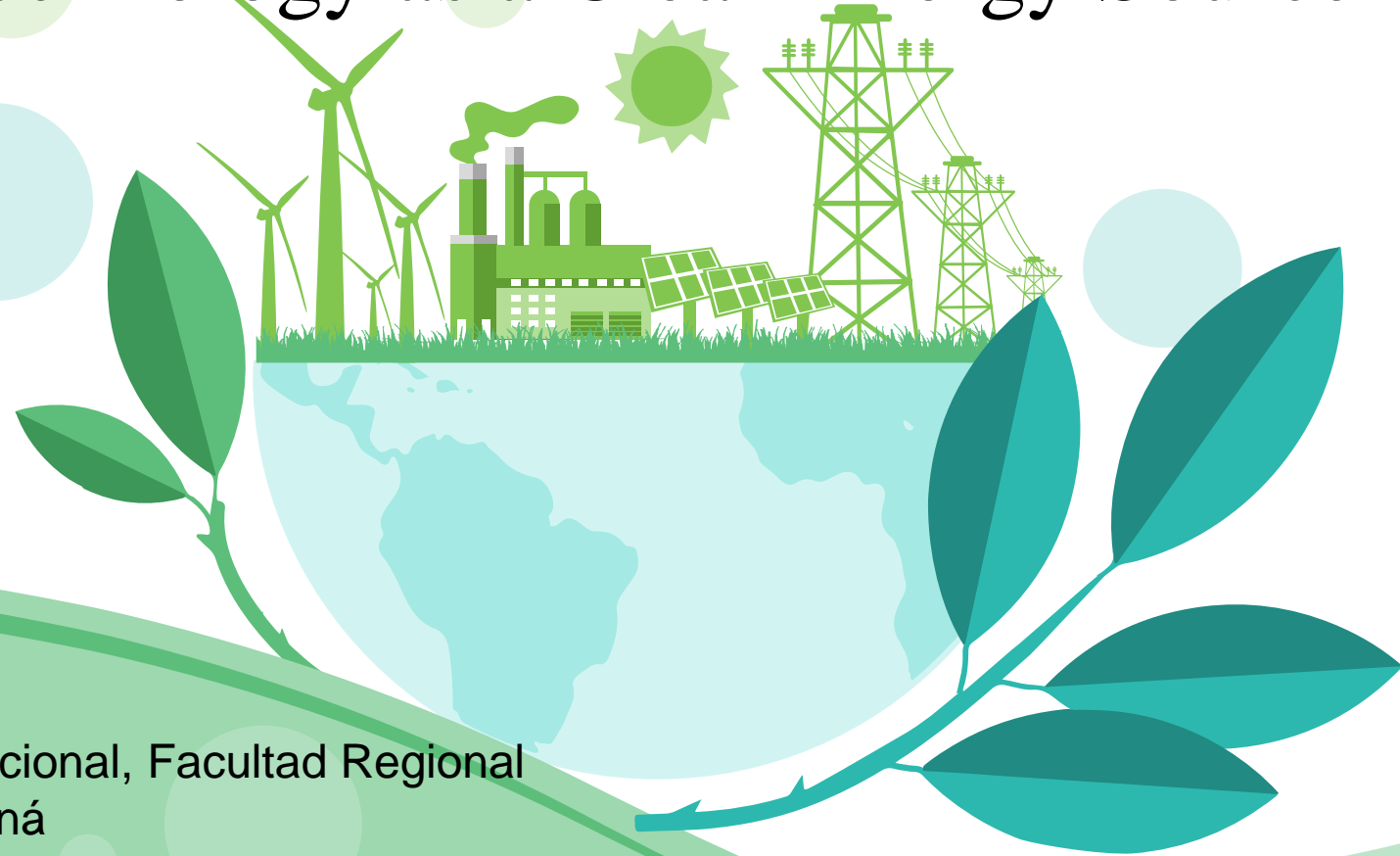


Transforming Waste into a Valuable Resource: Plasma Technology as a Clean Energy Source



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Paraná
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2023

INTRODUCTION

Current state of the world



Overpopulation

With such a large number of people having little to no awareness of sustainable ways of life, it leads to problems that directly affect everyone.



Industrialization

Poor waste management



United Nation's Agenda

The SDGs addressed in this work
are:

6 CLEAN WATER
AND SANITATION



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11 SUSTAINABLE CITIES
AND COMMUNITIES



Introduction

THESIS STATEMENT

But, is it enough?

Current state of
the world



A cutting-edge solution is needed

Plasma gasification converts materials into synthetic gas through high temperatures, useful for energy and waste management.



Introduction

OBJECTIVES OF THE PROJECT

The key outcomes encompass:

- Promoting Awareness
- Evaluating Viability
- Expanding Outreach Efforts



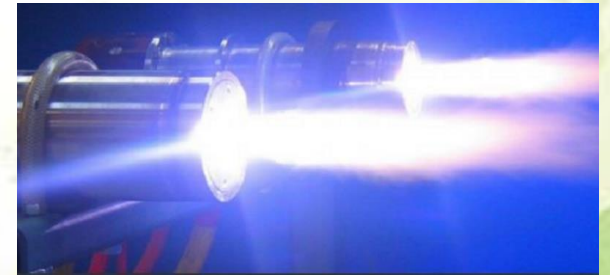
Introduction

MAP OF THE PRESENTATION

01 Waste Generation and its Consequences



02 Understanding Plasma Technology



2.1 Introduction to plasma

2.2 Gasification and Chemical Reactions

03 The System's Operation

3.1 Descriptive Analysis



Introduction

IMPACT OF THE PROJECT

Key results include:

- Changing Energy Generation Paradigm
- Giving Use to Waste
- Cleaning the Planet



Problem Statement

WASTE GENERATION AND ITS IMPACTS

- Generation of 2.01 billion tons of waste annually
- 75% of plastic disposal in oceans
 - Loss of biodiversity
- Inadequate waste management
 - Emission of millions of tons of greenhouse gases per year



Northern Africa and Western Asia

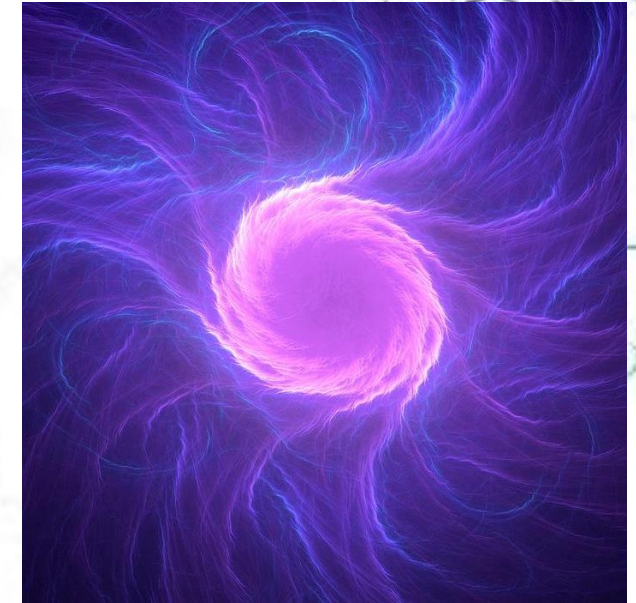


Problem approach

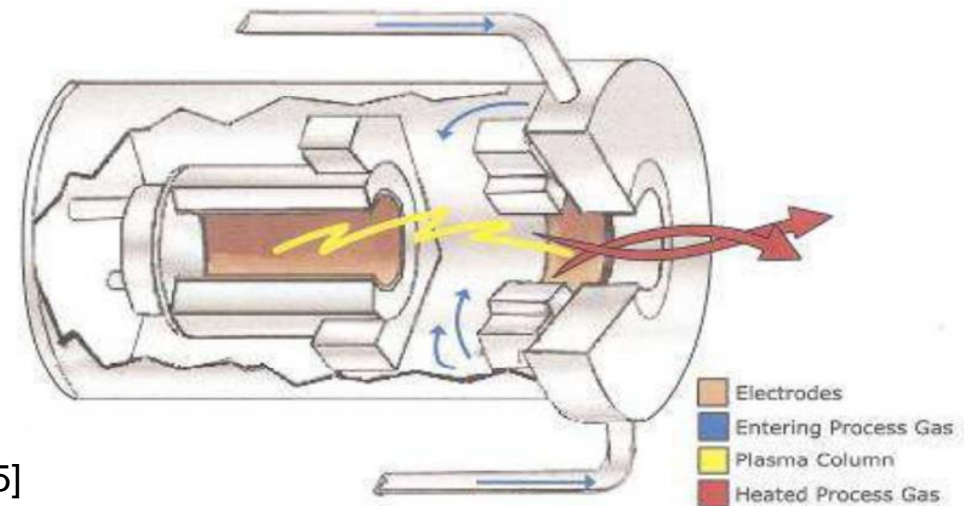
PLASMA TECHNOLOGIES: AN INNOVATIVE METHOD FOR ENERGY GENERATION

Introduction to Plasma

- An extremely heated gas, known as “The Fourth State of Matter”
- Useful for its reaction to electromagnetic fields and capability to conduct electricity



Formation process

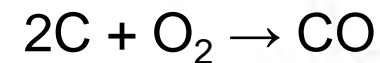
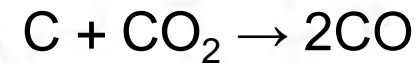
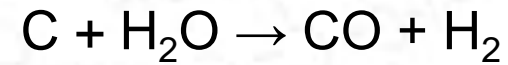
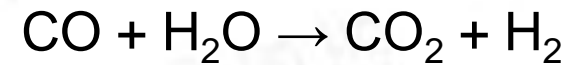
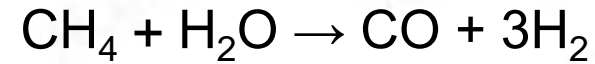


Problem approach

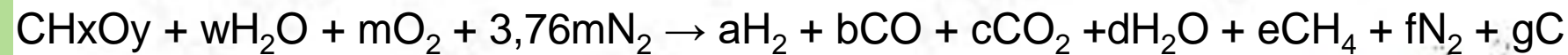
**PLASMA
TECHNOLOGIES:
AN INNOVATIVE
METHOD FOR
ENERGY
GENERATION**

Gasification and Chemical Reactions

Each individual reaction is as follows:



The global gasification reaction is:

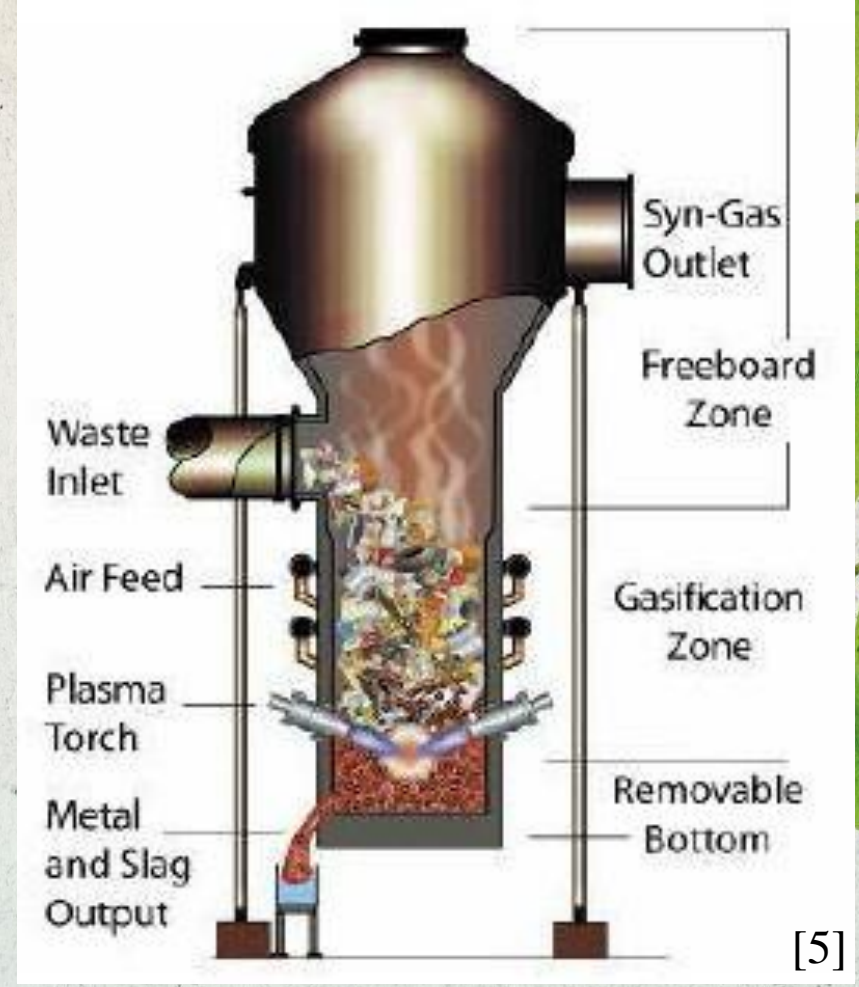


Problem approach

PLASMA TECHNOLOGIES: AN INNOVATIVE METHOD FOR ENERGY GENERATION

The System's Operation

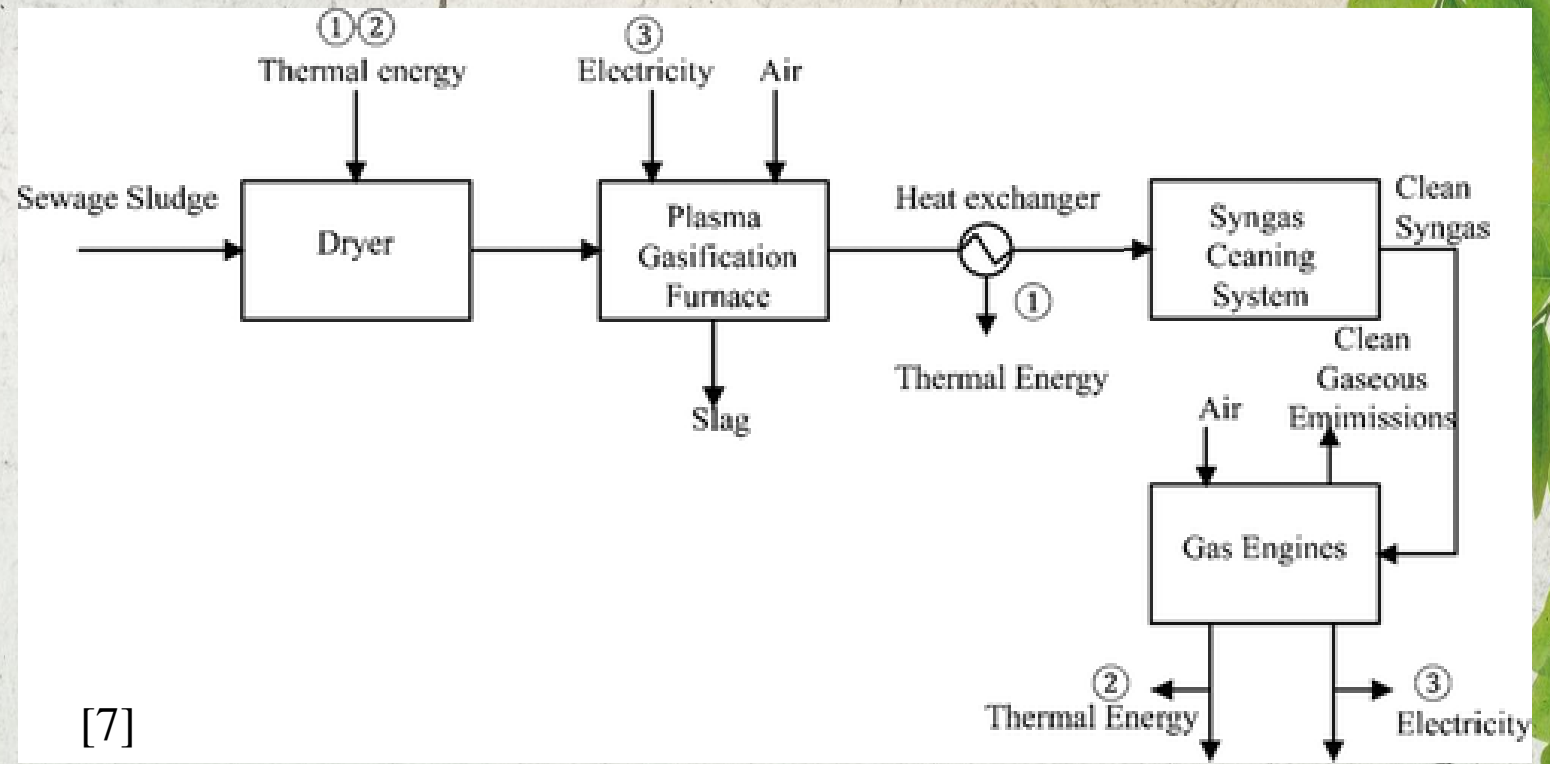
- **Freeboard Zone:** Upper area where waste breaks down and dries, enhancing gasification.
- **Waste Inlet:** Introduction point for waste feed, metallurgical coke, and limestone.
- **Plasma Torches:** devices positioned near the bottom to heat a coke bed and create a heat reservoir,
- **Gasification Zone:** place where waste materials undergo gasification, forming syngas.
- **Removable Bottom:** section where inorganic materials melt, creating molten metals and vitrified residue.



Problem approach

PLASMA TECHNOLOGIES: AN INNOVATIVE METHOD FOR ENERGY GENERATION

The System's Operation



[7]

“The H₂ and CO generated during the gasification process can be a fuel source. Therefore, plasma gasification process has been combined with many other technologies to recover energy from the syngas” [5].

Viability Assessment

VIRTUES, FLAWS, & GENERAL PERFORMANCE

Virtues

- ✓ It reduces waste material.
- ✓ It generates sustainable energy.
- ✓ It has high energy efficiency.
- ✓ It generates minimal levels of pollution.



Viability Assessment

VIRTUES, FLAWS, & GENERAL PERFORMANCE

Flaws



- ❖ It has a high initial investment cost.
- ❖ It requires superior skilled maintenance personnel.
- ❖ It is a complex technology.
- ❖ It has deficiency in regulatory terms.

Conclusion



Sustainable Future Through Innovation

Revolutionizing waste treatment and clean energy production for a sustainable future.



Optimization

Ongoing development is crucial to enhance efficiency and affordability.



Public Awareness

Essential for responsible adoption and continuous improvement.



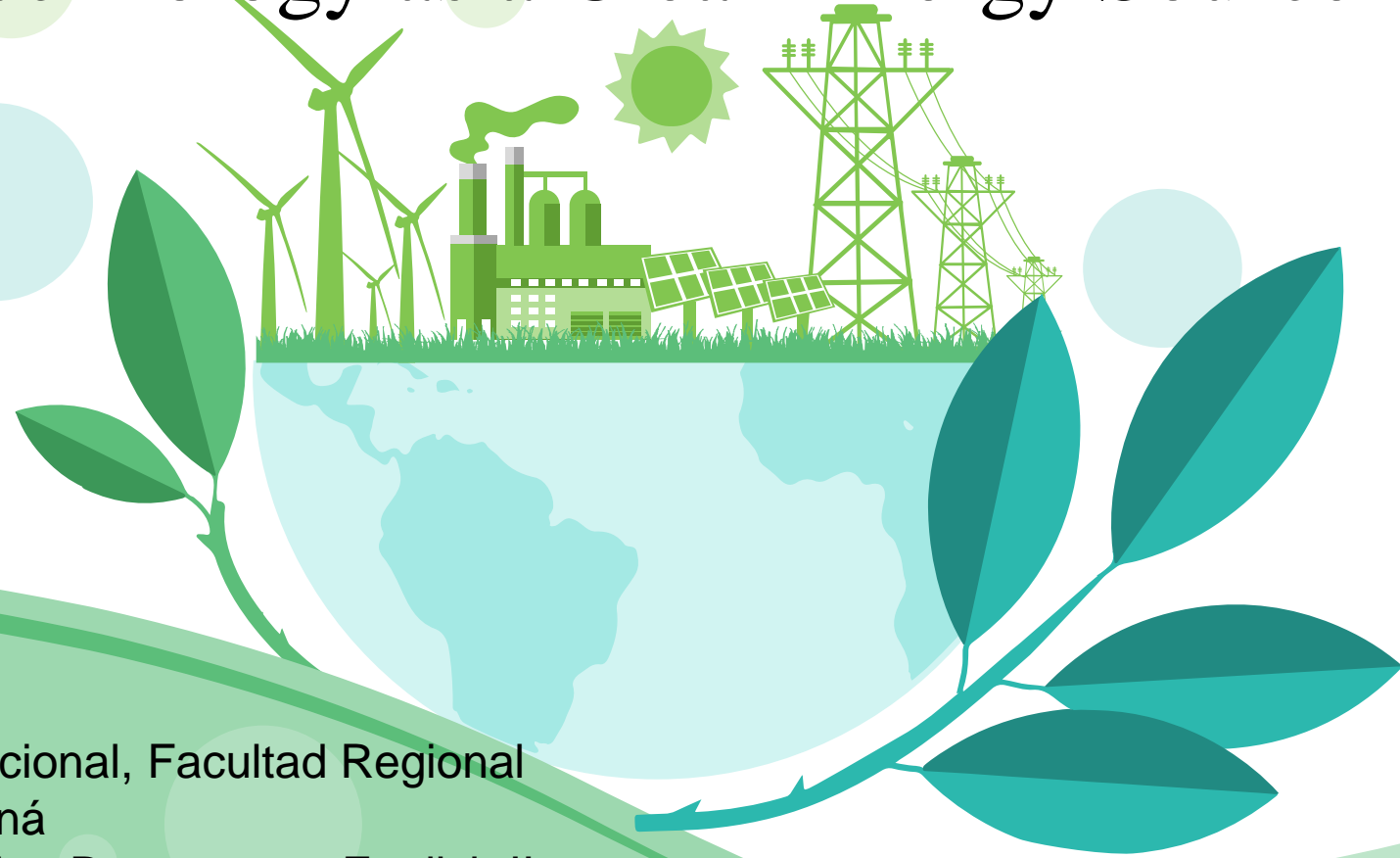
Thank you

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