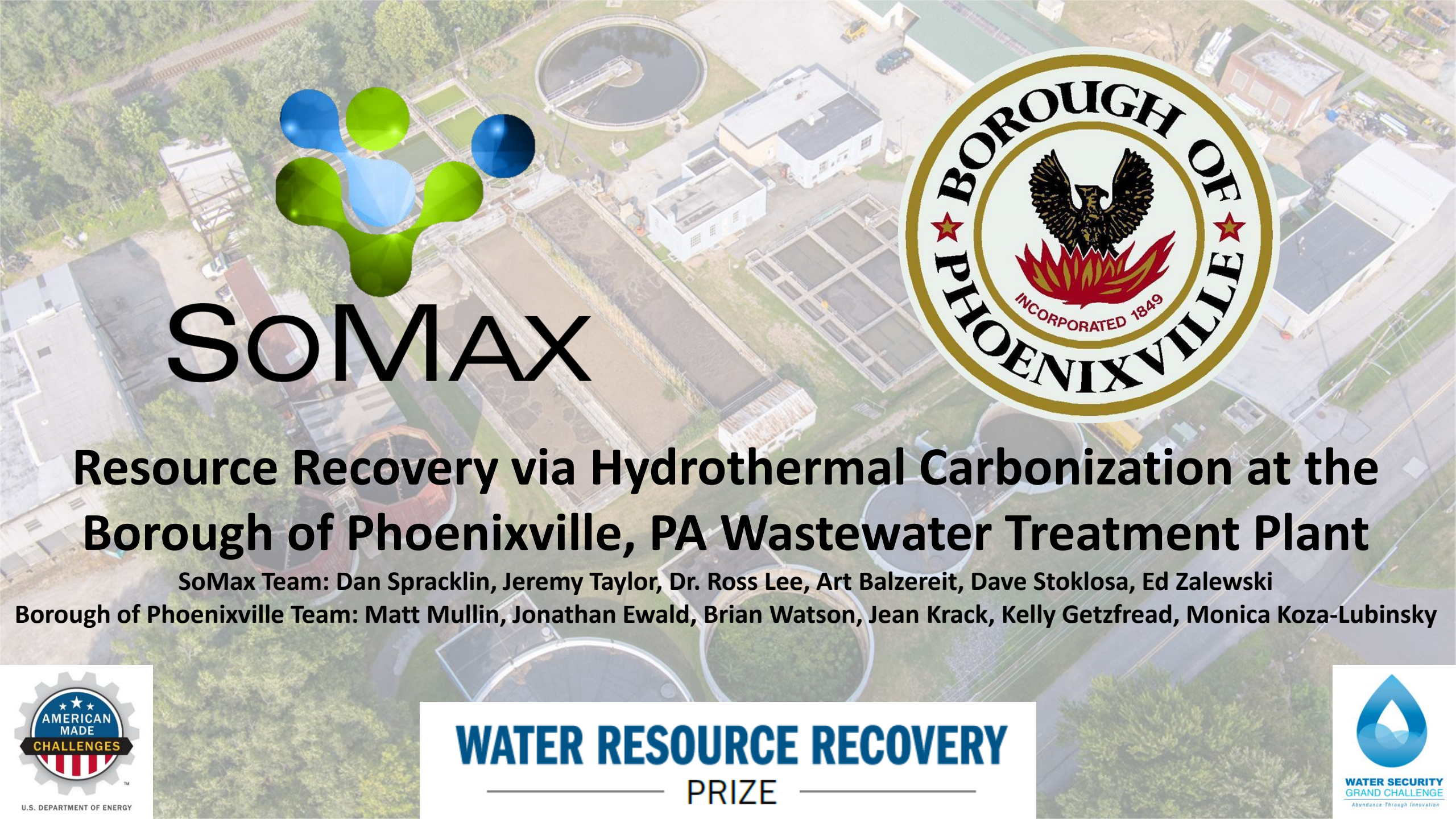


SoMax

BOROUGH OF PHOENIXVILLE
INCORPORATED 1849

Resource Recovery via Hydrothermal Carbonization at the Borough of Phoenixville, PA Wastewater Treatment Plant

SoMax Team: Dan Spracklin, Jeremy Taylor, Dr. Ross Lee, Art Balzereit, Dave Stoklosa, Ed Zalewski

Borough of Phoenixville Team: Matt Mullin, Jonathan Ewald, Brian Watson, Jean Krack, Kelly Getzfread, Monica Koza-Lubinsky

AMERICAN MADE CHALLENGES
U.S. DEPARTMENT OF ENERGY

WATER RESOURCE RECOVERY PRIZE

WATER SECURITY GRAND CHALLENGE
Abundance Through Innovation

Problem:

- Borough is experiencing **6.5%/year** increases in biosoilds disposal costs.
- Impending land application regulations will make the current disposal method more difficult and even more costly
- The WWTP is largest consumer of energy in the Borough of Phoenixville

Goal:

- Cover 100% of the WWTP energy demand by using Borough's own organic waste
- Offset largest energy consumer in an effort to meet the Borough's 2035 100% clean and renewable energy goal

Solution:

Hydrothermal Carbonization + Gasification

HTC Process Conditions

Temperature: 360 – 430°F

Pressure: 290 – 360 psi

Reaction time: 3 hours

Moisture Content: 70% – 85%

HTC Project Benefits:

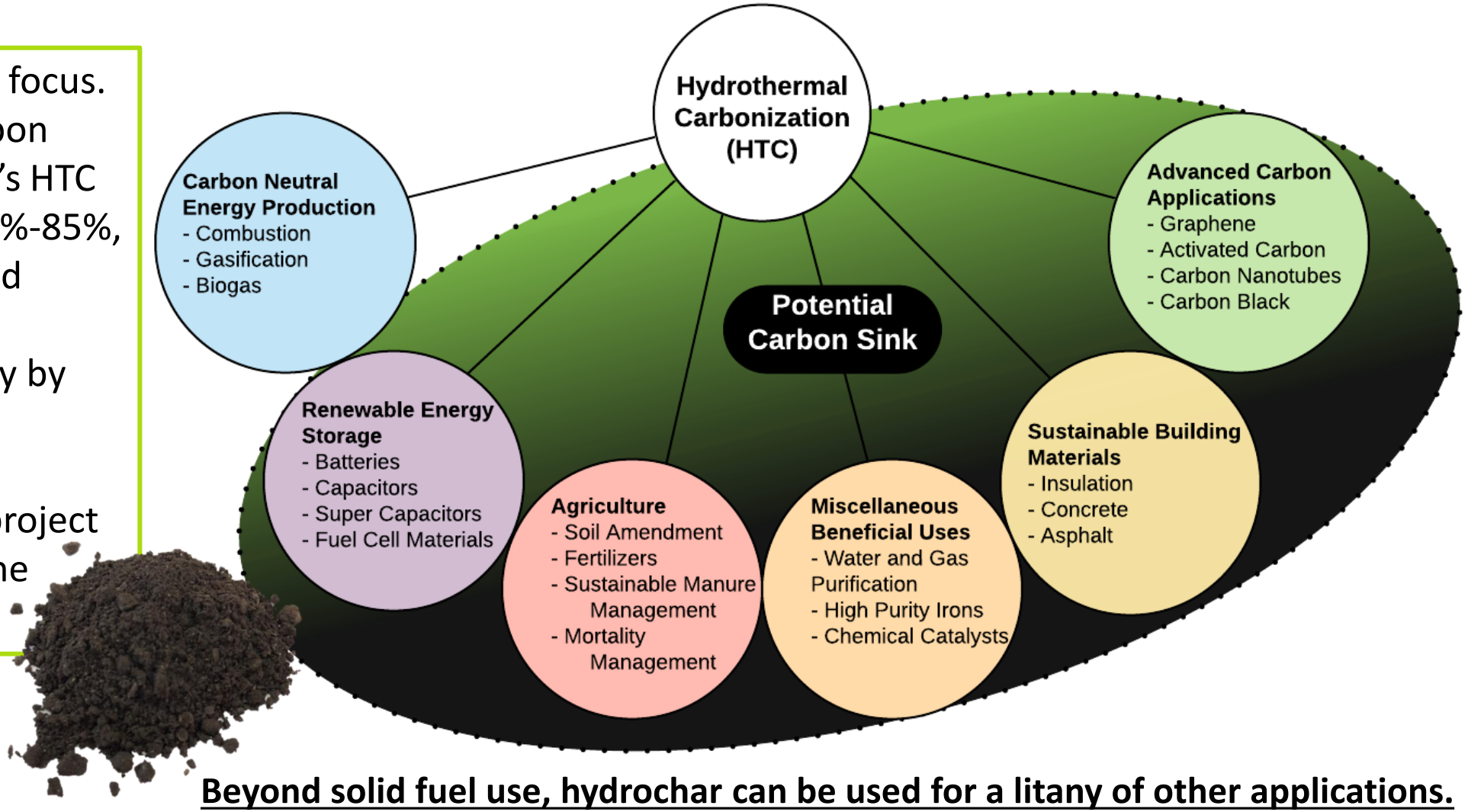
- Energy efficient organic waste conversion
- Processes wet feedstocks
- High dewaterability leads to low energy demand needed drying
  - >50% total solids out of dewatering device
- High volume solids processing with small footprint
- High **Carbon** recovery efficiency and utilization

WORLD ENERGY COUNCIL

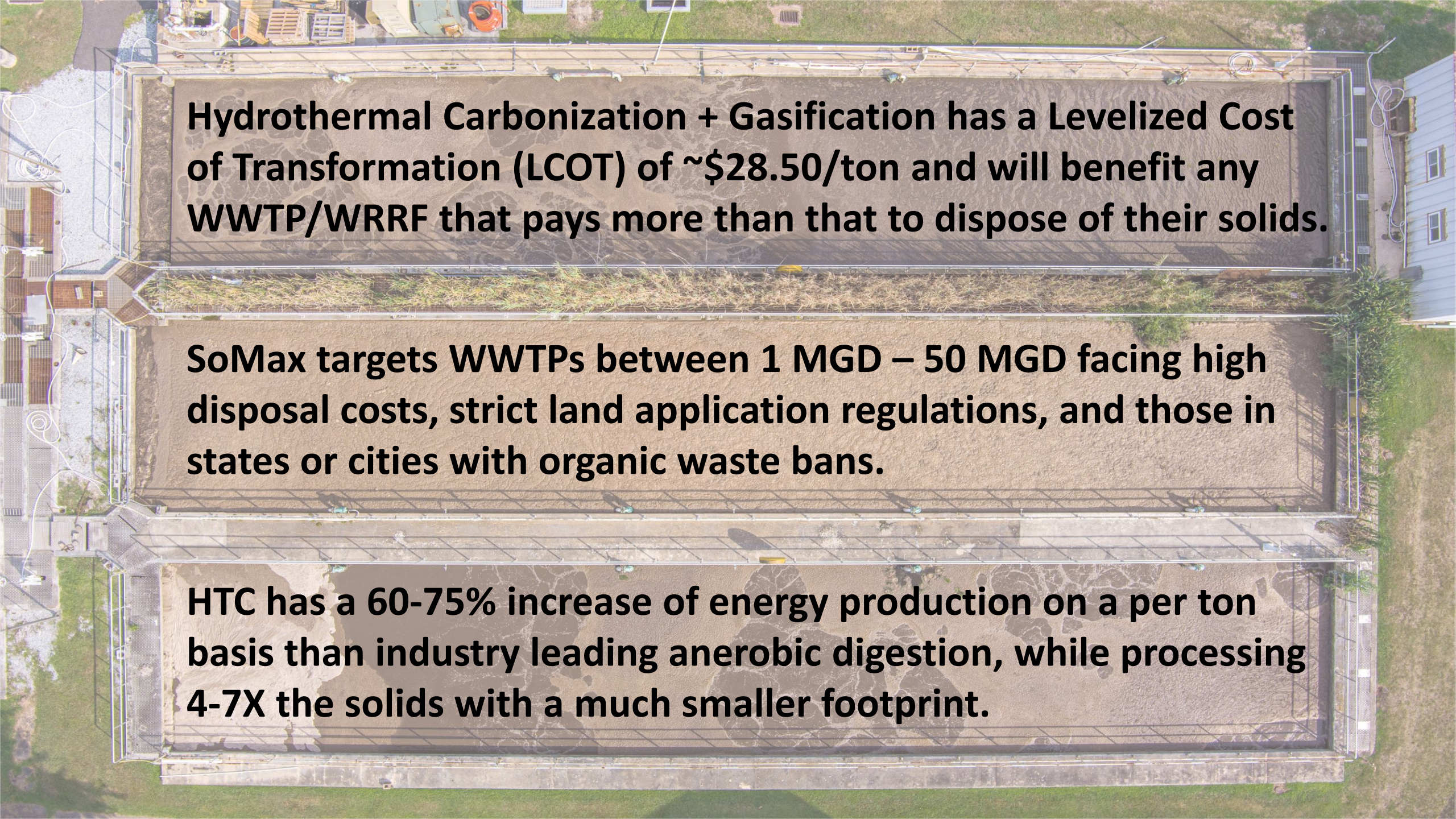
Most carbon efficient biomass conversion process
Lowest GHG emissions of any biomass conversion process

Carbon is the resource of focus. Initial tests show the carbon efficiency of the Borough's HTC project to be between 80%-85%, while increasing the mixed biosolids and food waste feedstock's energy density by over 42%.

At full capacity, the HTC project will cover over 150% of the WWTP energy demand.



Beyond solid fuel use, hydrochar can be used for a litany of other applications.

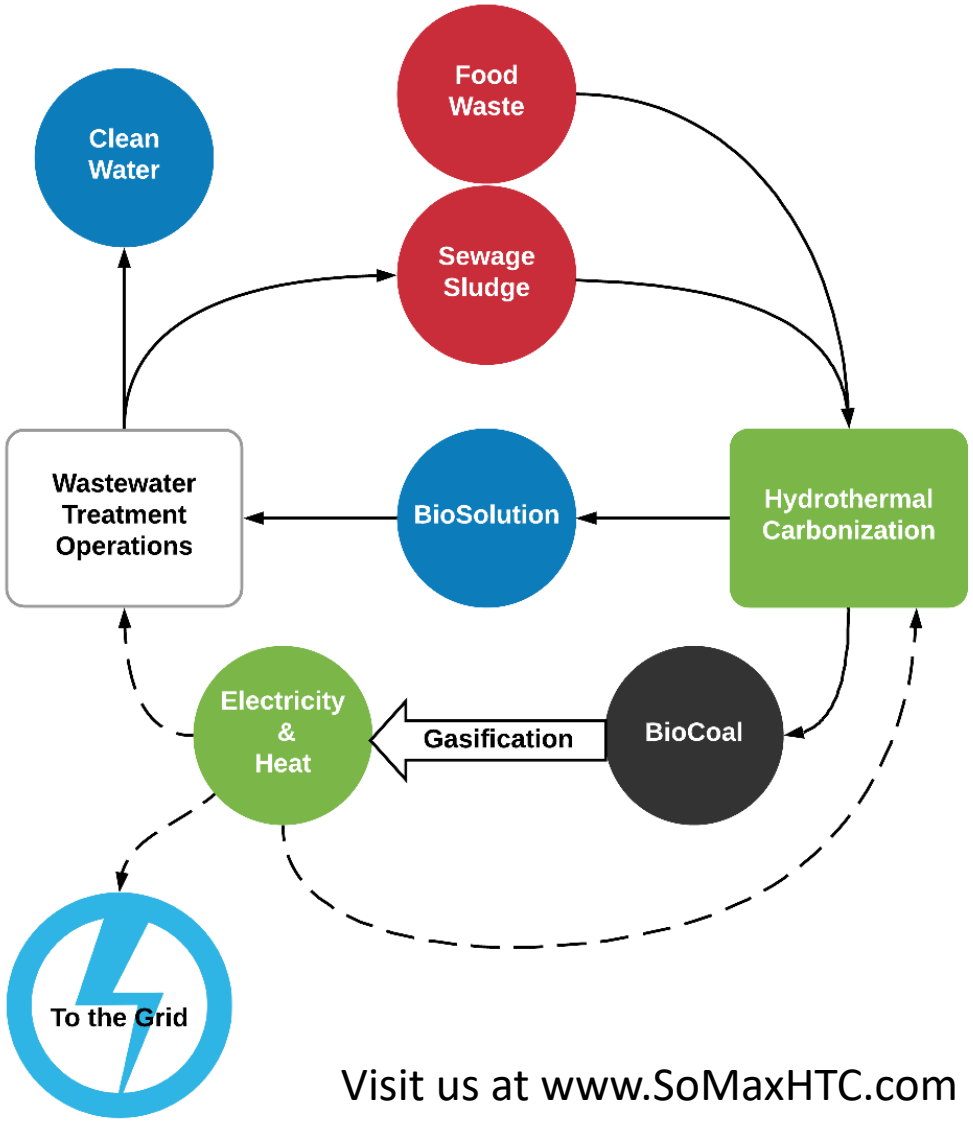


Hydrothermal Carbonization + Gasification has a Levelized Cost of Transformation (LCOT) of ~$28.50/ton and will benefit any WWTP/WRRF that pays more than that to dispose of their solids.

SoMax targets WWTPs between 1 MGD – 50 MGD facing high disposal costs, strict land application regulations, and those in states or cities with organic waste bans.

HTC has a 60-75% increase of energy production on a per ton basis than industry leading anerobic digestion, while processing 4-7X the solids with a much smaller footprint.

Resource Recovery via Hydrothermal Carbonization at the Borough of Phoenixville, PA Wastewater Treatment Plant



- **Efficient Energy Recovery**
  - Generates 10X more electrical energy than it consumes
  - Creates 153% of electrical demand of WWTP operations
  - Generates over 100% of thermal demand of HTC process
- **Industry Leading Efficiencies**
  - Carbon Efficiency up to 90%
  - A 60-75% increase of energy recovery and utilization than industry leading anaerobic digestion
  - Lowest GHG emissions of any biomass conversion process
- **Barrier Breaking Innovations**
  - Increases solids handling capacity by 4-7X without increasing plant footprint
  - Polymer-free dewatering of BioCoal over 50% TS
  - New pathways for nutrient recovery
- **Exceptional Technological Advantages**
  - Pathogen free, sanitary products
  - Antibiotic and pharmaceuticals destruction
  - Elimination of PFAS/PFOAS (Forever Chemicals)

Visit us at www.SoMaxHTC.com