LONG-TERM FINANCING
Interview with ENERCON CFO Dr Thomas Cobet on the new credit line.

SUPPLY CONTRACTS FOR 212 MW
ENERCON and Austrian utility conclude contracts for the supply of 51 WECs.

INSTALLATION UNDERWAY IN RUSSIA
Construction has started on 84 WECs destined for the second subproject in North Caucasus.

ENERCON’S NEW TOP MODEL

E-160 EP5 PROTOTYPE INSTALLED
Dear customers, business partners and employees, dear readers,

The coronavirus pandemic has plunged our society and our economy into an unprecedented situation. As governments imposed lockdowns to protect our health, millions of people and countless companies felt like the brakes had been slammed on at full speed. From one minute to the next, public life and large parts of the economy came to a halt. For weeks on end, people were forced to manage their daily lives with severe limitations. Companies’ business processes and their supply chains were disrupted, and many of them were forced to register for short-time work or else close completely.

How have we fared during this time? Thanks to a rapid switchover to remote working, good communication and professional and proactive crisis management, we have been able to tackle the health crisis without any significant restrictions thus far. We are doing everything necessary to ensure things stay this way. After all, the crisis is not over yet.

On the contrary – the work on coming to terms with its impact is just beginning. Billion-euro funding schemes are being set up to help soften the blow of the negative consequences of the globally-enforced break. Ideas such as a “European Marshall Plan” to coordinate rebuilding of the damaged economy in the aftermath of the corona crisis should be welcomed. They can help Europe to overcome the crisis as quickly as possible.

Urgent issues such as climate protection and the energy transition need to dominate any plan. The governments and the EU ought to find a meaningful way to connect the post-corona rebuild with the energy transition. There is no disputing how awful the crisis imposed on us all is, but it does offer the opportunity to become a catalyst for sustainable business models and technologies. The pending economic restart should thus involve making targeted investments in renewable energies to create impulses for green growth and initiate a new focus for the economy, as encouraged by the Agora Energiewende think tank, the German National Academy of Sciences “Leopoldina”, and even the world’s largest asset manager BlackRock. It would be fatal if the opinion held by sceptics that coronavirus has rendered the international community unable to afford climate protection or the energy transition were to gain ground.

The opposite is true: nature does not forgive! The advantages of renewable power generation are clearer than ever during this crisis. The EU had recognised the importance of the issue and announced a “Green Deal” before coronavirus even took over. The ambitious climate plan – the main project undertaken by the new Commission – aims for a climate-neutral EU by 2050. In order to achieve this, the EU intends to set up a one-trillion-euro investment programme. In addition, another billion-euro stimulus package for the “Green Recovery”, which refers to the rebuilding of the economy following the COVID-19 epidemic, is also currently being discussed. With regard to the coronavirus restart, EU Commission President Ursula von der Leyen has said that investments in renewable energies, innovations, clean transport and sustainable food will play an even bigger role than they do at present.

The industry also welcomes this view. It has to put this transformation into effect. Global corporations and investors such as Volkswagen, BASF, BlackRock and Allianz & Co. are shifting their focus to sustainability or setting goals to achieve CO₂-neutral production, and are thus calling for more renewable energy generation, including from onshore wind.

Supporting projects now need to be effectively combined with the coronavirus aids discussed. The stage is now set for active politicians to implement proposals like these ones: start giving carbon pricing the framework it deserves! Relieve the EEG surcharge! Give local energy generation a chance! Shut down the old plants earlier, in other EU countries too! Acceptance for energy generation that is harmful to the climate will severely decline as the negative impacts on the environment become more obvious. Get the energy transition and the thermal energy transition going! With foresight and the right ideas, the course to a CO₂-free economy can now be set earlier than expected. The money, the products and the options are there – let us tackle these issues!

Hans-Dieter Kettwig
Managing Director of ENERCON
ENERCON has reached the next intermediate objective in its EP5 programme: the second E-147 EP5 prototype has been installed in Falkenwalde in the Uckermark. It has a nominal power of 4.3 MW and will be commissioned soon. The prototype (wind class IIA) has been built on a modular steel tower at a hub height of 132 metres. Hub heights of 126 and 155 metres will be available for the series-produced versions of this wind energy converter.

The next step for ENERCON will be to focus on developing the wind energy converter type further. This second evolutionary stage of the E-147 EP5 has a nominal power of 5.0 MW and can achieve an annual energy yield of 18.1 million kWh with a mean wind speed of 7.5 m/s at hub height. This five-percent increase means the cost of energy for the E-147 EP5 can be substantially improved again.
E-115 EP3 generator undergoes first tests in Aurich

The generator of the new E-115 EP3 E3 wind energy converter type was installed on the ENERCON system test station for the electrical drive train in Aurich yesterday, and is now undergoing the obligatory testing and validating phases. The first construction of the electrical drive train will take place here to speed up commissioning of the prototype in the field. In a series of tests, the generator will pass through its various operating states and the function and efficiency of the electrical and mechanical systems will be tested for each one. The key figures identified here can be used to further optimise individual systems and controllers for use in real life.

Experiences from working with the E-138 EP3 E2 generator and technical improvements developed for that model were integrated in the evolution of the E-115 EP3 E3 generator. Like the E-138 EP3 E2, the E-115 EP3 E3 uses the new converter technology with active rectifier. The new closed-loop control system makes it possible to directly influence the overall behaviour of the WEC. “In the EP3 programme, we are trying to generate as many synergies as we can from our experiences. This enables us to optimise operation and comply with quality standards, and in turn ensure the availability and reliability of the wind energy converter,” explains Sebastian Windt, nominated person in control of the system test station at ENERCON’s research and development organisation WRD. The tests will continue until November. Once they are complete, the prototype will be installed with the tested generator.

The E-115 EP3 E3 completes ENERCON’s portfolio for the new EP3 platform. This third EP3 wind turbine type has a nominal power of 2.99 MW or 4.2 MW and is designed for sites with wind classes IA, IIA and IIB. Meanwhile the E-139 EP3 E2 prototype in Janneby has been successfully commissioned. The wind energy converter has fed its first kilowatt-hours into the grid and has already reached this WEC type’s increased nominal power of 4.2 MW.

ENERCON supports operators and owners during BNK retrofit

According to the German administrative regulation on the marking of aviation obstacles (AW), wind energy converters require appropriate nighttime marking to ensure the safety of air traffic. On 16 February 2020, the Bundesrat passed a revised version of the German administrative regulation on the marking of aviation obstacles (AW). The new regulation introduced updated and more concrete details on the legally required needs-based nighttime marking (BNK) of wind energy converters. It provides some new options for operators and owners of wind energy converters who need to retrofit their installations with BNK systems: In addition to active and passive radar systems, the revised law also permits transponder systems for the needs-based nighttime marking (BNK) of wind energy converters. The Federal Network Agency extended the deadline for retrofitting the BNK systems to 1 July 2021. ENERCON assists the operators and owners of wind energy converters with the implementation of this administrative regulation.

For the retrofitting of needs-based nighttime marking systems that use transponders, ENERCON is partnering with Lanthan Safe Sky GmbH. Lanthan Safe Sky GmbH supplies the transponder equipment and takes care of the commissioning and the site-specific recognition of the system. If desired by the customer, ENERCON will perform the installation of the transponder equipment and make the necessary arrangements with the manufacturer as well as provide the wind farm data.

After the type testing of our cooperation partner’s transponder system has been completed successfully, the first retrofits are possible since the end of June 2020. ENERCON wind energy converters can also be retrofitted with a BNK interface that is compatible with other BNK systems that are commonly available on the market; this interface can be used for the centralised control of the entire wind farm. The interface is available for most of ENERCON’s current wind energy converter models. New wind energy converters, too, can be equipped with the transponder system where applicable.

ENERCON successfully markets 250-MW wind farm in Sweden

ENERCON has gained Credit Suisse Energy Infrastructure Partners AG (CSEIP) as a majority shareholder for the ‘northern part’ of the Markbygden II project, a large-scale wind energy project in Sweden. The Swiss investor is acquiring up to 85 per cent of the shares in the onshore wind farm in the municipality of Piteå, in the northern Swedish province of Norrbotten. ENERCON is installing 63 wind energy converters of type E-138 EP3 in the project with a nominal power of 252.7 MW. ENERCON itself will remain long-term shareholder with a minority of the shares, underlining its lasting strategic interest in Sweden as a wind energy location. ENERCON is the sole owner of the MB Etapp II cluster. MB Etapp II is comprised of a “northern part” with 63 x E-138 EP3 WECs and a “southern part” with 97 x E-138 EP3 WECs. The necessary work for grid connection and infrastructure started in 2019. Construction of the “northern part” is scheduled to be completed by the end of Q3 2021. The “southern part” will follow.
ENERCON has installed the prototype of the E-160 EP5 at the Wieringermeer wind energy test site in the Netherlands. A large portion of the projects planned worldwide is already based on this WEC type.
ENERCON’s new type of wind energy converter, the E-160 EPS, is an important cornerstone of the new product and marketing strategy pursued by the company with the goal of strengthening their international market position even further. A large portion of the projects that are currently in the planning or negotiation stages worldwide is based on this new wind energy converter. It is ENERCON’s new top model with the largest rotor diameter in the product portfolio; it is the low-wind model of the EP5 platform, which also includes the E-147 EP5 for medium wind sites as well as the E-136 EP5 for strong wind sites. The installation of the first prototype at the wind energy test site in Wieringermeer in the Netherlands was therefore closely monitored by the WRD development engineers and the installation coordinators at ENERCON project management.

Installation in the time of coronavirus

“I am really proud of our team who were able to accomplish the installation for the first E-160 EPS while facing the special challenges presented by the coronavirus pandemic,” says Daniel Wolken, General Project Manager for Wieringermeer at ENERCON Project & Logistics Management. “Fortunately, the construction site was not affected by the lockdown. There were some minor restrictions and delays due to the effects of the pandemic on the global supply chain. But we were able to keep working on site and to stay largely on schedule.”

The E-160 EPS prototype with 4.6 MW of nominal power was built at the test site in North Holland province about 80 kilometres north of Amsterdam on a modular steel tower (MST) with a hub height of 120 metres. Within view of this site, ENERCON had already installed the E-138 EP3 E1 prototype with 3.5 MW of nominal power in the spring of 2019. That project, too, was managed by Daniel Wolken. “I am really excited to be part of the installation effort of the first machines of these series which are currently our most important ones,” says Mr Wolken. “Prototype projects always come with their own challenges because the technology is new and the procedures are new. But that is precisely what makes them so interesting. And the entire team really considers it an honour to be part of such important projects for the company.”

One of the important tasks of the prototype team is to gather experience values and relevant data for all processes during the installation. “For example, we determined how much time was needed for each individual work step at the construction site,” says Daniel Wolken. These data are then evaluated together with the ENERCON Site Logistics experts. “We use the prototype stage to further optimise the pre-assembly and installation processes of the EPS system type in preparation for the installation of the series-built machines that will start shortly,” explains the project manager. The experience from prototype installation will be integrated into the assembly instructions and the documentation for the wind energy converter.

Longest rotor blades in the portfolio

A particular challenge during the installation of the first E-160 EPS was the transport and handling of the rotor blades. These components, manufactured by rotor blade maker LM are 78.3 metres long. This makes them the longest rotor blades in the ENERCON portfolio at this time. This called for a new logistics concept which was developed in cooperation with the transport service provider, Transannaberg.

It included loading tests and test trips using the intended transport equipment and involving a detailed route inspection in order to optimally prepare the direct transport of the prototype components from the factory in Poland to the construction site.

The single-blade installation was performed using some tools that were newly developed by ENERCON: the blade hoisting device for rotor blade installation, where the device is attached to the crane hook together with the fitted rotor blade; and the hub rotating tool, specially adapted to the EPS type for turning the rotor head during blade installation. “This is new equipment for ENERCON,” says Daniel Wolken. “We were able to draw on some experience from the installation of the first E-147 EPS in Finland, where it was used for the first time, but in Wieringermeer, we had to adapt the procedures to the larger EPS type.”
Annual yield at 7.5 m/s wind speed at hub height: 19,415 MWh, 21,536 MWh

Hub heights: 120 m, 166 m

Generator: direct-drive permanent magnet generator (PMG)

direct-drive permanent magnet generator (PMG)

Note on ENERCON events: Events are currently being rescheduled as a result of the coronavirus pandemic. New dates will be published on enercosm.com as soon as they are definite.
Aloys Wobben Stiftung and EWE plan to combine wind farm business activities

The partners plan to establish a joint venture and signed a corresponding declaration of intent at the end of April.

The Aloys Wobben Stiftung and the EWE AG want to pool their wind farm business activities. A corresponding declaration of intent to establish a joint venture was signed at the end of April and since then the plans for the project have been in full swing. The aim of the partnership is to achieve a permanent and significant cross-sector increase in the share of renewable energies. The Aloys Wobben Stiftung, sole shareholder of the ENERCON network, will bring a significant proportion of ENERCON wind farms to the company. In addition, it will also bring ENERCON’s own project development – including the project pipeline – and the energy marketing subsidiary QUADRA Energy GmbH. For its part, the EWE will transfer wind farms to the company, which will become one of the largest onshore wind operators in Europe as a result of the cooperation.

“When this comes into being, ENERCON will be able to focus primarily on its key competencies of development and construction as well as sales and servicing of wind energy converters in future,” says Heiko Janssen, chairman of the board of the Aloys Wobben Stiftung. “For the Aloys Wobben Stiftung, the planned joint venture with EWE is an important element in the ongoing reorientation of the ENERCON network, and provides a good opportunity to continue developing the value of the portfolio and the project pipeline together with a regional partner,” says Janssen. According to him, ENERCON links the establishment of a joint venture to the goal of using the collectively created resources, particularly for ENERCON’s new focus on WEC business activities.

ENGERCON CEO Hans-Dieter Kettwig also points out the many years of shared history that connect the two companies from Lower Saxony. “We have a trust-based business relationship with the EWE that has been in place for decades already. The EWE was one of ENERCON’s first customers, we have worked together on various successful research projects over the years and have always committed ourselves to driving renewable energies further forward. We welcome this project, and see the EWE as the right partner for it.”

According to Kettwig, the handling of energy marketing matters in which ENERCON has heavily invested in will not change on the customer side once the joint venture is established. “The new shareholder structure will have no impact on the business activities conducted by QUADRA and ENERCON. QUADRA will remain one of the most important partners for our customers. In addition, the pooled expertise of QUADRA and EWE will benefit our customers in many areas – such as green energy marketing.”

Hans-Dieter Kettwig believes the onshore activities of both companies will be strengthened on the whole when they join forces. He sees each side as having extensive expertise that complements the other’s perfectly. “We will capitalise on our synergies and pool our strengths. As a result, a new key player will emerge in the energy market from the ranks of the renewables, setting an important course for the next stage of the energy transition!”

The contracts are expected to be finalised and the details of the cooperation prepared by the end of the year. The official formation of the company is planned for the beginning of 2021.
ENERCON has concluded an agreement for a new credit line with its financing banks. The KKV contract (Konsortialkreditvertrag) represents an important precondition for the successful continuation of the current turnaround efforts of the company.

Dr Thomas Cobet: We concluded a contract that allows us to provide the guarantees that are necessary in particular for major projects abroad. In addition, we will pay back our debt obligations at the corporate level, which are certainly not exorbitant in relation to our total assets, according to plan. This will be absolutely possible according to our financial plan, which the banks scrutinised closely of course, in spite of the large expenses related to the ongoing restructuring. The initial term of the agreement will be three years, giving us the planning security we need to implement the operational turnaround.

wb: What are the details of the agreement? Dr Thomas Cobet: We concluded a contract that allows us to provide the guarantees that are necessary in particular for major projects abroad. The result was a large annual loss, which already became apparent in autumn. It was mostly related to the posting of one-off expenses, which are virtually unavoidable in turnaround situations. At the same time, however, ENERCON has had many highly successful years and the corresponding profits have remained and been invested in the company, and for this reason, the company still has a very solid substance. This, on the other hand, has really helped the negotiations.

wb: What does the agreement mean in concrete terms for ENERCON’s reorientation? Dr Thomas Cobet: This refinancing is an important milestone on the road to restoring ENERCON to what it has always been: a developer of state-of-the-art wind energy converters of the highest quality. The turnaround provides the master plan. It allows us to reconnect with the successful times of the past.

wb: What remains to be done until then? Dr Thomas Cobet: We have already made good progress in the turnaround effort, and the KKV agreement calms things down and gives us room to manoeuvre. This gives us confidence and belief that the next steps will work out, too. However, there is still a lot of work ahead of us. The turnaround will be with us until the end of 2022. A particular focus will be on the market launch of the new EP3 and EPS WEC types, the ongoing and uncompromising optimisation of the cost of energy (CoE) as well as the internationalisation and reliability of the supply chain for the new products and everything that entails. In parallel, we need to press ahead with the reorganisation of the company, which has already started, with a view to our new international focus.

wb: How will the newly secured financing affect ENERCON’s customer relationships in your opinion? Dr Thomas Cobet: The financing agreement was reached independent of the actual realisation of this planned joint venture. The company still has a very solid substance. Of course I am happy that the talks have led to the desired outcome, in particular because the negotiations were in fact not always easy. One of the reasons is that the economic developments at ENERCON, in particular in 2019, cannot be called anything other than disappointing. The company has of course caused the banks to be somewhat cautious. In combination with our own difficult situation, it therefore took a little time at the beginning of the talks to build the necessary trust.

wb: What is the economic development at ENERCON currently found in particular because the negotiations were tricky at some point, even for a company that has a strong economic substance. wb: What other factor is important in the customer relationship instead? Dr Thomas Cobet: In order to keep the trust of our customers base in the long-run, I think that our operative performance is the most important factor – for example our reliability in completing orders, which our customers have always appreciated and which we intend to improve continuously in all areas as part of the turnaround.

wb: How did this help with reaching the agreement with the banks? Dr Thomas Cobet: The financing agreement was reached independent of the actual realisation of this planned joint venture. While I can understand this to a certain degree, but at the end of the day, all parties must recognise that a situation in which suppliers would like to see their money up front but banks want to hold off with disbursing funds until the very end becomes quite tricky at some point, even for a company that has a strong economic substance.

wb: Dr Cobet, how relieved are you that the company and its suppliers have come to this agreement? After all, the talks did take a while... Dr Thomas Cobet: Of course I am happy that the talks have led to the desired outcome, in particular because the negotiations were in fact not always easy. One of the reasons is that the economic developments at ENERCON, in particular in 2019, cannot be called anything other than disappointing. The result was a large annual loss, which already became apparent in autumn. It was mostly related to the posting of one-off expenses, which are virtually unavoidable in turnaround situations. At the same time, however, ENERCON has had many highly successful years and the corresponding profits have remained and been invested in the company, and for this reason, the company still has a very solid substance. This, on the other hand, has really helped the negotiations.

wb: What were the greatest challenges in these talks with the banks? Dr Thomas Cobet: It is certainly not helpful that the entire sector is currently experiencing an unprecedented price collapse, which is reflected in the business results and in the banks’ risk assessments. If you look at just the most recently published quarterly figures, the major western companies in the industry have amassed losses totalling half a billion euros in these three months. While I can understand that customers may find it tempting to reinforce this trend by making corresponding demands, I would like to point out that this can have dire consequences in the medium term if the selection on the market becomes severely limited and the quality of service and of customer-specific support deteriorates.

Getting back to the question – the low profitability of the industry in combination with the bankruptcy of another wind power company...
An optimal customer focus is the key factor. When it comes down to it, the most succesful companies are typically those that have a clear strategic direction – something that ENERCON definitely has – and that also make sure that this direction is really a good fit for what customers are looking for. This is where we need to find, and then keep, the right balance. We will never abandon our mission to build wind energy converters of the highest quality and reliability, but we cannot elevate these goals to such absolutes that we end up developing machines that no longer provide our customers with the right value for money. So we need to find the right balance that can also compete in the market in a leading position. With our new product platforms EP3 and EP5, we are well on our way towards achieving this very goal. The lively demand we see from our customers confirms this.

_‘wb: How would you judge ENERCON’s current financial situation – against the background of the ongoing turnaround, the KKV agreement and the coronavirus pandemic?_  

**Dr Thomas Cobet:** Like I said, in spite of everything – the dramatic collapse of the domestic market, the crisis year 2019, and the ongoing restructuring effort – ENERCON still has a very solid substance. Our professional and proactive crisis management also enabled us to maintain our operative business throughout the COVID-19 crisis without any significant restrictions. Given the global recession caused by the pandemic, this is not something that should be taken for granted. ENERCON is weathering the COVID-19 crisis relying on its own strength and wishes to continue in this way and not rely on government aid packages. In the financing talks, this was another point to our advantage which had a positive impact on achieving the agreement.

It is of course without question that in the current situation, we need to act with extreme caution, in particular with a view to costs. As the restructuring continues, we must keep a close eye on our liquidity. We have therefore imposed very strict cost discipline. However, even after the difficult year 2019, I remain convinced that I am working for a company that within the industry is in an excellent position with regard to financial solidity and that will enjoy great prospects for the future once the turnaround has been successfully completed. I also feel certain that the DNA of the company is strong enough to make it through the current difficult times.

_‘wb: Even though the first 100 days of getting used to your new job are already behind you, let us ask you the obligatory question: Have you settled in at ENERCON yet?_  

**Dr Thomas Cobet:** I most certainly have. Even though the initial phase was somewhat turbulent because of the financing, this change was the right decision. Ever since I have been involved in the wind industry, and that has been a few years now, ENERCON has always been the company that I found most fascinating. It starts with the unique design of the wind turbines, which I personally find quite beautiful, even though some changes will be required for the latest platforms while maintaining their uniqueness. And I am still convinced that the basic technological direction of the company is the right one: At the end of the day, I think that in science and technology the clearest evidence of human ingenuity is in the simplification of things, and the boundary value of simplification is of course the complete omission as done in gearless turbines.

### ABOUT DR THOMAS COBET

Dr Thomas Cobet, born in Kassel in 1975, joined ENERCON Management in October of 2019. He has many years of experience in the wind energy sector. His most recent position was as CFD Onshore for the region North Europe & Middle East at Siemens Gamesa. Before that, he was responsible among other things for integrating the financial divisions of Siemens and Gamesa following the successful merger of the companies.

Dr Thomas Cobet studied business economics and philosophy at the University of Würzburg and the École Normale Supérieure in Paris, graduating with two Master’s degrees. He then earned a Ph.D. in philosophy at the University of Cologne. He is married and has two children. As CFD, he is responsible for financial matters at ENERCON.

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**ENERCON focuses on new software for the assessment of wind resources**

ENERCON publishes in-house developed turbulence models for site analysis in the open-source tool OpenFOAM and thus saves maintenance of the software for the estimation of wind conditions at possible WEC sites.

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The development of a wind farm often starts with the site analysis. In addition to the examination of aspects of species and nature conservation, of distance rules and of legal framework conditions, it also includes the assessment of wind conditions at possible site for wind energy converter (WEC). Wind resource assessment is a process by which project engineers estimate the future Annual Energy Production (AEP) of a wind farm by estimating wind conditions at planned turbine locations in hub height. For flat and non-forested terrain, it can be assumed that the wind conditions at planned turbine locations would be same as observed on meteorological masts. In complex or forested terrain such assumptions are not valid. An advanced tool is needed for correct assessment of wind conditions.

ENERCON uses for simulating atmospheric flows in simple and complex terrain the in-house developed CFD (Computational Fluid Dynamics) tool E-Wind. “E-Wind is mainly used for wind resource assessment. By taking account of terrain and forest effects on wind flow in CFD simulations, E-Wind extrapolates the wind statistics from meteorological masts to planned turbine locations which is then later used for AEP calculation,” explains Marcus Latzel, Head of Site Simulation & Meteorology at ENERCON’s research and development subsidiary WRDMS.

E-Wind is based on open source (publically available) CFD package OpenFOAM which releases a new version every six months. The open source code has been extended internally by ENERCON: site simulation and meteorology department. New turbulence models have been implemented to cater for the needs of project engineers for wind resource assessments. As of now, over 50 trained project engineers can make daily use of E-Wind thanks to ENERCON’s HPC cluster “tarant.” E-Wind has successfully replaced a commercial CFD tool for wind resource assessment. ENERCON published these in-house developed turbulence models for atmospheric flows in the latest June 2020 release of OpenFOAM v2006. The turbulence models are extensions to already available standard “k-upwind” and “k-omega (SST)” models of OpenFOAM. Both models are extensively validated and give the CFD community a great tool to simulate the complex atmospheric flows involving plant canopy and buoyancy effects.

The models are published in joint cooperation with one of the world’s prestigious renewable energy institute, National Renewable Energy Centre of Spain (CENER), and the OpenFOAM core developer OpenCFD Ltd. “The motivated and committed cooperation with the partnering institutions CENER and OpenCFD made the publication possible,” states Marcus Latzel. ENERCON benefits from the strategic decision to publish the turbulence models, as do users, partnering institutions and the community. On the one hand, the published models no longer have to be maintained by ENERCON every six months with every release of a new OpenFOAM version. From now on, the maintenance will be taken care of by OpenCFD Ltd. “On the other hand, we are providing a benefit in return for the advantages that the publicly available tool offers ENERCON. It strongly highlights our belief in the culture of ‘giving back to the OpenFOAM Community,’ says Marcus Latzel. Since the basis of the turbulence models is an open source code developed by the community, ENERCON is willing to contribute to the OpenFOAM community by publishing some of the in-house developments.

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**TECHNICAL LEXICON**

- **CFD**: Computational Fluid Dynamics
- **WEC**: Wind Energy Converter
- **AEP**: Annual Energy Production
- **HPC**: High Performance Computing
- **OpenFOAM**: Open Source Fluid Dynamics Simulation Software
POLITICS_

Initial progress!? Taking stock of Minister Altmaier’s 18-point plan

CDU and SPD come to an agreement about the minimum distance from residential buildings. Minister Altmaier suggests involvement of municipalities. Deutsche Flugsicherung applies new calculation formula. Type testing for BNK transponders.

The depression of the German wind energy sector continues. All warnings and calls for help go unheard by politicians. It had to come to bankruptcies and deep cuts in this formerly healthy growth industry that were widely perceived in the public, had to come to factory closures both at ENERCON partners and at other wind power companies making newspaper headlines in order for the Federal Ministry of the Economy to take action because ambitious climate protection can simply not go hand in hand with snuffing out the expansion of the renewable energy sector! Still, the coalition partners insist that by the year 2030, 65 per cent of power consumption will come from renewable energy generation. If we want to assume that all power-generating systems that are currently on the grid will still be fully operational in 2030, the attainment of this goal would require a theoretical additional amount of electricity of 150 terawatt-hours (TWh) on top of the green power being generated today. According to FA Wind, a German wind power association, 84 TWh of this electricity would have to come from wind energy.

The reality, however, presents a different picture: By the end of 2020, around four gigawatts (GW) of wind energy capacity will drop out of the EEG scheme. After that, the funding scheme will shed an average of 2.4 GW every year. Even if profitability were still a given – which is at least doubtful in view of the current low prices in energy trading – many installations will reach the end of their service life in this very period. With the weak demand due to the coronavirus pandemic, the wholesale market prices are as low as 10 €/MWh for energy. In this very period. With the weak demand due to the coronavirus pandemic, the wholesale market prices are as low as 10 €/MWh for energy. These are historical lows!

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The AVW which finally passed into law gives hope that the local acceptance of wind energy will grow. This document defines the requirements for the marking of wind energy converters as aviation obstacles: With the approval of the Bundesrat, the transponder-based nighttime marking can now be introduced; by the summer of 2021, new and existing WECs will be dark at night rather than flashing red. The Federal Government must absolutely resist any calls to further extend the deadlines – otherwise, the conclusion of this success story will be delayed needlessly, creating more frustration among residents.

The Federal Ministry of the Economy published a key issues paper about the financial participation of municipalities and communities that has already been discussed with the federal states and industry associations. The legal aspects will be fleshed out in the upcoming major amendment of the Renewable Energy Sources Act. ENERCON is critical of the proposed implementation and reiterates that legislators should listen to the proposals coming from the industry. “To create acceptance for wind energy among residents, we need more local value creation,” says ENERCON Managing Director Hans-Dieter Kettwig. “For this reason, ENERCON supports the clear obligation of all wind projects to share a fixed portion of their revenue with the municipality.”

Air traffic control – DVOR

Deutsche Flugsicherung (DFS), the German air traffic control body, and the Bundesbaudienstamt für Flugsicherung (BAF), the Federal Supervisory Agency for Air Traffic Control, will use the revised assessment method from the “WERAN plus” project on the interaction between wind energy converters and terrestrial navigation/radar; this project was conducted by the PTB, the National Metrology Institute of Germany. The WERAN plus project used drone-based on-site measurements and numeric full-wave simulations to examine the impact of wind energy converters on Doppler omnidirectional radio range systems (DVOR). This was used as a basis for evolving and adjusting the calculation formula developed by the DFS in collaboration with the PTB. It has now been adopted by the DFS and will be applied in wind energy projects starting on 1 June 2020. ENERCON views this updated calculation formula as a welcome first step; however, this cannot hide the fact that a thorough review of the “new” DFS evaluation methods is needed; complete with critical scrutiny of the associated flight measurement data. Furthermore, we reiterate our core demands, namely the adoption of ICAO guidelines: a test range of 10 km for DVOR as well as the fastest possible upgrade of all VOR (omnidirectional radio range) systems to at least DVOR (Doppler omnidirectional radio range) or better yet, DME (distance measuring equipment). In addition, the switch should be made to pure area navigation, moving away from VOR/DVOR. To this end, we call on the DFS to publish its plans for the dismantlement of VOR/DVOR.

As a reminder: Deutsche Flugsicherung, the German air traffic control body, has defined an absolute maximum permitted test radius of 15 km around omnidirectional radio range systems – even though the international standard is only 10 km. Throughout Germany, almost 4,800 MW of wind power already in the planning stage are being prevented according to a survey conducted by FA Wind. If the 39 DVOR systems throughout Germany would only require a test radius of 10 km, this would allow the construction of an additional 1,080 MW of wind power in one fell swoop.
Uncompromising climate policy is a must: How will we achieve long-term economic recovery after the coronavirus recession?

The effects of the coronavirus pandemic have created huge challenges for the German economy. At the same time, the crisis also has the potential for a climate-friendly new beginning based on future-oriented technologies. It is now up to politicians to rigorously drive the energy transition forward in order to boost the economy. Climate policy and economic policy must go hand in hand, heading towards the same goal. Short-term coronavirus aid packages are not enough. By contrast, economic stimulus packages with a clear focus on the energy transition and climate protection could strengthen the economy in the long term and further incentivise ecological business strategies.

Windblatt spoke to Andreas Jung, member of the German parliament and vice-chairman of the CDU/CSU parliamentary group, about ways out of the coronavirus recession, about the inseparability of climate protection and economic recovery, and about the prospects for wind energy in Germany.

Andreas Jung: We need more ecological components in corporate taxation, for example. The principle should be: less CO₂, fewer taxes! Companies that invest in climate protection early on must enjoy greater tax benefits. The provisions of the economic stimulus package are not enough in this respect. More scenarios must be covered, for example the installation of solar power systems on company buildings. On the whole, energy taxation should exclude the CO₂-free portion. The EEG surcharge must be further reduced through funds from certificate sales and via the budget. This lightens the load, and it also makes e-mobility and heat pumps more attractive. We need to rigorously expand on the steps contained in the climate and economic stimulus package. The success of Europe’s Green Deal must come from an uncompromising application of market-economy climate instruments. Based on additional CO₂ trading systems for heat, transport and shipping as well as an aggressive expansion of the certificate trading system for air traffic, in the long term we need to develop a standardised, ambitious system – in Europe and, ideally, beyond Europe.

Andreas Jung: The combination of coronavirus aid with investment in climate protection is enjoying broad support in our parliamentary group. This is evidenced, for example, by the fact that the coalition is launching a combined economic stimulus AND future-oriented package. We would be sorely misguided if we allowed climate protection to take a back seat as we are facing the challenges of the COVID-19 crisis. We cannot risk creating a gap between our goals and the things we have already achieved. For this reason, we must continue to build on the climate package without compromise. We must not slack off now. If we keep pursuing future-oriented technologies for nature and for the stimulus programme, then we will strengthen the economy at the same time – without such innovation, we will backslide!

Andreas Jung: I am happy that we were able to come to an agreement regarding the issue of minimum distances, and hopes that this will increase acceptance in the community. Giving the municipalities a share of the proceeds will also help in this regard. We need to strengthen community-owned energy. What is also crucial right now is to speed up the planning and approval processes and to better integrate the expansion of renewable energies with the expansion of the grid. In addition, wind energy can support the breakthrough of green hydrogen as a key technology. Because the billions included in the economic stimulus package are also intended to make Germany a driver of innovation in the field of hydrogen technologies and electricity-based fuels. Another issue that will receive greater focus in the future is the combination of renewable energies and battery storage systems.

QUESTIONS TO

Andreas Jung

Member of the German parliament and vice-chairman of the CDU/CSU parliamentary group

1. “wb: Which concrete measures do you propose for bolstering industry in Germany and promoting climate protection at the same time?”

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2. “wb: What is the “signs of the times”, in your opinion, that the wind energy sector in Germany needs to expect for the future?”

Andreas Jung: We are facing de-industrialisation, it is not because of our climate policy but because we have failed to recognise the signs of the times.” This was in response to positions taken by the Economic Council, a business association aligned with the CDU. Do you think this will convince the sceptics in your party who want to put climate protection and the energy transition on the back burner because of the coronavirus recession?

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What will be the consequences of the coronavirus pandemic for the Green Deal and the transition to a decarbonised economy? In late May, the European Commission presented its strategy for the economic recovery of the EU and provided some initial answers to this question. On the positive side, the European Commission wants to hold on to the Green Deal as a core project for the coming years. The time is now to take the right decision, said Commission President von der Leyen in her speech in front of the European Parliament: “We can now lay the cornerstone for a Union which is climate neutral” – these were the words of the Commission President. With a new EU budget for the years 2021 to 2027 and an additional investment programme of 750 billion euros, the European Commission plans to make total funds of 1.85 trillion euros available to help the EU emerge from this crisis stronger than before. These investments are intended to drive reforms in the EU member states that focus on the “green” transformation and the “digital” transformation.

After the European Commission started its legislative period last year with ambitious plans for a “European Green Deal”, the coronavirus pandemic broke out and hit Europe hard. In a heretofore inconceivable turn of events, the measures taken to protect the public health have brought the economic activity in many EU countries to a screeching halt. In view of these developments and not only in Europe, other political goals had to take a back seat temporarily. However, organisations like the International Energy Agency (IEA), science academies such as the German National Academy of Sciences Leopoldina, and international financial institutions like BlackRock agree: The recovery must be in harmony with climate protection and the goal of total decarbonisation by the year 2050 at the latest.

On 27 May, EU Commission President Ursula von der Leyen presented the EU strategy for the reconstruction of the European economy following the COVID-19 crisis. Used properly, these investments could speed up the energy transition in Europe and bring the continent closer to its goal of climate neutrality.

While the cornerstones of the recovery plan have now been revealed, the Commission has not yet followed them up with concrete measures. For example, we do not yet know which concrete instruments will be used to make the additional investments into renewable energies and the integrated energy concept. According to early announcements, additional money will be put into the Just Transition Fund of the EU that is intended to support the move towards renewable energies even in the traditional coal regions. The financing of additional calls for tender for wind energy and photovoltaic projects through EU funds has also been mentioned as a possible measure. The cofinancing, for example through the European Investment Bank (EIB), of wind energy projects that have already cleared the approval process would be another helpful measure.

The recovery plan will act in addition to the national stimulus programmes that have already been decided by individual member states. The latter still need to approve the plan. While a majority of the EU countries has already signalled their agreement, the “frugal four” have raised concerns about the amount of direct subsidies that would go to member states. This group includes Austria and the Netherlands as well as Denmark and Sweden. As Germany takes over the EU Council Presidency in July, the country will play a particularly important role in mediating between these positions. The German Federal Government should now demonstrate strong leadership and use this historic opportunity in order to set the course for a climate-neutral economy once and for all. This would also entail a clear commitment to wind energy and the important role it plays as an economic factor and a driver of innovation.
ENERCON has agreed another close cooperation with the utility Energie Burgenland in its expansion of onshore wind energy in Austria. The two companies recently concluded contracts on the supply of 51 ENERCON wind energy converters. This corresponds to an overall volume of 212 megawatts. The various ENERCON wind energy converters in different performance classes are to be installed in seven wind farms planned for Burgenland. Construction of the next projects resulting from this cooperation has already started.

“We are very happy that Energie Burgenland has chosen to put its trust in our company and technology once again,” says Paul Dyck, Country Sales Manager for Austria at ENERCON Sales. “We have a long-standing partnership expanding wind energy in Austria. We hope the new projects will add further chapters to our success story.”

ENERCON concludes supply contracts for 212 megawatts in Austria

The utility Energie Burgenland is having 51 wind energy converters made up of different ENERCON models installed by ENERCON in 7 wind farms. Construction of the next projects has already begun.

Energie Burgenland was focussed on generating renewable energy as early as 1997, when the first wind farm was constructed in Zunzdorf. After Austria passed its own Green Electricity Act regulating the generation of power from wind energy converters in 2003, a real construction boom took place: within the space of a few years, the Neusiedl, Weiden, Gols, Pama, Noudorf, Kittsee, Parndorf and Patmsneusiedl wind farms were built in North Burgenland, as well as another wind farm in Deutschkreutz (Central Burgenland). Energie Burgenland is the largest wind energy producer to this day and has made a huge contribution to Burgenland’s calculated energy autarky.

This concept for success will carry on in the third wind expansion stage. “We will be able to increase our power generation by around 25% using fewer WECs that are more modern,” report Managing Directors Wolfgang Trimmel and Klaus Maras. “Competent and experienced project partners will play an important role in achieving this.”


ENERCON rates the prospects for the Austrian market in the next years as extremely positive. Around 600 MW of approved projects across the country that had no existing funding tariff by the end of 2019 have now received confirmation of funding and will be realised in the next four years. In addition, the repowering of existing wind farms is gaining in significance. ENERCON is therefore in advanced talks with customers in other federal states as well, in order to discuss cooperation in onshore projects. “We want to make sure we can play our part in implementing the energy transition in Austria in future, too,” reiterates ENERCON CEO Hans-Dieter Kettwig. “We hope that this good start will be a sign of things to come and that this will have an effect on neighbouring countries. Austria and its neighbours still offer huge growth potential for wind energy. The region thus continues to be an important sales market for ENERCON.”
ENERCON realises major Soma and Karaburun projects in Turkey

ENERCON has successfully realised the two biggest wind energy projects in Turkey. With 564.1 MW installed power, the Soma and Karaburun wind farms are some of the largest in Turkey and Europe.

Over several stages of installation, more than 564.1 MW of power were installed in the Soma and Karaburun wind farms in Turkey using only ENERCON technology. The two major Turkish projects are among the largest wind energy projects in Europe. “We are proud of the fact we were able to wrap up installation of both of these large-scale projects in April despite the coronavirus pandemic,” says Mustafa Sunbol, Regional Head PLM ENERCON Turkey.

A total of 181 WECs were installed in the Soma wind farm, made up of 89 E-44, 80 E-70 and, most recently, 12 E-126 EP3 WECs. The wind farm output equals 312.1 MW. Its annual energy yield has now reached approximately 873 million kilowatt-hours following the completion of the Soma IV subproject. Around 525,000 tonnes of CO₂ can be saved as a result. Installation of the 12 E-126 EP3 WECs on tubular steel towers at a hub height of 116 metres started in the last quarter of 2019 in the provinces of Manisa and Balıkesir in western Turkey. The rotor blades, towers and foundation baskets were manufactured in Turkey, while the rest of the components were supplied from Germany. Official commissioning of the final two WECs is set to take place in May.

The company Polat Enerji is the customer in the Soma IV project. ENERCON has been working with them in Turkey for many years already. Polat has installed around 600 MW of wind energy capacity across the country using only ENERCON technology. For the Karaburun wind farm, ENERCON has installed 83 wind energy converters with a nominal power of 252 MW in two subprojects: 30 E-82 E2 WECs, 20 E-82 E4 and 11 E-126 EP3 WECs with tubular steel towers (116 metres) and 22 E-126 EP3 WECs with tubular steel towers (116 metres).

ENERCON commissioned the first E-126 EP3 model at the Karaburun wind farm located in the western Turkish province of Izmir in May 2019. The WEC components were mainly produced in Germany and Portugal. “ENERCON has proven its power of innovation with the new WEC type. The customers in Turkey are very satisfied with the EP3 range of WECs,” explains Arif Günyar, Managing Director ENERCON Turkey.

With more than 1,760 MW installed power (as at the end of April 2020), Turkey has been identified as a core market in the turnaround. ENERCON also expects favourable market development in the future. “As well as the two major projects Soma and Karaburun, we also want to complete the Kocatepe (100 MW) and Ulu (120.4 MW) projects in 2020 and 2021. Both of these are also in the three-figure megawatt range,” says Arif Günyar.

ENGERCON installs first wind farm in Tanzania

ENERCON commissioned the first wind energy converters in Tanzania in June. The project provides valuable experience for other projects in sub-Saharan Africa.

The three E-53 wind energy converters with a hub height of 72 m and a total power of 2.4 MW have been commissioned in the Southern Highlands of Tanzania in the Mufindi District, 580 km west of the port city and commercial hub Dar-Es-Salaam. Thomas Barkmann, Regional Manager of Sales for Africa, highlights the fact that these wind energy converters are the first to be installed in the country at all. The decision to use ENERCON technology was based largely on its excellent grid connection systems. This was a requirement for the project, as it is part of a rural electrification programme consisting of small hydropower plants and wind energy to supply power to the local tea industry and around 42 villages in the surrounding area. ENERCON is confident this project will generate further strategic advantages for the sale of more WECs. The three WECs will demonstrate the sophisticated technology and high quality for which ENERCON is known to other potential partners, such as the national utility Tanesco.

ENERCON carried out the project together with Rift Valley Energy, an African company specialising in project development and operation of infrastructure for renewable energies. For its part, ENERCON delivered the WECs to the port in Dar-Es-Salaam, provided the equipment for installation, trained the local installation teams and posted a Construction Manager to oversee the construction of the crane platforms and foundation and the installation of the wind energy converters. Rift Valley Energy took over the transport in Tanzania and the actual installation of the wind energy converters. “We supported the customer at all stages of project implementation,” explains Christian Mbeumo, General Project Manager. “Thanks to the dedication of all parties involved in this collaboration, ENERCON’s expertise and the project partner’s knowledge of the country complemented each other perfectly to enable this first wind farm to come into being in Tanzania.”

The three E-53 wind energy converters that have ever been installed in Tanzania.
ENERCON puts 82-MW Desfina wind farm into operation

ENERCON has installed a total of 35 wind energy converters (WECs) with an overall capacity of more than 82 MW in the Desfina wind farm in Greece. ENERCON commissioned the last wind energy converters in the south part of the wind farm at the end of May.

The Desfina wind farm was put into operation in May.

ENERCON has installed 28 E-92 and seven E-82 WECs with a hub height of 78 metres in the Greek wind farm Desfina, located to the north of the Gulf of Corinth in the region of Central Greece. The first WECs on the peninsula in the south of the municipality of Delphi were connected to the grid in February and March, and the remainder of them in the last weeks of May. An annual energy yield of 214 GWh is now set to be generated. The wind farm will thus supply clean renewable energy to around 47,500 households.

The trust-based cooperation between the authorities and the project companies meant ENERCON could draw up a logistics concept that was both time-saving and environmentally-friendly. The wind energy converter components were delivered to the Port of Itea, which is normally reserved for passenger liners and cruise ships. “This meant we were able to reduce the time required to transport the components by 90 percent, avoid detours to distant ports and implement an environmentally-friendly transportation concept,” explains Christof Büttner, Head of ENERCON IPP International. Access roads covering 60 kilometres had to be laid to transport the components to the wind farm. Sustainability was a huge aspect here, too, as they were created by recycling around 241,500 m³ of soil material dug out during foundation construction. ENERCON also used a concept with special purpose vehicles to deliver large components such as the rotor blades and tower sections in order to minimise the impact on nature.

Alongside the wind energy converters, ENERCON also created the electrical infrastructure: the high-voltage substation installed for the wind farm and the 35 WECs in the mountainous region were connected to the Greek power grid via a 36-kilometre MV cable and 11 kilometres of overhead line.

The cooperation for developing the wind farm in the regional district of Fokida had already been concluded in 2006. However, the project was temporarily put on hold due to the Greek debt crisis. ENERCON still stuck by the project. “We have always had good experiences in Greece and the favourable economic conditions under which the project has now been realised have proven us right,” reports Christof Büttner. The ENERCON IPP Team arranged the non-recourse project financing via a Greek bank in a tendering process.

Thanks to an extensive programme to raise awareness before and during project implementation and a constructive cooperation with the Greek approval authorities, the project was also widely accepted by the population.

The conditions for expanding renewable energies in Greece are favourable. In its National Energy and Climate Plan, the country announced its intention to become coal-free by 2028. The installation of wind energy converters with a total capacity of seven gigawatts is planned to help Greece achieve its aim of increasing the share of renewable energies in power generation to 65 percent by 2030. Billions will have to be invested in the renewables in the next years if these goals are to be met.
A total of 84 L100 LP2 WECs are currently being installed in North Caucasus. The first wind farm in Adygea comprising 60 L100 LP2 WECs has already been put into operation.

The Red Wind joint venture with the Russian wind energy company NovaWind came into being under the management of Lagerwey, and began installation of the second subproject at the start of April. 84 L100 LP2/2.5 MW wind energy converters are currently being installed for the 210 MW wind farm situated in the Kochubeyevsky district in the Stavropol region of North Caucasus, Russia.

Essential components of the Lagerwey WECs for this wind farm, including the generator, are being manufactured by ENERCON production partners in Germany and delivered to Russia. Due to the local content requirements that exist in Russia, Red Wind will produce the components for future subprojects in a new factory in Volgodonsk on the basis of a licensing agreement. By creating the WEC design and training teams for production, ENERCON is providing crucial support in localising production in Russia.

NovaWind is the wind energy division of the Russian energy corporation Rosatom. It set up the Red Wind joint venture with Lagerwey at the end of 2017 for the expansion of wind energy in Russia. Since ENERCON acquired Lagerwey at the start of 2018, the joint venture has belonged to the ENERCON network.

The overall project assigned to Red Wind amounts to 1 gigawatt. This is the equivalent of 600 WECs installed in several subprojects at various sites in Russia. The first wind farm to come out of this cooperation was already successfully connected to the grid this spring: a total of 60 L100/2.5 MW WECs (adding up to 150 MW) were installed in the Adygea subproject.

At the present time, ENERCON is conducting constructive talks with NovaWind on the subject of further cooperations in Russia and other eastern European countries. Irrespective of the Russian government’s still relatively reserved attitude towards renewables, Russian commercial enterprises are showing a growing interest in making investments in wind energy. The potential of power-2-X and production of hydrogen from wind energy are of particular interest to Russian oil and gas companies and could thus cause the government to revise its stance too.

Russia has a huge potential for wind energy expansion in general and is only just getting started. Experts believe there is a technical potential of up to 1,000 gigawatts. With fossil fuels, the “customer” in the European Union is up against Russia as the producer. As far as wind energy is concerned, however, Russia could benefit from European technology and experience and generate energy for the domestic market and possibly for exporting. ENERCON would thus welcome a deeper energy cooperation that expands the view to cover all forms of energy generation.