

# World Bioenergy Congress and Expo

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## Hybrid thermochemical and biochemical conversion of biomass for renewable fuels and products

Food security, climate change, and energy sustainability are three major challenges in the 21<sup>st</sup> century. Among different renewable energy sources, bioenergy is a renewable primary energy source that touches all three major issues due to its competition with food on land use, low net CO<sub>2</sub> emissions, and potentially sustainable if the economical, environmental and societal impacts are properly managed. The research at Bio-Renewable Innovation Lab (BRIL) at Guelph focuses on research and development of a novel approach for the production of an array of renewable products such as energy, fuels, and products from Canada's particular range of low grade biomass sources. These sources range from woody biomass to agricultural wastes, municipal green bin collections, and animal manures. This novel approach integrates thermochemical and biochemical conversion processes through a series of innovative technologies (i.e. hydrothermal pretreatment, supercritical gasification or anaerobic digestion with dry reforming, gas-to-liquid fuel through fermentation). The innovative and synergistic integration of design with processing through the above projects are expected to result in renewable fuels and value-added products. The resulting biocarbon can substitute fossil resources on a cost-performance basis with the added benefit of eco-friendliness. This could mean a tremendous reduction in greenhouse gas emission through the use of bioproduct, reducing our dependency on petroleum. The use of hydrothermal, chemical looping and supercritical gasifications, anaerobic digestion, dry reforming of biogas to produce syngas, and syngas fermentation techniques in the development and application of biofuels and products would lead to reduced dependency on petroleum and a sustainable economy.

## Biography

Animesh Dutta is an Associate Professor and Director of Bio-renewable Innovation Lab, and Associate Director of School of Engineering at the University of Guelph. He is specialized in advanced energy systems and thermo-fluid science with hands-on experience in reactor design and pilot plant operation, design and performance of various tests in laboratory scale and pilot scale units, thermal design and process development. In his career, he has published over 70 peer-reviewed journal papers, 2 book chapters, and has roughly 85 conference publications and reports.

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