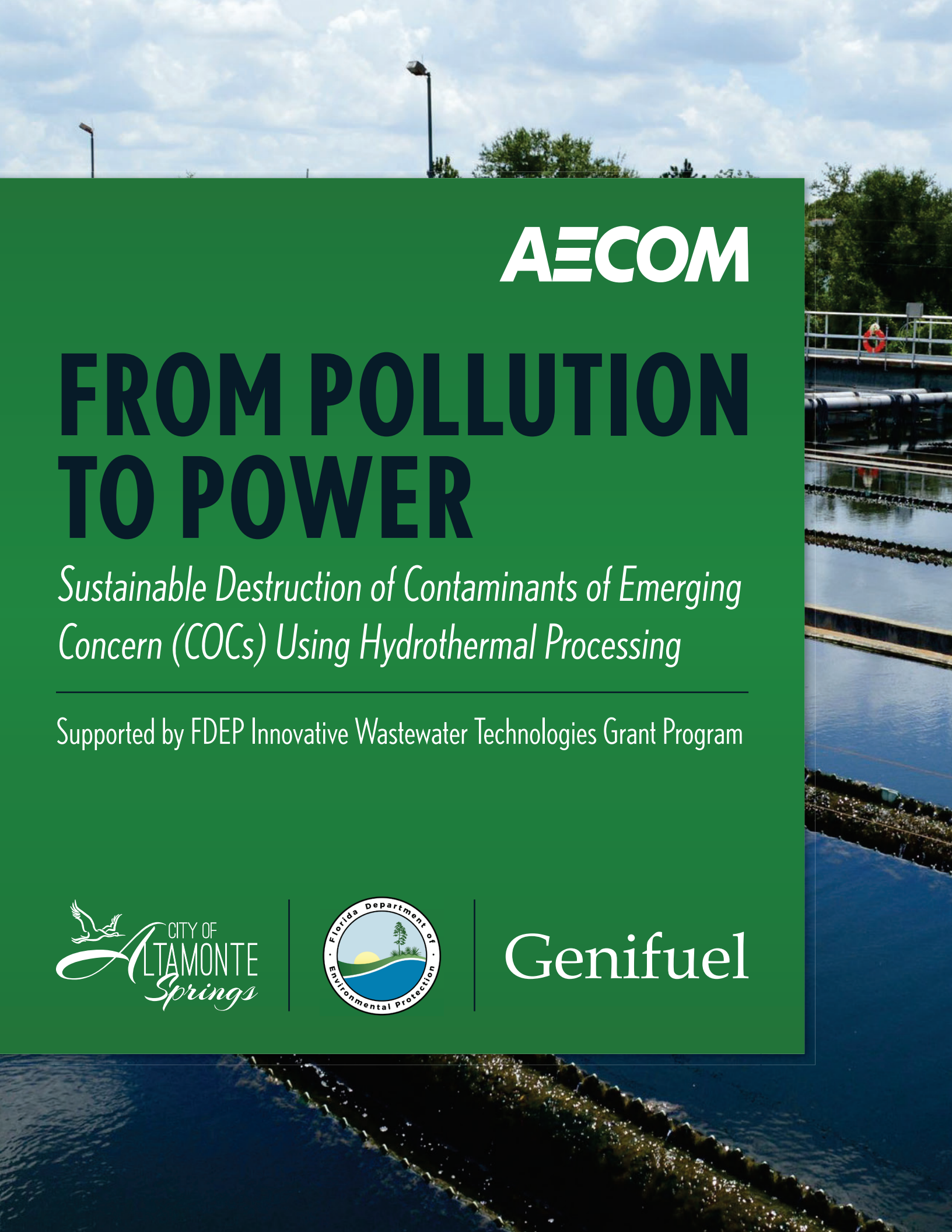




AECOM

FROM POLLUTION TO POWER

*Sustainable Destruction of Contaminants of Emerging
Concern (COCs) Using Hydrothermal Processing*

Supported by FDEP Innovative Wastewater Technologies Grant Program



Genifuel

Altamonte Springs Is Leading the Effort in Removing COCs from the Environment by Converting Wastewater Biosolids Into Clean Energy

Breaking the Cycle of Pollution

COCs, also known as “forever chemicals,” include a growing number of synthetic substances such as pharmaceuticals, pesticides and per and polyfluoroalkyl substances (PFAS). These chemicals are molecularly stable and difficult for conventional wastewater treatment plants to fully remove or destroy. As such, they can be found in the plant’s biosolids (sludge) and may be introduced to the environment when biosolids are applied to agricultural lands. Due to their potential health risks and adverse ecological impacts, the removal of COCs from biosolids has become a critical technical and environmental challenge.

Hydrothermal Liquefaction (HTL) can help prevent the introduction of COCs into the environment. HTL leverages heat and pressure to expedite the conversion of carbon components in the waste stream into biocrude oil emulating the natural process that creates fossil fuels, but at a remarkable pace—minutes instead of millions of years. HTL aims to not only re-purpose biosolids into liquid biocrude but to also obliterate these COCs.

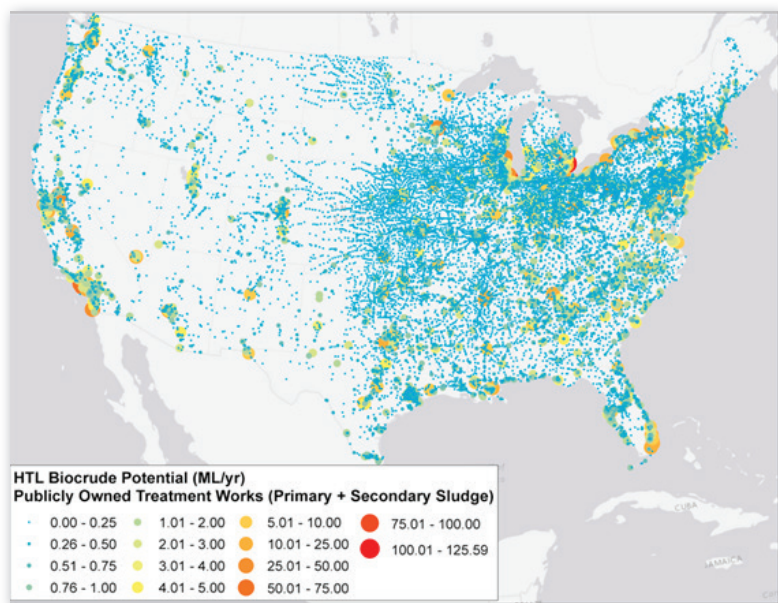
Technical literature indicates that HTL shows promise in rendering PFAS compounds harmless (Elliott 2013; Yu 2020; Wu 2020). Additionally, as an alternative biosolids disposal method, HTL aligns with the growing emphasis on reducing carbon emissions and achieving beneficial reuse for a positive impact on wastewater sludge.



HTL process outputs: biocrude oil, aqueous effluent and blowdown solids.

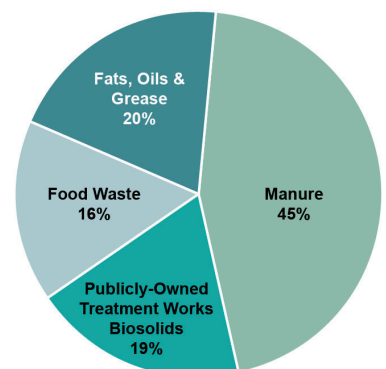


Genifuel HTL pilot system equipment.



U.S. potential for biocrude oil generation through HTL processing of biosolids.

Distribution of Wet Waste Resources Suitable for HTL Feedstock in the U.S.



Innovative Technology That Transforms Waste Into Clean, Sustainable Energy

AECOM has expanded its research and development of innovative technologies. Through a strategic partnership with Genifuel, a sustainable closed-loop system that transforms wet waste (biosolids, FOG [fat, oil and grease], algae, etc.) into sustainable biofuel was created. This grant focused on using HTL to breakdown PFAS present in wet waste.

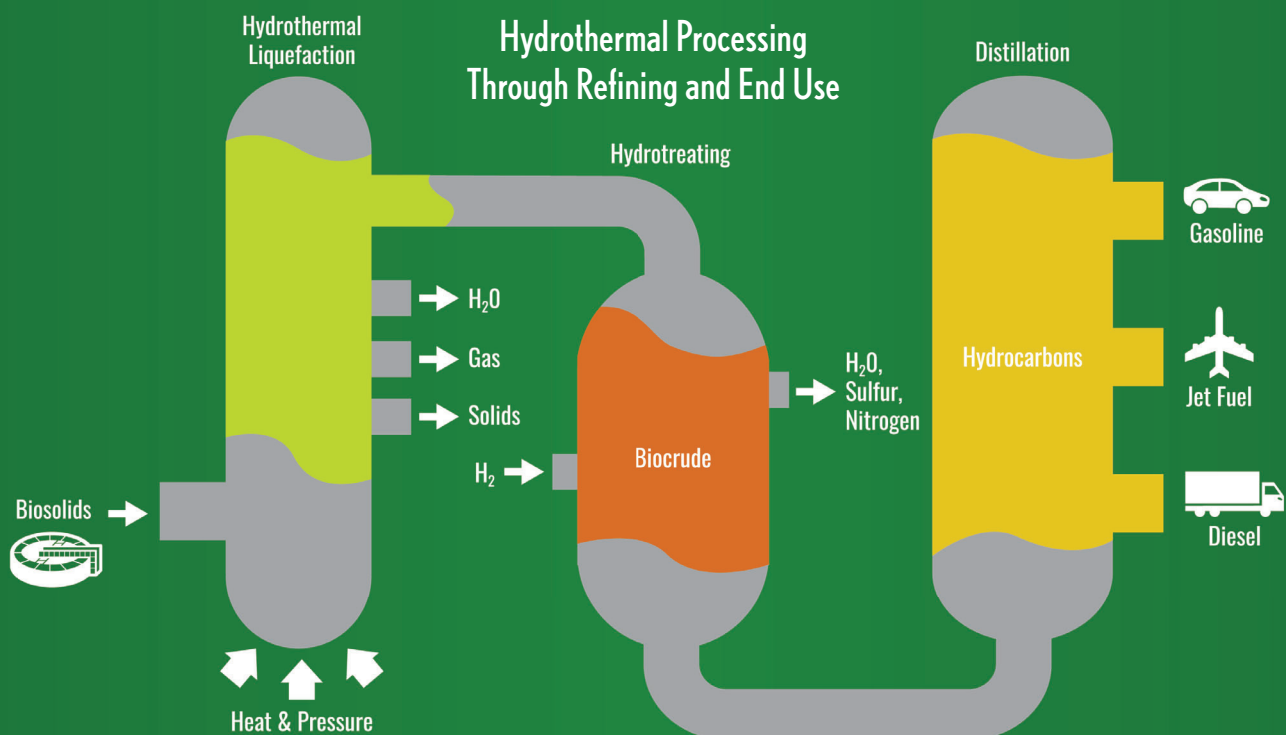


Biocrude oil generated through HTL processing during previous pilot testing.

- HTL offers a promising pathway for PFAS destruction - six trials were tested showing a 56-75% destruction of PFAS in biosolids amended with FOG and a 96% destruction of PFAS in biosolids with no amendments.
- The majority of the PFAS concentrated in the HTL biocrude for feedstock containing FOG, whereas PFAS favored the aqueous effluent when there was no FOG.
- Secondary PFAS destruction and power generation was demonstrated with a 3.3 kW diesel generator. HTL biocrude provided secondary fueling following simple biocrude refinement and blending with B100 biodiesel with up to 5% HTL biocrude blend. A high degree of PFAS destruction with internal combustion was indicated with exhaust soot showing PFAS at or below the analytical reporting limit.

How It Works

HTL mimics the natural formation of fossil fuels—on fast-forward. By applying high heat and pressure to organic wastes, HTL rapidly converts biosolids into renewable biocrude oil, offering a sustainable, low-emissions alternative to traditional waste disposal and energy production. A typical 10 Million Gallon per day (MGD) Plant has the potential to produce 12,000 barrels (500,000 gallons) of biocrude per year.



Demonstrating Innovation

This project is funded by the State of Florida General Assembly through a Department of Environmental Protection Wastewater Innovative Technologies Grant awarded to the City of Altamonte Springs.

Reduced Contaminants

HTL Processing Has Shown Up to 96% Reduction of PFAS Concentrations Within Biosolids



Exhaust soot collected for PFAS analysis following internal combustion and power generation with blended HTL biocrude and biodiesel.

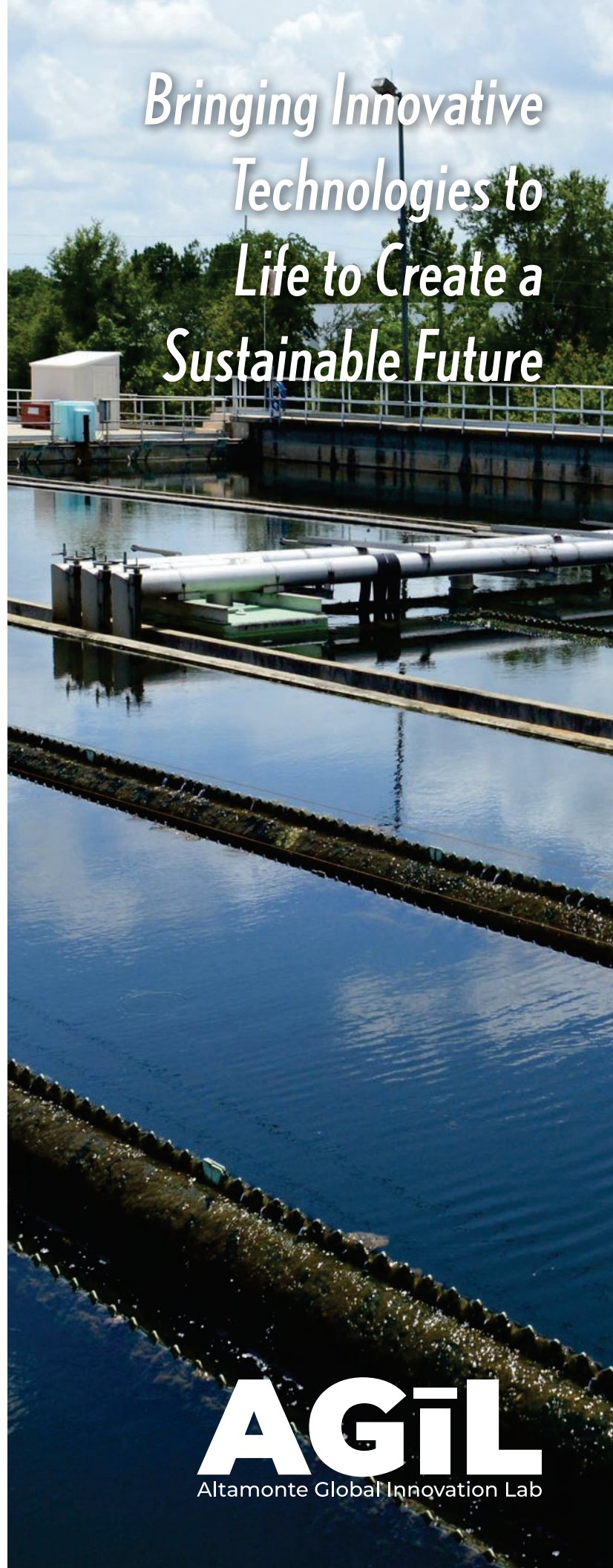
Clean Energy

Biocrude Oil Made from HTL



FOR MORE INFORMATION:
AskEnvironment@aecom.com

Bringing Innovative Technologies to Life to Create a Sustainable Future



AGIL
Altamonte Global Innovation Lab