

Integrated Deflector-Counter-Rotating Wind Turbine System (ID-CR WTS)



Communications & Information

Computer/AI/Data Processing and Information Technology

Opportunity

Nevertheless, the wind speed in Urban areas is inherently low, whereas the flow is relatively smooth in offshore areas. As a result, traditional vertical axis wind turbines (VAWTs) are in a difficult position to achieve high efficiency. Hence VAWTs have successfully regained researchers' interest over the past decade due to their great potential in urban and offshore areas.

Technology

This invention presents an integrated deflector-counter-rotating wind turbine system (ID-CRWTS). The IDCRWTS is comprised of three major components: (a) counter-rotating (CR) twin straight-bladed rotors, (b) an angled deflector with vortex generators (VGs) attached to its pressure surface, and (c) a wind vane. The ID CRWTS has the promise to overcome problems of conventional VAWTs and boost the power production performance. The CR twin rotors can be spaced closely. This significantly increases the packing density of multiple turbines. Apart from that, the torque and Magnus effect of the CR twin rotors are balanced, and hence the structural stability of the ID-CRWTS is improved. In addition, the ID-CRWTS modifies the wake features and results in a symmetrical wake, which benefits the placement of multiple turbines. Moreover, the deflector redirects the approaching flow and augments the wind speed. This enhances the self-starting and power performance in low-speed winds. Besides, the VGs produce vortices, which energize the boundary layers of blades. Therefore, the dynamic stall can be delayed to raise the power production. To ensure the deflector to be always oriented to the wind direction, the wind vane is introduced.

Advantages

- Low manufacture and maintenance costs compared with traditional horizontal axis wind turbines (HAWTs)
- More power output in a given area
- Improve efficiency of the power production in urban and offshore areas
- Suitable for low-speed and turbulent regions

Applications

- Renewable Energy
- On-shore Wind Turbine

IP Status

Patent granted



Technology Readiness
Level (TRL) ?

9

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