

# SANY RENEWABLE ENERGY



# 01 Who We Are



## About SANY Group

Founded in 1989, SANY Group has become a multi-national company that is pursuing the vision of "building a first-class company, fostering first-class talents, and making first-class contributions to society". Since its establishment, SANY is striving to build a global brand and become an industry-leading equipment manufacturer.

SANY's core businesses are design, manufacturing, sales, and support of heavy-duty engineering equipment, covering a full spectrum of products including concrete machinery (pump trucks, mixer trucks, trailer pumps, batching plants), earthmoving machinery (excavators, loaders), hoisting machinery (cranes), road machinery (soil compactors, motor graders, pavers), piling machinery (rotary drills), port machinery (reach stackers, telehandlers), petroleum drilling machinery, mining machinery (mining trucks, roadheaders), wind harness system, and prefabricated equipment.

Through an acquisition of Putzmeister, a leading German concrete machinery manufacturer, SANY concrete machinery ranks No. 1 globally for 16 years consecutively. Regarding earthmoving equipment, the units of SANY excavators sold in 2020 ranked No. 1 among all OEMs, dominating 15% market share globally. SANY's large-tonnage truck cranes, crawler cranes, piling machinery and roadheaders all take No. 1 title in China.

SANY is also well recognized by prestigious publications. Nominated in Forbes Global magazine, SANY ranks 468th, the very first Chinese heavy-duty equipment manufacturer ever listed in Forbes. Plus, SANY was among world top 500 largest companies per Financial Times, the only company originated in China. In 2021, the total sales revenue of the company broke a record of 27 billion USD.

SANY Group operates 11 manufacturing complexes located in China, U.S.A., Germany, India, and Brazil. Our sales and service network covers over 170 countries and regions. SANY Group has three listed companies: SANY Heavy Industry, listed in Shanghai Stock Exchange; SANY International Development Ltd., listed in Hong Kong Stock Exchange; and SANY Polytechnic College listed in NEEQ in China.

Sticking to our mission "Quality changes the world", SANY invests about 5% of its annual revenue on R&D. In terms of technology development, SANY has applied for a total of 13,694 patents, in which 10,613 has been awarded. There are three state post-doc research hubs, two national enterprise technical centers, and one state-approved testing center in SANY.

## Vision

Build a first-class enterprise  
Foster first-class talents  
Make first-class contributions

## Mission

Quality changes the world





## About SANY Renewable Energy

As a member company of SANY Group, SANY Renewable Energy was founded in year 2008 and is committed to becoming the global leader in the field of clean energy equipment supply and services. SANY Renewable Energy's market share has increased significantly and ranked among the TOP 10 global wind power manufacturers in 2021. The main business of SANY Renewable Energy includes:

- \* Wind turbine R&D, manufacturing and sales
- \* Wind farm designing, construction, operation & management

By integrating the world's top research and technology resources, SANY Renewable Energy continues to create wind turbine products with competitive advantages, and has the ability to independently design, construct and operate wind farms. SANY has developed comprehensive wind energy solutions including digital top-level design, intelligent production and manufacturing, complete integration system, core components manufacturing, wind farm designing, EPC, wind farm operation and maintenance.



# 02 Global Footprint

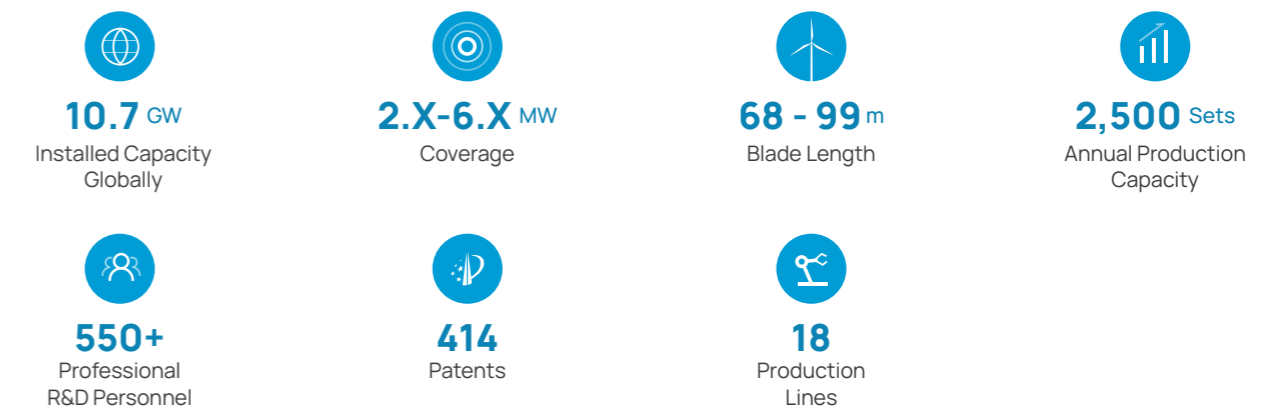


## Based in China and Expanding to World Markets

SANY Renewable Energy has three wind power blade production bases: Zhangjiakou in Hebei Province, Yutong in Jilin Province and Shaoshan in Hunan Province. Besides, SANY has established its R&D center in Spain and is one of the pioneers in promoting China's wind power technology to the global market.

With the first 102 units wind turbines exported to Ethiopia in 2013, SANY wind turbines are being used globally in over 20 countries including America, India, Vietnam and China. There will be a focus on the countries that rely on the layout of SANY's overseas system of globalization, such as India, Vietnam, Uzbekistan and more.

## Key Facts and Figures



# 03 Development History

## 2008

The first SE7015 (1.5MW) Wind Turbine was successfully rolled off the assembly line in Shanghai, indicating that SANY can independently develop and manufacture high power-rating wind turbine generator.

## 2010

SANY Wind Turbines were exported to the United States for the first time which brought the first step in global market.

3 SANY Renewable Energy Industrial Parks in Nankou, Tongyu and Zhangjiakou were completed and put into production, further improved production capacity of assembly line.

## 2012

SANY won a lawsuit against Obama and CFIUS for being blocked from investing in wind power projects in the United States.

## 2017

SANY Renewable Energy released the 905 ultra-low wind speed turbine, adopting a new structure, new control strategy, and new drive train to provide customers with smart wind turbines with high reliability and low electricity cost.

SANY Renewable Energy Europe Research Institute was established in Pamplona, Spain.

## 2019

SANY Renewable Energy's hot-selling model SE14125 with new generation ultra-low wind speed prototype was installed in Donghutang Wind Farm.

## 2021

The 5MW onshore Wind Turbine of SANY Renewable Energy obtained the certification issued by DNV, the international authoritative certification institution.

The first Wind Turbine of SANY Renewable Energy Tongyu Intelligent Manufacturing Base officially rolled off the assembly line, becoming the first domestic manufacturer of complete machines with all "turbines + blades" in Jilin.

SANY Renewable Energy officially launched three new models for the affordable and low-speed market: SI-1713.85/4.0, SI-1753.85/4.0, and SI-1834.55.

## 2009

The first SE9320 (2.0MW) onshore Wind Turbine was rolled off the assembly line.

## 2011

SANY built the first Wind Power Project in a turnkey model for the customer Tongmei Group.

## 2014

Ten innovative technologies for wind turbines and large components were launched in the field of research and development.

## 2018

SANY Renewable Energy successfully produced 908 model WTG in Beijing Nankou Industrial Park.

SANY Renewable Energy 71m Wind Power Blades were successfully rolled off the assembly line in Zhangjiakou, Hebei. The blade was the longest onshore 3.XMW low-wind speed one in the world, and it also marked the official entry of China's onshore low-wind speed Wind Turbine blade into the "70 meters era".

## 2020

SANY obtained the ISO9001 quality system certification for Indian wind power, becoming the second Chinese-funded enterprise approved for Wind Turbine production in India.

SANY Renewable Energy created a miracle in the industry that a single production line "produces 800 Wind Turbines in 100 days".

The largest onshore 5MW Wind Turbine unit with the mounted transformer in China completed the prototype installation and grid-connection.



# 04 Product Portfolio

## 3.XMW - 6.XMW Platform

SANY Renewable Energy mainly focuses on onshore wind turbines, fully covering onshore wind products from the 2.X MW to 6.X MW range. The company's wind turbine product design is characterized by "higher, larger, longer, lighter, and smarter"; namely: high tower, high power, long blades, light-weighted, and intelligent control. Our customized offering meets the needs of different customers and enables wind farms to achieve profitable return on different wind resource conditions.

SANY Renewable Energy adopts differentiated designs for its products according to different geographical and climatic conditions. Based on different environmental conditions, onshore wind turbines series are developed for sites with high, medium and low wind speeds, and high altitudes, normal low and freezing temperature environments.

Currently, we have signed many contracts of 4.X MW, and won the bid for many large projects of 5.X MW products. SANY Renewable Energy also has the highest market share in wind turbine products of 5 MW and above.



### 3.X MW - 4.X MW platform wind turbine

3.X MW~4.X MW platform wind turbine products are suitable for both the three north medium/high speed wind areas and the middle southeast low wind speed areas. The power covers 3.0 MW~4.05 MW. The diameter of the rotor can reach 171 meters, and the height of the hub can reach 140 meters.



### 4.X MW - 6.X MW platform wind turbine

4.X MW~6.X MW platform wind turbine products focus on the mid-to-high wind speed wind area of the affordable market, with power covering 4.2 MW~6.X MW, while the diameter of the rotor can reach 172 meters, and the height of the hub can reach 140 meters.



### High Reliability

Optimized product design, mature and reliable supply chain, and certificates from third-parties.



### High Cost Effective

Advanced control strategy is used to reduce the foundation load and weight of the tower, which can achieve lower LCOE.



### High Energy Production

Larger rotor can harness more wind, which combined with smart wind farm and control technology, jointly improves the power WTG power production.



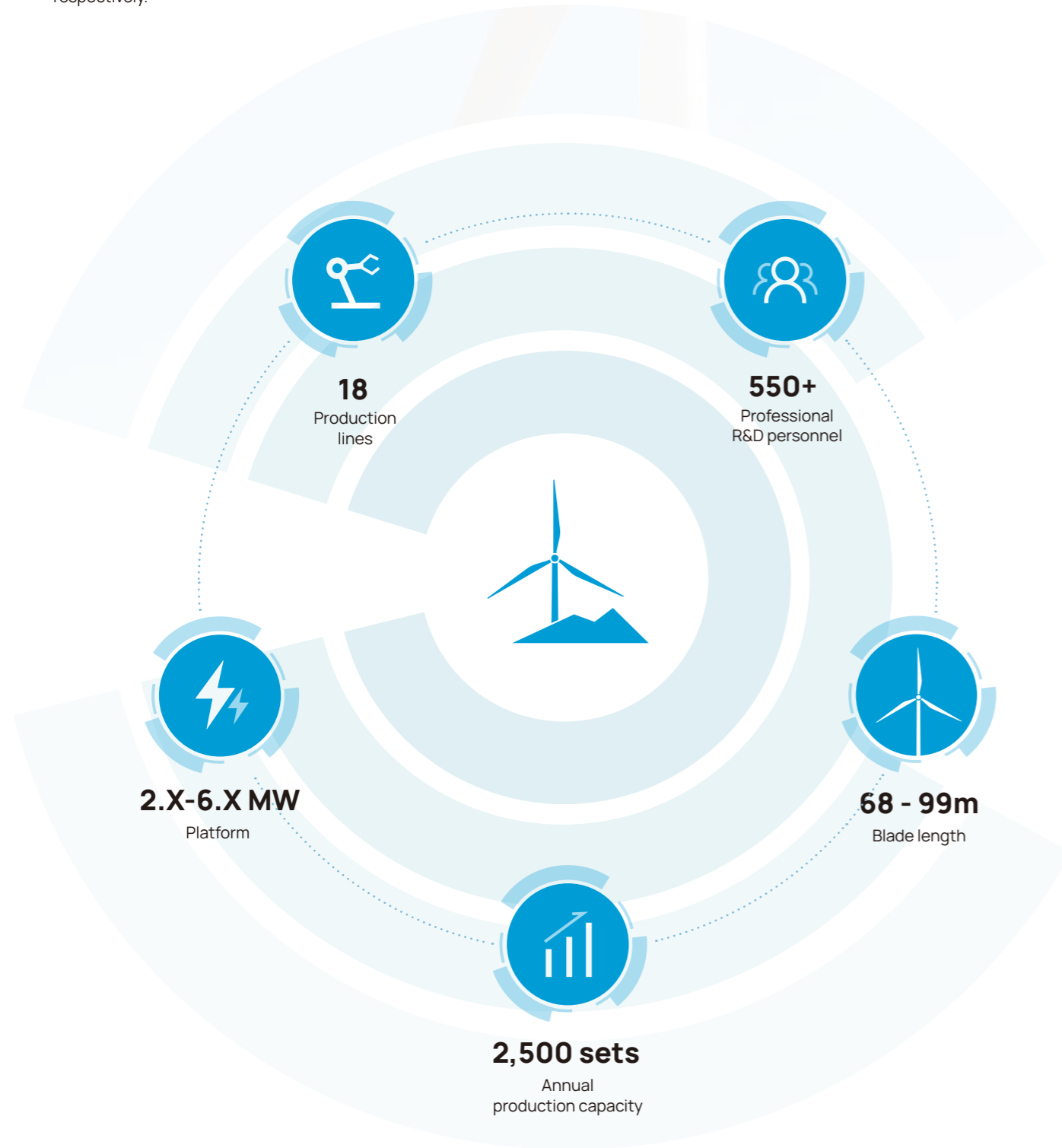
### Widely Applicable

Through advanced modularity and platform thinking in design, SANY aims to meet customization needs for low to high wind sites.



## Wind Turbine Blades

SANY Renewable Energy has the ability to independently develop and manufacture turbine blades. It has three blade production factories in Zhangjiakou, Tongyu, and Shaoshan respectively.



### Product Features

- 1 With shape and structure integrated coupling design, blades are closely integrated with the whole machine to achieve optimal matching.
- 2 Blade weight is optimized to lightest by reduced blade-root size design and integrated iteration of blade interface to wind turbine.
- 3 Complete inspection and testing system for raw materials, components and full-size blades ensures safety and reliability.
- 4 Family development platform and its strong expansibility enable product customization and rapid design.
- 5 Reliable and lightweight product design is achieved by collaboration between global development teams and partners





## Generator

Beijing SANY Intelligent Motor Co., Ltd. ( "SANY Generator" ), a subsidiary of SANY Renewable Energy, has been deeply engaged in the field of double-fed generators for over ten years. It specializes in R&D, manufacturing and after-sales service for double-fed generators.

SANY Generator focuses on technological innovation, introduction and training of team members, and has established a first-class R&D team in the industry. Digital project management platform and simulation technology is applied to develop generators with high reliability and high performance, contributing to the value for customers.

SANY Generator owns leading automated production equipment in the industry including robotstrapping machinery, automatic rotor bar forming machinery, imported expanding machinery and imported dynamic balance machinery, with an annual production capacity of 3,000 units.



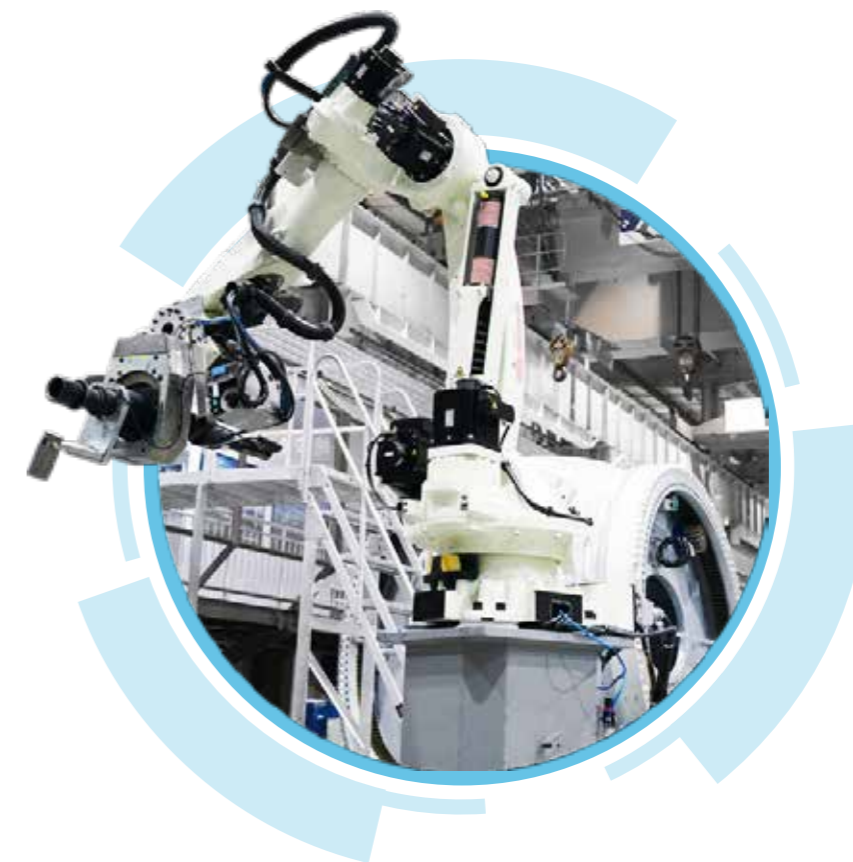
### Advanced Product Design

The product adopts advanced digital R&D platform and modular design, applying the latest technology to realize first-class output performance of wind turbine



### Upgraded Structure Design

The product has a super dual-circuit cooling system and super strong ability to discharge toner.



### Innovative Material

The product adopts leading H-grade less glue epoxy solvent-free insulation system and anti-corona technology.



### Stable Process

The product adopts new automation technology and refined process control to ensure product consistency.

**1 Smart Wind Farms**

Through the transformation and upgrading of operation and management modes, SANY Renewable Energy has developed Smart Wind Farms that form an innovative, integrated and interactive smart operation mode. The Smart Wind Farms has realized a leap-forward in development through the online to offline, cloud station, intercommunication and mutual trust mode for the new energy field.

**2 Wind Farm Monitoring Systems**

SCADA (Supervisory Control And Data Acquisition)  
 PHM (Prognostics and Health Management)  
 RDC (Renewable Data Center)  
 SWAPP (Smart Wind Farm Mobile Terminal)  
 CMS (Condition Monitoring System)  
 DOM (Document Object Model)  
 MO (Mobile Operation APP)



Supervisory Control  
And Data Acquisition



Prognostics and  
Health Management



Condition  
Monitoring System



Mobile Operation APP



Document Object Model



Centralized Control  
Management

**3 Wind Turbine Predictive Maintenance**

Intelligent operation and maintenance  
 WTG life prediction  
 Key component failure warning  
 WTG safety guard  
 Energy production performance improvement

**4 Cases**

SANY Smart Wind Farm serves **117** customers in **20** provinces in China currently:  
 Providing smart monitoring services for **117** stations  
 Providing fault diagnosis services for **51** stations  
 Providing online monitoring service of transmission chain for **95** stations  
 Providing mobile operation and maintenance business support for **12** new energy stations

# 05 Operation and Maintenance



## Digital Maintenance



### WTG Safety Guard

On-site safety issues are strictly guarded to ensure the safe and stable operation of WTGs



### Operation and Maintenance Support

On-site problems, difficulties and pain points are quickly located by experts, and the perfect working mechanism promotes the rapid correction of on-site problems.



### Wind Farm Quality Supervision

Standardize the operation and maintenance process with the help of digital methods to ensure strict quality control of key control points such as on-site hoisting, spot installation and commissioning.



### Aftersales Market Reservation

Use efficient operation and maintenance tools and technical means to grasp long-term market development trends.

Operation and maintenance services are one of the important businesses of SANY Renewable Energy. The main services are as follows:

### 1 Warranty for Spare Parts

We have one central warehouse, 100 spare parts warehouses, 500 professional service engineers and 80 million spare parts for regular operation and maintenance. Our service outlets in various provinces and cities across the country provide 2,000 types of common factory-made spare parts for wind turbines with ultra-low-cost parts and warranty services for repair, replacement and refunds.



### 2 Turbine Technology Upgrades

#### Technology upgrades

Aiming to improve the reliability of wind turbines and energy production, SANY Renewable Energy provides professional services including the replacement of large components and upgrading of control systems, converters and pitch.

#### Localization

According to the requirements of local power grids, we adopt domestic software and hardware in our monitoring systems and energy management platforms. At present, our company has implemented a domestic system for multiple wind farms, with stable equipment operation and smooth-functioning software, which have been recognized by many customers.



### 3 Digital Wind Farm System

The intelligent monitoring system provides 24/7 monitoring of the entire wind farm. Relying on big data and intelligent functions, it can perform online real-time analyses and predictions of operational data. Through the continual screening of data, problematic turbines can be identified and improved. The cycle of monitoring, analysis and prediction can be used to continuously improve the operation of the wind turbines.



### 4 Wind Turbine Operation Maintenance & Safety Testing

#### Wind Turbine Operation and Maintenance

SANY Renewable Energy can perform operation and maintenance work for manufacturers. We are able to address pain points and realize a favorable ecological operation and maintenance environment by employing a strong R&D team and a complete supplier system.

#### Turbine Performance Testing

We develop effective testing solutions for key items of concern and for core components during operation. These solutions can detect aerodynamic balance, gearbox functions, super capacitor functions and safety functions to promote safe, long-term turbine operation.

### 5 Blade Repair

SANY Renewable Energy has three blade production lighthouse factories in Zhangjiakou, Shaoshan and Tongyu, six fixed maintenance points across the country, 50 professional motor blade maintenance engineers, 10 sets of professional maintenance tools, and provides 24-hour response, providing one-stop service in blade inspection, diagnosis and repair.

# 06 Social Responsibility

## Peak Carbon Dioxide Emission and Carbon Neutrality

To build a new power system based on new energy.  
Our contribution to carbon neutrality and it will keep improving:



**3,364,837** /Ton

Energy Conservation and Carbon Dioxide Emission Reduction



**1,566,358** /Ton

Standard Coal Saving



**3,372,113** /MWh

Accumulated Electrical Power

## The Dream of Net Zero

### Green Dream, Net Zero Future

SANY Renewable Energy is committed to "promoting the efficient use of clean energy", protecting the lucid waters and lush mountains with clean energy, and building a "Net Zero Dream" with green manufacturing.

"Peak carbon dioxide emission and carbon neutrality" is leading a broad energy revolution and industrial transformation in China. An energy and power system with renewable energy as the main body will be established.

The transformation of renewable energy and the "carbon neutrality" reform are reshaping the new pattern of global energy and industry. SANY Renewable Energy will unwaveringly develop clean energy, actively contribute to the realization of the "dual carbon" goal, and contribute its wisdom and strength to a Net Zero future!

# 07 Wind Projects

## Shandong Yangxin Wind Farm, Binzhou, China

Capacity	48MW
Developer	SANY Renewable Energy
Turbine Type	SE11520
O&M	SANY Renewable Energy





**Ethiopia Adama Phase II,  
Adama, Ethiopia**

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Capacity	153MW
Developer	SANY Renewable Energy
Turbine Type	SE7715
O&M	SANY Renewable Energy

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**Jiangxi Leigongshan Wind Farm,  
Ganzhou, China**

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Capacity	70MW
Developer	SANY Renewable Energy
Turbine Type	SE11520, SE12120, SE13125
O&M	SANY Renewable Energy

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### Hunan Ningxiang Donghutang Wind Farm, Changsha, China

Capacity	50MW
Developer	SANY Renewable Energy
Turbine Type	SE13122, SE13625, SE14125
O&M	SANY Renewable Energy



### Hunan Longshan Wind Farm, Jishou, China

Capacity	50MW
Developer	SANY Renewable Energy
Turbine Type	SE11520
O&M	SANY Renewable Energy





## Qinghai UHV Base, Haixi State, China

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Capacity	650MW
Developer	SANY Renewable Energy
Turbine Type	SE14125
O&M	SANY Renewable Energy

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**CGNPC Jilin Tongyu C Wind Farm, Baicheng, China**

Capacity	50MW
Developer	SANY Renewable Energy
Turbine Type	SE14125
O&M	SANY Renewable Energy





### Three Gorges Nuomuhong Project, Haixi State, China

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Capacity	50MW
Developer	SANY Renewable Energy
Turbine Type	SE14125
O&M	SANY Renewable Energy

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## Hunan Shangjiangwei Wind Farm, Yongzhou, China

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Capacity	70MW
Developer	SANY Renewable Energy
Turbine Type	SE11520
O&M	SANY Renewable Energy

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**Inner Mongolia Linxi Wind  
Farm, Chifeng, China**

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Capacity	22MW
Developer	SANY Renewable Energy
Turbine Type	SE10020
O&M	SANY Renewable Energy

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### Shanxi Qipanshan Wind Farm, Jinzhong, China

Capacity	50MW
Developer	SANY Renewable Energy
Turbine Type	SE11520
O&M	SANY Renewable Energy

## Huaneng Hujiawan Wind Farm, Zhongxiang, China

Capacity	150MW
Developer	SANY Renewable Energy
Turbine Type	SE11520
O&M	SANY Renewable Energy



## Hunan Ningxiang Shenxianling Wind Farm, Changsha, China

Capacity	50MW
Developer	SANY Renewable Energy
Turbine Type	SE11520
O&M	SANY Renewable Energy

