Renewable Electricity Supply: Alternative Energies for Remote Areas in Argentina

UTN-Facultad Regional Paraná English II 2023

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UTN PARANÁ

Electronics Engineering Department

01

Introduction

Introduction

- Lack of electricity
- Expensive and challenging network infrastructure
- Impact on well-being and social equity

Introduction

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Achieving an improvement in the percentage of the population with access to electricity requires primarily clean energy sources

Introduction

The objective of this presentation is to analyze the main concerns regarding the lack of access to electricity in remote areas and discuss three possible alternative energy sources.

Map of the Presentation

02

Areas without Electricity

03

Current Possible Solutions

04

Brief Feasibility Analysis

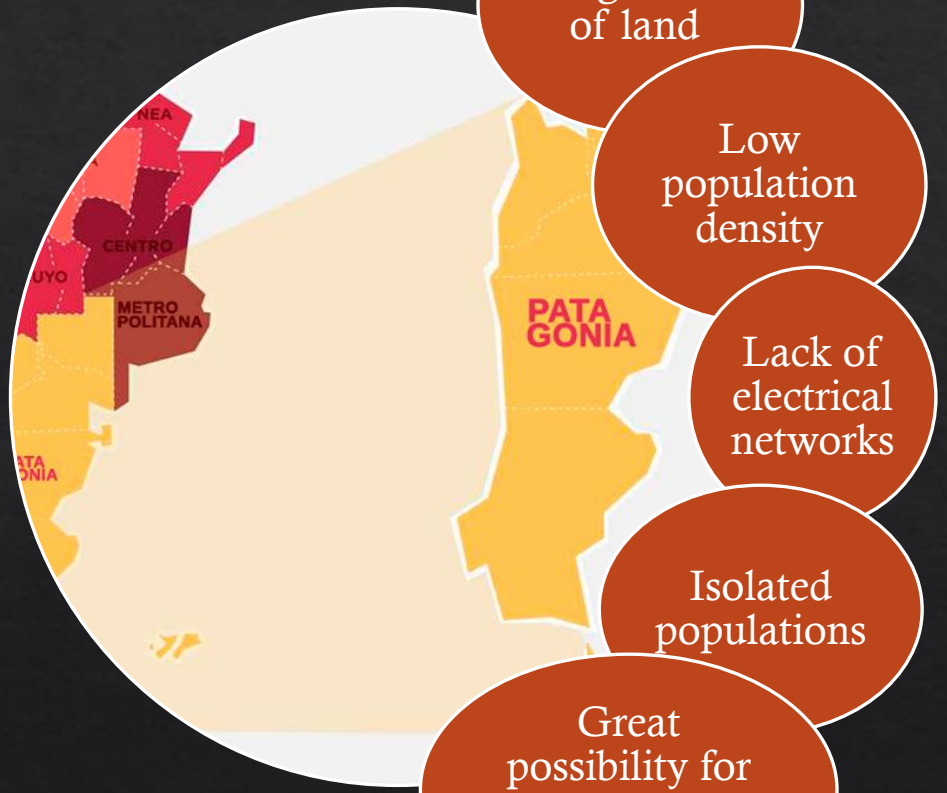
Introduction

This presentation is expected to contribute to the analysis of the viability of the implementation of renewable energy sources to provide electricity in remote areas.

02

Areas without electricity

The southern Patagonia



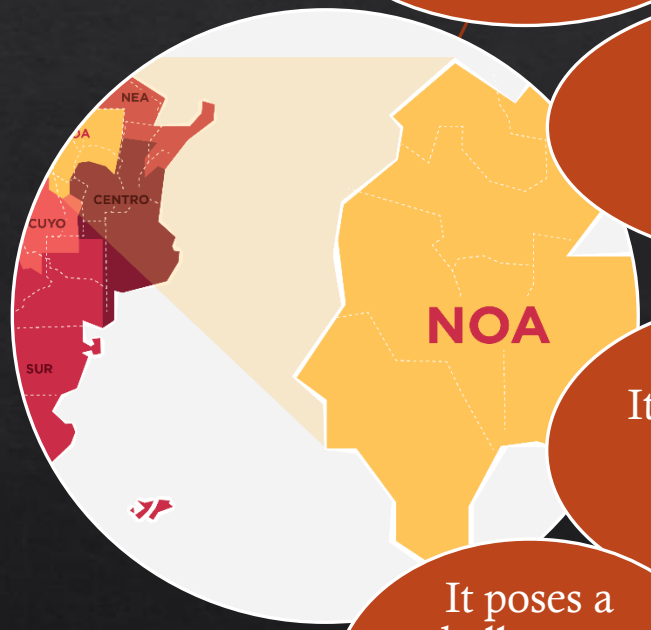
- Large tracts of land
- Low population density
- Lack of electrical networks
- Isolated populations
- Great possibility for wind power generation

"Patagonia", *Cfcultura*, 2019

The northwest

This area faces a severe shortage of electricity supply.

It hinders the provision of essential services.

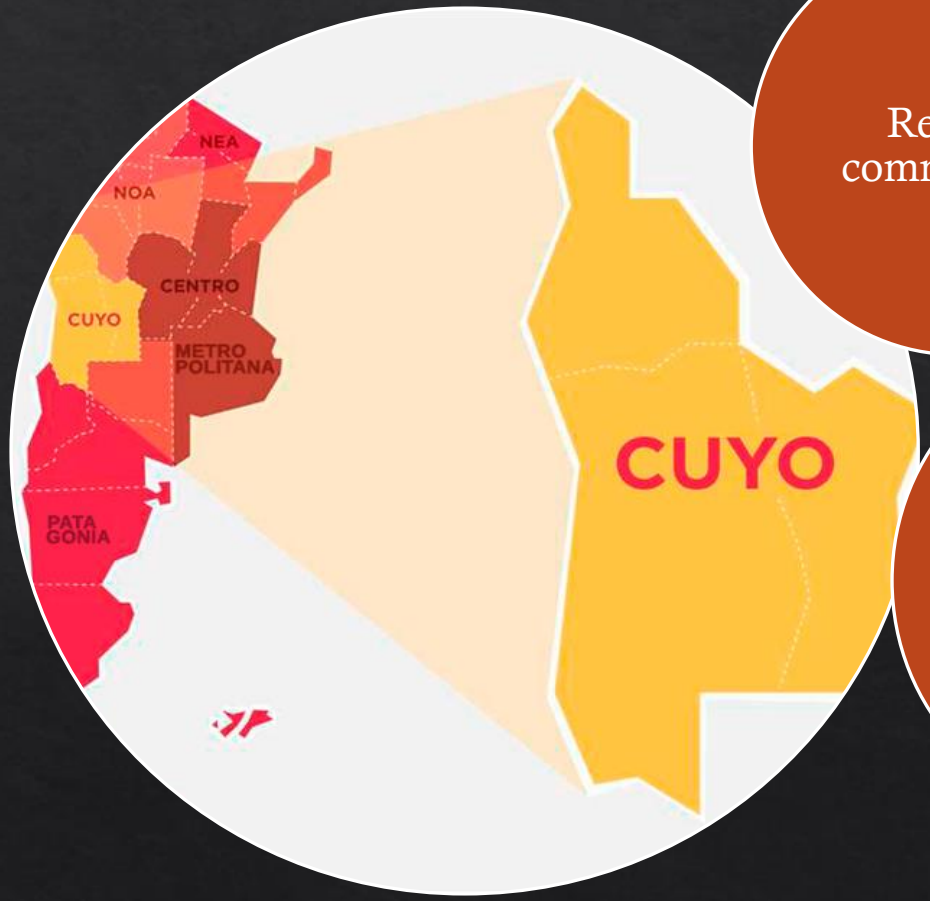


It mainly affects farmers and ranchers.

It poses a challenge to economic and social progress.

"Nortwest", *Cfcultura*, 2019

The Cuyo region



Remote communities

Rudimentary and expensive methods of power generation

"Cuyo", *Cfcultura*, 2019

03

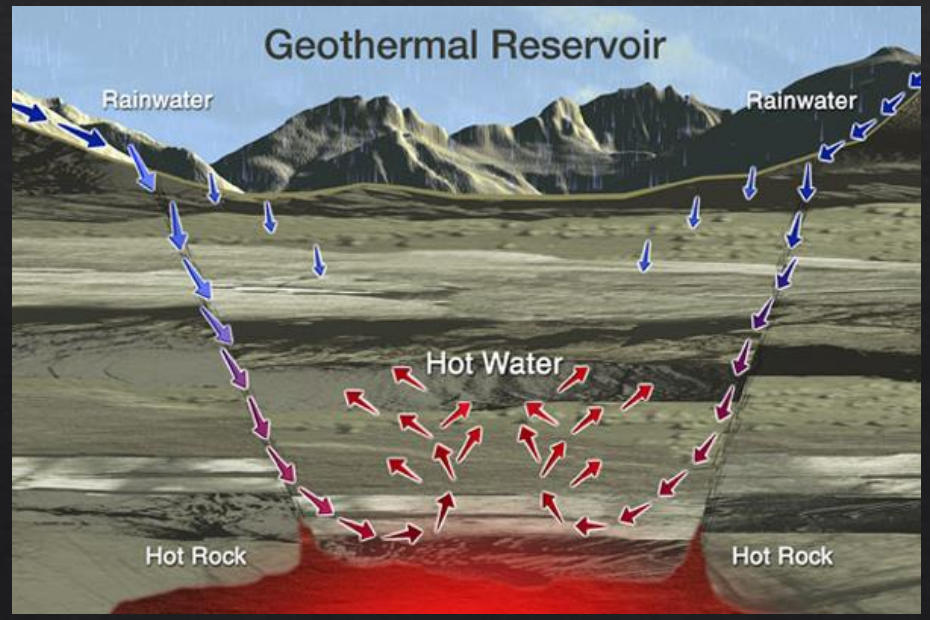
Current Possible Solutions

A. Geothermal energy generation

According to IRENA, geothermal energy is the heat released from the core of the Earth.

This presentation delves into three primary technologies employed in geothermal energy generation: direct dry steam plants, flash plants, and binary plants.

Geothermal plants

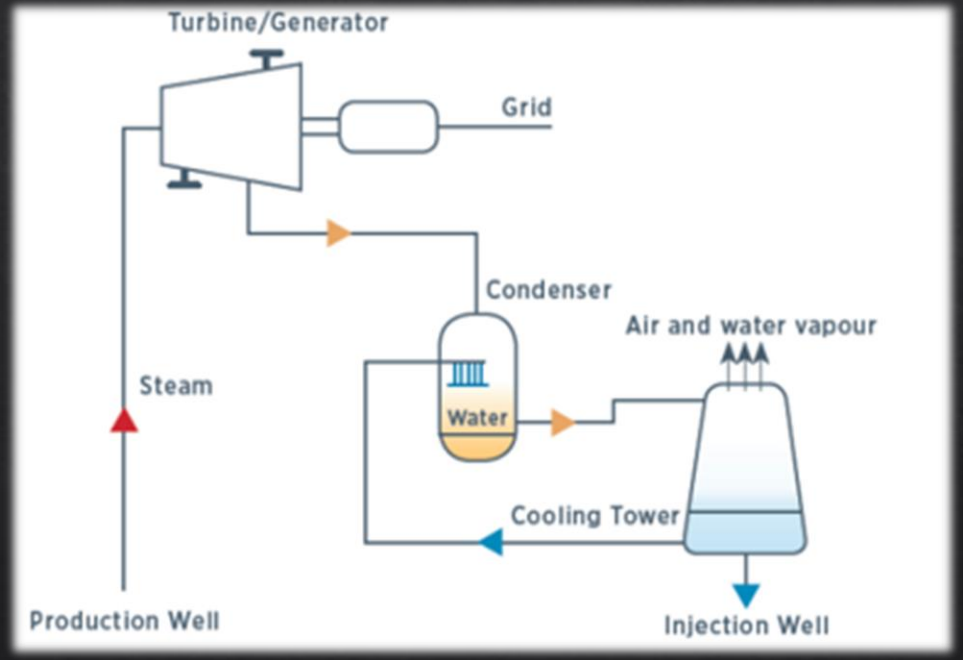


Geothermal reservoir

1. Dry Steam Plants (Direct Dry Steam)

They use steam at 150°C or higher, and, generally, the steam entering the turbine must be 99.995% dry to avoid scaling or erosion in the turbine.

The size of this type of plants ranges from 8 Mega Watts (MW) to 140 MW.

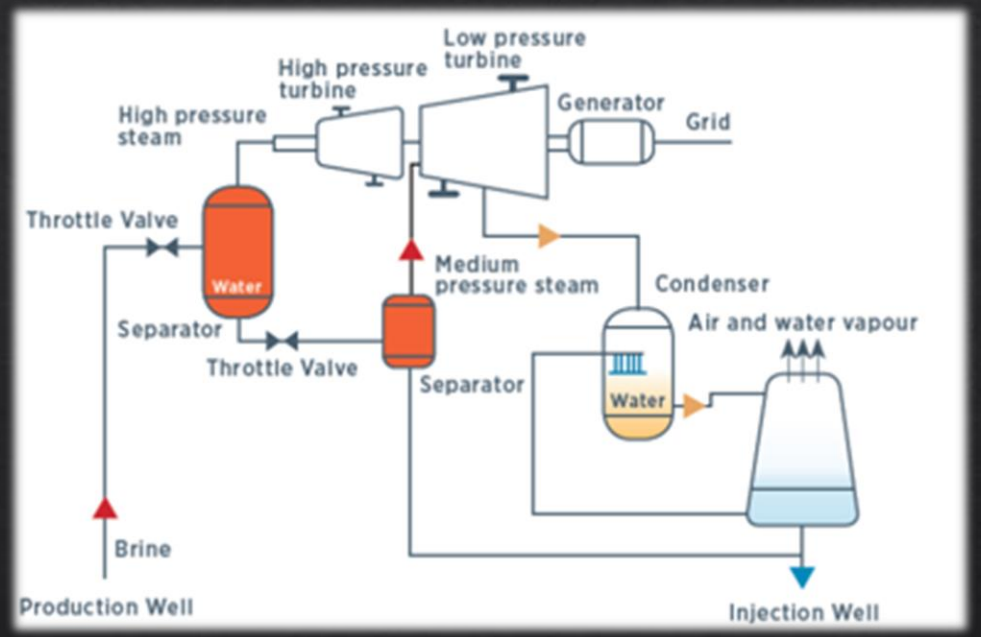


"Dry steam plant scheme", M. González, G. Siroit, and M. Morrone, Sep. 2019

2. Flash Plants

Flash plants work best when temperatures are higher than 180°C.

Flash plants vary in size depending on the climate. They are single-flash (0.2 – 80 MW), double-flash (2 – 110 MW) or triple-flash (60 – 150 MW).

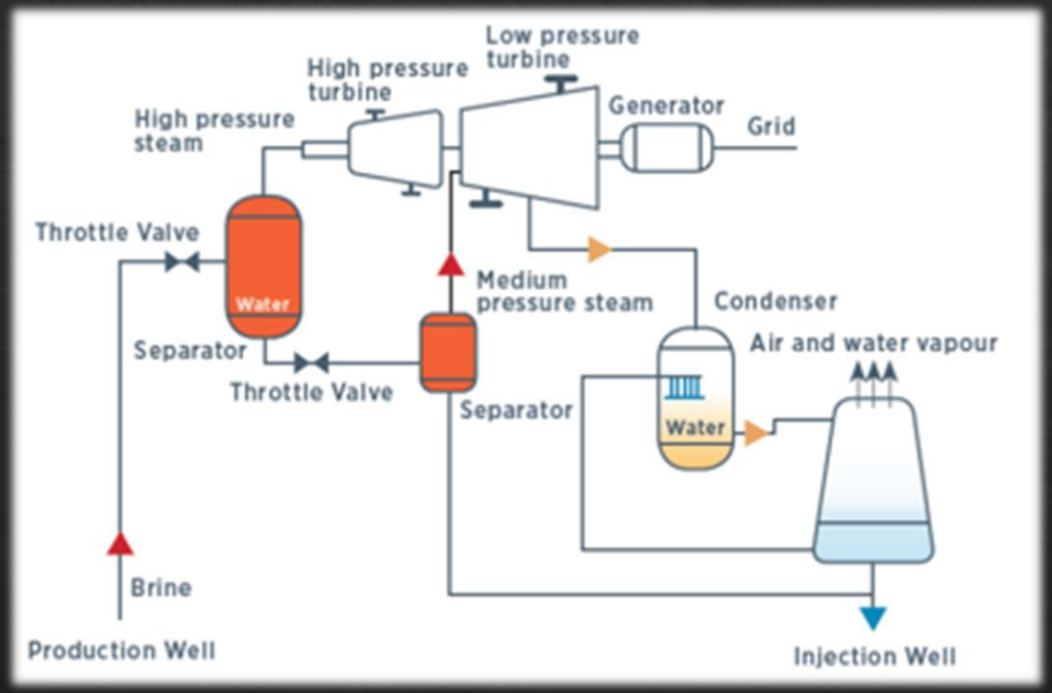


"Flash plant scheme", M. González, G. Siroit, and M. Morrone, Sep. 2019

3. Binary Plants

They operate at temperatures between 100°C and 250°C.

The size of binary plants varies between 1 MW and 50 MW.



"Binary plant scheme", M. González, G. Siroit, and M. Morrone, Sep. 2019

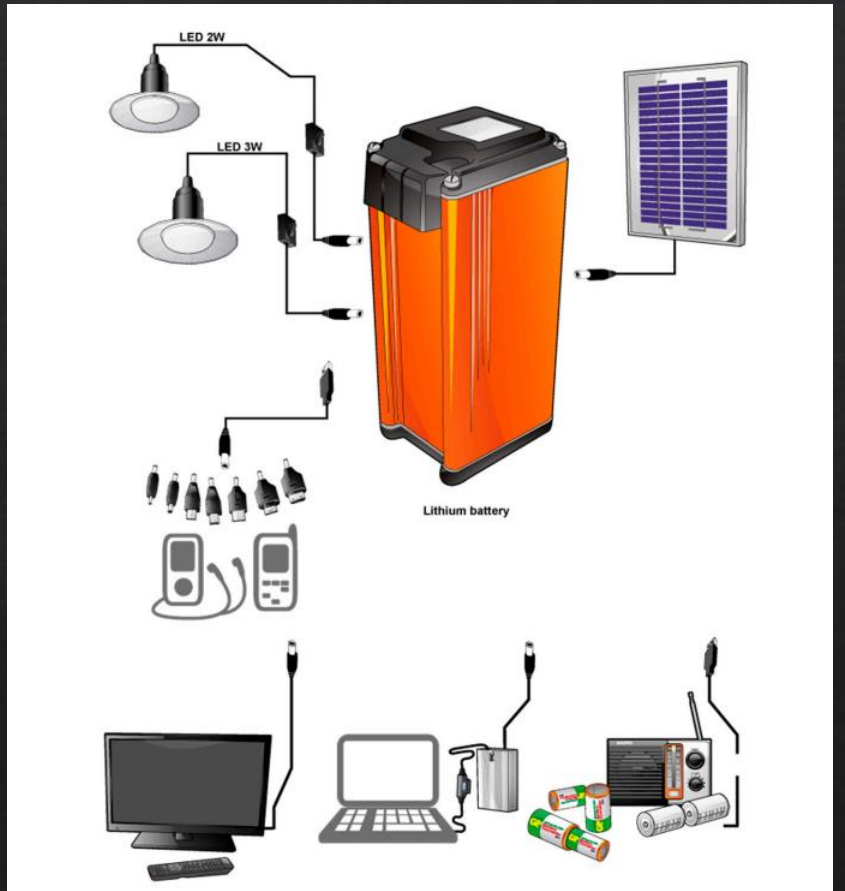
B. Solar Energy Generation

Solar panels convert solar energy into electricity.

The electrons released from the silicon atoms generate a flow of electrical current.

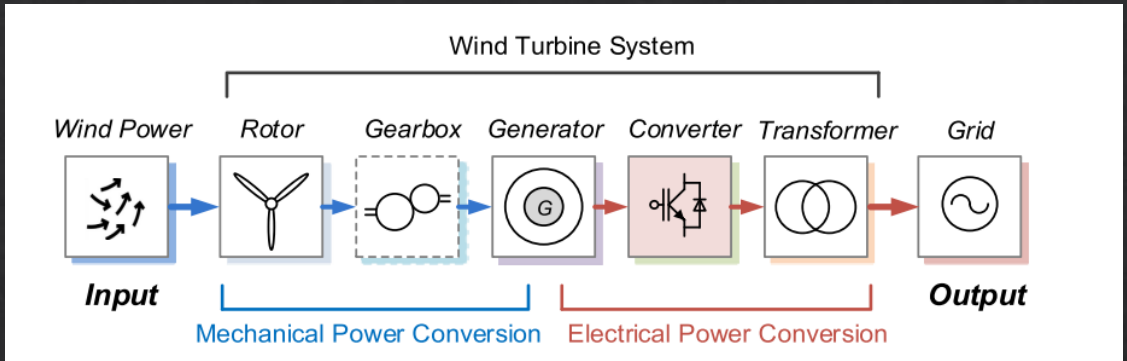
This energy is controlled by a charge regulator and stored in a battery bank.

Most appliances use alternating current (AC).



"Components of 3G-SHSs", M. H. Fernandez-Fuentes, A. A. Eras-Almeida, and M. A. Egido-Aguilera, Jan. 2021

C. Eolic Energy Generation



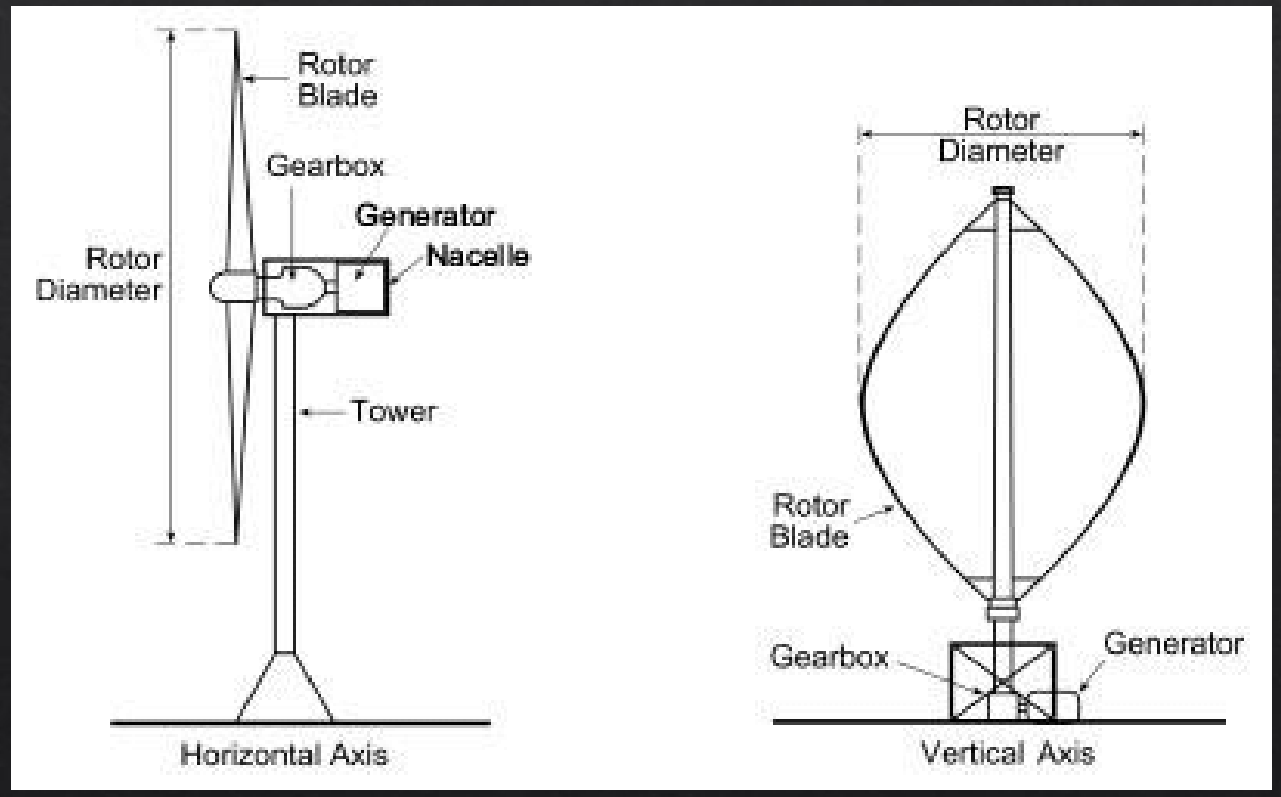
"Wind turbine system", E. M. S. Mohamed

The gearbox facilitates efficient energy conversion.

The converter then transforms the direct current (DC) into alternating current (AC) for distribution.

There are two types of wind turbines: horizontal axis and vertical axis.

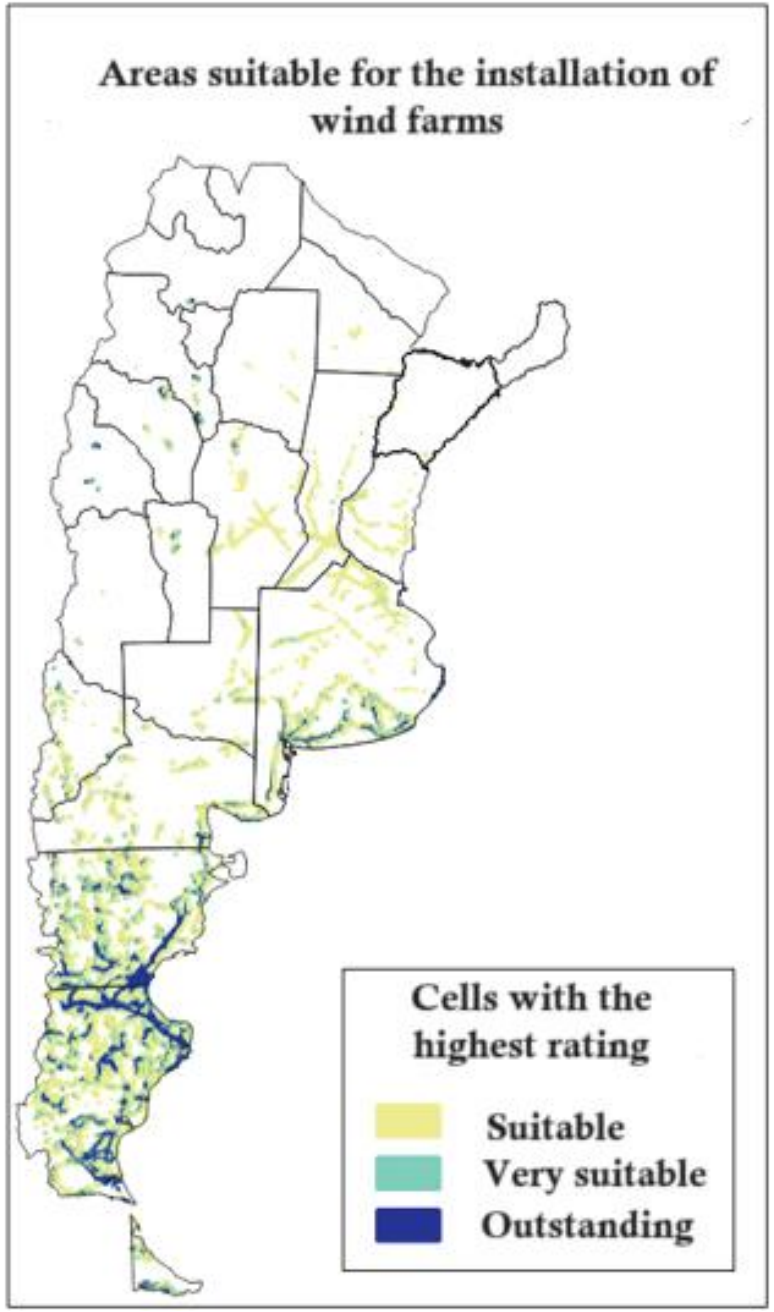
Vertical axis wind turbines vs Horizontal axis wind turbines



"Horizontal and Vetical Axis", E. M. S. Mohamed

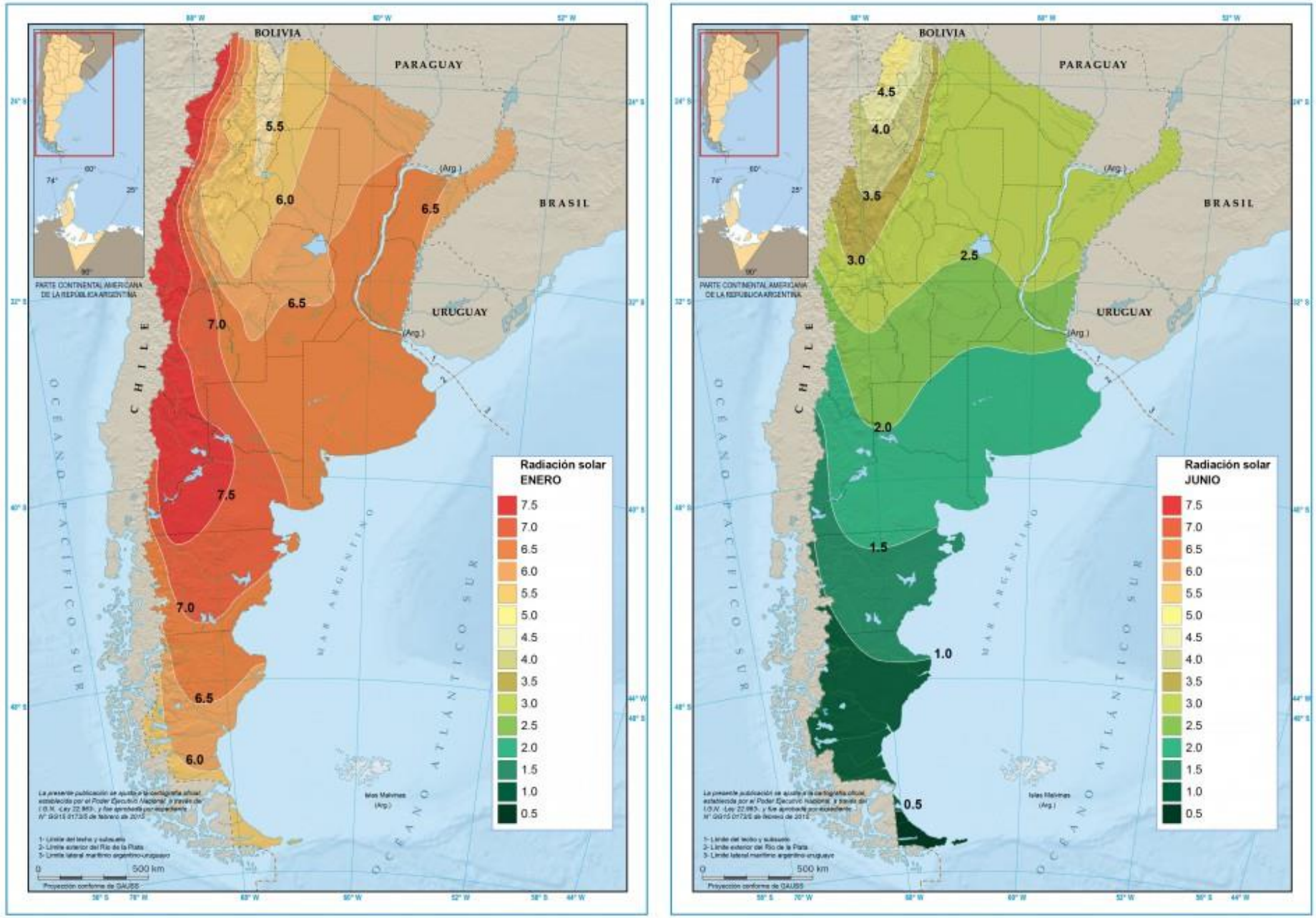
04

Brief Feasibility Analysis



"Eolic potential map", Fundación YPF, 2023

"Geothermal potential map", F. Carmona, Dec. 2018



"Solar radiation map", Fundación YPF

Energy generation systems: viability assessment

Northwestern Argentina:

Due to its climate and mountainous topography, solar powered-SHS systems are the optimal and viable solution.

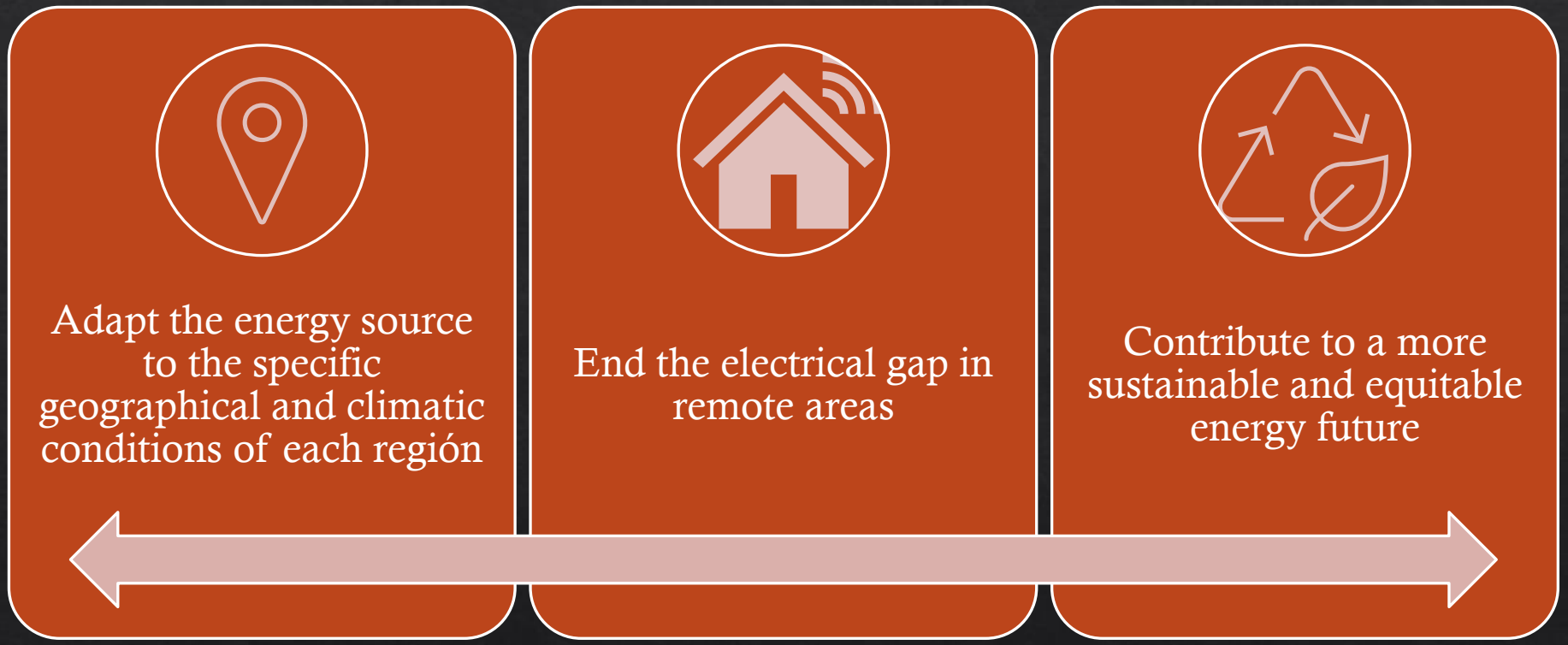
Cuyo region:

Geothermal energy can provide a constant generation base while solar energy can increase generation capacity during sunny days.

Southern Patagonia:

Its constant, high-speed winds makes it an ideal climate for the efficiency of horizontal-axis wind turbines.

Conclusion


Adapt the energy source to the specific geographical and climatic conditions of each región
End the electrical gap in remote areas
Contribute to a more sustainable and equitable energy future

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