BIO-CRUDE OIL FROM SEWAGE SLUDGE VIA THERMOCHEMICAL CONVERSION ROUTES

InSanirator | MIT D-Lab | Cambridge, MA, USA

Grant Application to the DOE Water Resource Recovery Prize

Short Description: InSanirator is shaping the future of sanitation by employing a synergistically integrated waste-to-energy system developed at MIT. Our system safely transforms sewage sludge /biosolids into value-added bio-crude oil that generates revenue while reducing the environmental and public health impacts of wastewater treatment, achieving energy neutrality at WWTPs and increasing access to safe sanitation. According to our preliminary analysis, installing the proposed waste-to-energy system at a 10Million Gallon per day water resource recovery facility will offset all the costs of electrical and thermal energy needed by the facility, while generating a revenue of 0.5Million USD per year from selling bio-crude oil. The integrated system includes a small-scale hydrothermal liquefaction (HTL) plant that produces bio-crude oil and hydro-char, and a gasification reactor that produces syngas from the hydrochar. The syngas is further combusted to generate the energy needed to thermally dry the sludge, preheat HTLliquefaction feedstock and provide heating to the facilities buildings.

Team Members (click on name for linked in profile)

1. Islam Genina: Environmental and Chemical Engineer, D-Lab research staff.
2. Andrew Tsang: Systems and Mechnical Engineer, MIT SM SDM ’19
3. Eliott Donlon: Mechanical Engineer, MIT SM MechE ’20
4. Hannah Hoffman: Energy analyst and Nuclear Engineer, MIT SM NSE ’18
5. Kanika Ghakar: Aerospace Engineer, MIT SM AeroAstro ’20
6. Jordan McDormett: Electrical Engineer, MIT BSc. EECS ’21

Advisors:

1. Prof. Susan Murcott, MIT, Water and Wastewater Treatment Expert
2. Prof. Wan-Ting (Grace) Chen, UMass Lowell, Thermochemical Conversion Expert
3. Mr. Sorin Grama, MIT D-Lab, Serial Entrepreneur and Business Model expert
4. Mr. Aaron Desatnik, Vice President, Food & Agriculture Private Equity at Ceres Partners
5. Potential Partner and Advisor: Mr. Jason Knutson, Chief of Wastewater, Wisconsin Department of Natural Resources.

Figure 1: Graphical Abstract