BIOMASS ENERGY TOWARDS A SUSTAINABLE CIRCULAR ECONOMY: A POTENTIAL SOLUTION TO GLOBAL PROBLEMS

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Abstract:

Biomass energy refers to bioenergy, is the energy derived from plant-based materials and is considered a potential solution to the global energy problems. Concerning global sustainability, reliance on fossil fuels and greenhouse gas emissions that contribute to global warming are particularly alarming. In order to address the pressing issues and crises, an alternative and potentially viable solution is necessary. Massive amounts of biomass are produced as a result of the industrial and agricultural revolutions of the twenty-first century, making its management a tremendous challenge. Currently, the most prevalent biomass feedstocks for energy conversion are plants, crops, and their wastes, which are potential resources for biofuels, biopower, and a variety of bioproducts. The primary biomass sources in Malaysia are sewage treatment plant (STP) sludge managed by the Indah Water Konsortium (IWK), a national sewerage company, and oil palm industrial (OPI) wastes considered oil palm biomass (OPB) with their treatment and processing facilities. The majority of biomass conversion processes use conventional treatment and management techniques, which are time-consuming, costly, polluting, and limit the possibility of a sustainable future. Current advanced research and development seeks an effective and efficient solution to the biomass by converting waste to bioenergy, which could be a complete and viable solution with the generation of revenue and a circular economy approach at the point of generation for sustainable development. The global focus on this issue necessitates the proposal of an environmentally friendly system that converts abundant and inexpensive renewable resources into valuable bio-products, particularly bioenergy and biofuels. This keynote address will provide an overview of the research on 'Turning waste into useful bio-products,' focusing on biofuels (bioethanol, biodiesel, and biogas) and bioenergy through the lens of green technology. Various biofuels and bioenergy are currently being developed in Malaysia from a variety of domestic and industrial waste sources. Sources and characteristics of various biomass feedstocks in Malaysia are to be discussed. The topic discusses how data from research and development (R&D) could be scaled up to the commercial level for the recovery of renewable energy using green technology. For sustainable development, certain case studies on the bioconversion of food waste, sewage sludge, and oil palm industry waste into biofuels and bioenergy will be shared.