

Renewable and Sustainable Energy Reviews

Biowaste biorefineries in South Africa: Current status, opportunities, and research and development needs

Patrick T. Sekoai ^{a, *}, Viren Chunilall ^{a,b}, Kwanele Msele ^c, Lindiswa Buthelezi ^c, Jonas Johakimu ^a, Jerome Andrew ^a, Manqoba Zungu ^c, Karabelo Moloantoa ^d, Nontuthuko Maningi ^d, Olivier Habimana ^e, Ashton Swartbooi ^f

^a Biorefinery Industry Development Facility, Council for Scientific and Industrial Research, Durban, 4041, South Africa

^b University of KwaZulu-Natal, Discipline of Chemical Engineering, Durban, 4041, South Africa

^c Centre for Functional Biodiversity, University of KwaZulu-Natal, School of Life Sciences, Private Bag X01, Scottsville, Pietermaritzburg, 3209, South Africa

^d Department of Microbiology, University of KwaZulu-Natal, School of Life Science, Westville Campus, Durban, 4000, South Africa

^e Department of Biotechnology and Food Engineering, Guangdong Technion-Israel Institute of Technology (GTIIT), Shantou, 515063, China ^f HySA & CCU, Chemical Cluster, Council for Scientific and Industrial Research, Pretoria, 0001, South Africa

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Abstract

As one of the highest carbon-emitting nations, South Africa is working tirelessly to swiftly transition to sustainable technologies in order to strengthen its green economy initiatives. Amongst the technologies that are explored in the scientific and industrial community, biorefineries are seen as the most efficient technologies that can be used to create economic opportunities and will contribute to the advancement of a bio-based economy as they can synthesize diverse industrially-competitive products. Despite their numerous socio-economic advantages, the establishment of large-scale biorefineries in developing nations like South Africa is very scarce. Therefore, it is imperative to address the technological gaps that hinder the growth of large-scale biorefineries and provide practical solutions that could be used to solve these bottlenecks. This work provides a comprehensive review of the development of biowaste biorefinery-based technologies in South Africa. Different biowaste valorization technologies applicable to locally available organic waste streams, and the resulting market-based compounds that can be obtained from these sustainable feedstocks, are reviewed. Finally, the work provides insights into research and development needs (knowledge gaps) that should be explored by scientists and industries, as these technological solutions might propel biorefineries toward industrialization in South Africa.