

Coal Processing Plan & Report:

Enhancing Value through Comprehensive Processing Steps



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for

Daresa Investment LTD, Dar Es Salaam, Tanzania.

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Coal, a vital energy resource, undergoes a complex series of processes after extraction to enhance its value and suitability for various applications. This report/plan outlines the key steps involved in coal processing, emphasizing the comprehensive approach to maximize its quality and utility. A summary list and table of the entire value enhancement process are included for reference as appendices A & B, and a plan for implementing a comprehensive, fully functional coal processing system from extraction to final utilization is included.

The process begins with the extraction of coal from mines using specialized equipment such as excavators and haul trucks. Essential permits and licenses are secured, and transportation infrastructure, including conveyor belts and loading facilities, is established. This initial step sets the foundation for subsequent processing stages.

Following extraction, the coal undergoes washing to remove impurities and enhance its quality. The coal washing process employs heavy media separators, jigs, and froth flotation units. The design and construction of a coal washing plant, combined with the installation of these apparatuses, contribute to the reduction of ash and mineral content in the coal, thus improving its overall quality.

To facilitate transportation and optimize combustion efficiency, coal is subjected to crushing and sizing processes. Crushers and screens are employed for reducing coal to smaller, manageable sizes. This step involves the development of infrastructure dedicated to crushing and sizing operations, ensuring the coal meets specific industry standards.

Moisture removal is a crucial aspect of coal processing to enhance its heating value and combustion efficiency. Drying facilities are designed and constructed for this purpose, incorporating rotary dryers and fluidized bed dryers. These technologies effectively reduce moisture content, contributing to the improved overall quality of the coal.

The desliming process focuses on removing fine particles from the coal, typically in the size range of micrometers. Hydrocyclones, sedimentation, and flocculation techniques are employed to achieve this. Desliming enhances coal quality by eliminating fine impurities, a critical step in the preparation of coal for further downstream processes.

To extract maximum value from coal, upgrading processes such as pyrolysis and gasification are implemented. These technologies convert coal into valuable by-products, including coke, syngas, and chemicals. Upgrading facilities are established, incorporating pyrolysis units and gasification reactors to facilitate these transformative processes.

Adjusting coal quality to meet specific requirements is achieved through blending. Facilities are developed to house blending beds and stacker-reclaimers, allowing for precise adjustment of coal characteristics. Blending ensures the final coal product aligns with the desired specifications for various industrial applications.

Maintaining stringent quality control measures is paramount in coal processing. A dedicated laboratory equipped with analyzers and testing equipment is established. Quality control procedures ensure that the coal consistently meets industry standards and customer specifications.

Efficient logistics for moving and storing processed coal are essential. Infrastructure, including conveyors, trucks, and stockpiles, is established to streamline transportation and storage operations. This step prepares the processed coal for distribution and consumption.

The final stage involves the utilization of coal for power generation or industrial processes. Facilities are established for burning coal in boilers and turbines or incorporating it into various industrial processes. This comprehensive approach maximizes the value of coal by harnessing its energy potential and providing raw material for industrial applications.

In conclusion, the comprehensive processing of coal involves a series of well-coordinated steps, from extraction to utilization. Each stage contributes to enhancing the value of coal, ensuring it meets quality standards and serves as a versatile resource for diverse industrial needs.

Coal Processing Value Enhancement Implementation Plan

Implementation Plan for Coal Processing and Value Enhancement (All values in USD)

1. Mining and Transportation:

Action Steps:

Acquire necessary mining licenses and permits.

Purchase mining equipment (e.g., excavators, haul trucks).

Establish transportation infrastructure (conveyor belts, loading facilities).

Time Frame: 6 months

Labor Costs: \$150,000

Equipment Costs: \$3 million

2. Coal Washing:

Action Steps:

Design and construct coal washing plant.

Procure and install heavy media separators, jigs, and froth flotation units.

Time Frame: 12 months

Labor Costs: \$300,000

Equipment Costs: \$5 million

3. Crushing and Sizing:

Action Steps:

Procure and install crushers and screens.

Develop infrastructure for crushing and sizing operations.

Time Frame: 8 months

Labor Costs: \$200,000

Equipment Costs: \$2.5 million

4. Drying:

Action Steps:

Design and build drying facilities.

Procure and install rotary dryers and fluidized bed dryers.

Time Frame: 10 months

Labor Costs: \$250,000

Equipment Costs: \$4 million

5. Desliming:

Action Steps:

Integrate desliming equipment (hydrocyclones, sedimentation, flocculation) into the washing process.

Time Frame: 4 months

Labor Costs: \$100,000

Equipment Costs: \$1.5 million

6. Coal Upgrading:

Action Steps:

Evaluate and implement coal upgrading technologies (pyrolysis, gasification).

Procure and install upgrading equipment.

Time Frame: 18 months

Labor Costs: \$400,000

Equipment Costs: \$8 million

7. Blending:

Action Steps:

Develop blending facilities and infrastructure.

Procure and install blending beds and stacker-reclaimers.

Time Frame: 6 months

Labor Costs: \$150,000

Equipment Costs: \$2 million

8. Quality Control:

Action Steps:

Establish a quality control laboratory.

Procure and install laboratory equipment and analyzers.

Time Frame: 8 months

Labor Costs: \$200,000

Equipment Costs: \$3 million

9. Transportation and Storage:

Action Steps:

Develop logistics infrastructure (conveyors, trucks, stockpiles).

Procure and install transportation and storage equipment.

Time Frame: 10 months

Labor Costs: \$250,000

Equipment Costs: \$4 million

10. Utilization:

Action Steps:

Establish facilities for power generation or industrial processes.

Procure and install boilers, turbines, furnaces, and other required equipment.

Time Frame: 24 months

Labor Costs: \$600,000

Equipment Costs: \$12 million

Final Result:

A fully integrated coal processing system capable of producing high-quality coal, meeting industry standards and customer requirements.

Increased value of coal through quality improvement and the generation of by-products.

Enhanced efficiency in transportation, storage, and utilization processes.

Please note: *These estimates are approximate and should be refined based on detailed project analysis, local labor rates, and equipment costs. Consulting with industry experts and obtaining quotes from suppliers would be crucial for accurate planning. Additionally, regulatory compliance and environmental considerations should be incorporated into the planning process.*

Appendix A – Coal Value Enhancement Process Description – Step by Step

Mining and Transportation:

Process: Extraction of coal from mines using various mining equipment and transportation via conveyor belts.

Effect: Initial step in obtaining raw coal for further processing.

Apparatus/Machine Employed: Caterpillar, Komatsu, TAKRAF (Tenova).

Coal Washing:

Process: Removal of impurities from coal through methods such as heavy media separation, jigs, and froth flotation.

Effect: Enhances coal quality by reducing ash and mineral content.

Apparatus/Machine Employed: Steinert, Binder, MBE Coal & Minerals.

Crushing and Sizing:

Process: Reduction of coal size for transportation using crushers and screens.

Effect: Facilitates transportation and improves combustion efficiency.

Apparatus/Machine Employed: Hazemag, Thyssenkrupp, Kleemann (Wirtgen Group).

Drying:

Process: Removal of moisture from coal using rotary dryers and fluidized bed dryers.

Effect: Enhances heating value and combustion efficiency.

Apparatus/Machine Employed: Allgaier, Büttner, RUF.

Desliming:

Process: Removal of fine particles from coal using hydrocyclones, sedimentation, and flocculation.

Effect: Improves coal quality by eliminating fine impurities.

Apparatus/Machine Employed: Andritz, Steinert, KHD Humboldt Wedag.

Coal Upgrading:

Process: Conversion of coal into valuable products through pyrolysis units and gasification reactors.

Effect: Produces by-products like coke, syngas, or chemicals.

Apparatus/Machine Employed: Thyssenkrupp, Lurgi (Air Liquide), IKN.

Blending:

Process: Adjustment of coal quality through blending beds and stacker-reclaimers.

Effect: Achieves desired coal characteristics or meets specific industrial requirements.

Apparatus/Machine Employed: Schenck Process, Bedeschi, Aumund.

Quality Control:

Process: Analysis of coal properties using laboratory equipment and analyzers.

Effect: Ensures compliance with quality standards and customer requirements.

Apparatus/Machine Employed: Bruker, Sartorius, Zeiss.

Transportation and Storage:

Process: Logistics for moving and storing processed coal using conveyors, trucks, and stockpiles.

Effect: Prepares coal for distribution and consumption.

Apparatus/Machine Employed: Beumer Group, Schade, AMOVA (Siemens).

Utilization:

Process: Burning coal for power generation or using it in industrial processes.

Effect: Generates electricity or serves as a raw material in various industries.

Apparatus/Machine Employed: Siemens, MAN Energy Solutions, Babcock & Wilcox; Siemens, SMS group, Bosch Rexroth.

Each of these processes contributes to enhancing the overall quality, efficiency, and value of coal, making it suitable for a wide range of applications across different industries.

APPENDIX B – Table: Coal Value Enhancement Processes

Process	Effect	Machine	Manufacturer
Mining and Transportation	Extraction of coal from mines	Various mining equipment, conveyor belts	Caterpillar, Komatsu, TAKRAF (Tenova)
Coal Washing	Removal of impurities from coal	Heavy media separators, jigs, froth flotation	Steinert, Binder, MBE Coal & Minerals
Crushing and Sizing	Reduction of coal size for transportation	Crushers, screens	Hazemag, Thyssenkrupp, Kleemann (Wirtgen Group)
Drying	Removal of moisture from coal	Rotary dryers, fluidized bed dryers	Allgaier, Büttner, RUF
Desliming	Removal of fine particles from coal	Hydrocyclones, sedimentation, flocculation	Andritz, Steinert, KHD Humboldt Wedag
Coal Upgrading	Conversion of coal into valuable products	Pyrolysis units, gasification reactors	Thyssenkrupp, Lurgi (Air Liquide), IKN
Blending	Adjustment of coal quality	Blending beds, stacker-reclaimers	Schenck Process, Bedeschi, Aumund
Quality Control	Analysis of coal properties	Laboratory equipment, analyzers	Bruker, Sartorius, Zeiss
Transportation and Storage	Logistics for moving and storing processed coal	Conveyors, trucks, stockpiles	Beumer Group, Schade, AMOVA (Siemens)
Utilization	Burning coal for power generation and Industrial processes using coal as a raw material	Boilers, turbines, furnaces, kilns	Siemens, MAN Energy Solutions, Babcock & Wilcox, SMS group, Bosch Rexroth