LiqBlue - Catalyzed-Hydrothermal-Liquefaction

Turning complex waste-streams into simple high quality biofuels, biomaterials and monomers

Problem

30-50% of waste is still incinerated
generating minimal electricity and producing high levels of CO2. This is because it is heterogenous and difficult or too expensive to separate. The industry is facing increasingly strict CO2 emission and recycling requirements from the EU. Next to that the product manufacturers are facing strict recyclable materials admix requirements.

Renewable waste processing solutions require specific, high-quality input
often not aligning with the varying characteristics of waste-streams. Therefore, processing plants often operate at sub-optimal conditions or don't consider these novel processing technologies at all because of financial reasons. The quality of output products of these installations is also too poor to maintain a sustainable circular life.
Existing solutions such as *anaerobic digestion and pyrolysis*, require homogeneous feedstock and therefore complex and expensive pre-treatment. Normal hydrothermal liquefaction requires high temperatures, making it very costly to operate.

Solution

Hydrothermal Liquefaction (HTL)
Developed over 2+ years at TU Delft's L. Cutz lab, HTL mimics natural geological processes to produce high-value hydrocarbons and platform chemicals in 15-60 minutes. Lab experiments have shown high conversion efficiency and product purity, indicating strong scalability potential.

Regenerative catalysts to increase efficiency
LiqBlue integrates nearly fully regenerative, metal-free catalysts, which reduce process temperatures, costs, and material footprint. These catalysts do not rely on critical raw materials, offering a sustainable and efficient solution.

Tailor-made catalyst to reach optimal conditions for each stream
Our catalysts are designed to optimize conditions for each feedstock stream, allowing the processing of mixed biogenic and plastic waste. This flexibility reduces pre-treatment costs and improves the quality of output products like biofuels and platform chemicals.

Creating the new building blocks – monomers and platform chemicals
The technology upcycles plastic waste into monomers and platform chemicals, enabling the production of various plastics. This creates a closed-loop system and provides a competitive edge in waste-to-value conversion, particularly in facilities worldwide.
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About the technology

TRL: 3 (proof of concept in lab) -capable of processing multiple grams of material to test waste stream samples for potential customers
Patent status: Several plans for patenting solution (under embargo)
Department: Mechanical Engineering - Process & Energy
Team: TU Delft: Luis Cutz & Baris Kumru **- Ideation labs:** Mark ter Heide

Reduced process costs
Our catalysts lowers the process temperature needed for processing waste, resulting in significant cost savings.

Lower CO2 emissions
The process itself produces less CO2-emissions, and emitted gases are relatively easy to capture

Produce high-quality outputs
Biowaste ➔ bio-oil with low oxygen content.
Plastic waste ➔ depolymerizing into building blocks such as monomers and chemicals.

We are looking for:

Financing
to build proof of concept with demo plant

Network
waste processors, grant providers, regulatory experts

Next steps

- ✓ Continued collaboration between Mark and Luis & Baris
- ✓ Trials with real samples from Netherlands' biggest waste processors
- ✓ Expand knowledge on waste processing flows, financials and sample composition
- ✓ Build network of prospect customers and partners

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