

LACK OF ENERGY IN ISOLATED COMMUNITIES: MICRO AND SMALL GENERATORS FOR CREEKS AND RIVERS

Universidad Tecnológica Nacional – Facultad Regional Paraná

Students of Electromechanical Engineering

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English II - 2023

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Introduction



7 AFFORDABLE AND
CLEAN ENERGY



[1]

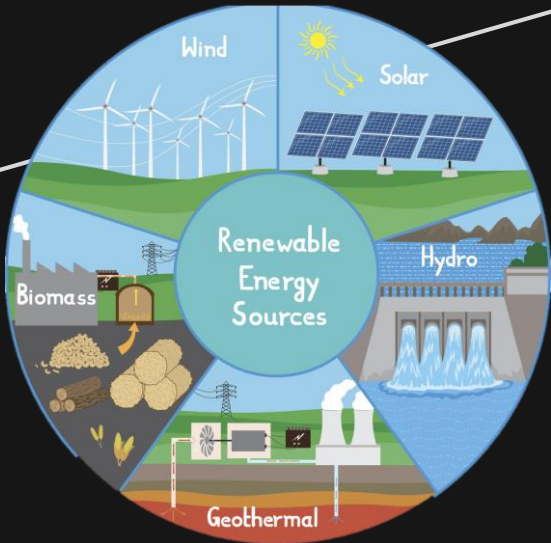
Many people around the world live in remote and isolated places that do not have electricity.

7 AFFORDABLE AND
CLEAN ENERGY



[1]

Introduction



There are many ways to generate energy from natural resources.

The focus will be on the use of small devices that are able to generate energy from creeks.

It will be shown that these devices do not leave a carbon footprint.

MICRO AND SMALL HYDROPOWER GENERATORS

Source: <https://www.opportunitiesandcareers.com/2023/08/29/africa-fellowship-for-young-energy-leaders/>

https://www.youtube.com/watch?v=XjEgFIngZ04&ab_channel=JapanVideoTopics-English

<https://www.rfi.fr/en/podcasts/paris-perspective/20221223-paris-perspective-37-25-years-later-%E2%80%93-the-kyoto-protocol-and-cop-stephan-savarese>

Map of the Presentation

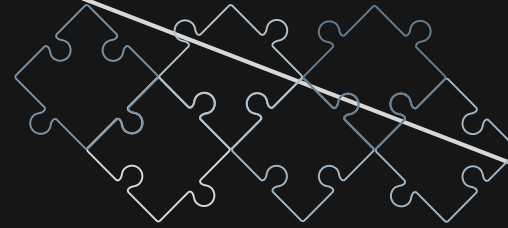
Presentation and description of the problem

- The context
- The causes
- The consequences

Presentation of solutions proposed around the world

- Micro hydro-power devices

Presentation of benefits of the use of micro hydro-power devices

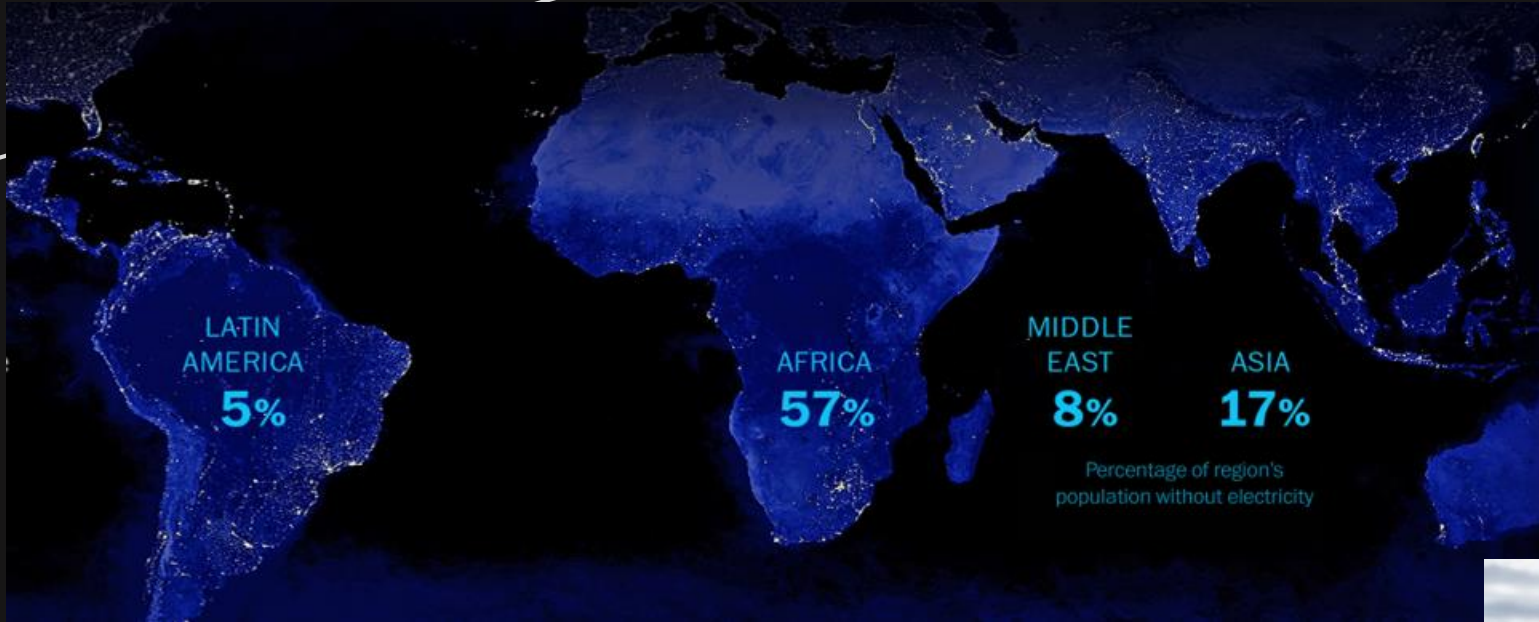


Impact of the paper

- Introduction of energy problems in isolated and rural places around the world.
- Presentation of the quality of life of people who do not have access to the service.
- Explanation of sustainable solutions to provide a solution to the problem.
- Presentation of information necessary to contribute to the environment.



Problem Description



Around the world, there are 759 million people without electric power service.

[3]

The presentation will focus on the rural context, which suffers the lack of power due to its isolation and distance from urbanization.





Problem Description

Causes

- High price of the high voltage distribution lines
- Logistics costs
- Lack of importation of materials for current distribution lines construction
- The economic inflation of the country
- Low interest of the government to help

Consequences

- Great difficulty in developing a decent life
- Generation of pollution to the environment due to the use of alternative energy, causing:
 - Deforestation
 - Polluting smoke fog due to high use of fuel

Problem Approach: Micro Hydro-Power Generators

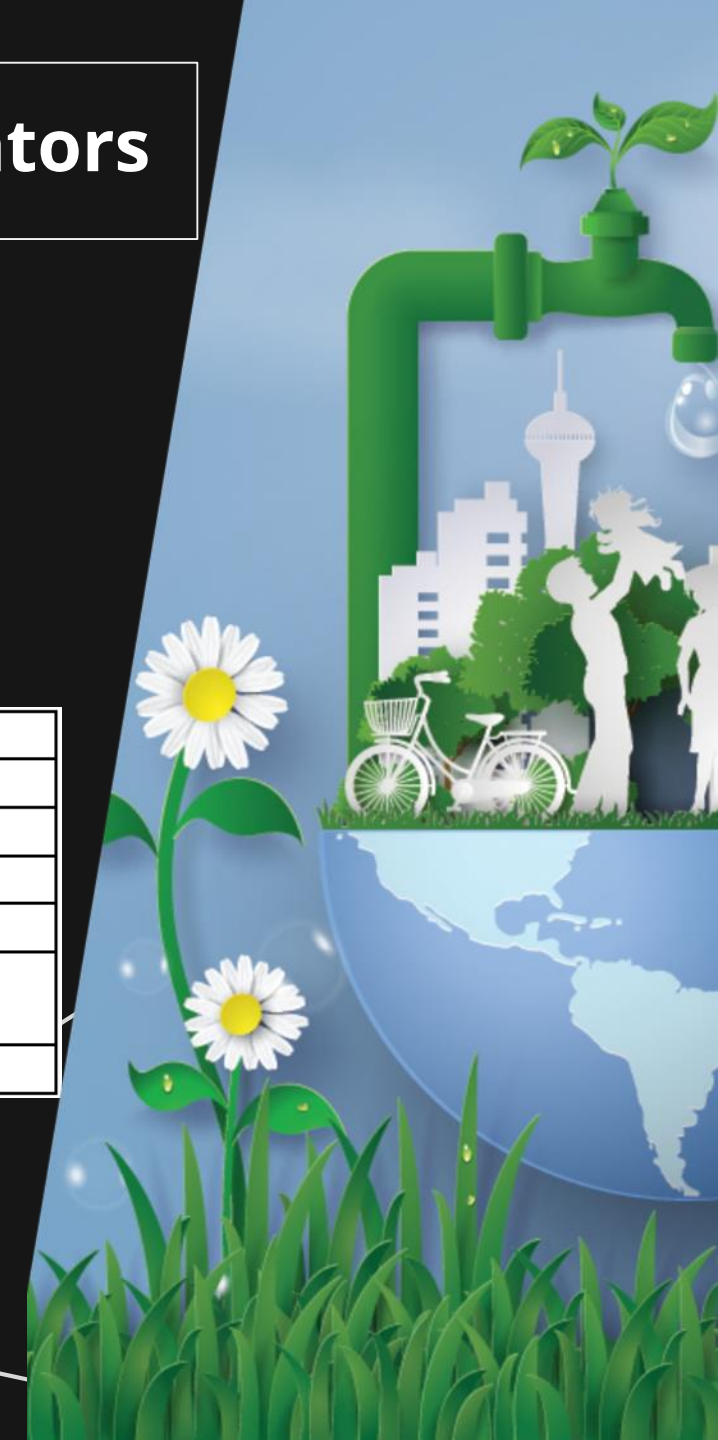
It is the way to generate energy from the flow of water.

Depending on the amount of energy generated by each device, they can be classified into:

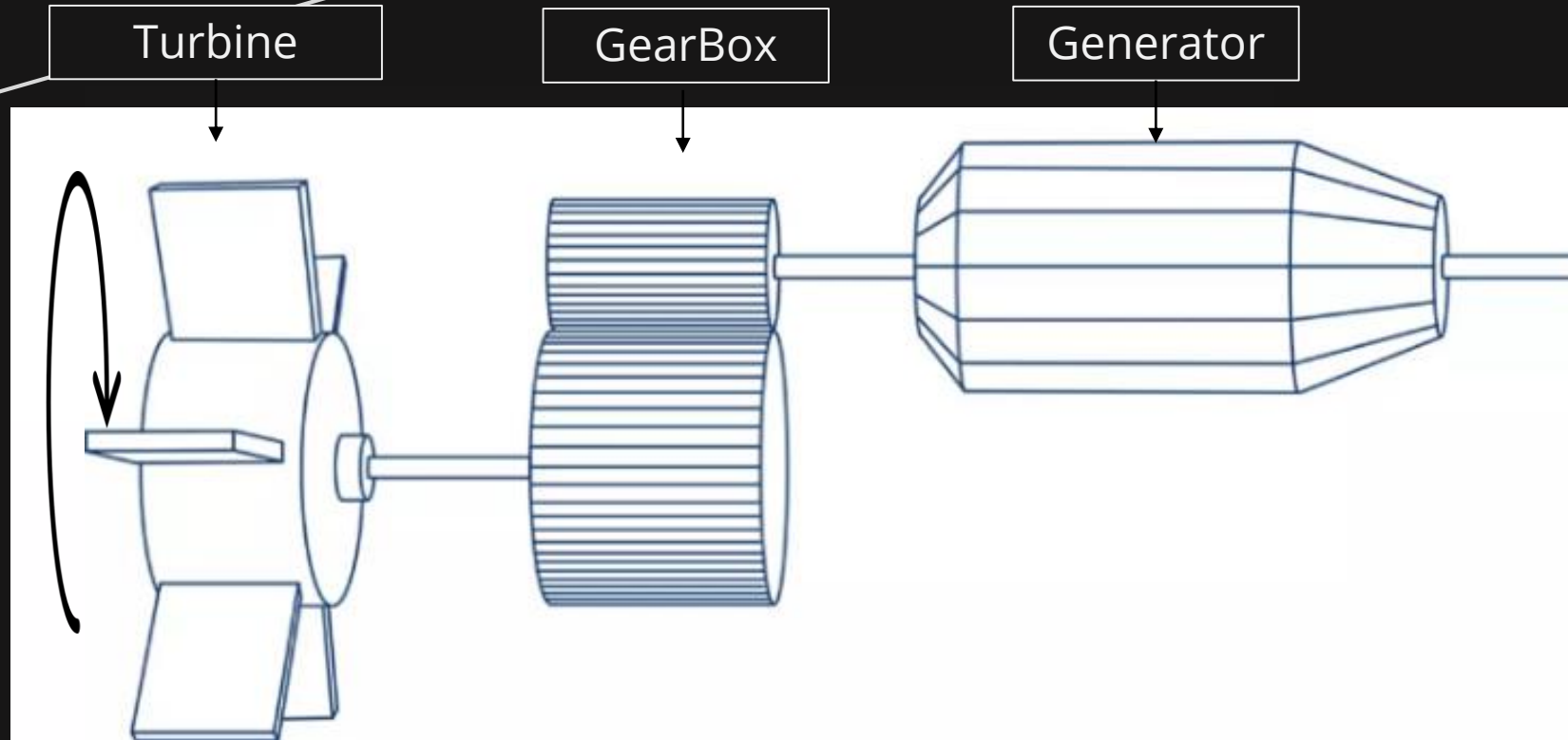
S/N	Classification	Rated Power	Consumer
1.	Large- hydro	>100 MW	usually feeding into a large electricity grid
2.	Medium-hydro	15 - 100 MW	usually feeding a grid
3.	Small-hydro	1 - 15 MW	usually feeding into a grid
4.	Mini-hydro	100 kW - 1MW	either stand alone schemes or more often feeding into the grid
5.	Micro-hydro	5kW -100 kW	usually provided power for a small community or rural industry in remote areas away from the grid
6.	Pico-hydro	< 5kW	

[8, p. 5]

They are an advantageous way to harness the energy in isolated communities



Principle of Operation



[10]

The flow of water passes through the blades.

The rotation movement is transmitted to the gearbox to obtain the necessary speed transmission between the turbine and the generator.

The generator produces electric power.

Micro Hydro-Power generators Around the World

1- The Vortex Turbine:



- It has a capacity to generate between 15kW and 75 kW

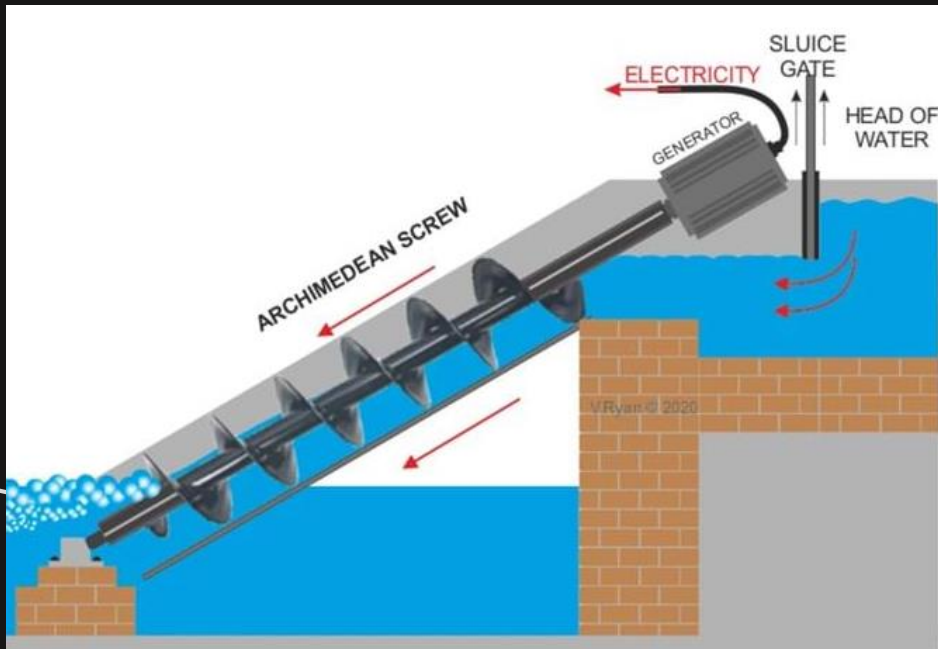
- It can operate in any waterway that has low drops ranging from 1,5m-5m

[12]



Micro Hydro-Power generators Around the World

2- Archimedean Screw Hydro Turbine:



- It has a capacity to generate between 5kW and 500 kW

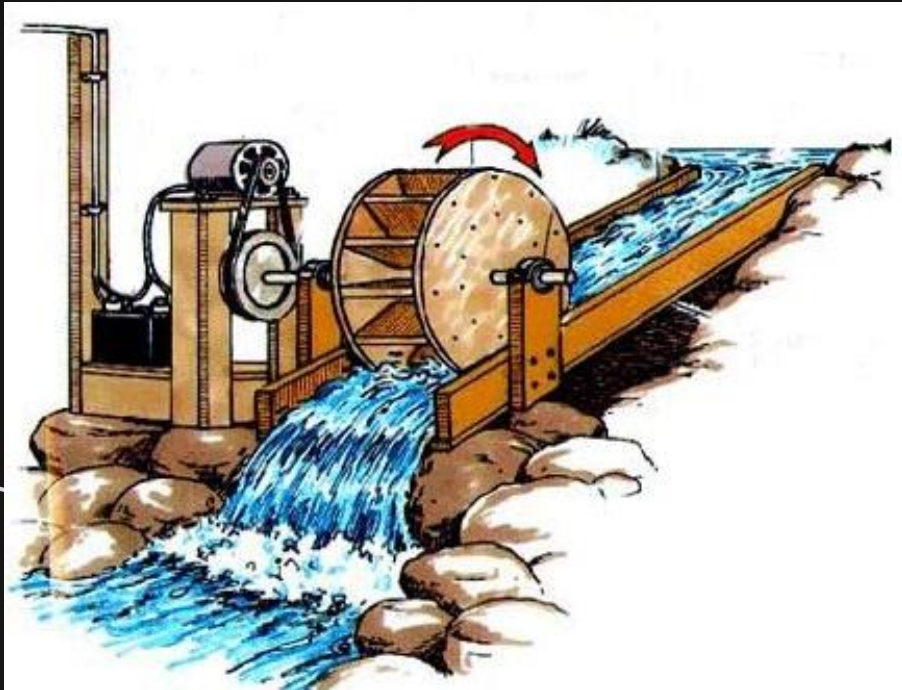
- It has a useful life of 30 years.

[14]



Micro Hydro-Power generators Around the World

3- Crossflow Turbine Generator:



- It has a capacity to generate 100 kw easily.

- It operates on the impulsive force created during the striking of the water flow on the turbine blades.

- It can be built with recycled components and without technical difficulties.



Advantages and disadvantages of the proposed systems

advantages

- Low head and flow required
- No reservoir needed
- Zero carbon-dioxide emission
- Continuous operation and reliability
- Comparatively low cost
- Higher efficiency
- Little impact on ecology

disadvantages

- Location Suitability
- Expertise Required
- Limited Expansion Options
- Seasonal Variability

Conclusion



It is very important to spread this technology.



Many energy problems can be solved with sustainable devices.



Other people who have access to electricity can also use this device to reduce their carbon footprint.



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