STATISTICALLY RIGOROUS DEEP DIVE NATIONWIDE CHARACTERIZATION OF MUNICIPAL SOLID WASTE AND SELECTION OF TECHNOLOGIES ENABLING PRODUCTION OF CONVERSION-READY FEEDSTOCKS

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SUMMARY/ABSTRACT FOR PUBLIC RELEASE

The primary objective of this project is to create MSW resource-shed maps that cover the range of values of key characteristics relevant to production of conversion-ready feedstocks and that accurately capture both geographic and seasonal variability. To achieve this objective, a nationwide MSW characterization study will be completed over a performance period of 39 months. Waste disposal facilities representing variances in housing density, climate region, diversion programs, and generator types will be first identified. MSW samples will then be collected from the identified facilities, and then will be sorted and separated into different material categories. Based on the weight of each category, the composition of the MSW samples will be determined. Biodegradable and non-biodegradable subsamples will then be created by mixing the corresponding material categories into separate containers. Key characteristics relevant to biological and thermochemical conversions for the production of biofuels will be systematically evaluated from the two different types of subsamples, respectively. Moreover, biological and thermochemical conversion tests will also be performed on the selected samples to develop the property-processing-reaction relations among the key characteristics, the conversion efficiency, and the biofuel quality. Conceptual conversion flowsheets will be designed, based on the characterization data. The technical and economic feasibility as well as environmental impacts of the processes will be evaluated through techno-economic analysis and life cycle assessment. Finally, web-based resource-shed maps will be developed and made available and freely accessible to all users. The maps will be based on the data obtained from this project, such as the composition and the range of values of the key characteristics of MSW.

Many jurisdictions around the country have completed waste characterization studies via direct measurement of MSW received at landfills and transfer stations. However, a nationwide characterization study that considers geographic and seasonal variability of the key characteristics of MSW relevant to biofuel production is not currently available. In this proposed project, this gap will be bridged by the joint private and public partnership efforts from several industrial stakeholders and academic institutions with rich experience and outstanding expertise in this subject. It is anticipated that the experimental results and characterization data obtained from this project will largely contribute to the achievement of BETO's goal: reducing the production cost of biofuels to $2.5 per gallon gasoline equivalent by 2030 via the introduction of economically-advantaged feedstocks, such as MSW.