Diversifying the Energy Matrix:

Implementation of Vertical Axis Wind Turbines in Urban Areas in Argentina

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Inglés II
Academic Year: 2023
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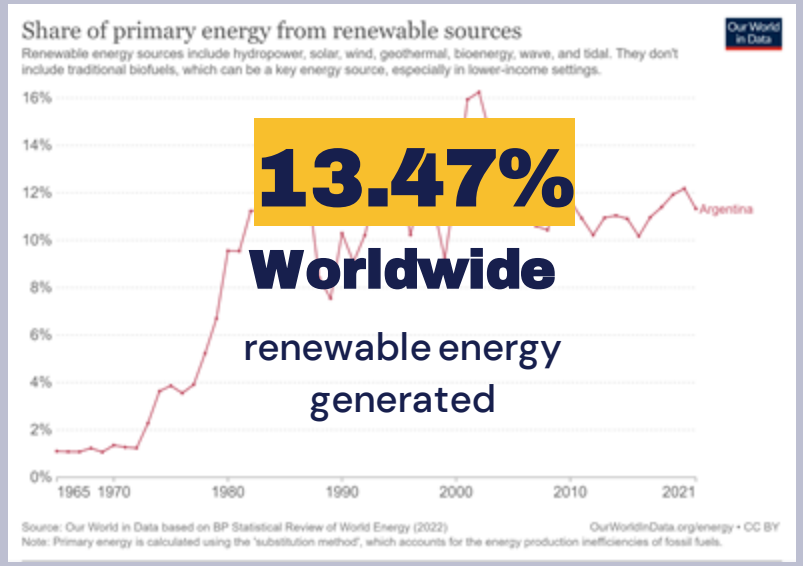
01

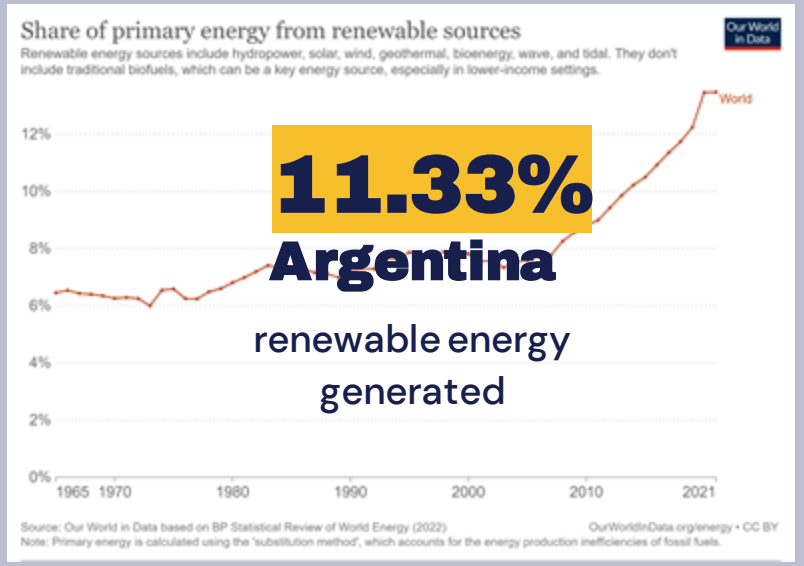
Introduction

Introduction

Today the world is in the transition to renewable energies.

Introduction





Introduction

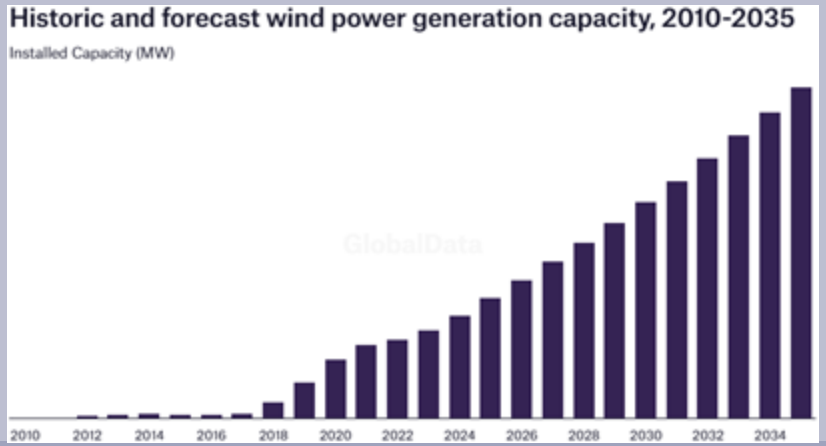
Wind Energy's Share in Argentina's National Energy Matrix

2021

8%

2035

23%



Introduction

Minimum winds

Low power

Affordable and Clean Energy

Targets:

- By 2030, ensure universal access to affordable, reliable and modern energy services
- By 2030, increase substantially the share of renewable energy in the global energy mix
- By 2030, double the global rate of improvement in energy efficiency

Work Aim

- Demonstrate the feasibility of implementing Vertical Axis Wind Turbines in urban areas in Argentina

Map of the Presentation

Wind patterns and wind energy production capacity across Argentina

Vertical Axis Wind Turbines

Commercial products

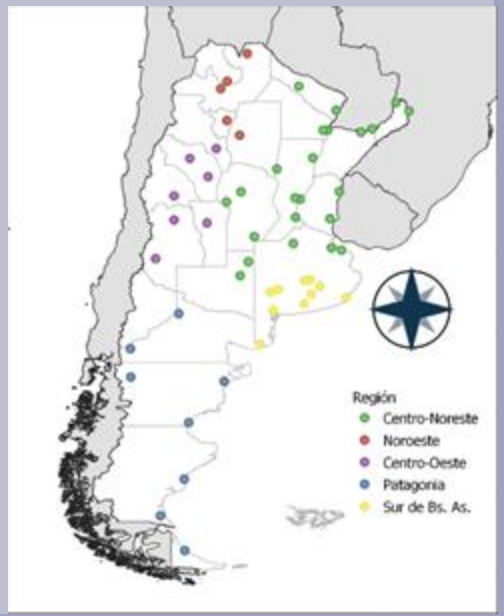
VAWTS' advantages and disadvantages

02

Wind Patterns and Wind Energy Production Capacity across Argentina

Argentine regions according to their wind characteristics

- Northwest Region
- Central-Northeast Region
- South of Buenos Aires
- Central West Region
- Patagonia Region



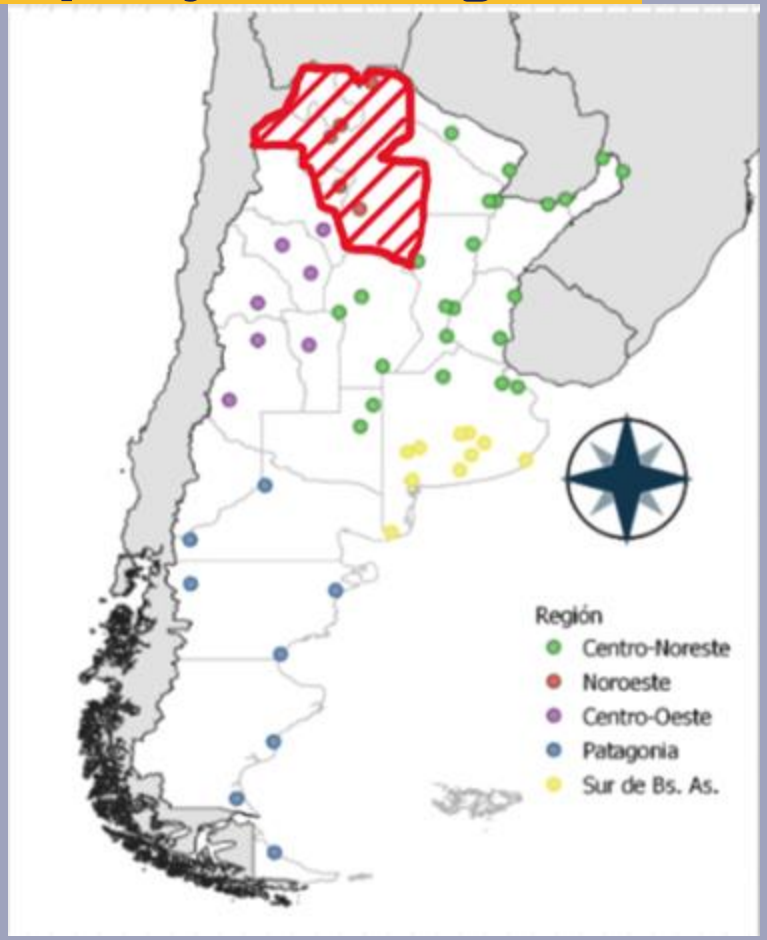
Wind Patterns and Wind Energy Production Capacity across Argentina

Northwest Region

Provinces:

- Salta
- Jujuy
- Santiago del Estero
- Tucumán

Average wind intensity: less than 10 km/h



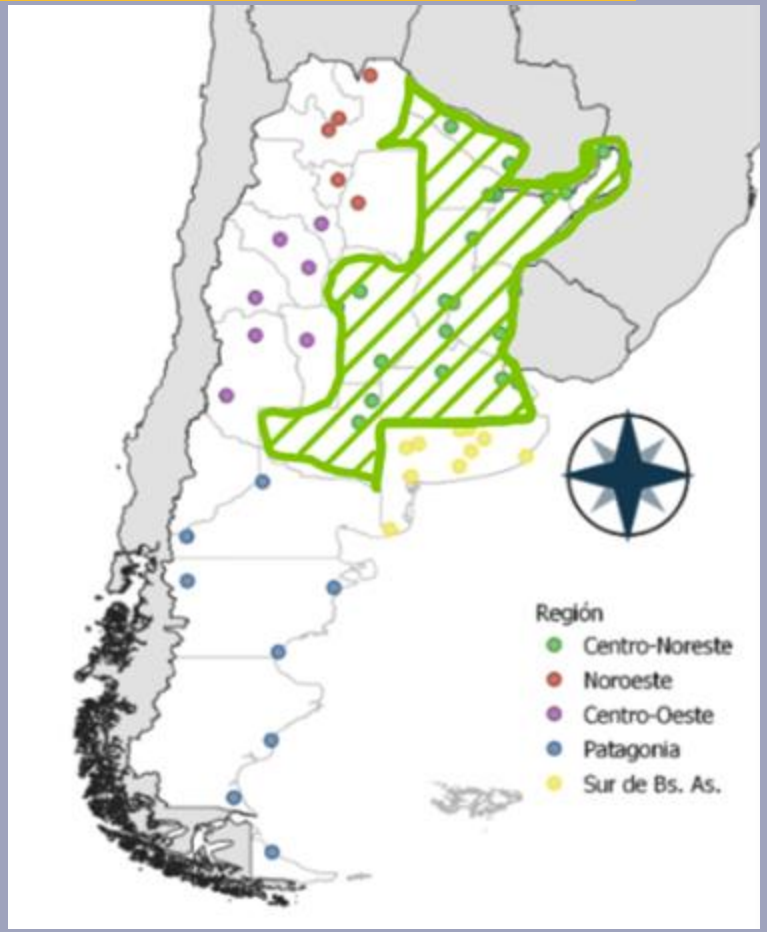
Wind Patterns and Wind Energy Production Capacity across Argentina

Central-Northeast Region

Provinces:

- Cordoba
- North of Buenos Aires
- La Pampa
- Santa Fe
- Entre Rios
- Corrientes
- Misiones
- Chaco
- Formosa

Average wind intensity: between 10 and 14 km/h



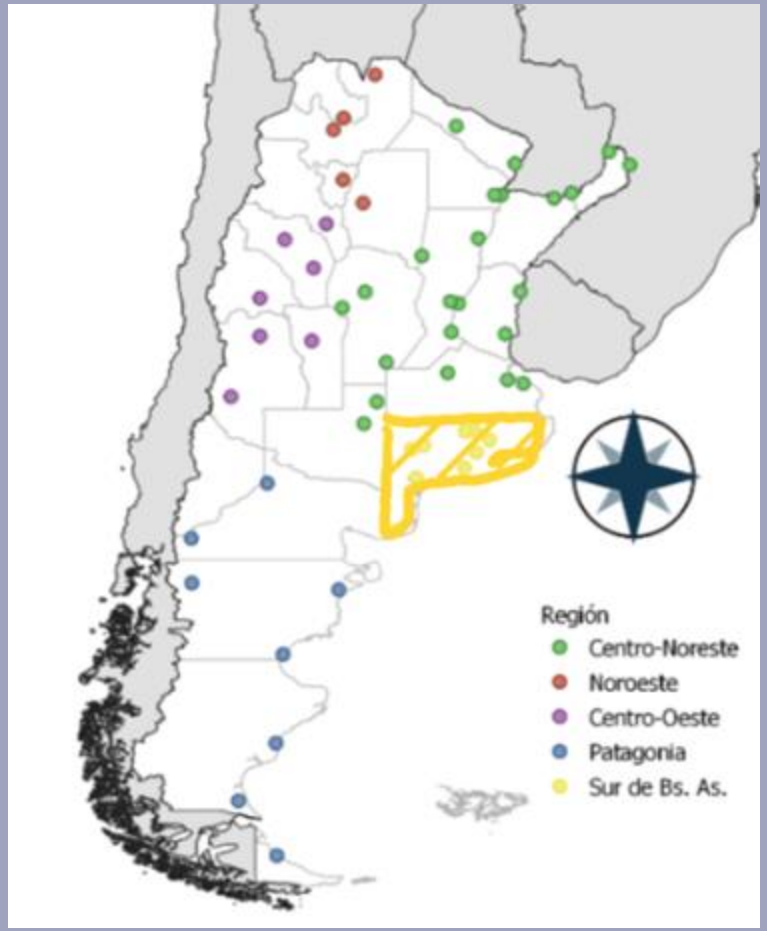
Wind Patterns and Wind Energy Production Capacity across Argentina

South of Buenos Aires

Provinces:

- Buenos Aires

Average wind intensity: between 12 and 18 km/h



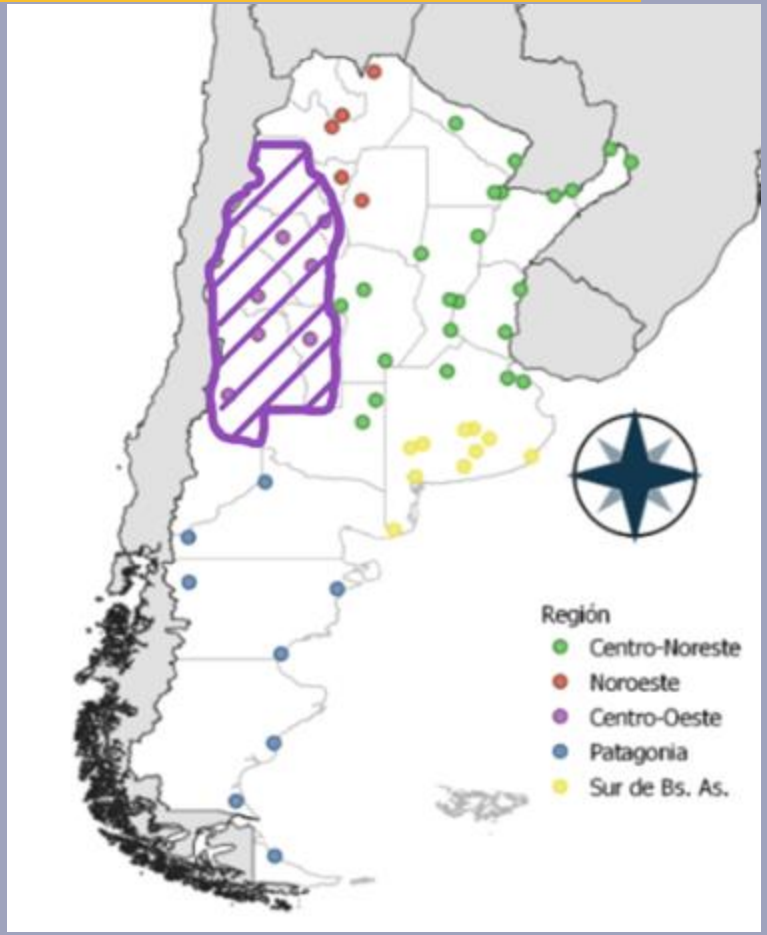
Wind Patterns and Wind Energy Production Capacity across Argentina

Central West Region

Provinces:

- San Juan
- La Rioja
- Catamarca
- San Luis
- Mendoza

Average wind intensity: around 14 km/h



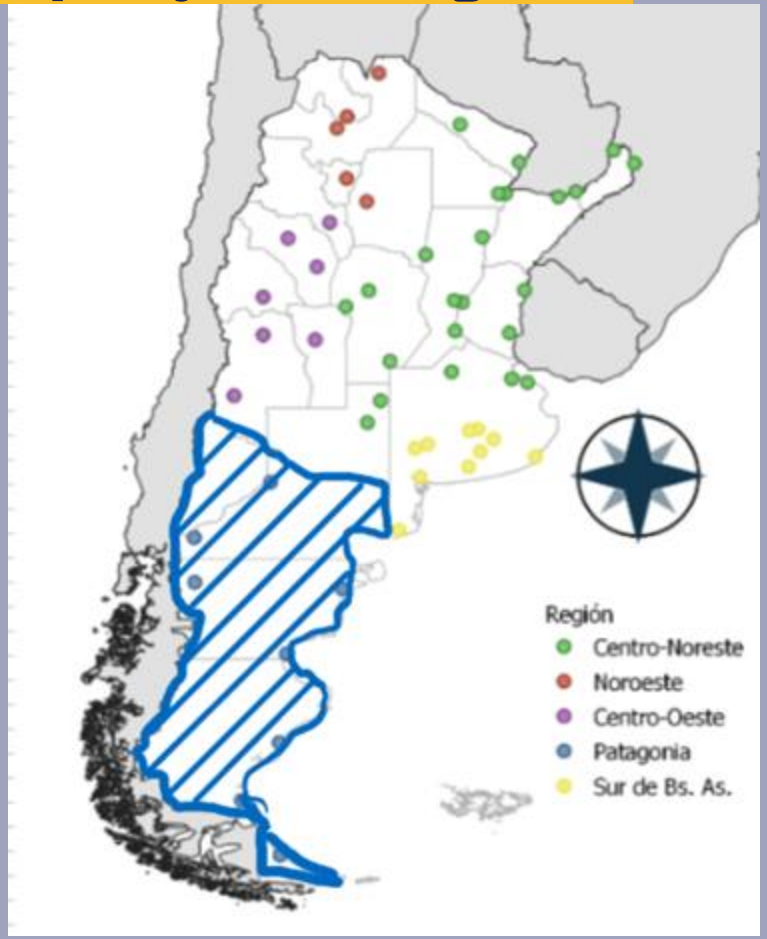
Wind Patterns and Wind Energy Production Capacity across Argentina

Patagonia Region

Provinces:

- Neuquén
- Rio Negro
- Santa Cruz
- Chubut
- Tierra del Fuego

Average wind intensity: 23 km/h



03

Vertical Axis Wind Turbines

Vertical Axis Wind Turbines

Horizontal Axis

Vertical Axis

Vertical Axis Wind Turbines

Vertical Axis

- They do not need addressing mechanisms.
- They are located in low places.
- They work with low wind speeds.
- They are easy to place in urban areas.
- They are not noisy.
- They are less dangerous.

Horizontal Axis

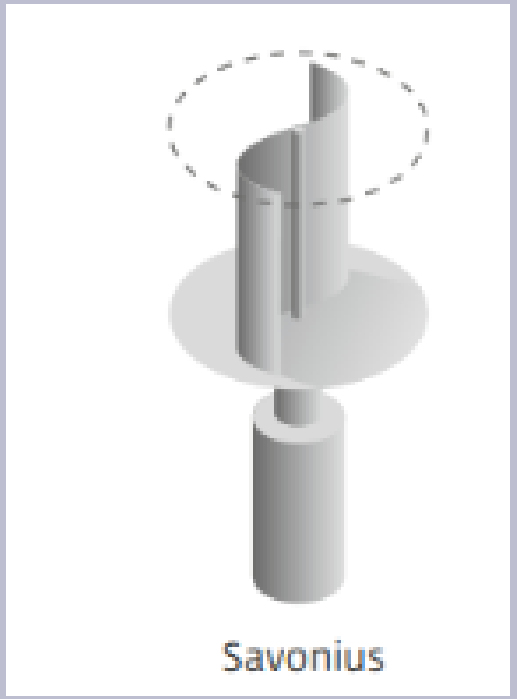
- They need addressing mechanisms.
- They are installed at high places.
- They work with high wind speeds.
- They are noisy.
- They are dangerous.

Darrieus Turbines

Darrieus

- They operate by using an elevator to lift the air.
- Their rotor spins faster than the speed of the wind.
- Their blades are curved.
- Their starter needs an external force to start spinning.

Savonius Turbines



- They operate by using an elevator to lift the air.
- Their maximum speed is given by the speed of the wind that hits them.
- Their starter does not need an external force to start spinning

04

Commercial Products

Commercial Products

Commercial Products

Flower Turbines: Medium Tulip Wind Turbine

Characteristics:

- Dimensions: 300 cm high by 100 cm in diameter
- Starting speed: 2 - 4 m/s
- Operating speed: Not specified by manufacturer
- Maximum speed: 15 m/s
- Watts generated: 300-500
- Number of blades: 2
- Maker: Flower Turbines

Commercial Products

Cemi-023 Wind Turbine

Characteristics:

- Dimensions: Not specified by manufacturer
- Starting speed: 2,01 m/s
- Operating speed: 11 m/s
- Maximum speed: 45 m/s
- Watts generated: 3.7KW / 4.2KW
- Number of blades: 4
- Maker: Coldwind

Commercial Products

Wind Generator Eolo

Characteristics:

- Dimensions: 195 cm× 130 cm × 130 cm
- Starting speed: 1.9 m/s
- Operating speed: Not specified by manufacturer
- Maximum speed: Not specified by manufacturer
- Watts generated: 1KW / 2KW / 3KW
- Number of blades: 3 / 12
- Maker: Makemu green energy

Commercial Products

Wind Generator Domus

Characteristics:

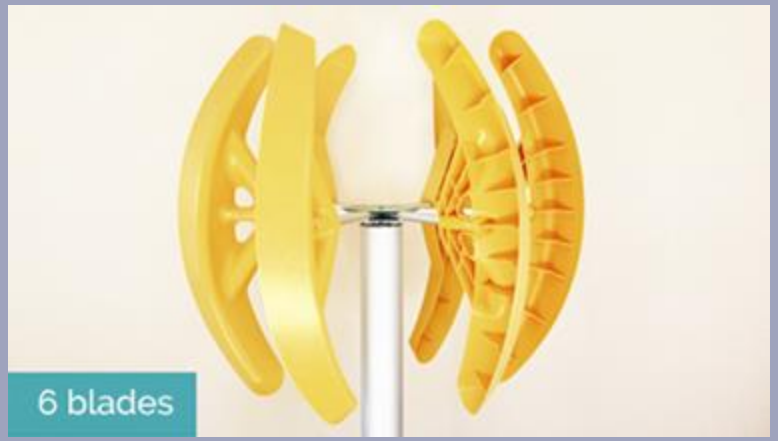
- Dimensions: 115 cm× 130 cm × 65 cm
- Starting speed: 1,2 m/s
- Operating speed: Not specified by manufacturer
- Maximum speed: Not specified by manufacturer
- Watts generated: 1KW / 750W / 500W
- Number of blades: 3 / 6
- Maker: Makemu green energy

Commercial Products

Wind Generator Smartwind

Characteristics:

- Dimensions: 130 cm× 80cm × 85cm
- Starting speed: 0.9 m/s
- Operating speed: Not specified by manufacturer
- Maximum speed: Not specified by manufacturer
- Watts generated: 500W / 400W / 300W
- Number of blades: 3 / 6
- Maker: Makemu green energy



Commercial Products

Wind Generator Ninilady

Characteristics:

- Dimensions: 1.42 meters tall
- Starting speed: 1.31 m/s
- Operating speed: Not specified by manufacturer
- Maximum speed: 12 m/s
- Watts generated: 600-650
- Number of blades: 2
- Maker: NL

05

VAWTS' Advantages and Disadvantages

VAWTS' Advantages and Disadvantages

Advantages

- Independence of yaw mechanism
- Ease of maintenance (can be located close to the ground)
- Very low starting speed
- Ability to be placed anywhere in a building (on top, to the side or below)
- Suitable for placement on irregular terrain, particularly in areas such as plateaus and hilltops

Disadvantages

- Lower efficiency compared to HAWT (due to its higher resistance against the vertical axis or due to the lower efficiency of the wings)
- Installation proximity to the ground, leading to reduced operational wind speeds

Conclusion

Conclusion

- VAWTs positioning
- Viability across regions
- Anticipated market integration
- Impact on clean energy generation

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Thank you for your time!

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