

## DOCKETED

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## **Next Generation Wind Turbine Rotor Design Power rated at 50 MW or more**

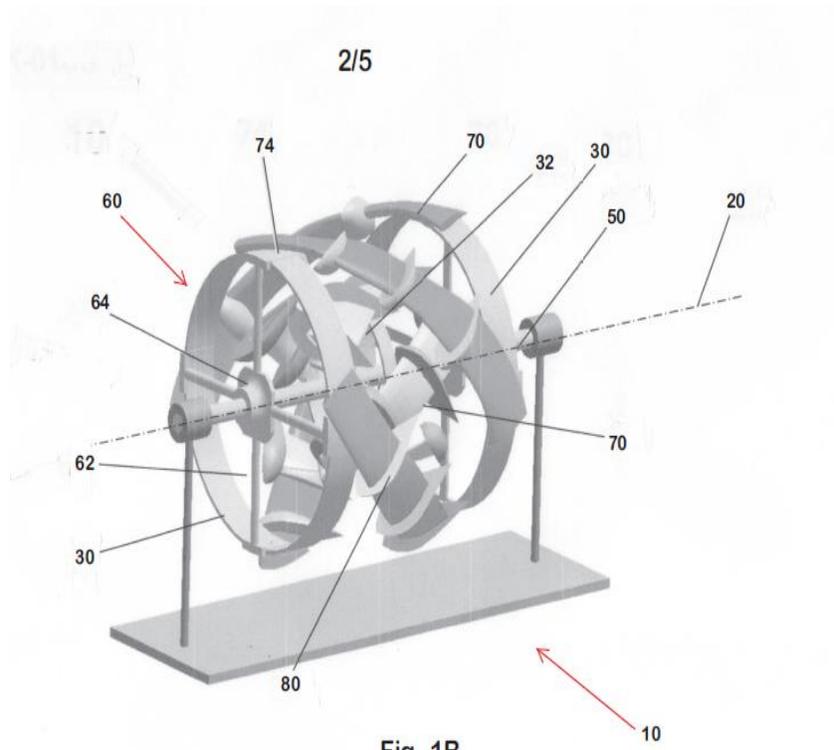
The new Axial Flow Helical Bladed rotor ( US patent 9,537,371 B2 attachment 3) is seen to offer the low cost (nearly 1/3 to 1/5) and energy efficient wind turbines, versus the conventional radial bladed wind turbines (attachment 4).

This rotor can be scaled up to 50 MW units at ~1/5 th weight vs the radial bladed rotor and at low cost.

The primary objective of this request for funding is to evaluate the design by using a CFD simulation model to estimate the power performance and cost details versus the conventional radial bladed rotor model.

*Additional submitted attachment is included below.*

# AXIAL FLOW HELICAL BLADED CONTRA ROTOR SYSTEM



## 10 MW WIND TURBINE ROTOR

	<b>Conventional Radial Bladed HAWT</b>	<b>Suggested Rotor</b>
Rated Wind speed	10 m/s	10 m/s
Tip Speed Ratio	6	4.0
Rotor Speed	5.7 rpm	3.9 rpm
Rated Power	10 MW	10 MW
Blade Length	<b>98 m</b>	<b>20 m</b>
Number of Blades	3	126
Blade Tip Chord	<b>4.8 m</b>	<b>0.5 m</b>
Each Blade Weight	<b>55 tons</b>	<b>0.25 ton</b>
Rotor Diameter	196 m	188 m
Hub Height	130 m	120 m
Blade Helix Angle		76 deg
Total Rotor Weight	<b>165 tons</b>	<b>30 tons</b>

## 50 MW WIND TURBINE ROTOR

	<b>Conventional Radial Bladed HAWT</b>	<b>Suggested Rotor</b>
Rated Wind speed	10 m/s	10 m/s
Tip Speed Ratio	6	6.0
Rotor Speed	2.6 rpm	2.6 rpm
Rated Power	50 MW	50 MW
Blade Length	<b>220 m</b>	<b>29 m</b>
Number of Blades	3	290
Blade Tip Chord	<b>10.5 m</b>	<b>0.29 m</b>
Each Blade Weight	<b>421 tons</b>	<b>0.20 ton</b>
Rotor Diameter	441 m	440 m
Hub Height	300 m	300 m
Blade Helix Angle		80 deg
Total Rotor Weight	<b>1263 tons</b>	<b>58.0 tons</b>

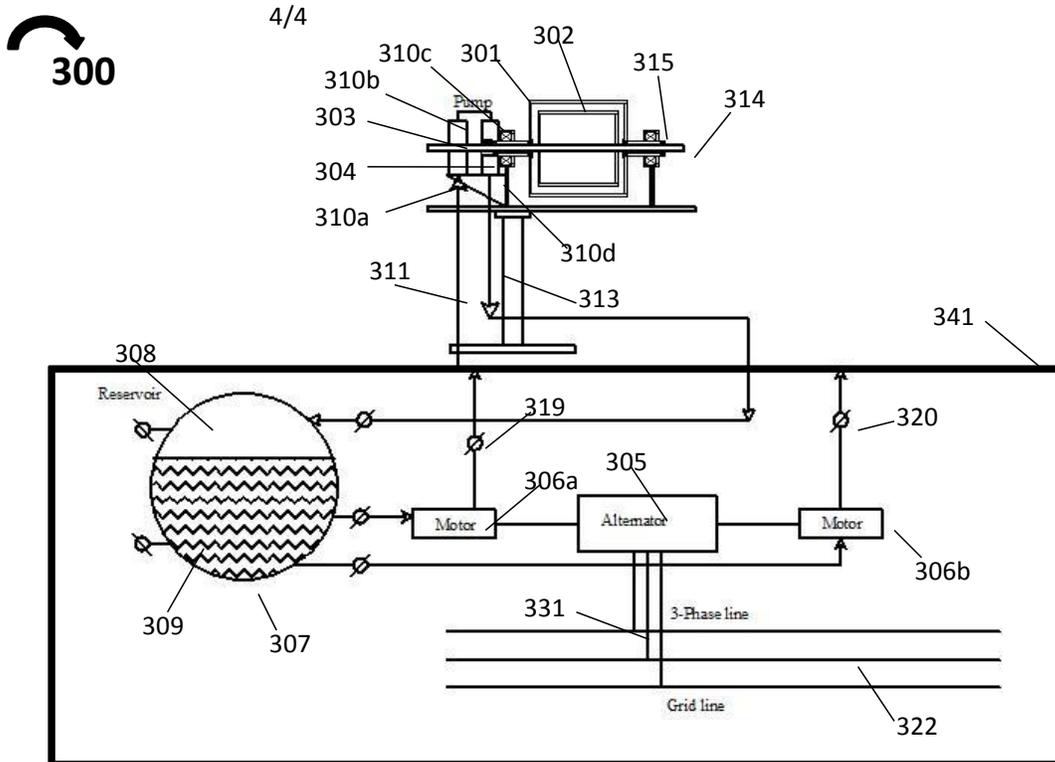


Fig 2

**Axial Flow Helical Bladed Contra Rotor System Using Hydraulic Power Transmission Device**