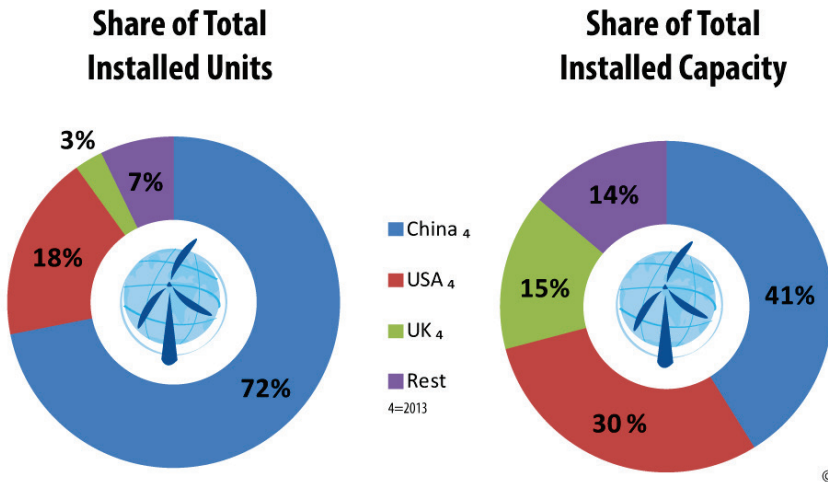
Small Wind World Market: Growth at Lower Pace

After several years of continuous growth, 2013 was a challenging year for the small wind industry. The three biggest markets suffered a decrease in the number of units installed in a year. As of the end of 2013, a cumulative total of at least 870'000 small wind turbines were installed all over the world. This is an increase of 8% (10% in 2012) compared with the previous year, when 806'000 units were registered.

The numbers presented here are based on available figures and even exclude major markets such as India and Italy. WWEA therefore estimates an actual total number of more than one million units to be installed worldwide.



China continues clearly to be the market leader in terms of installed units: 55'000 units were added in 2013, 15'000 less than in 2012, reaching 625'000 units installed by the end of 2013. The Chinese market gained 2% of the global market during 2013; it now represents 72% of the world market in terms of total installed units. According to estimations, around half of the turbines continue to produce electricity in China given that this market started already in the early 1980s.



In parallel with the 2013 decline in overall US wind installations, the small wind industry saw also a major decrease in new installations, although a bit less dramatic: 2'700 units were sold during 2013 (3'700 in 2012). With a total cumulative units installed of 157'700, USA is the second largest market, clearly behind China, but well ahead of a number of medium-sized small wind markets.

The changes in the feed-in scheme introduced in the UK in November 2012 had a big impact on the market reducing the deployment of sub-50 kW new turbines by nearly 80%. Only 500 units were installed in the UK during 2013, a decrease of 86% compared with 2012 and the lowest level for four years.

Germany, Canada, Japan and Argentina are all medium-sized markets with total number of small wind turbines between 7'000 and 14'500 units.

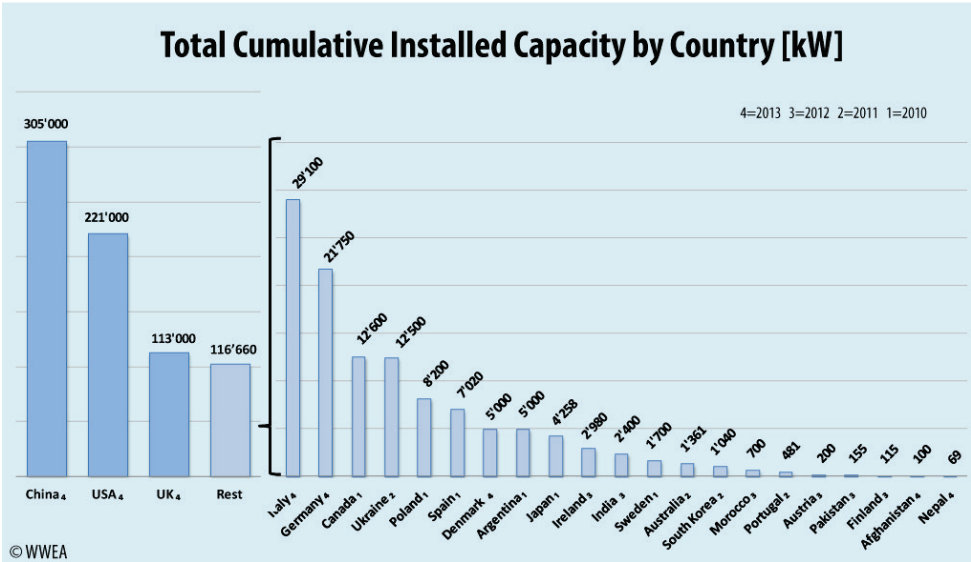
12% Increase in Global Small Wind Capacity

The recorded small wind capacity installed worldwide has reached more than 755 MW as of the end of 2013. This represents a growth of more than 12% compared with 2012, when 678MW were registered.

In terms of installed capacity, China accounts for 41% of the global capacity, the USA for 30% and UK for 15%.

The USA small wind market grew by 5,6 MW in 2013, a 70% decline in new capacity compared with 18,4 MW in 2012. The small wind market accounted for \$36 million in investment. Iowa, Nevada and California remained the leading states for cumulative small wind capacity¹.

In the UK, the sub-50 kW saw a dramatic decrease, installing in average 32 units per month while in 2012, 181 units were installed in monthly average. In total, 26 MW were installed during 2013, 87% of them in the range 50-100kW, 4% in the range 15-50kW and 9% in the range 0-15kW.



Globally, the average size of small wind turbines continues to grow: In 2010, the average installed size was 0,66 kW, in 2011 0,77 kW, in 2012 0,84 kW, and in 2013 it has already reached 0,85 kW.

Country wise, the average size is quite diverse: While the average Chinese turbine has a capacity of 0,5 kW, small wind turbines in the US have an average capacity of 1,4 kW and in the UK the capacity has reached 4,7 kW (after 3,7 kW in 2012).

¹ 2012 Market Report on Wind Technologies in Distributed Applications, U.S. Department of Energy

Small Wind Turbine Manufacturing

Five countries (Canada, China, Germany the UK and the USA) account for over 50% of the small wind manufacturers. By the end of 2011, over 330 small wind manufacturers have been identified in the world offering complete, one-piece commercialised generation systems, and an estimate of over 300 additional firms supplying parts, technology, consulting and sales services.

Based on the world distribution of turbine manufacturers, the production of small wind remains concentrated in few world regions: in China, in North America and in several European countries. Developing countries continue to play a minor role in small wind manufacturing.

More than 120 new small wind manufacturers were established between 2000 and 2010 worldwide. China alone has an exceptional manufacturing capacity of more than 180'000 units per annum (as of 2011).

Technology and Major Applications

The early horizontal axis wind turbine (HAWT) technology has dominated the market for over 30 years. Based on the study of 327 small wind manufacturers as of the end of 2011, 74% of the commercialised one-piece small wind manufacturers invested in the horizontal axis orientation, while only 18% have adopted the vertical design (VAWT). 6% of the manufactures have attempted to develop both technologies. The majority of the vertical axis models have been developed in the past five to seven years, and their market share remains relatively small. The average rated capacity of VAWT is estimated to be 7,4 kW with a median rated capacity of merely 2,5 kW. In comparison with the traditional horizontal axis orientation, the average and median rated capacity are much smaller. Out of the 157 models of vertical turbines catalogued in this report, 88% are below 10 kW and 75% are below 5 kW. This corresponds well with the actual market demand, as the average unit sold in 2011 had a capacity of 1,6 kW.

Despite a market trend that leans towards a grid-tied system with larger capacity, off-grid applications continue to play an important role in remote areas of developing countries. Off-grid applications include rural residential electrification, telecommunication stations, off-shore generation, and hybrid systems with batteries and other sources like solar. Over 80 % of the manufacturers produce stand alone

applications. In China, off-grid units comprised 97% of the market in 2009, and 2,4 million households still lack electricity. In USA, off-grid small wind turbines account for most of the units deployed in distributed wind applications. For these reasons off-grid systems will continue to play a significant role, in China and in many other countries with non-electrified areas. In the future, significant growth of offgrid applications is expected in particular in India and in African countries.

Driving Factors

Costs

In the USA, the installed cost estimates of top ten small wind turbine models in 2011 ranged between \$2'300/kW and \$10'000/kW, and the average installed cost of all SWTs in 2013 was \$6'940/kW. The Chinese small wind industry yielded, in comparison, a significantly lower average turnover of 12'000 Yuan/kW (1'900 USD – 1'500 EUR) in 2011. In the UK, the average installed costs in 2013 was 3'895 £/kW (5'873 USD/kW).

Policies

Like most other renewable energy technologies, the success of the small wind market depends on stable and appropriate support schemes. Today, feed-in tariffs (FITs), net metering, tax credits, and capital subsidies are the major energy policies geared specifically towards small wind. The small wind sector has especially benefited from the growing global trend of FITs. Unfortunately, only few countries have yet implemented specific FIT schemes for small wind which can be seen as the best tool for grid-connected small wind.

In the UK, recent changes in the policy framework for small wind have negatively impact the industry. In November 2012, the government have merged all turbines under 100 kW to the same FiT. This change brought financial advantage for turbines in the range of 50-100kW. In April 2014, the government introduced an excessive FiT degression mechanism to which the industry is unable to respond.

Denmark has recently set up a new FIT for small wind with attractive remuneration rates which may create a major new market in this European country in the near future.

However, new policies need to be designed and implemented in order to boost the market for offgrid and minigrid systems. Microcredit schemes, in conjunction with loan guarantees provided by public institutions, seem to be promising approaches.

Table. Small Wind Feed-in Tariff Pricing Worldwide

Country/ Region	Size Limit	EUR/kWh	Country/ Region	Size Limit	EUR/kWh
Canada			Japan	< 20kW	0,418
Nova Scotia	< 50kW	0,350		≥ 20kW	0,167
China (off-grid)	0,2–3kW	0,140	Lithuania	< 10kW	0,081
(on-grid)	5-20kW	0,110		11-350kW	0,075
Chinese Taipei	1-10kW	0,185		> 351kW	0,064
Denmark	< 10kW	0,330	Portugal	< 3,68kW	0,432
	10-25kW	0,200	Slovenia	< 1 MW	0,095
Greece	< 50kW	0,250	Switzerland	< 10MW	0,179
Italy	< 1MW	0,300	UK	< 100kW	0,207
Israel	< 15kW	0,250	USA		
	15-50kW	0,320	Hawaii	< 100kW	0,110
			Vermont	< 15kW	0,200

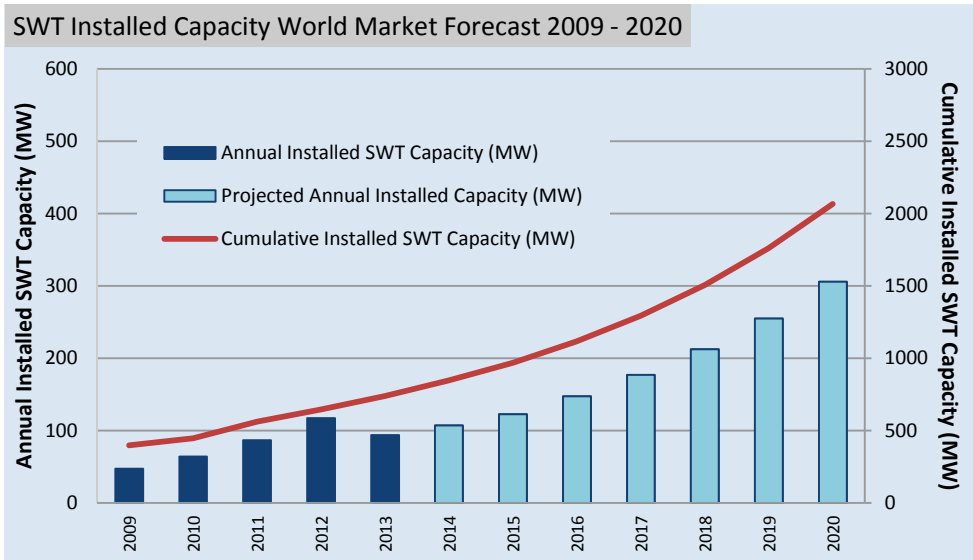
World Market Forecast 2020

Even though the global small wind market saw a decrease during 2013, it is expected that it will stop decreasing in 2014 and grow again from 2015 mainly because an increase in the installations in China and USA. A minimum growth rate of 13% is anticipated to continue until 2015, reaching an annual installation of 125 MW of SWTs.

Within this time frame, individual countries and the international small wind community will be able to establish more rigorous and structured standards and policies to regulate the market and support investments. WWEA is planning to set up a global body which will support this process and help the small wind sector to mature and grow.

It is also expected that, due to an increasing interest in electrification of remote areas, small wind will see major new market prospects in offgrid applications.

Based on a conservative assumption, the market could subsequently see a steady compound growth rate of 20% from 2015 to 2020. The industry is forecasted to reach approximately 300MW of newly installed capacity added annually in 2020 and achieves a cumulative installed capacity of about 2GW by 2020.



Definition of Small Wind

Technically, there are several definitions of small wind turbines: The most important international standardisation body, the IEC, defines SWTs in standard IEC 61400-2 as having a rotor swept area of less than 200 m², equating to a rated power of approximately 50 kW generating at a voltage below 1'000 V AC or 1'500 V DC. In addition to this standard, several countries have set up their own definition of small wind. The discrepancy of the upper capacity limit of small wind ranges between 15 kW to 100 kW for the five largest small wind countries. The major pattern of today's upper limit capacity leans towards 100 kW. This is largely caused by the leading role of the North American and European market. Over the past decades, a growing average size of the small wind capacity has been observed. This pattern is largely caused by the increasing interest in larger grid-connected systems and a comparatively diminishing market of standalone systems. Nevertheless, in order to create a standardised and healthy small wind market share, an agreeable definition of small wind should be agreed upon.

This report intends to bring forward the discussion on the definition of small wind and aims to create eventually a unanimous international classification system of small wind accepted by all parties of the industry. For the purpose of generating comparable graphs, figures and charts in this report, 100 kW is chosen as the temporary reference point. The definition, however, requires further discussion until a globally harmonised agreement is reached.

In practise, the major pattern of today's upper limit capacity leans towards 100 kW, although the IEC defines a limit of equivalent to 50 kW. In order to create a standardised and healthy small wind market share, an agreeable definition of small wind should be agreed upon. This report intends to bring forward the discussion on the definition of small wind and aims to create eventually a unanimous international classification system of small wind accepted by all parties of the industry. For the purpose of generating comparable graphs, figures and charts in this report, 100 kW is chosen as the temporary reference point. The definition, however, requires further discussion, until a globally harmonised agreement is reached.

Bergey Windpower

www.bergey.com



Products type: HAWT
Products size (kW): 1/6/ 7,5/ 10
Applications: GC/SA
Presence: USA, Worldwide

Bergey Windpower is the oldest and most experienced manufacturer of residential-sized wind turbines in the world.

Thirty years ago Bergey pioneered the radically-simple "Bergey design" that has proven to provide the best reliability, performance, service life, and value of all of the hundreds of competitive products that have come and gone in that time. With only three moving parts and no scheduled maintenance necessary, the Bergey 10 kW has compiled a service record that no other wind turbine can match. We back it up with the longest warranty in the industry.



dibu Wind

www.dibu-energie.de



Products type: HAWT
Products size (kW): 5,5,7,5/15
Applications: GC/SA/HB
Presence: Germany

dibu Wind production GmbH sells windturbines from 5 to 15kW. The inovative design allows most extensive maintenance, low noise, and high efficiency. In addition, dibu is a competent partner for the planning and construction of photovoltaic systems.



Endurance Wind Power www.endurancewindpower.com



Products type: HAWT
Products size (kW): 50/225
Applications: GC
Presence: Canada, Italy, UK, USA

Endurance Wind Power is a Canadian headquartered small wind turbine manufacturer with facilities in Canada, UK, Italy, Denmark and the United States. Our E and X Series turbines are designed in-house specifically for distributed wind power applications such as farms, dairies, institutions and light industry.

Endurance turbines provide economic and efficient solutions for community wind, self-generation or off-setting expensive grid power or fossil fueled electricity generation worldwide. Our lines of induction-based turbines have a zero electrical conversion loss, making the most of your production.

Together our team strives to provide Endurance wind turbine owners with the best products and support in the market today!



Envergate

www.envergate.com



Products type: VAWT
Products size (kW): 20/100
Applications: GC
Presence: Switzerland, Worldwide

Envergate Energie AG develops, manufactures and sells wind turbines. Are you thinking about a classical rotor? Think vertically! Do wind turbines have to look like they usually do? They don't have to. There's a different way. More intelligent. We're convinced of it.

Our wind turbines guarantee high wind yield and above average efficiency. We research and further develop our innovative technology. Progress and growth - a dynamic process. We stay in motion. Like the wind that shows us the direction.

Clean. Lean. Intelligent.



Eocycle

www.eocycle.com



Products type: HAWT
Products size (kW): 25
Applications: GC, SA
Presence: Canada

Eocycle Technologies Inc. develops, manufactures and commercializes worldwide the EOCYCLE 25, a state-of-the-art 25 kW direct-drive wind turbine for distributed wind energy applications.

Capitalizing on more than 12 years of internal R&D and prototyping, Eocycle Technologies stands out from its peers by being an integrated technology and manufacturing company.

Eocycle Technologies holds all intellectual property and commercial rights for every key component of its wind turbine, including Eocycle's patented Transverse Flux Permanent Magnet (TFPM) generator technology, which is capable of achieving - in a smaller and lighter package - much higher torque and power at lower rotational speeds than competing technologies.



Ghrepower

www.ghrepower.com



Products type: HAWT
Products size (kW): 0,3/0,5/2/3/5/10/30/50/100
Applications: GC/SA
Presence: China, Belgium, France, Italy, UK, USA

GHREPOWER is a leading wind turbines manufacturer which specializes in R&D and manufacture in China.

We have an integrated design, production, installation, commissioning, sale and after-sale service, and our products are widely applied for mobile communication, military, maritime monitor, home use, commercial business and remote area etc.

Our products export to all over the world, such as Germany, UK, France, Italy, Korea etc. The company's wind and solar hybrid energy system installed base also exceeds 10'000 units.



HY Energy

www.hyenergy.com.cn



Products type: HAWT

Products size (kW): 0,3/0,4/0,6/1/1,5

Applications: GC/SA/HB

Presence: China

HY Energy Co., Ltd is a high-tech enterprise engaged in designing, manufacturing, marketing and severing in wind-solar hybrid power system integration technique.

HY Energy Co., Ltd has made tremendous contributions to improve national wind generator manufacturing level under the breakthrough technique on wind turbine design conception and production craft since 2001.



Kingspan Wind

www.kingspanwind.com



Products type: HAWT

Products size (kW): 3/6/15

Applications: GC/SA/HB

Presence: UK, Worldwide

Born as the result of over 30 years innovation, our urbines have surpassed all expectations when it comes to delivering clean, green electricity for farms, land owners, schools, businesses and community projects.

Installed on every continent, our turbines have been delivering efficient, reliable and affordable on-site generation for customers in over 70 countries. Designed, tested, certified and manufactured in Great Britain – complemented with our specialist in-house wind team with over 25 years' experience in the International Small Wind Industry.



KLiUX energies

www.kliux.com



Products type: VAWT

Products size (kW): 1,8/3,6

Applications: GC/HB

Presence: Spain

Kliux Energies is a Spanish company, with international presence, that specializes in DISTRIBUTED ENERGY SOLUTIONS based on renewable sources. Kliux has worldwide exclusivity rights to manufacture and sell the GEO1800 VERTICAL AXIS WIND TURBINE, developed by Geolica Innovations which also integrate into hybrid system with solar photovoltaic technology. Its unique aerodynamic design results in a noiseless, energy generating turbine that also performs extremely good in architectural integration and visual impact. THE TRULY URBAN WIND TURBINE.



Montanari Energy

www.montanarienergy.it



**Montanari
Energy**

Products type: HAWT

Products size (kW): 1/2,5

Applications: GC/SA

Presence: Italy

We at Montanari Energy believe in the value of wind and our objective is to develop the finest technology in order to allow everyone to generate all the energy they need from this free, clean and endless resource.

Designed by some of the finest Italian engineers operating in the small-wind sector, our turbines are excellent products incorporating Italian design at its best.

We at Montanari Energy believe that everyone can one day be pioneers of the world again. It will be a freer and richer world, a world that deserves our full attention.



Superwind

www.superwind.com



Products type: HAWT

Products size (kW): 0,350

Applications: GC/SA/HB

Presence: Germany, Worldwide

The Superwind 350 is a small wind generator for professional use, which even under extreme conditions works autonomously and automatically. It is often used on sites where there is no grid available. The electric power generated by Superwind charges batteries and can be used directly for 12V- or 24 V-appliances.

Ideal fields of application for example are navigational aids, traffic control systems, environmental monitoring stations or transmitters, but also sailing yachts, campers, summer cottages and mountain shelters. Concerning the rural electrification in remote areas of developing countries, Superwind generators provide electric power for whole families.



Turbina Energy AG

www.turbina.de



TURBINA
natural energy

Products type: VAWT

Products size (kW): 0,25/0,5/1/4

Applications: GC/SA/HB

Presence: Germany

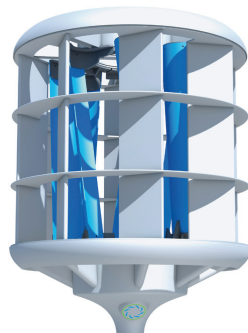
Vertical axis wind turbines (VAWT) from TURBINA Energy AG are first choice for an economical, independent and full-year power supply.

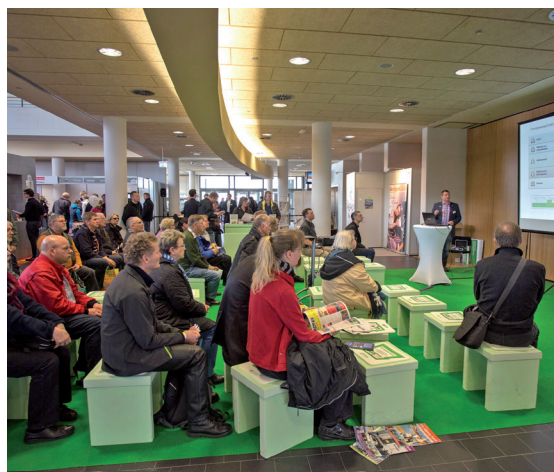
The uniqueness of our turbines is based on the innovative combination of the rotor and stator blades, which allows a maximum output of energy even at lowest wind speeds.

Since 2009 we supply customers from our headquarters in Unterhaching/Munich.

Our turbines are serving clients on all 5 continents and under all weather conditions.

Experience the unique characteristics and advantages of our products!





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17 - 20 March 2016 · Husum, Germany

Book your stand now!

www.new-energy.de

**new
energy**
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