

Hydrothermal Liquefaction to Convert Organic Wet Wastes to Transportation Fuels

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Topic Area 4: Community Scale Resource and Energy Recovery from Organic Wastes

GLWA 2636-1644

Team Member Organizations

Great Lakes Water Authority: Dr. Xavier Fonoll Almansa, Dr. John Norton

Genifuel: James Oyler

PNNL: Dr. Michael Thorson, Dr. Lesley Snowden Swan, Dr. Uriah Kilgore

Wayne State University: Dr. Carol J. Miller

A collaboration between The Great Lakes Water Authority (GLWA), PNNL, Genifuel, and Wayne State University seeks to turn wet wastes into opportunities for energy recovery through use of hydrothermal liquefaction (HTL). Wastewater solids from water resource recovery facilities (WRRF), if left untreated, present ecological and human health liabilities. As a result, they must be continually and carefully managed. The HTL process has advantages compared to alternative wet waste disposal methods including complete treatment of pollutants, reduction of wastewater operational costs, resource recovery from wastes, and reduced ecological impacts. This collaboration is taking a community centered approach to evaluate the potential of HTL and to measure the social, ecological, and economic impacts of implementing the technology in the Detroit region. At the conclusion of this two-phase project, the team will have demonstrated a replicable, community-driven implementation of the technology and how the approach can be tailored to the unique needs of communities across the US.

In Phase 1, the team will engage community leaders and conduct a feasibility assessment to build the business case, and develop an implementation plan for HTL-based waste disposal and energy recovery from wet wastes in the Detroit region. Community outreach will also include workshops and education. Through these engagements, the team will gather the necessary input and feedback to drive an implementation approach having the ability to re-lift a region once strong in manufacturing. The project will also explore expanding the HTL feedstocks to include other local wastes such as food wastes, yard wastes, and wastepaper. As part of the HTL feedstock study, the team will examine the impacts on local employment, waste collection, biosolids volume reduction, operation and maintenance of each system, impact on wastewater treatment operations, quality and value of energy (biocrude) generated, third party owner operations (including the availability of third-party operators), pollutant destruction, energy generation, GHG emissions, and process economics.

In the demonstration phase (Phase 2) the team will bring a mobile HTL reactor unit to GLWA to achieve 3 objectives: community engagement and education, technology demonstration, and regional feedstock conversion testing against the social, economic, and ecological impact metrics established in Phase 1. In community engagement and education demonstrations, residents and organizations in the region will have the opportunity to see HTL reactors and operations in person. Through technology demonstrations and engagement with eight of the largest WRRFs in the country on this project, we ensure the information is widely disseminated, that risks are addressed and incorporated and stakeholders are included in the feasibility analysis. Finally, the feedstock conversion tests will ultimately result in a fuel sample derived from a blend of local wastes which will be evaluated for suitability as a diesel fuel.