

HELIOSTORM™

PERFORMANCE • RESULTS • CERTAINTY

**Ultra-High Temperature Ionic Gasification
for Biosolids Treatment**

Heartland Water Technology



Heartland Concentrator™

Two decades of proven performance

Award-winning, globally recognized solution

COVAP: Cogen using waste-heat from engines

ROVAP: Evaporating RO concentrate

Established 2008

Hudson, MA

Technical Center

Murfreesboro, TN

Services

Produced Water

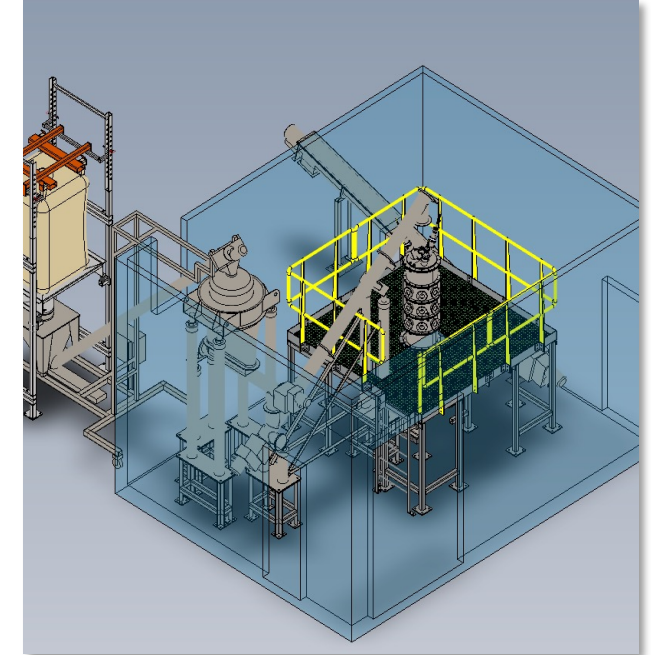
(Oil & Gas)

Leachate

(Landfills)

Waste Conversion

(Biosolids)



HelioStorm™ Gasifier

Ultra-high temperature ionic gasifier

20 years in development at Idaho National Labs

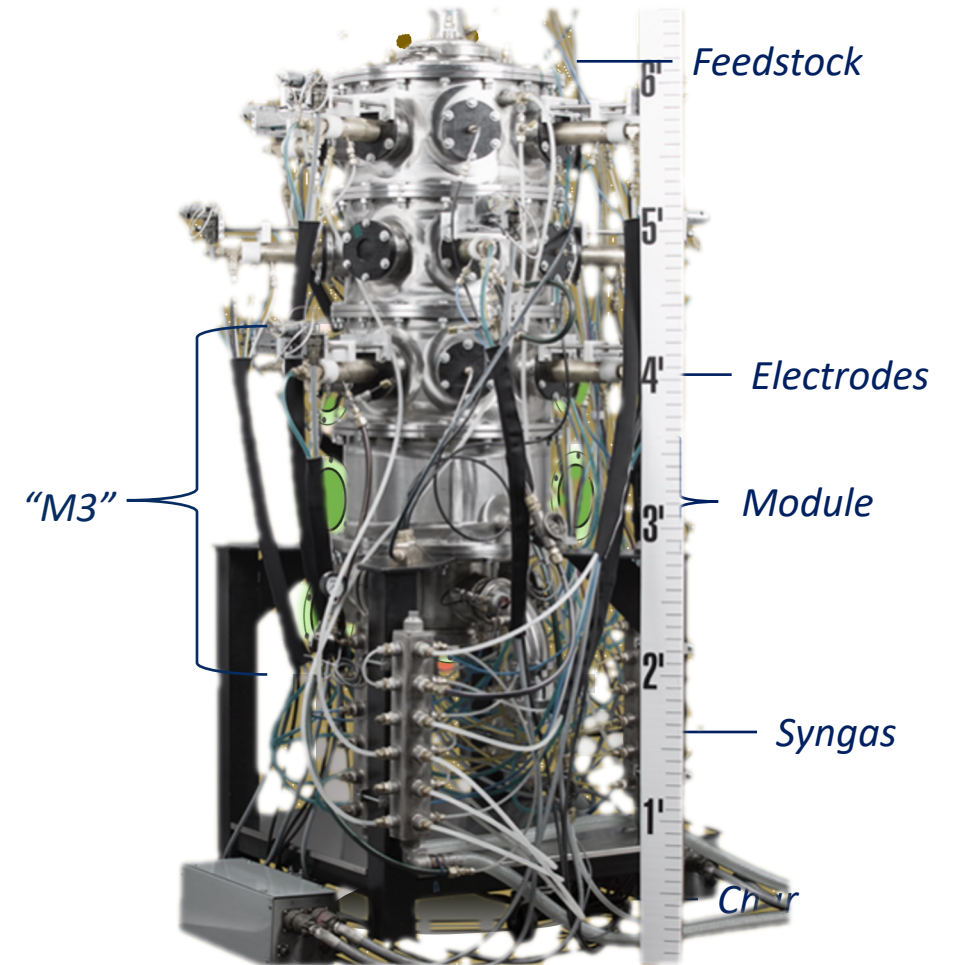
Launching for Residuals in 2023

Provides Assured PFAS Destruction™

HELIOSTORM™

A **scalable, multi-purpose, ultra-high-temperature** electric driven gasifier/pyrolyzer with key features and operations:

- Ionic field created by paired electrodes that produce an electric arc, filling the entire internal volume of the gasifier
- Multiple electrode pairs per module create an ultra-high temperature electric field
- Feedstock falls through, fully immersed into an ultra-high-temperature reaction zone, disassociating into individual atoms and ions
- Design of stacked modules creates a cascade of energy that reduces total input power
- Multiple units grouped to meet capacity demand



Ultra-High Temperature Ionic Gasification

DESTRUCTION RANGE

3,000 to 10,000°C Plasma Arc
Electrically driven

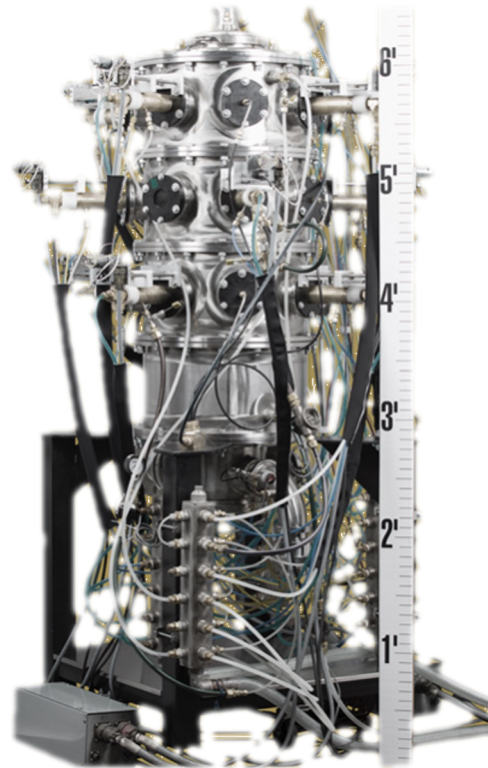
VERSATILE

HelioStorm™ can accept a range of feedstocks
and generate multiple products eligible for
beneficial reuse

TAR-FREE SYNGAS

Tar-free syngas is used to generate electricity
for the needs of HelioStorm™ without the
need for a thermal oxidizer

HELIOSTORM™



SCALABLE

Small individual footprint
Multiple units combine to satisfy specific and
changing plant outputs

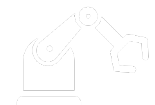
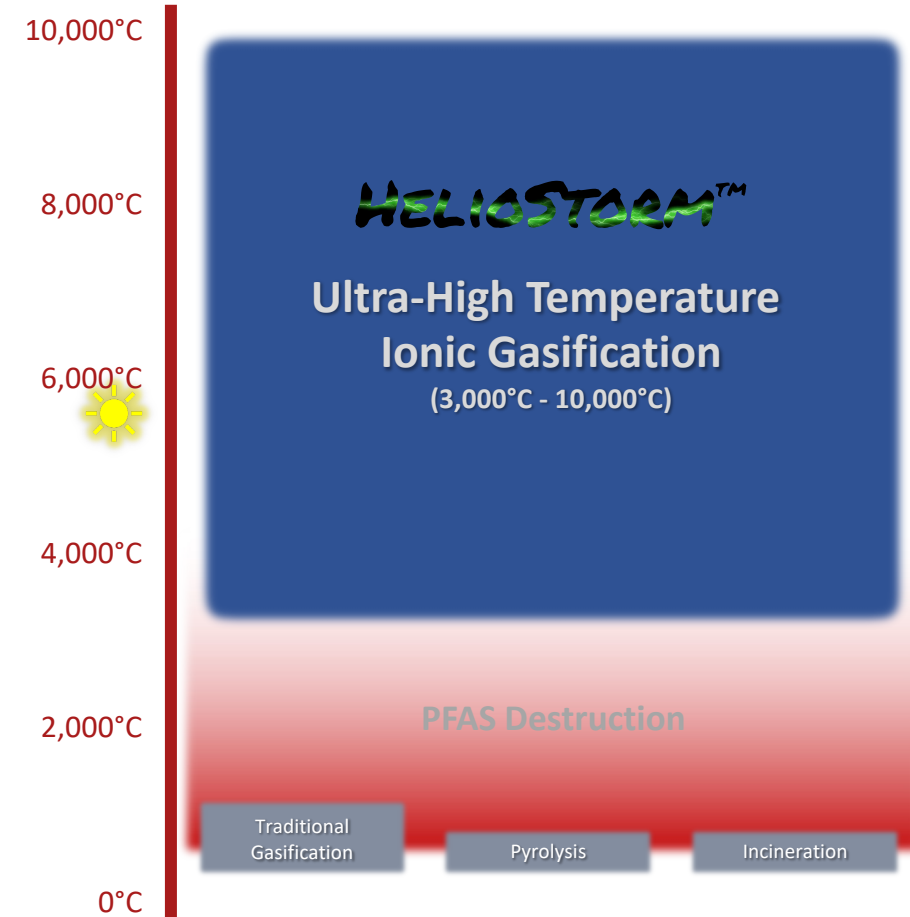
CHAR

HelioStorm™ generates PFAS-free Char that is
eligible for beneficial reuse or wide range of
other outlets and applications

Assured PFAS Destruction

ULTRA HIGH TEMPERATURE IONIC GASIFICATION

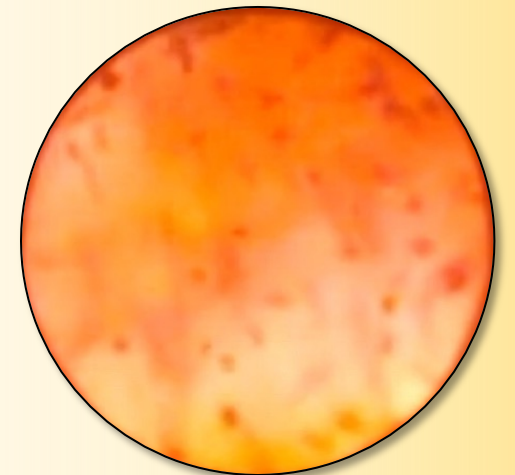
- Entire interior of the processor is an ultra-high temperature reaction zone
- Processing zone contains hyper-energetic gaseous ions, accelerating conversion process
- Vaporizes all feedstock, including carbon
- Transforms water into high-energy oxygen and hydrogen radicals and ions, rather than lower-energy steam
- Waste completely breaks down to individual atoms and ions generating a consistent tar-free syngas with no by-products or toxin production



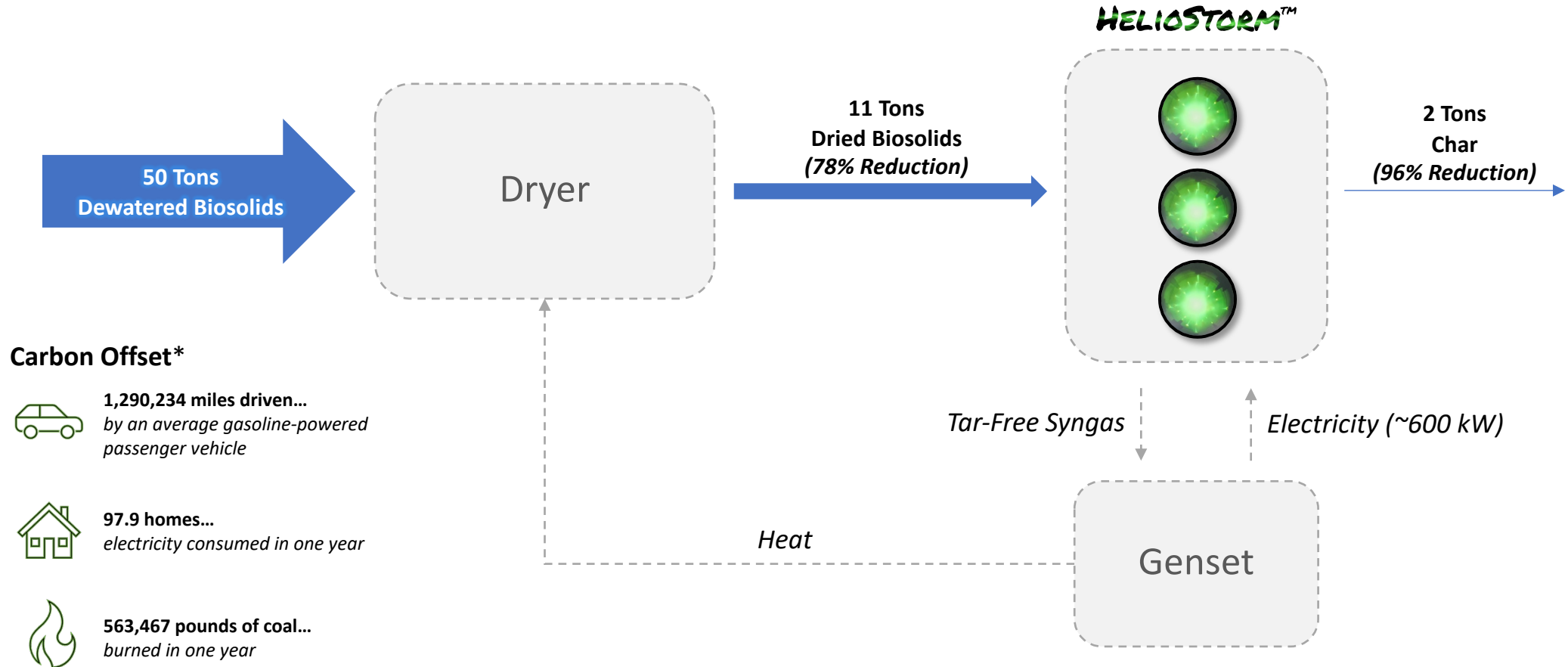
Biosolids Destruction Process

Heartland's breakthrough HelioStorm™ gasification technology enables efficient, cost effective and environmentally friendly biosolids destruction and value recovery

- Efficiently processes relatively small volumes dried biosolids (1-4 dt/d)
- Operates at ultra-high temperatures reaching 3,000 - 10,000 °C
- Produces a clean syngas with no tars (CO and H₂)
- Syngas used on site to generate electricity
- No greenhouse gas or toxic emissions from the gasifier core
- Replaces traditional disposal options



25:1 Feedstock Reduction



*EPA

Project Delivery



BUILD

Full Project Development
Tailored to Customer KPIs
Heartland Team
Permitting
Construction
Commissioning



OWN

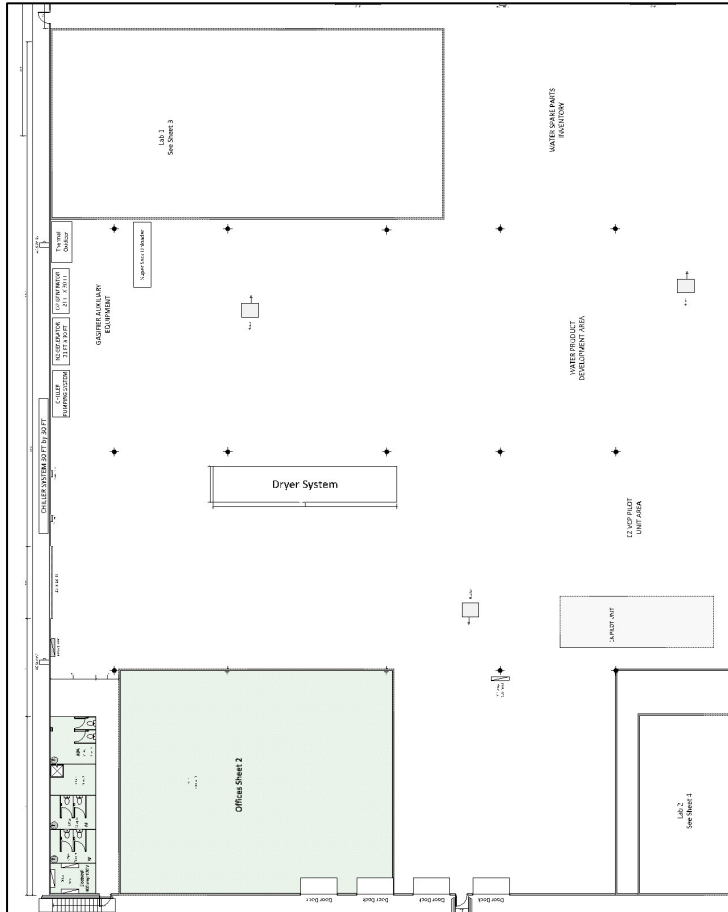
NO Client Capital
Long-term Cost Guarantee
Cradle-to-Grave responsibility



OPERATE

NO Client Staffing
NO Client Training
Assured PFAS Destruction
Heartland Personnel
Optimal O&M

Heartland Technology Center



Murfreesboro, TN

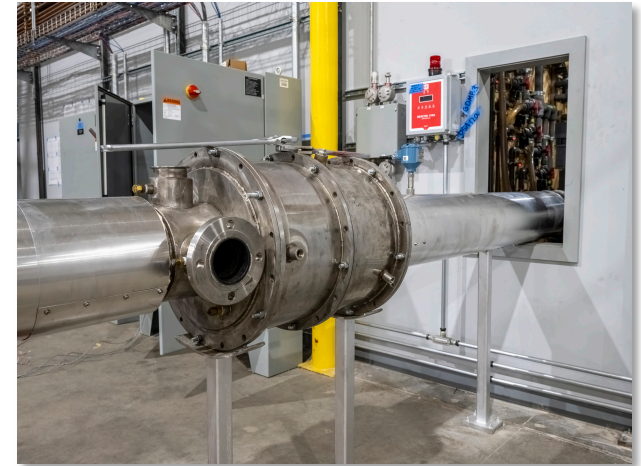
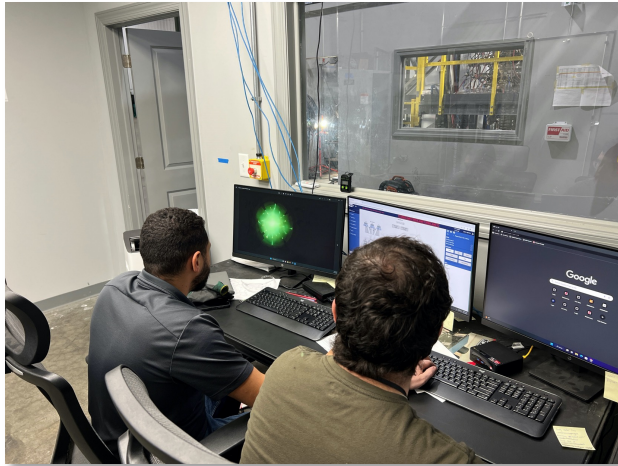
Commercial-scale Gasifier:

Facilitates client feedstock evaluations

Delivers complete analytical data capture to assess performance against Utility KPIs

Validates performance at commercial scale

Heartland Technology Center



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HEARTLAND
WATER TECHNOLOGY



Jim Henderson

Business Development Director
jhenderson@heartlandtech.com
www.heartlandtech.com
757.483.8933

Casey Cammann

Chief Marketing Officer
ccamman@heartlandtech.com
www.heartlandtech.com
603.490.9203