

# A Study on Electricity Generation through Rice Husk Gasifier: A review

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**Abstract**— In this paper study on the rice husk power plant is based on direct combustion technology. A Thermal steam power plant continuously converts energy stored in fuels (fossils/biomass) in to mechanical energy and ultimately into electrical power. The purpose of the paper is to collect and utilize available sustainable growth and un-utilized waste biomass resources effectively for generation of electricity. The technology used for power generation is environmentally friendly and will significantly contribute to the reduction of environmental pollution which in turn will directly affect the local and global Environment.

**Keywords**- Rice husk, gasifier, paddy, power generation.

## I. INTRODUCTION

India is second largest country in the world as the population point. India is also developing and fast growing country and also due to the very large population power demand is very high. The power demands of India fulfill 70-80% part by conventional fuels but these fuels are not are the environment friendly. So India concentrated on the renewable energy sources such as solar power, hydropower, wind power, geothermal energy, ocean tidal power and electricity by biomasses.

### Rice Husk

India is the second largest country to produce rice in the world. In India approximately 120 million tons of paddies are produced every year. Every year approximately 24 million tons of rice husk and 4.4 million tons of rice husk ash. Rice is a major cereal in India accounting for about 40% of food grain production and over 30% of its cropped area. India's share in world rice production is 21%. Rice is the edible form of paddy (also known as rough rice) and in the process of conversion from paddy, rice husk and rice bran are generated as a by-product. The outermost layer of the paddy grain is the rice husk also called rice hull. It is separated from the brown rice in rice milling. Burning rice husk produced rice husk ash (RHA), if the burning process is incomplete carbonized rice husk (CRH) is produced. Technologies for conversion of husk into electricity and thermal energy at relatively higher efficiencies are now available. The present work is an attempt at assessing the financial feasibility of using rice husk as an energy source to meet on site electricity and/or thermal energy require. Since there are several technological problem yet to be resolved before the rice husk gasifier dual fuel engine –generator systems could be considered an appropriate technological alternative to grid electricity or diesel generator sets in India, the primary objective of the

present work is to present a systematic methodology for financial feasibility evaluation of such systems .In fact the values of the various input parameters (like costs/ efficiency etc. Of the energy conversion equipment) used may be considered an indicative only. With more authentic input data available in near future, the methodology presented in this work could be used to arrive at specific realistic conclusion.

TABLE I. COMPOSITION OF RICE HUSK

Components	Amount (%) of components
Bulk Density	0.72
Volatile Matter	6.74
Moisture Content	9.02
Ash	13.74
Carbon	37.28
Oxygen	31.60
Nitrogen	0.85
Sulphur	0.05
Total	100

## II. RESOURCE AVAILABILITY

The availability of husk depends on the paddy production its proportion paddy production it's processed into rice and the faction of husk in paddy. Total energy potential would depend upon its calorific value as well as the quantity available. Annual paddy production in the country can be estimated from the area under crop and its average productivity. These two parameters depend on several independent and interrelated factors such as the variety of paddy shown, proportion of irrigation area, fertilizers used, prevailing weather, price of paddy etc. Assessment of all such factors on a country wide basis with reasonable certainty is a very difficult task. Rice husk has certain properties mainly because of high silica content in its ash fraction and silica cellulose structural arrangement. It has an inherent resist to burning and its abrasive characteristics causes wear and tear of mechanical component coming in contact with husk.

## III. DEMAND OF ENERGY FOR RICE PROCESSING

Rice processing mainly includes paddy parboiling its drying and milling. Paddy milled without parboiling produce raw rice otherwise termed as parboiled rice. Parboiling and drying operation largely require thermal energy whereas milling requires motive power which is generally provided through electric motors. Some electricity may also be used in motor handling.

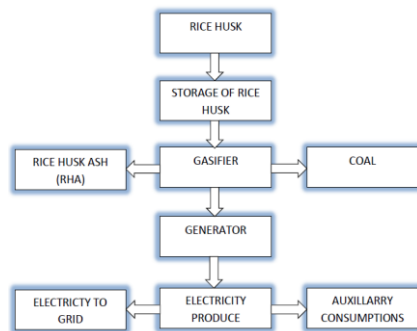


Figure 1. Block Diagram of the Electricity generation by Rice Husk

#### IV. THERMO CHEMICAL CONVERSION OF RICE HUSK INTO ENERGY

The available literature on use of rice husk as an energy source relates to its thermo chemical conversion. Combustion in furnaces as a boiler fuel or for generating heat is the traditional and well established technology for husk utilization but the overall heat utilization efficiency have been low. Through there are several technical problems yet to be resolved, gasifier of rice husk to generate producer gas is another technology which has potential for use in India. Producer gas can be used to generate motive power/electricity through the use of internal combustion engines and generators. It can also be used to generate thermal energy for use in process industries.

##### Type of Gasifier

- Fluidized bed Gasifier
- Counter-current fixed bed Gasifier
- Co-current fixed bed Gasifier
- Plasma Gasifier
- Free radical Gasifier
- Entrained flow Gasifier

##### System of Rice Husk Gasifier Structure

The gasification of rice husk is:

- Circulation fluidized bed gasifier
- Feeder
- Ash device
- Blower
- Cyclone separator
- Automatic controlling device

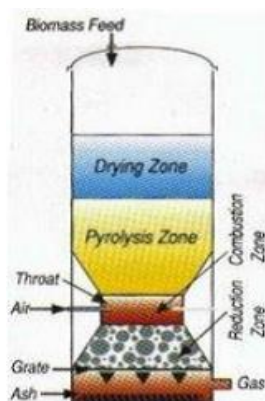


Figure 2. Various Zone of Rice Husk Gasifier

#### V. ADVANTAGES

1. Rice husk works as renewable source of energy.
2. Rice husk electricity production is much more reduces as compare to electricity produced by conventional fuels.
3. Ash of rice husk is useful in many industries like rain force brick, cement manufacturing etc.
4. As the production of electricity is approximately pollution free therefore electricity production is eco-friendly.

#### VI. CONCLUSIONS

The use of rice husk waste material as a non-conventional fuel source for production of electricity. In this review also multi-fuel gasifiers: Gasifiers can use multiple types of feedstock such as rice husk, wheat husk, mustard stems, corn cobs, wood chips etc. The former problem of disposal of rice husk as waste gets solved too and the power generated can meet the thermal energy requirements. The decision regarding the choice of fuel for process steam is made based on the availability of rice husk and other techno-commercial consideration and cost benefits. In this process can generate employment for collection and supply of rice husks.

The substantial proportion of the energy demand of rice processing operations in India can be met with the currently available technology for exploitation of the energy potential of husk. Rice husk electricity production is much more reduces as compare to electricity produced by conventional fuels. The production of electricity is approximately pollution free therefore electricity production is eco-friendly. Ash of rice husk is useful in many industries like rain force brick, cement manufacturing etc.

The rice husk power plant is very helpful for villages and rural areas of provide electricity by using rice husk as fuel and also use some other waste resources.

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