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Achievement of Sustainable Development and Industrialization through Combined Use of Biomass Pellets as an Alternative Fuel and Jatropha Curcas - A Potential Biofuel Plant

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Abstract: ***The production of green energy to satisfy the energy requirement while maintaining the sustainable development motto is the need of today. Switching to non conventional resources for the generation purpose has rendered the manufacture of biomass pellets which can be used in lieu of coal as raw material for combustion purpose. The jatropha seeds are used for conditioning of pellets which in turn increases its calorific value.***
Keyword: Biomass, green energy, pelletization, jatropha.

I. INTRODUCTION

The production of biomass pellets will ease the load off from the conventional energy sources such as coal. For this we need to analyse the quantity of biomass production in a particular place, the effective amount usable for the production of pellets and site of establishment of such a unit as also power plants which will procure the pellets and the economic feasibility of the same.

II. TECHNICAL DESIGN

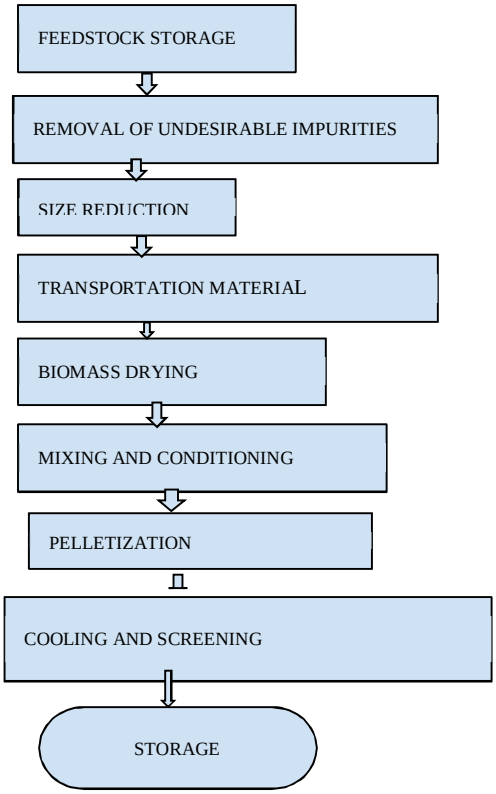

Figure I

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A. Process Description

First and foremost the process includes the collection of biomass and treating it to get the required form i.e. pellets which can be used in combination with coal. The algorithm or process description is given in figure 1

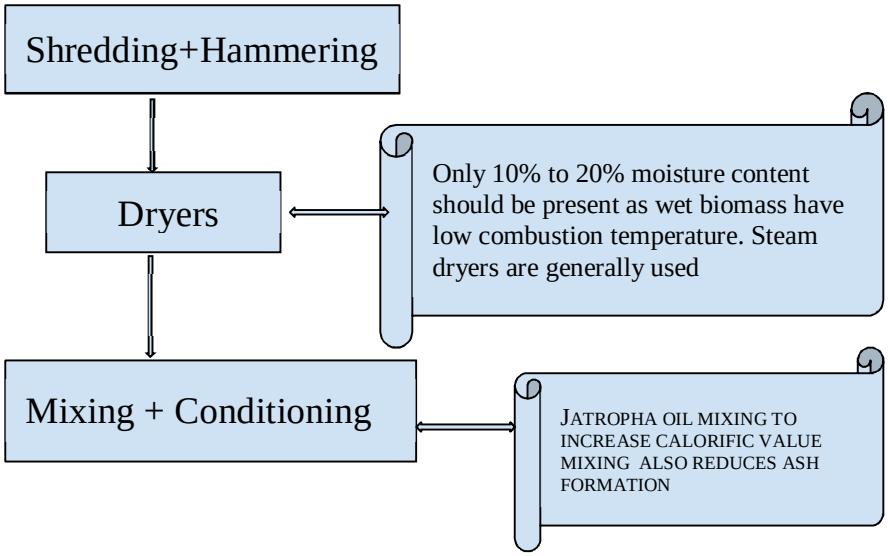

Figure II

III. CHARACTERISTICS OF PELLETS

A. The pellets have a density of 1.1-1.3 t/m^3, ash content is 1% to 2%, calorific value-4400(+-)100kcal/kg.
B. No sulphur or phosphorus (P2O5) content so does not corrode boiler
C. High heat utilization rate
D. Combustion efficiency of pellets is 75% to 80%
E. Ash and slag content is very less

IV. COMPARISON CHART

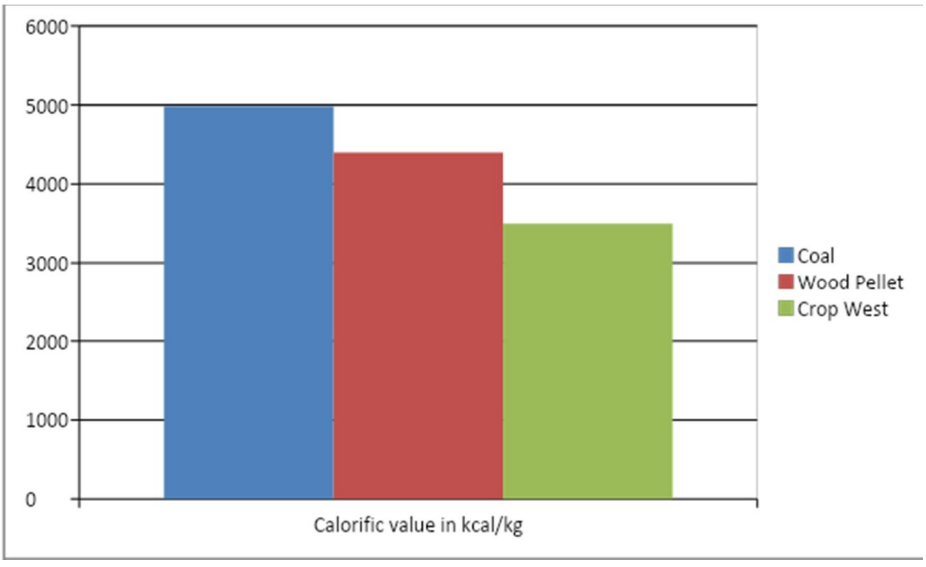

Figure III

Comparative study of the calorific value of various components.

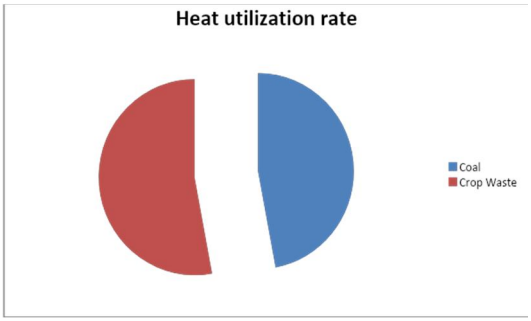

Figure IV

V. ADVANTAGES OF WOOD PELLETS

A. High calorific value
B. High heat utilization rate, carbon content is 75% to 85%
C. Ash content is 3% to 6% and moisture content is 1% to 3%
D. It is convenient for storage due to its small size and can be directly used in boiler
E. Ash derived from pellets specially wood pellets are rich in high quality organic potassium fertilizers

Employment generation through pellet production: Pellet mills need to be established for the production of pellets

VI. JATROPHA CULTIVATION FOR CONDITIONING PURPOSE

A. Why Jatropha seed oil for Conditioning
1) Higher flash and fire point
2) Hence conditioning the pellets with the same will increase the calorific value of the pellets further more

B. Reason for Emphasis on Jatropha Plantation
1) Jatropha is a hardy plant and has wider adaptability of different climatic conditions.
2) It can tolerate water scarcity hence can be used in waste lands
3) Waste land soil fertility can be increased.
4) Animals do not graze on the plant as well as the plant is not affected by pests hence low maintenance is required.
5) It has both medicinal and industrial uses.
6) Economic life of jatropha is 30 to 40 years.
7) Cost of cultivation is 20000/- to 40000/- per hectare over a period of three years.
8) It will yield returns for 30 to 40 years.

VII. CONCLUSION

The environmental degradation has resulted in global warming and many hazardous diseases. The extensive use of fossil fuels have rendered empty mines along with aforesaid harmful effects. The conventional sources are going to end in the near future hence we need to switch to non conventional sources of energy if not totally then in combination mode.The power plants nowadays are not solely dependent upon the coal as raw material but they are using biomass pellets for co-striking the furnace with coal. Cultivation of jatropha not only lead to utilization of waste lands but also help farmers to create alternative income facilities with less maintenance, whereas the pellet industries will create new job opportunities as also help in sustainable development .

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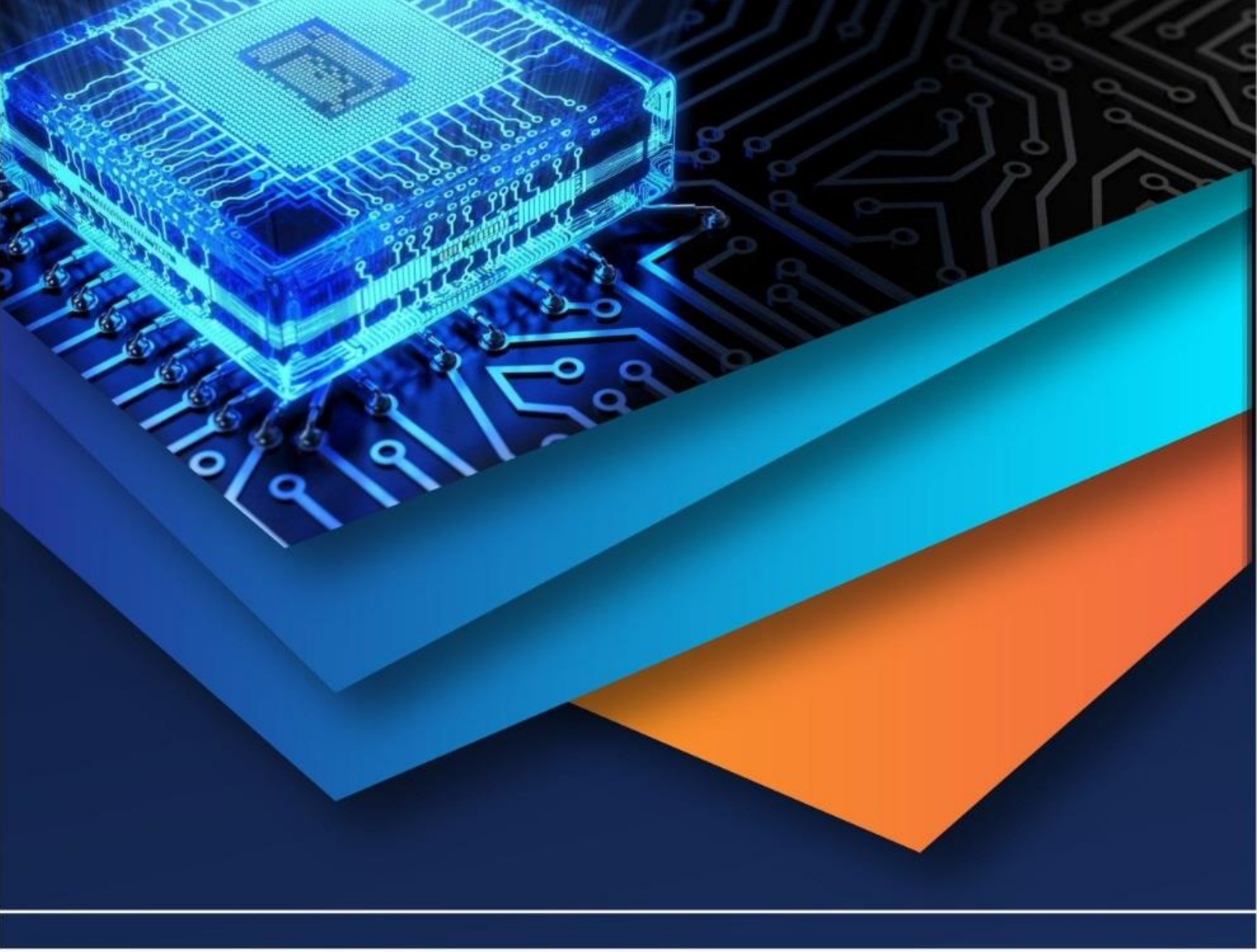

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