

# CONSTRUCTION

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## NEW CONCRETE TOWER CONSTRUCTION METHOD FOR WIND TURBINES



A team led by Professor Johann Kollegger at the Institute of Structural Engineering at Technische Universität (TU) Wien has developed a new tower construction method wherein double-wall elements are joined together on the ground to form large double-walled concrete rings. These rings are then lifted up with a crane, stacked one on top of the other, and filled with concrete. This technique results in a construction method for wind tur-

bine towers that is faster and less expensive than traditional methods.

“In wind turbine construction, large precast concrete parts are usually delivered to the construction site,” Kollegger said. “These are then assembled into a tower and then fixed to one another. This method is fast, but the costs associated with the special transportation of large precast parts can often be very high.”

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In addition, the tower construction method developed by TU Wien also features thinner walls and less reinforcing steel, which means that significantly fewer resources are being used compared to the familiar precast construction methods.

### A DOUBLE-WALLED STRUCTURE FILLED WITH CONCRETE

In recent years, Kollegger's team has repeatedly created a stir with their new and creative concrete construction solutions, for instance, with a folding bridge or even a concrete dome, which can be formed by inflating an air cushion beneath the concrete. And now a new concrete tower construction method has been developed and successfully tested.

Instead of heavy, solid concrete rings, hollow, rectangular double-walled elements are transported to the construction site. These double-walled elements are erected and joined together in a circle, so that they form a polygonal segment with an outer and inner wall.

"The segments are then stacked on top of one another, retaining the hollow space between the two walls," Kollegger said. "Only then is the inner space filled with concrete — one segment at a time. A monolithic concrete block is created, whereby the segments are joined together in an extremely stable way."

### THE DESIGN OF THE DOUBLE-WALLED SEGMENTS IS FLEXIBLE

"The individual elements are joined together to form a regular nonagon," said Ilja Fischer at TU Wien. "It is crucial to plan the segments in such a way that they remain stable throughout construction. Then, once they have been filled with concrete, stability is no longer a problem."

It is also important that the segments are packed closely together when the concrete is being poured in. Once they have been placed on top of one another using a crane and precisely aligned, the joints are sealed so that the concrete cannot flow out.



### PRESENTATION AT THE HANNOVER MESSE TRADE FAIR

TU Wien's tower construction method has already been successfully tested on a test site in Lower Austria.

"The new construction method is simple and fast," Kollegger said. "The double-walled elements can be transported without any issues. Taking into account all of our experience to date, our new method is expected to be economical and capable of establishing itself compared with the previous construction methods. We believe that our patented process offers benefits for very high wind power stations in particular." ↴

*Source: TU Wien*

For more information, go to [www.tuwien.ac.at](http://www.tuwien.ac.at).

## ENEL STARTS CONSTRUCTION OF NEW 150-MW U.S. WIND PROJECT

Enel S.p.A., through its subsidiary Enel Green Power North America, Inc. (EGPNA), has started construction of the Lindahl wind project, which will be Enel's first project to be built in North Dakota.

The wind project, which is owned by EGPNA subsidiary Lindahl Wind Project, LLC, will have a total installed capacity of 150 MW and, once completed, will be able to generate approximately 625 GWh annually

— equivalent to the energy consumption needs of more than 50,000 households in the United States — while avoiding the emission of approximately 450,000 tons of CO<sub>2</sub> each year.

"Lindahl underlines the strength of Enel's growth strategy in North America," said Rafael Gonzalez, head of the North American area for Enel's Global Renewable Energies division. "The new wind farm also marks

the group's entrance into a new state, North Dakota, further broadening our geographical footprint in the United States."

The construction of Lindahl, which is expected to be operational by 2017, will require an investment of over \$220 million, in line with Enel Group's current strategic plan. All of the power and renewable energy credits from the Lindahl wind project will be sold under a bundled, long-term power purchase agreement to Basin Electric Power Cooperative.

Lindahl is the fourth Enel renewable energy project to start construction in the U.S. in 2016, together with the 108-MW Drift Sand wind farm in Oklahoma, the 400-MW Cimarron Bend wind project in Kansas, and the 150-MW Aurora solar power project in Minnesota.

EGPNA is present in 22 U.S. states and two Canadian provinces



with more than 2.5 GW of total installed capacity of which more than 2 GW comes from wind. ↘

Source: Enel Green Power  
For more information, go to [www.enelgreenpower.com](http://www.enelgreenpower.com).

## GOLDWIND AMERICAS SIGNS 160-MW TEXAS DEAL WITH RES AMERICAS

Goldwind Americas, a subsidiary of Xinjiang Goldwind Science & Technology Co., Ltd., recently announced that it has signed an agreement with Renewable Energy Systems Americas Inc. (RES) to acquire the 160-MW Rattlesnake Wind Project located in McCulloch County, Texas. Once operational, the project will become Goldwind's largest wind project in the United States to date.

"This investment in the Rattlesnake Wind Project highlights our long-term commitment to the U.S. wind market and represents our first step of a five-year growth strategy to capitalize on the extension of the production tax credit," said David Halligan, CEO of Goldwind Americas.

The Rattlesnake Wind Project located approximately 125 miles northwest of Austin will utilize 64 Goldwind 2.5-MW permanent magnet direct-drive (PMDD) wind turbines.

The 160-MW Rattlesnake Wind Project represents the first phase of an expected 300-MW wind project, which was developed and will be constructed under a balance of plant agreement by RES.

"We are proud to partner with RES, a leading renewable energy developer and constructor, on our first project together," Halligan said.

Goldwind Capital, a subsidiary of Xinjiang Goldwind Science & Technology Co., Ltd., provided bridge financing to acquire the project and is in the process of arranging a financing package in partnership with top-tier financial institutions that will include construction and tax equity financing and a long-term ERCOT fixed price hedge for power production. ↘

Source: Goldwind Americas  
For more information, go to [www.goldwindamericas.com](http://www.goldwindamericas.com).



## SGURRENERGY SUPPORTS CANADIAN WIND PORTFOLIO TO FINANCIAL CLOSE

A portfolio of wind projects in Canada has reached financial close after SgurrEnergy provided lender's technical due diligence to support the financing process. SgurrEnergy, a Wood Group business, supported the project sponsor InstarAGF Asset Management Inc. with lender's technical due diligence on the zero emissions developments (ZED) wind energy portfolio. The scope consisted of an energy yield analysis and full review of site suitability, technology, design, construction contracts, and financial models. SgurrEnergy will also undertake construction monitoring services during the construction phase. The 30-MW portfolio consists of two sites in British Columbia, which will use five 3.2-MW Senvion wind turbines on each site. The projects will comply with the British Columbia Standing Offer Program (SOP), which encourages the development of small clean or renewable electricity projects up to 15 MW throughout the province.

"The SgurrEnergy team brought significant expertise to our process, thereby positioning InstarAGF to secure financing for these projects," said Stephen Simpson, vice president of InstarAGF. "SgurrEnergy is a global leader in renewable energy, and we look forward to their continuing support through the construction

phase of these projects."

Construction will begin in the next few weeks with commercial operations expected to commence by the first quarter of 2017.

"In a province that is dominated by hydropower, it is great to see wind energy projects come to fruition," said Matthew Irvine, senior consultant

at SgurrEnergy. "Having worked on these projects since 2014, the team is delighted to see them achieve financial close and move toward commercial operation." ↵

Source: SgurrEnergy

For more information, go to [www.sgurrenergy.com](http://www.sgurrenergy.com).

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## SENVION SECURES TURBINE ORDER IN JAPAN AND OPENS OFFICE IN TOKYO

Senvion, one of the world's largest and leading wind turbine manufacturers, recently announced the opening of its office in Tokyo to service the local market. Furthermore, Senvion has secured the go-ahead to deliver three turbines to a wind farm in Japan. The wind farm will use three Senvion MM92 turbines

designed to withstand extreme wind loads with a total generating capacity of over 6 MW.

These Senvion turbines will be some of the first wind turbines to comply with rigorous new construction standards introduced by the Japanese government last year. Senvion is working closely with the Meidensha Corporation, a leading electrical manufacturing company, to deliver the project, which is expected to start generating clean electricity in 2017. Senvion has been active in the Japan market since 2003 and has delivered 68 Senvion turbines with an installed capacity of 118 MW across 16 wind farms.

“While we are an international company, we put a very high value on local expertise,” said Jürgen Geissing, CEO at Senvion. “Our new office in Japan will ensure that our approach to delivering projects best meets the needs of both our clients and the local communities we work in.”

Senvion has recruited an experienced local team to manage the Japanese office. The team brings several decades of wind energy and broader energy expertise to their new roles. Kazuhiro Tanaka, the new general manager for Senvion in Japan, has several decades of experience in the



energy sector and has been working in the renewable energy industry since 2000, managing the sales, development, and operation of wind power plants. Prior to joining Senvion, he was Senvion’s sales agent in Japan since 2001 and was responsible for the sale of 68 Senvion wind turbines with a total generating capacity of 118 MW in Japan.

“This is an exciting time for wind energy in Japan,” Tanaka said. “The future market for new wind farms

The Senvion MM92 model turbines

looks very promising, and we are pleased that there will now be an established local Senvion presence. Senvion’s turbine technology is well-suited to the Japanese market where high performance and reliability are valued.”

Source: Senvion

For more information, go to [www.senvion.com](http://www.senvion.com).

## O&M TAKES CENTER STAGE IN MORTENSON’S NEW WIND ENERGY STUDY

The wind energy industry looks to be making a major shift, according to data in Mortenson’s new Renewable Energy Leadership Series study, “The 40-Year Turbine.”

According to the study, now that the industry has begun to mature, owners and operators are beginning to face the challenge of turbines that are coming to the end of their design lives and are turning to more proactive strategies to increase both ROI and the lives of existing turbines. The results of Mortenson’s survey indicate that these strategies rely on collecting more data.



“The industry is evolving into more predictive, proactive maintenance,” said Mortenson wind executive Todd Bell. “Owners are starting to install all of these maintenance processes to collect data so they can start forecasting failures, to avoid having unexpected catastrophic failures.”

This data is helping the industry at a time when critical decisions are being made.

As technology evolves, the strategies for prolonging turbine life are shifting at every level, from owners to manufacturers and EPCs. Standardization in parts and procedures as a way to extend turbine life appears as a recurrent theme in the study, as does the most significant challenge facing the industry — a challenge that has nothing to do with equipment or technology.

According to Bell, the largest challenge that the industry is cur-



rently facing is in finding, retaining, and developing qualified technicians, and how the industry responds will certainly drive the future of wind energy. ♪

Source: Mortenson

For more information, go to [www.mortenson.com](http://www.mortenson.com).

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