



# CITIC Heavy Industries Shortens Construction Time By 20%, Saving over CNY 5 Million

Bentley Applications Drastically Diminished Operation and Maintenance Costs for a 1.2-Million-Kilowatt Wind and Solar Base

## DESIGNING AND CONSTRUCTING MASSIVE WIND AND SOLAR ENERGY PLANT

With a complete design in hand, CITIC Heavy Industries is planning construction on key components of a wind power and photovoltaic power integration project in Xindian, a town located in Luoyang's Jianxi district. Consisting of 14 wind turbines, it will ultimately generate 1.2 million kilowatts of power. It is a transformative project in the region, as it integrates AI, Internet of Things (IoT), and advanced communication technologies to empower China's low-carbon energy transition with a new means of power generation.

The project employs transmission channels, efficiently consumes power, coordinates wind and photovoltaic power resources and consumption conditions, and focuses on optimizing land resources in mountainous and desert areas—all to achieve substantial ecological and economic benefits throughout the region. To meet all these goals and successfully deliver the project, CITIC sought to analyze and design efficient wind turbine foundations for the given environment and subsurface conditions,

## NOT OVERPOWERED BY SUBSTANTIAL CHALLENGES

CITIC realized that because this project was located offshore, it would present unique challenges to project delivery—and at tremendous scale. When compared to onshore projects, offshore assets carry particularly complex maintenance and safety requirements, high costs, and elaborate engineering considerations.

Another challenge was that CITIC would be working with various stakeholders representing different interests of the project. Projects designed, constructed, and maintained with other stakeholders, especially government agencies, often require

data to be collected and shared collaboratively. For this project, the team closely collaborated with the Luoyang Municipal Government and energy technology company CATL to ensure the project progressed as efficiently and effectively as possible.

## NUMEROUS SOLUTIONS WORKING IN TANDEM

CITIC chose to work with Bentley because of its powerful, intuitive and comprehensive design and analysis capabilities. "CITIC Heavy Industries' [use of] BIM technology has been successfully applied to the whole lifecycle of plant design," said Jian Ruan, head of BIM technology research and development at CITIC.

The team began by using PLAXIS and SACS to help complete the load calculation of wind power generating units, an element analysis of wind power, and an aerodynamics analysis of wind turbine blade and mechanics. CITIC also used OpenPlant Modeler and OpenBuildings Designer to generate a 3D model of the project, then used SYNCHRO to simulate construction to ensure timely completion of the project while boosting high-quality development and delivery.

## POWERING ECONOMIES AND A SUSTAINABLE FUTURE

Through comprehensively applying Bentley's solutions, CITIC Heavy Industries reduced the cost of procuring and constructing the complex infrastructure project. "The construction period is projected to be shortened by around 20%, reducing the cost of more than CNY 5 million," said Ruan. Bentley applications also allowed CITIC to substantially increase the return on investment by reducing maintenance costs and optimizing output. In fact, procurement costs were reduced by about 5%, construction costs by 2% to 3%,

## PROJECT SUMMARY ORGANIZATION

CITIC Heavy Industries

## SOLUTION

Structural Engineering

## LOCATION

Luoyang, China

## PROJECT OBJECTIVES

- ◆ To design, construct and operate a 1.2-million-kilowatt wind and solar base in Central China.
- ◆ To achieve substantial ecological and economic benefits throughout the region.

## PROJECT PLAYBOOK

OpenBuildings<sup>®</sup>, OpenPlant<sup>®</sup>, PLAXIS<sup>®</sup>, SACS<sup>™</sup>, SYNCHRO<sup>™</sup>

## FAST FACTS

- ◆ CITIC Heavy Industries collaborated with Bentley to dramatically reduce construction time for a substantial wind and solar project in Luoyang, China.
- ◆ Bentley's technology helped stakeholders overcome the immense technical and economic challenges that often come with offshore projects.
- ◆ The project will play a large part in China's ambitious carbon reduction targets.

## ROI

- ◆ With Bentley's solutions, the construction period is slated to be shortened by around 20%.
- ◆ The savings that CITIC generated will reduce project costs by more than CNY 5 million.

“With Bentley’s software, [this project] will become a benchmark for the industrial application of wind power in China.”

– Jian Ruan, Head of BIM Technology Research and Development, CITIC Heavy Industries

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design costs by 8%, and ongoing operation and maintenance costs of equipment by about 3%.

From a broader perspective, the wind and photovoltaic power generation base project will play a large part in achieving China’s goal of reaching carbon peaking by 2030, along with the country’s ambitious carbon neutrality goals. “With Bentley’s software, [this project] will become a benchmark for the industrial application of wind power in China,” said Ruan.



*CITIC Heavy Industries collaborated with Bentley to dramatically reduce construction time for a substantial wind and solar project in Luoyang, China.*



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