CRANE RIDGE ANALYTICS & DISABILITY ECONOMIC EMPOWERMENT TRUST

Advocating for Sustainable Tire Recycling and Agricultural Rehabilitation

Using Pyrolysis Technology for Environmental and Economic Benefits

INTRODUCTION

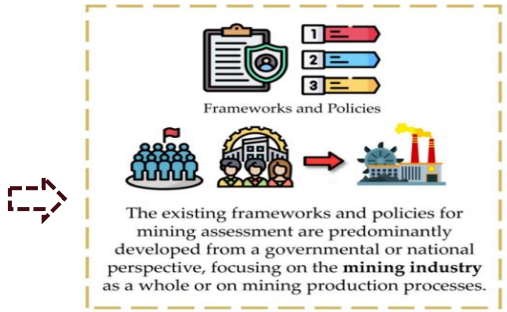
Crane Ridge Analytics is proud to be in a strategic partnership with the Disability Economic Empowerment Trust (DEET). This collaboration aims to drive inclusive economic growth and create opportunities for people with disabilities as well as youth and women in Africa.

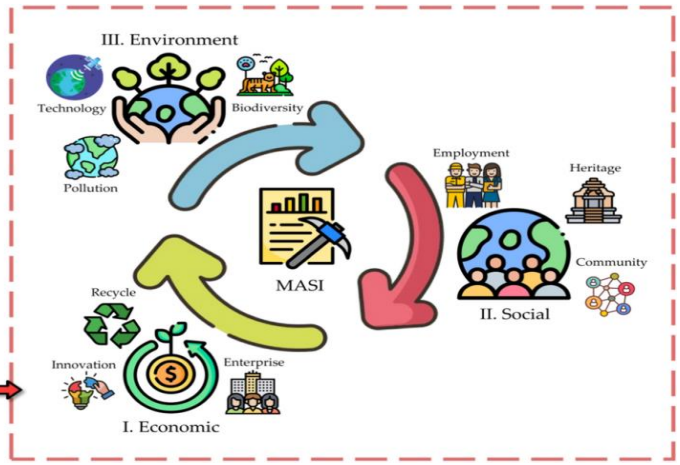
DEET, renowned for its dedication to fighting poverty and unemployment among individuals with disabilities, offers a range of programs including SMME Development, Training and Skills Development, Employment Support Services, and Inclusive Education Programs.

Together, Crane Ridge Analytics and DEET are committed to fostering an inclusive society where everyone has the opportunity to thrive.

Our approach ensures that sustainability initiatives generate revenue, fund social programs in mining communities, and work towards preventing mining towns from becoming ghost towns after mine closures.

The Mining Area Sustainability Index (MASI)





BACKGROUND

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According to research from the University of Cape Town, over a quarter of South Africa's local municipalities host an operating mine.

This means that millions of people living in these mining host communities could be significantly affected by mine closures. Specifically, **48 of South Africa's 230 operating mines are projected to close within the next 10 years.**

Mining companies in South Africa spent an estimated **R4.9 billion on social development programs per year**. These programs are designed to improve the quality of life in mine-host communities through various development projects.

Continuation of Social Programs: There isn't a specific percentage available for how many mining companies continue social programs after mine closure in South Africa.

However, the continuation of these programs often depends on factors such as:

- Regulatory requirements
- Financial health of the company
- Community engagement
- Partnerships with local stakeholders

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Current Challenges:

Unfortunately, there are currently over 6,000 derelict and ownerless mines in South Africa, many of which have led to the creation of ghost towns.

This highlights the critical need for sustainable solutions that ensure the long-term well-being of mining communities even after mine closures.

Proposed Solutions:

By developing Sustainable Tire Recycling and Agricultural Rehabilitation programs during the life of the mine and beyond, we can address the problem effectively.

These programs would not only manage waste and improve environmental outcomes but also provide ongoing economic benefits to the community.

This integrated approach ensures that communities continue to thrive and develop even after the mining operations have ceased, preventing the formation of ghost towns and creating a lasting positive impact.

ESTABLISHMENT OF THE PROGRAM

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Flexible Implementation:
The establishment of this program can be done at any mine site, making it a versatile and adaptable solution for diverse mining operations.

Objective:
To set up a tire recycling facility on the mine site using pyrolysis technology and integrate an agricultural rehabilitation program utilizing biochar produced from the recycled tires.

Phases: The project will be implemented in two phases:

Phase 1: Pyrolysis Plant

- **Definition :** A pyrolysis plant is a facility that uses the thermal decomposition process to convert waste materials, such as tires and plastics, into valuable by products like fuel oil, Biochar , and syngas.

- **Process :** They pyrolysis process involves heating waste materials in an inert atmosphere (absence of oxygen) at elevated temperatures , causing the materials to break down into simpler compounds without burning.

Phase 2: Agricultural Rehabilitation using Biochar

PHASE 1: BACKGROUND

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Mining Waste Challenges:

- Mining activities generate large volumes of waste, including waste rock, tailings, and spent ore. These materials can have a significant environmental impact if not managed properly.
- Waste tires from mining equipment, such as off-the-road (OTR) tires, are a major component of mining waste. These tires are difficult to dispose of and can cause various environmental issues.

Importance of Pyrolysis for Mining Waste:

- The main purpose of waste recycling should be to produce the highest quality commodities possible without secondary pollution. Thus, pyrolysis, as one of the most environmentally-friendly ways to recycle waste tires.
- Pyrolysis is the thermal decomposition of materials at elevated temperatures in an inert atmosphere. It involves a change in chemical composition and is irreversible.
- Tires treated by pyrolysis will generate products like fuel oil and carbon black. Each product has value and the potential to be reprocessed into alternative energy and raw materials.

PHASE 1: ENVIRONMENTAL & ECONOMIC BENEFITS

Reduction of Tire Waste:
Pyrolysis significantly reduces the volume of waste tires, mitigating the environmental impact of mining operations.

Resource Recovery:
The by-products of pyrolysis, such as fuel oil and carbon black, can be used as alternative energy sources and raw materials, contributing to a circular economy.

Air Quality Improvement:
Pyrolysis captures harmful emissions, improving air quality and reducing the environmental footprint of mining activities.

Sustainable Development:
By integrating pyrolysis technology into mining operations, companies can contribute to sustainable development.

This includes the use of biochar produced in Phase 2 for agricultural rehabilitation, enhancing soil health and crop yields, supporting social programs, and ensuring long-term community resilience.

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PHASE 1: PROJECT PLAN

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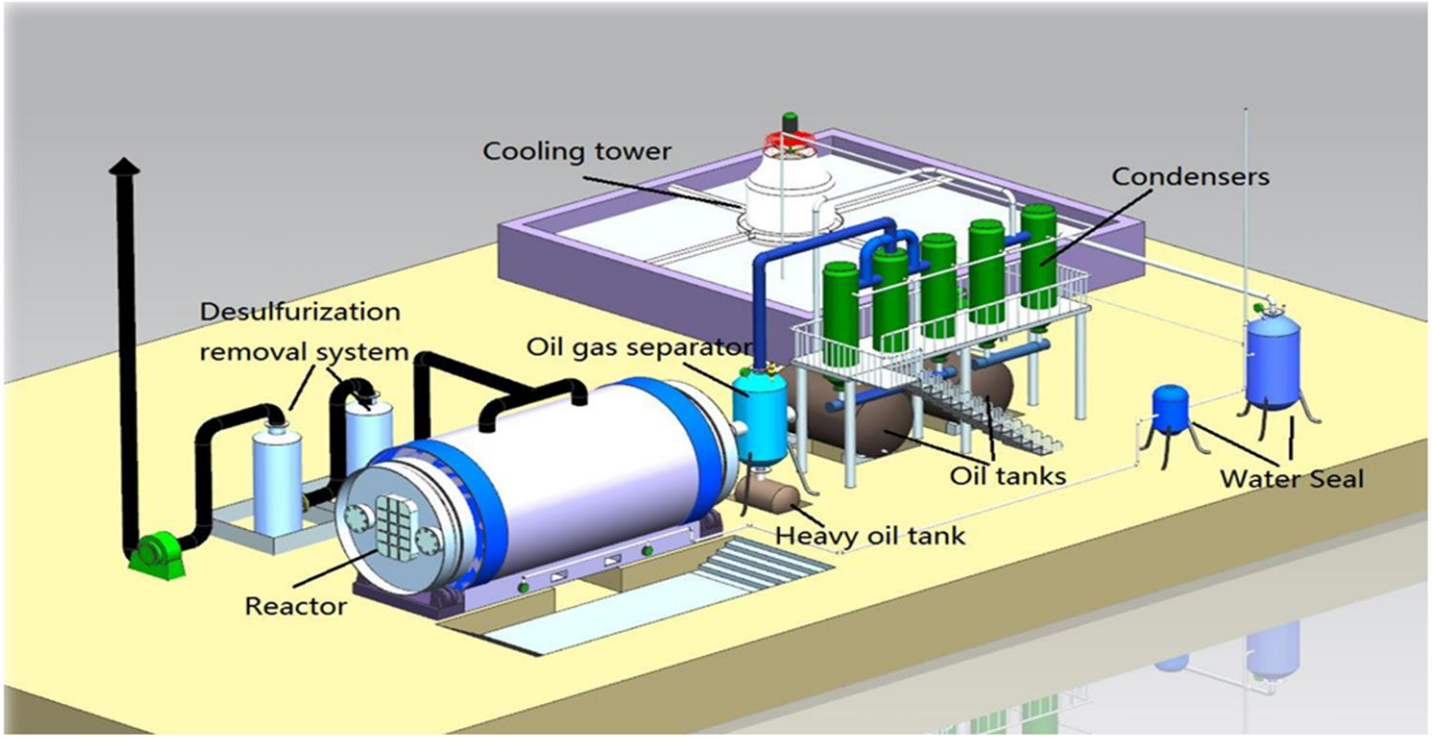
Onsite Installation:

The pyrolysis plant can be installed at any mining location, ensuring ease of access to waste tires and integration with existing waste management infrastructure.



The pyrolysis plant comes in different handling capacities, depending on the mine size and the volume of waste generated. It can handle between **8 tons to 20 tons** of waste tires per day. This flexibility ensures that the plant can be tailored to meet the specific needs and waste management requirements of different mining operations.

PHASE 1: PROJECT PLAN – OPERATIONS

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Tire / Rubber Pyrolysis

Tire oil :40%~45%

a. Can be sold directly as fuel

b. Can be refine to diesel and gasoline by oil distillation plant

Carbon Black: 37%

a. Can be sold directly

b. Can be refined by carbon black processing machine to make it finer

c. Can be made into pellet/briquitte

Steel Wire: 13%

Can be sold directly as steel or iron

PHASE 1: PROJECT PLAN – KEY BENEFITS

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Environmental Impact:

- Significant reduction in tire waste
- Conversion of waste tires into valuable products like oil, gas, and biochar
- Improvement in air quality by capturing harmful emissions

Economic Benefits:

- Generation of revenue from by-products
- Enhancement of agricultural productivity through biochar application
- Creation of job opportunities, particularly in rural areas

Community Development:

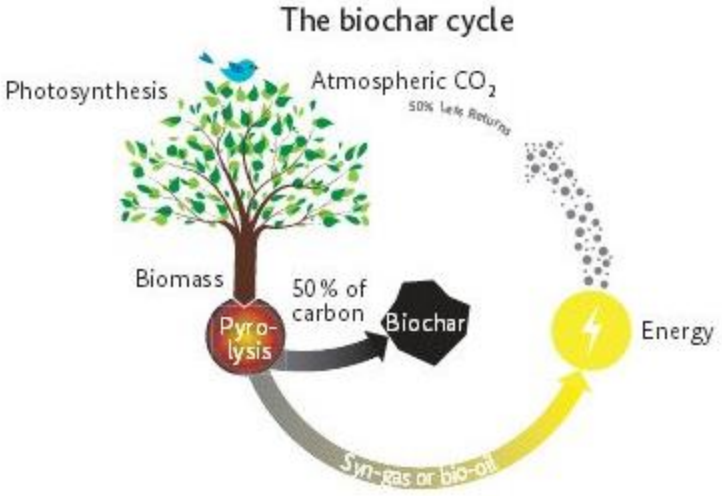
- Sustainable funding for social programs
- Improved soil health and crop yields in local agriculture
- Prevention of mining towns from becoming ghost towns after mine closure

PHASE 2: ARRICULTURAL REHABILITATION USING BIOCHAR

Introduction to Biochar

Definition:

Biochar is a stable form of carbon produced from the thermal decomposition of organic materials, such as waste tires, in an oxygen-limited environment (pyrolysis).



Benefits:

Improves soil health, increases water retention, enhances nutrient availability, and sequesters carbon, contributing to climate change mitigation.

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PHASE 2: STEPS TO ACHIEVE AGRICULTURAL REHABILITATION USING BIOCHAR

1. Biochar Production

- **Source Material**: Use the char produced from the pyrolysis of waste tires.
- **Quality Control**: Ensure the biochar meets quality standards for agricultural use, with proper testing for contaminants.

2. Soil Analysis

- **Assessment**: Conduct comprehensive soil tests on the agricultural land to determine baseline conditions, including pH, nutrient levels, and soil structure.
- **Target Areas**: Identify areas that would benefit most from biochar application, such as degraded soils or regions with poor water retention.

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PHASE 2: STEPS TO ACHIEVE AGRICULTURAL REHABILITATION USING BIOCHAR

3- Biochar Application

- **Application Rate**: Determine the optimal rate of biochar application based on soil tests and desired outcomes (typically ranging from 5 to 20 tons per hectare).

- **Method**: Incorporate biochar into the soil using appropriate agricultural machinery, ensuring even distribution. Methods can include tilling, mixing with compost, or top-dressing followed by irrigation.

4- Crop Selection and Planting

- **Choice of Crops**: Select crops that will benefit most from improved soil conditions, such as high-nutrient-demand crops or those suited to the local climate.

- **Planting**: Implement planting strategies that maximize the benefits of biochar, such as crop rotation, intercropping, and cover cropping.

PHASE 2: STEPS TO ACHIEVE AGRICULTURAL REHABILITATION USING BIOCHAR

5- Monitoring and Evaluation

- **Regular Testing**: Conduct regular soil and crop health tests to monitor changes in soil properties and crop performance.
- **Data Collection**: Gather data on crop yields, soil moisture levels, and nutrient content to evaluate the effectiveness of biochar application.
- **Adjustments**: Make necessary adjustments to biochar application rates and methods based on monitoring results to optimize outcomes.

6 - Community Involvement

- **Engagement**: Involve local farmers and community members in the project through education and training programs.
- **Support**: Provide technical support and resources to ensure successful implementation and adoption of biochar practices.
- **Partnerships**: Collaborate with local agricultural organizations, government bodies, and NGOs to enhance the project's impact and sustainability.

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PHASE 2: ENVIRONMENTAL AND ECONOMIC BENEFITS

Soil Health:
Improved soil structure, increased water retention, and enhanced nutrient availability.

Crop Yields:
Higher crop productivity and resilience to environmental stressors.

Carbon Sequestration:
Long-term carbon storage in the soil, mitigating climate change.

Job Creation:
The project will create job opportunities in both the pyrolysis plant operation and the agricultural sector, boosting local employment.

Income Generation:
The sale of biochar and increased agricultural productivity will generate income for the community, supporting local economies.

Community Development:
Promotes sustainable farming practices, reduces reliance on chemical fertilizers, and supports ongoing social programs.

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WHY SHOULD THE MINING INDUSTRY INVEST IN TIRE RECYCLING AND AGRICULTURAL REHABILITATION PROJECTS

1. Environmental Responsibility

- **Waste Reduction**: Investing in a pyrolysis plant to recycle waste tires significantly reduces the environmental footprint of mining operations by decreasing landfill waste and pollution.

- **Carbon Sequestration**: Biochar produced from the pyrolysis process can be used to improve soil health and sequester carbon, contributing to climate change mitigation.

2. Economic Benefits

- **Resource Recovery**: The pyrolysis process generates valuable by-products such as fuel oil and carbon black, which can be sold or used as alternative energy sources, creating a new revenue stream.

- **Increased Crop Yields**: The use of biochar in agricultural rehabilitation enhances soil health, leading to higher crop productivity and resilience, benefiting local farmers and generating income for the community.

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WHY SHOULD THE MINING INDUSTRY INVEST IN TIRE RECYCLING AND AGRICULTURAL REHABILITATION PROJECTS

3. Social Impact

- **Job Creation**: Both the tire recycling and agricultural rehabilitation projects create job opportunities, boosting local employment and supporting community development.

- **Sustainable Funding for Social Programs**: The revenue generated from these projects can fund social development programs in mining communities, improving the quality of life and ensuring long-term sustainability.

4. Regulatory Compliance and Reputation

- **Compliance with Environmental Regulations**: Investing in these projects helps the mine comply with environmental regulations and guidelines, avoiding potential fines and enhancing operational sustainability.

- **Enhanced Reputation**: Demonstrating a commitment to environmental and social responsibility enhances the mine's reputation among stakeholders, including investors, regulators, and the community.

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WHY SHOULD THE MINING INDUSTRY INVEST IN TIRE RECYCLING AND AGRICULTURAL REHABILITATION PROJECTS

5. Long-Term Community Resilience

- **Preventing Ghost Towns**: By supporting sustainable initiatives during the life of the mine and beyond, these projects help prevent mining towns from becoming ghost towns after mine closure, ensuring ongoing economic and social stability for the community.

6. Expenditure to Date

- **Current Expenditures**: Mining companies in South Africa have spent an estimated R4.9 billion annually on social development programs, with little to no return on investment. This highlights the need for sustainable and revenue-generating initiatives.

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CONCLUSION

Investing in tire recycling via a pyrolysis plant and agricultural rehabilitation using biochar not only addresses environmental and waste management challenges but also creates economic, social, and regulatory benefits.

These integrated projects ensure a sustainable and prosperous future for mining communities, making them a smart and responsible investment.

CONTACT US

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