

Bioenergy utilization and Bioeconomy

Balendu Shekher Giri*, Ashok Pandey, Vimal Katiyar

*Corresponding author: balendu@rnd.iitg.ac.in

Department of Chemical Engineering, IIT Guwahati, Guwahati, Assam -781039, India

Abstract

Environmental changes, waste generation, urbanization, and depletion of fossil reserves are the major inherent problems that require sustainable attention. Call for sustainability has established biorefinery as potent means for generating bioenergy products from waste feedstocks. In this perspective, India being rich in biomass can utilize circular green economy to produce value-added bioproducts. However, complete biomass utilization and zero waste generation must be embraced through biorefineries in order to achieve maximal utilization of feedstocks. With diminishing oil supplies and growing political instability in oil-producing nations, the world is facing a major energy threat which needs to be solved by virtue of alternative energy sources. The main bottleneck so far has been the technology concerns, which do not support cost-effective and competitive production of lignocellulosic bioethanol. This review sheds light on some of the practical approaches that can be adopted to make the production of lignocellulosic bioethanol economically attractive. These include the use of inexpensive substrates, cost-effective pre-treatment techniques, overproducing and recombinant strains for maximized ethanol tolerance and yields, improved recovery processes, efficient bioprocess integration, economic exploitation of side products, and energy and waste minimization. An integrated and dedicated approach can help in realizing large-scale commercial production of lignocellulosic bioethanol and can contribute towards a cleaner and more energy efficient world. This review also focuses and compiles the literature survey on the various biorefineries for the different waste biomass towards sustainable bioeconomy for the society betterment.

Keywords: Bioenergy; Natural gases; Biomass; Biorefineries; Bioproducts; Bioeconomy