

## Chapter 5

# “Catalyst in Biorefineries” Solution to Promote Environment Sustainability in India

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### **ABSTRACT**

*India is one of the fastest growing economies in the world. India has taken various initiatives to promote environmental sustainability. One of the important initiatives is increasing production and utilization of renewable energy by adopting ethanol biorefineries. Lignocellulosic biomass, which has a complex structure that can be broken down by enzymes to produce products like biodiesel, bioethanol, and various high-value products, is the major feedstock for biorefineries. The chapter presents a review of the various type of catalysts used in biorefineries and their positive impact on the environment.*

### **INTRODUCTION**

India is one of the fastest growing economy of the world. Energy is not only required to sustain the lives of citizens of a country but it also acts as an impetus to it's socio-economic development. Gross domestic Product (GDP) of a country by sector and energy consumption by type are cointegrated. Fossil fuels have been powering economies around the globe to meet the energy requirement. There is empirical evidence to suggest that developing countries should increase their renewable

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energy consumption to achieve growth in their GDP (Al-mulali & Mohammed, 2015). However, given the focus on environmental issues and depleting fossil fuel reserves, there is a major transformation in the global energy system that will take place over the next few decades in which Renewable energy (RE) and natural gas is going to play a major role in meeting global energy requirements.

India’s energy demand has almost doubled and responsible for around 10% of the increase in Global energy demand since the year 2000 (Energy Agency, 2015). Primary energy consumption for India will grow by 4.2% (from 701 Mtoe to 1603 Mtoe) in the next two decades till 2035. RE will play a major contributory factor, that may contribute around 8% of primary energy consumption by the year 2035, with a net change of (+) 712% from the last two decades (BP, 2017).

With the ever-increasing energy requirements of the country, India has established goals to expand its use of RE and more efficient technologies. The Biofuel apart from photovoltaics, wind and solar are the area that the RE technologies are showing maturity for the positive changes in energy needs. India has undertaken ambitious target to set up 12 second generation bio refineries in the country which shall produce around 360 million litres of bioethanol to support ethanol blending program and utilizing surplus lignocellulosic agricultural residue.

India has 140MMT surplus lignocellulosic feedstock agricultural residue such as rice straw, cotton stalk, wheat straw, which has the potential to yield around 27000 Million litres of ethanol. This can help in reducing the dependency on fossil fuels and since Biofuels are generally considered green fuels, with a zero-net carbon dioxide emission, the proposed bio refineries will help in promoting environment sustainability as well.

## **LIGNOCELLULOSIC BIOMASS**

Lignocellulosic materials have been the most promising feedstock because of its renewable nature. Lignocellulosic materials includes biomass from agriculture (corn stover, corn cobs, rice straw, sugarcane bagasse), forestry (paper and saw mill discards), naturally occurring terrestrial trees/bushes/grass and energy crops such as elephant grass, Miscanthus which are grown as low-cost and low-maintenance harvest with high yield of lignocellulosic biomass. Energy crops are preferably used for production of second generation biofuels as feedstock.

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