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NEWS FROM LEITWIND WORLD



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LEITWIND CONQUERS GUADELOUPE

LEITWIND set to install six LTW80 turbines on the islands in the French Antilles by 2020

In 2017 LEITWIND expanded its presence in France with a plant at Gilly-sur-Isère to accommodate POMA-LEITWIND's assembly facilities. This collaboration has proven to be a successful decision and, due to the synergies between

Italian know-how and French manufacturing skills, is bearing its first fruits in markets beyond the Alps.

One new project concerns a contract signed for the sup-



ply, installation and maintenance of six 1.65 MW hh48 Typhoon GL A Class LTW80 turbines on the French islands of Guadeloupe, in the Atlantic Ocean, which will go into operation in 2020.

Guadeloupe is not only a paradise of white sandy beaches and modern cities; it is also a pioneer among the Caribbean islands in green energy. It is well known that Guadeloupe's greatest peril is tropical storms and typhoons, which frequently occur between June and November.

LEITWIND's turbines are designed to operate in extreme winds. However, winds in regions like Guadeloupe that suffer from tropical storms can be very different from winds in Europe and North America. The turbines that LEITWIND will install in this area of tropical cyclones must be specifically designed to withstand higher wind speeds, based on typhoon intensity. The characteristics of tropical cyclones, levels of turbulence, rapid changes in wind direction, the likelihood of failure of the electricity grid, and the danger of flooding due to heavy rains must be taken into consideration throughout the design process.

Logistics adds an additional layer of complexity: components can only be supplied by ship during the night, since the islands have restrictions on shipping. Even the main crane used to raise the "star" must be delivered by ship, since the islands do not have one. The time frame is very limited: installation must be completed before the most severe cyclones begin in late summer.

The Guadeloupe project is a major challenge for LEITWIND, but the team has identified efficient solutions to guarantee delivery within the agreed time frames and a long-term performance that meets LEITWIND's standards.



LORENZO LUCCHINI PROJECT MANAGER AT LAZZARI&LUCCHINI, LEITWIND'S CUSTOMER:

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"The company's excellent reputation in the wind turbine sector prompted us to choose LEITWIND. In particular, being able to install the LTW90 for this project was the best solution in terms of the wind farm's production and profitability. For the future we are planning new projects in Puglia, Basilicata and Campania using LEITWIND turbines because we know, based on previous experience, how they perform in the field."





DEBUT IN THE ITALIAN MARKET

Installation of the first LTW90 wind turbine was **completed in Vallata (AV)** in October 2018. This turbine, which has a rated power of 900 kW and stands 75 m tall, brings the winning and now proven concept of LEITWIND's technology, guaranteeing excellent performance and low maintenance, to new heights. In addition to the supply and installation contract, the customer also signed a 15-year service contract.

The LTW90 model was installed on high ground in Vallata: the morphology of the terrain and constraints affecting access roads to the site added complexity to this project, which was a challenge for those who worked on it.

"By transporting and raising the components on such a difficult site in conditions of poor visibility during the approach to winter, our team demonstrated its capabilities even in the most extreme conditions," explains project manager Mattia Modenese.

The turbine chosen was the LTW90, following a careful assessment of suitability set out in a technical document entitled "Wind and Site Evaluation" written by LEITWIND's technical office: the site is classed as type IIIA/IIIA+, with relatively low winds and little turbulence. The LTW90 wind turbine has a large rotor diameter and a relatively low rated power, so its production is high compared to other wind turbines of the same power: these are the characteristics that make it more efficient than competitors' products, especially in low wind conditions.

THE LAND OF THE SULTANS PLACES ITS TRUST IN LEITWIND YET AGAIN

January 2019 saw the completion of installation works on an LTW80 H65 1 MW turbine in the Alia a district in the province of Izmir, Western Turkey, a hilly area not far from the Aegean Sea.

The construction works were completed in just a little over two months: LEITWIND provided the reinforced concrete foundations and all civil engineering works necessary for traffic systems within the facility, along with the electrical infrastructures essential for connection to the network. The electromechanical installation of the wind turbine was completed in January, in the middle of winter, under extremely poor weather conditions and in a geographical area exposed to high winds. An additional challenge was the geomorphology of the land, which is especially rugged and characterized by steeply sloping hillsides, making the civil engineering works even more difficult. Despite the environmental difficulties, LEITWIND was able to complete the works within the agreed deadlines.

The installation confirms once again the success of the 1 MW LTW80 in the Land of the Sultans. The concept underpinning the design of this wind turbine is the need to maintain high performance and availability over time.

The DirectDrive system, which is made up of a limited number of moving parts, makes it possible for the components to operate at low loads and therefore guarantee a high standard of quality in the long term.

In addition to the advanced technology provided by the wind turbines, there are a series of factors that make LEITWIND so competitive in the Turkish market, namely the offer of an all-inclusive package that includes not just traditional supply, installation and maintenance of the turbines but also procedures associated with planning, design, construction and authorization of the entire facility.



LEADER IN ITALY IN 1 MW

LEITWIND has good reasons to celebrate: a study by GSE (Gestore dei Servizi Energetici) has shown that LEITWIND is the market leader in the category 200 – 2,000 kW installations in its home market Italy. The study has analyzed the Italian energy market and has identified the distribution of each manufacturers market volume in this segment. With a market share of 42%, LEITWIND is at 1st place in the above-mentioned category, leading by far in comparison to other wind turbine generator manufacturers.

42% IN THE CATEGORY 200-1.000 KW

LEITWIND with its state of the art advanced technology has been active in the wind energy sector for more than 10 years, designing, developing, manufacturing and installing wind turbine generators and entire wind farm. 143 successfully installed wind turbines in Italy alone underline the results of the GSE study. With its large portfolio of products LEITWIND can provide the wind turbine generator, which suits best to the site specific wind conditions at individual locations, that is an essential criteria for an optimal energy production.

All LEITWIND products follow a modular concept and have LEITWINDs DirectDrive, an active electrical yaw and a pitch control system in common. The stae of the art technology and continuous investments in research and development are the eky to LEITWIND's success.



THE LTW42 A NEW LEITWIND WIND TURBINE

A new iteration of LEITWIND turbines in north Germany are helping to protect the environment by producing renewable energy cheaply at the site where it will be used

While hundreds of thousands of young people gathered in squares all over the world earlier this year to protest about the environment, in the north of Germany practical action to protect the environment was celebrated with a **new generation of LEITWIND wind turbines, the new LTW42.** *"Together with our partners we've invested money, resources and a huge amount of effort in developing an efficient, compact and small-sized wind turbine capable of producing clean energy from the wind at the site where the energy will be consumed,"* explained Anton Seeber, president of the Leitner group, a participant in the b.ventus start-up, the key player in this new business challenge.

On 15 March at Steinfeld, in Schleswig-Holstein, close to the border with Denmark, the first LTW42 wind turbine of its kind was officially inaugurated. A further 49 turbines will be installed by the end of 2020.

The first calculations on the installation in SchleswigHolstein demonstrate that the turbine will supply the customer's agricultural business with 660MW of self-produced electricity annually, with a reduction of CO2 emissions equal to 370 tonnes.

Aside from the advantages of LEITWIND's proven technology, such as its quiet DirectDrive system, the small size and low height of the hub, at 28m, also play a part in the new turbine's success. In Germany only a simple building permit is required for an installation like this, so on average it takes only six to 12 months from signing the contract to commissioning. The wind turbine is also specially designed to meet the energy needs of small- to medium-sized businesses, enabling them to produce clean energy 'in house' without CO2 emissions. And finally, because of the installation's excellent efficiency and expected life of at least 20 years, the cost is depreciable over six to 10 years.

Major contribution For Seeber, the installation of this first wind farm marks a milestone in LEITWIND's history, which now stretches back more than 15 years. "What's particularly impressive is that, for this installation, we worked successfully with our partners to quickly develop an innovative solution, a real technological tour de force, capable of producing renewable energy cheaply and efficiently from the wind, once again demonstrating our research and development prowess," he said. "This project makes a major contribution to renewable energy and to saving our planet, and this is something of which we're really proud."



HUB HEIGHT	28 meters
ROTOR DIAMETER	42 meters
TIP HEIGHT	< 50 meters
GENERATOR	DirectDrive, 250 kW
ROUNDS ROTOR/MIN.	29,7

b.ventus-

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REPOWERING A FRENCH WIND FARM

LEITWIND is set to replace the 16 existing 1.3 MW turbines at the wind farm in southern France with 1.5 MW LTW62 units. The customer is RES – Renewable Energy Systems Ltd, the UK-based renewable energy developer, which has decided to repower its first wind farm constructed in France, increasing capacity to 24 MW.

Repowering usually involves replacing old, obsolete wind turbines with new larger, more technologically advanced units. Repowering of wind turbines has, in fact, created a new market.

The procedure can involve two types of processes:

- > A design involving a new layout for the wind farm with new turbines and therefore new permits: this can, however, create problems in terms of the constraints on maximum rotor tip height, maximum diameter or hub height.
- > A re-authorization process: this approach involves the installation of new turbines with the same dimensional characteristics as the existing units. The problem in this case is that the turbines are often not available on the market or their performance is no longer adequate or does not meet the most recent requirements in terms of safety, performance, etc.

LTW62

In the light of these considerations, LEITWIND has agreed to develop a new customized wind turbine specifically for RES, the LTW62 1.5 MW.

The customer wanted to retain the existing permit, avoiding a new complex authorization process where the outcome was uncertain. However, there was no wind turbine on the market that met the existing requirements and that could guarantee adequate energy yield while ensuring sustainable performance over time at a site with very aggressive wind conditions.

The Souleilla-Corbières wind farm is located in a hilly region in the French département of Pyrénées-Orientales. The site is subject to very high winds, partially above the IEC standard: the mean annual value at a hub height of 49 m varies between 8 and 9.3 m/s, depending on the position of the unit. This meant that the design of the LTW62 wind turbine at the French site would need to be customized.

The base model for the repowering is the robust, well-proven 1.5 MW LTW80. This model is IEC-certified and is extremely well-suited as a starting point for customization in line with the specific conditions of the site and the constraints of the Souleilla-Corbières project. Almost all of the principal structural components of the LTW62 will be the same as those used in the LTW80, including the hub, the stator, the rotor and the main frame connecting it to the tower. The pitch system will be the LeitPitch, developed by LEITWIND, which is now the standard on all LEITWIND wind turbines.

The innovations in the LTW62: blade and tower.

The new blade on the LTW62 will be 30 m long, to guarantee the rotor diameter required under the existing permits, and is called LS30. This type of blade is able to achieve its rated power of 1.5 MW even under turbulent wind conditions. The tower will be designed specifically for the Souleilla-Corbières site, taking into account the worst possible wind conditions inside the wind farm, especially in terms of turbulence. The tower will be made of tubular/conical steel, divided into two segments.

The LTW62 model is designed for sites with strong winds and high turbulence, and will be certified both for the site specific conditions of Souleilla-Corbières and for IEC wind class IA-standard, thus making it a suitable and very attractive option for any site with high or extreme intensity winds.





REMO SANNA, originally from Sardinia, grew up in Vipiteno (*BZ*), and has now been working for six years as a maintenance technician in the LEITWIND Customer Support Department at the company's main site in Vipiteno.







WHAT DO YOU DO? Remo Sanna, customer support technician, leitwind

What does a customer support technician do?

As a customer support technician, I am responsible for providing support and maintenance for our various systems / for various systems. I have regular jobs to perform, such as routine maintenance, but I am also always available, if there is a problem or unexpected issue at a site, because these situations need to be resolved quickly.

Some of the activities involved in the commissioning of the wind turbines are also performed by our technicians. I find these turbines incredibly interesting: working on them is exciting and I never get bored. My job also gives me the opportunity to travel far and explore new places and cultures.

What does a customer support technician do when not in the field?

Even in the office, the work is really varied: I juggle drafting reports on completed operations and preparing for upcoming service runs in the field ... I organize retrofits, prepare material, and answer emails and phone calls dealing with a huge range of issues.

But while I'm in the office, it is the preparation for the next operation that takes up most of my time: everything needs to be planned a long time in advance, so that I can do the best possible job. This is the way I have always worked. In fact, I love mountains and climbing: the same principle applies here, you need to plan for every eventuality in your mind beforehand so you have everything you might need to be able to finish the tour without any stress or problems.

What role does safety play in your work?

The issue of safety is very important, especially for customer support technicians. We don't work on standard sites, especially when we're dealing with wind turbines, where we are exposed to a range of risks: high voltage electricity, moving mechanical parts, the heights we have to work at, heavy weights. You could almost say that we sometimes work at the very limit. In some circumstances, even the tiniest mistake can cost lives, which is why technicians must always work in pairs: if one stumbles and falls from the top of the tower, he'll just hang there and can't climb back up. After 30 minutes, even if he's not injured, there is a serious risk of suspension trauma. The blood vessels in the legs are compressed by the harness and the entire body is in a position that puts the internal organs under stress. The other technician must quickly set up the evacuation kit (cable and abseil device) and reach the victim so they can get back to the ground together.

It's a bit like ski mountaineering: if you're alone and you're hit by an avalanche, even a small one, who can help you other than a companion?!

What can you tell us about safety courses?

In addition to an annual medical check-up, our support technicians are required to complete three different workplace safety training units each year. All technicians must perform the emergency descent on the outside of the wind turbine at least once a year. LEITWIND has offered me the opportunity to become a certified instructor for one of these training courses.

Which skills should a LEITWIND support technician have?

Obviously every support technician or installer should be prepared and willing to travel. You might find yourself away from home for weeks at a time.

Finally, how would you describe LEITWIND and the team in three words?

YOUNG, INNOVATIVE AND AMBITIOUS; we want to keep improving in order to meet our customers' needs in the best possible way.

WIND TURBINE TYPE CERTIFICATION

In today's energy market, it is vital for wind turbine manufacturers like LEITWIND to be able to convince customers of the capabilities of their new designs. The customer needs as much assurance as possible that the design meets the required specifications.

But what is type certification? It is an evaluation by a third party — an accredited certification body — which certifies that the wind turbine manufacturer sells products that meet reference standards and regulations.

TÜV Süd, TÜV Nord, TÜV Rheinland and DNVGL are just a few of the organizations authorized to issue type certificates. The types are linked mainly to the sectoral standards IEC 61400 (currently being replaced by the IECRE), GL2010 (Germanischer Lloyd) and other national standards such as DIBt (towers and foundations certification in Germany).

Taking IEC 61400-22 type certification as an example, the purpose can be:

- Prototype certification: evaluation of a new wind turbine design.
- > Type certification: evaluation of a wind turbine design and a serial production process.

In general, IEC 61400-22 type certification has numerous advantages such as giving a new turbine model greater credibility and providing easier access to finance and new

LEITWIND certified models:

MODEL	RATED POWER (MW)	WIND CLASS	BLADE TYPE	HUB HEIGHT	CERTIFICATION
LTV/80	1.0	IIA	LS39	HH65	IECC61400-22
LTV/80	1.5	IIA	LS39	HH80	IEC61400-22
LTV/80	1.8	IIA	LS39	HH80	IEC61400-22
LTV/86	1.5	IIIA	LM421P	HH80/90	GL2010
LTV/101	3.0	IIA/IIIA	LM48.8P	HH93.5	IEC61400-22
LTV/90	1.5	IIIA	LS44	HH80	GL2010
LTV/80	1.5/1.65/1.8	IIIA+	LS39	HH48/50/60/65/80	IEC61400-22
LTV/42	0.25	S	LS20	HH28	DIBT*

markets. A type certificate gives evidence about its manufacturability, installability and operability. Consequently, the type certification process is usually one of the most important, though it is often based on prototype certification carried out in a previous phase.

There are several stages to type certification, some of them mandatory and some optional.

The mandatory stages are:

- > Design Basis Evaluation: this stage checks that standards, methodologies, assumptions, etc. comply with IEC 61400-22.
- > Design Evaluation: in this stage the certification body checks in detail that the design complies with IEC 61400-22, for example the control of design loads, structural checks, manuals, etc.
- Manufacturing Evaluation: this is a check of the component manufacturers' quality systems; inspections of their production are carried out.
- > Type Testing: this is a set of performance tests carried out at specialist laboratories and on a prototype turbine, to check that they comply with the design. Prototypes of the blade and gearbox, and loads and energy performance, are also tested.
- > Final Evaluation: the evaluation results are provided in this stage.

Type certification is valid for 5 years on average and can be renewed by the certification body once any design modifications and any problems with installed turbines and the remediation of these problems have been evaluated.

LEITWIND TECHNOLOGY Maximizes performance and Benefits the grid

LEITWIND turbines with LEITDRIVE converters and FULL-SCALE CONVERTER technology not only maximize the energy produced and do not disrupt the grid, but are even beneficial to it

Wind farms are often accused of causing damage to the electricity grid. This is due to the fact that the power fed into the grid by the turbines is not continuous, with frequency and current variations that can cause losses during the process of transforming the kinetic and electrical energy. This is directly due to the primary energy source powering the turbines – wind – which by nature is variable, often intermittent, and unpredictable.

LEITWIND's Research & Development department has found a solution to this problem by designing a FULL-SCALE CONVERTER, the LEITDRIVE. This converter, combined with the permanent magnet generator with DirectDrive technology, not only improves the efficiency of LEITWIND turbines and their compatibility with electricity grids, but also cuts maintenance times. The LEITDRIVE makes the turbines suitable even for less windy sites, remote locations and urban areas.

LEITWIND turbines convert the electricity produced by the generator into power to be fed into the grid, minimizing dispersion, losses and inefficiency in the conversion phase. A characteristic of the LEITWIND turbines is that the biggest part of the energy produced by the generator ends up in the grid.

LEITWIND frequency converter technology adapts perfectly to the requirements of international grid codes, which have become increasingly stringent because of the need to guarantee continuity of electricity supply to the public and support the supply of power from different types of production plants. For this reason, wind farms are required to play a part in stabilizing the electricity grid, and must autonomously regulate:

- Active Power, turbines must stabilize grid frequency and prevent overloads on power lines.
- > Reactive Power, turbines must be able to inject reactive power to stabilize grid frequency and voltage. LEITWIND turbines are able to stabilize and regulate frequency and voltage even when they are switched off.



- Frequency Operating Range, continuity of operation is required within a country-specific frequency range.
- Low Voltage Ride-Through, if the grid suffers a voltage sag, turbines without FULL-SCALE CONVERTER immediately disconnect and only restart when the grid stabilizes, which loses electricity and has significant negative impacts on the grid. LEITWIND turbines do not damage the grid; they stabilize it by helping it to restart, and they also reduce electricity losses as the turbines stay connected for longer compared to traditional technologies.

Another advantage of the LEITWIND converter is reflected in the wind farm capacity factor. With traditional technology and without a converter, the capacity factor was only 20%; using a FULL-SCALE CONVERTER together with technological improvements and larger rotors achieves a capacity factor of more than 50%.

Very windy sites are becoming increasingly rare, and demand for electricity is constantly increasing. Responding to this demand requires technological evolution based on efficiency. It is this continuous quest for efficiency and constant improvement that drives the development and construction of LEITWIND turbines, making them simply efficient.

BENEFITS OF THE 'LEITDRIVE' FULL SCALE CONVERTER WITH PERMANENT MAGNET GENERATOR AND DIRECTDRIVE TECHNOLOGY:

- > Maximizes turbine efficiency, even in light winds
- All the electricity produced by the generator is managed and fed into the grid
- Stabilizes and above all benefits the grid by feeding in active power and reactive power
- > Operation even during voltage sags
- > Less maintenance



REFERENCES ALL OVER THE WORLD

Some of the 365 wind turbines installed throughout the world with a total rated power of 495.75 MW



HOLLAND – FLEVOLAND LTW101 3.000 KW

FRANCE – ISÈRE 8X LTW77 1.350 KW

AUSTRIA – STYRIA LTW77 1.350 KW + LTW80 1.500 KW

CROATIA – SIBERNIK 7X LTW77 1.500 KW

ITALY – BASILICATA 28X LTW77 1.000 KW + 11X LTW77 850 KW

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INDIA – TAMIL NADU 67X LTW77 1.500 KW, 43X LTW80 1.500 KW

SRI LANKA – PUTTAMLAM 7X LTW77 1.500 KW

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