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The Untapped Potential of Wind Resources for Electric Generation in Argentina

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ABSTRACT

Argentina's energy landscape relies heavily on conventional sources, leaving it susceptible to fossil fuel-related uncertainties. This study highlights the untapped wind energy potential as a transformative solution for diversifying and securing the nation's energy supply. By harnessing its significant wind resources, Argentina could achieve energy independence and contribute to a greener future.

INTRODUCTION

Argentina is at a crucial moment in its pursuit of sustainable energy solutions. As shown in **Figure 1**, **60% of its electricity comes from fossil fuels, with wind energy contributing only 8%** (CAMMESA, 2023). The country's reliance on electricity imports further emphasizes the need for energy diversification. **In 2022, it imported 6310 GWh of electricity from neighboring countries, equivalent to 4.5% of the total demand** (CAMMESA, 2023). It is evident that diversifying the energy mix is essential to enhance energy security and mitigate climate change.

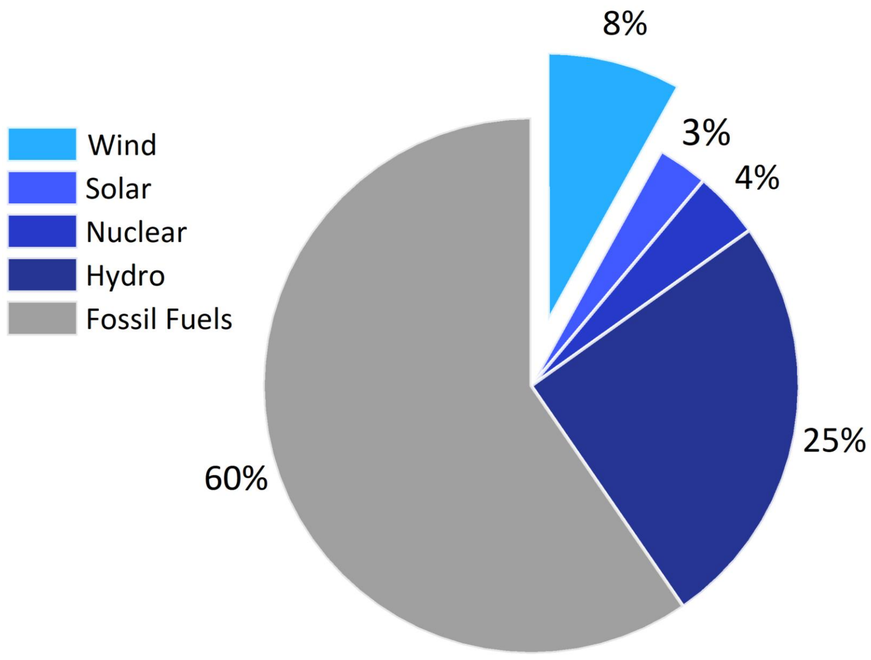

Figure 1. ***Electric power generation matrix of Argentina***
Source: CAMMESA

WIND ENERGY EFFICIENCY

Capacity factors (CF) are one of the pivotal indicators of wind energy efficiency (**Figure 2**). About **90% of country's onshore wind resources can have a capacity factor of more than 34%**, that belongs to a **high-quality wind resource**, underlining Argentina's prowess in harnessing wind resources (Tang et al., 2021). The remarkable efficiency of wind energy generation in Argentina underscores the country's substantial untapped potential.

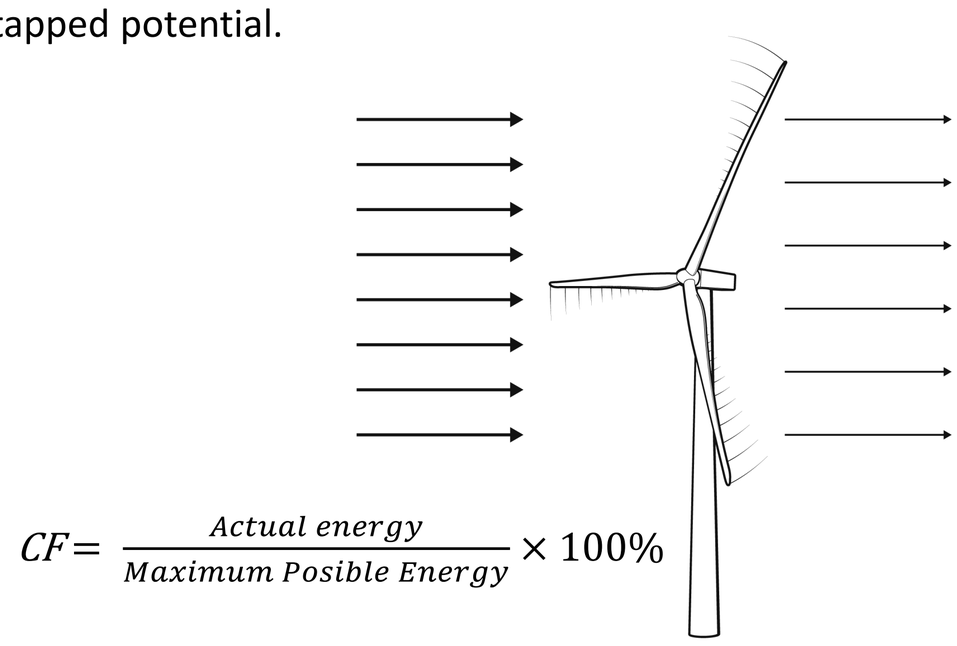

Figure 2. ***Wind turbine capacity factor*****. Source: Vernier**

WIND RESOURCES

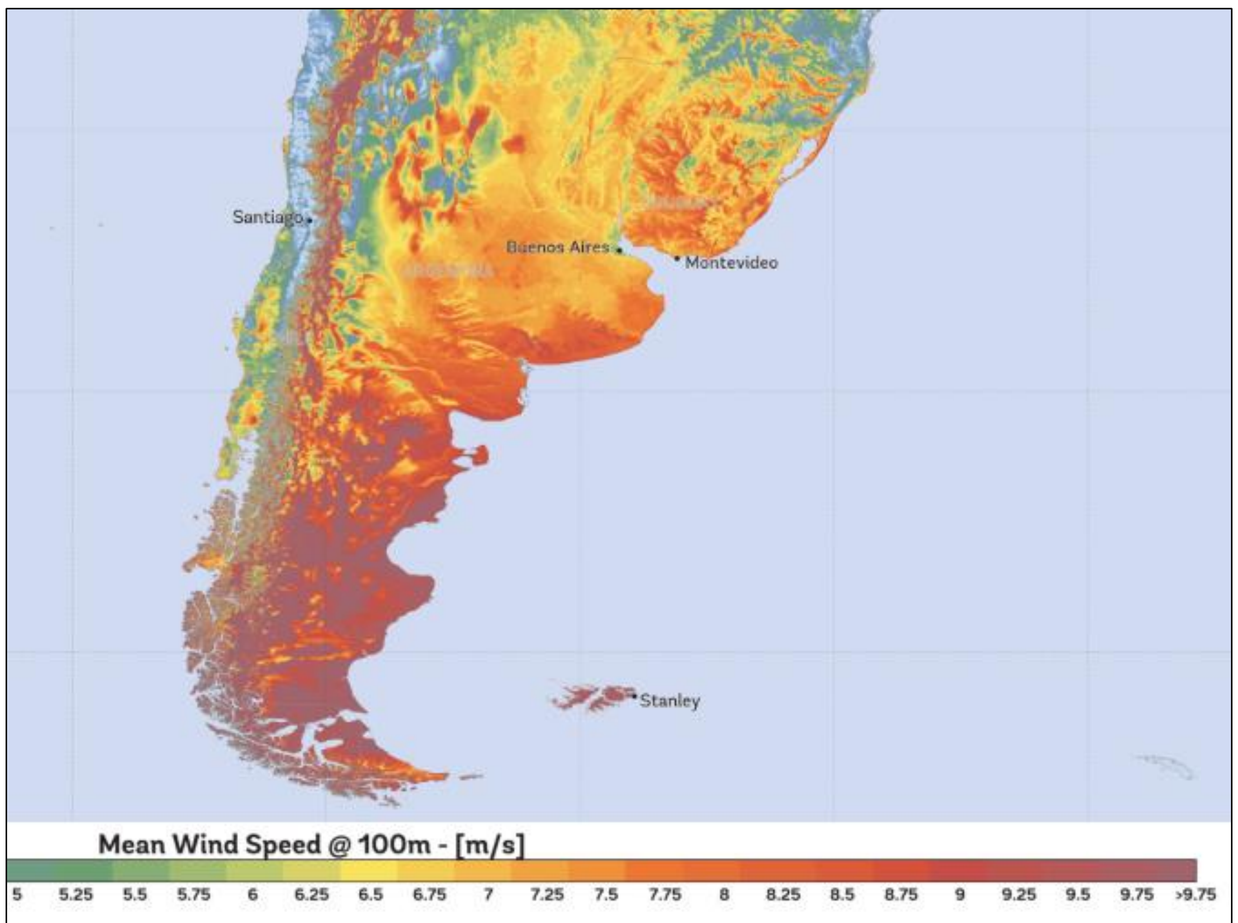

Figure 3. ***Wind Resource Map.***
Source: Global Wind Atlas

Figure 3 shows geographical and wind speed data, presenting ample opportunities for large-scale wind energy projects. The **Patagonian region in the south** stands out for its high-quality and efficient winds, ideal for the establishment of wind farms. Nevertheless, this is not the sole area of high potential. Zones of similar magnitude can be identified in the central region, encompassing the **Buenos Aires, Córdoba, San Luis and La Rioja provinces** (Content Engine LLC, 2022b).

CHALLENGES

Despite its potential, wind energy development in Argentina faces various obstacles like **inadequate infrastructure**, **saturated transmission lines, and economic/political challenges** (Content Engine LLC, 2022a). Solutions include better regulations, addressing grid integration issues, securing funding, and improving infrastructure for successful and sustainable growth.

CONCLUSIONS

Argentina's untapped wind potential offers the key to energy security, sustainability, and growth. Despite challenges, its exceptional wind conditions and efficient energy generation pave the way for a substantial wind development. By surmounting obstacles through comprehensive strategies, Argentina can lead in wind energy, reducing dependency, enriching the environment, and nurturing a thriving green economy. **Its path to a brighter and sustainable future is within grasp, powered by the winds of change**.

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