Environmental Protection Through Zero Waste Initiatives
What We Will Cover

• Garbology 101: Getting to Know Your Garbage
• Challenges with Solid Waste Management
• Global Disruption to the Recycling Market
• Waste as a Resource
• Leveraging Innovation to Protect the Environment
• Developing a Zero-Waste-to-Landfill Commerce Campus
A Bit About Me…

Welcome Air Commandos

“The Quiet Professionals”

Advancing Zero Waste Solutions
Garbology 101: Getting to Know Your Garbage
Garbology 101: Getting to Know Your Garbage

Total MSW generation in the United States by type of waste, 2015
Total = 262 million tons

- Paper: 25.9%
- Food waste: 15.1%
- Yard trimmings: 13.3%
- Plastics: 13.1%
- Other: 3.6%
- Glass: 4.4%
- Wood: 6.2%
- Rubber, leather, and textiles: 9.3%
- Metals: 9.1%

Source: U.S. Environmental Protection Agency, Advancing Sustainable Materials Management: 2015 Fact Sheet, July 2018

Management of MSW in the United States, 2015
Total = 262 million tons

- Landfilled: 52.5%
- Recycling: 25.8%
- Combustion with energy recovery: 12.8%
- Composting: 8.9%

Source: U.S. Environmental Protection Agency, Advancing Sustainable Materials Management: 2015 Fact Sheet, July 2018
Challenges with Solid Waste Management

In the United States, we landfill over 260,000,000 tons of solid waste each year. Solid waste generation is expected to quadruple by 2060 based on global population growth estimates.
Global Disruption to the Recycling Market

- The “traditional” recycling model is changing...dramatically!
- Up until 2017, China was the world’s largest importer of recyclable materials.
- Overnight, Materials Recovery Facilities across the country closed, indefinitely.
- Many communities have been forced to landfill its recyclables.
- The future of recycling is in jeopardy unless we find new markets and/or reduce contamination rates.
Global Disruption to the Recycling Market

NERC BLOG
ELEVEN STATES UNITED FOR ENVIRONMENTALLY SUSTAINABLE MATERIALS MANAGEMENT

News & Updates > Blog > NERC Blog > China’s Ban on Recyclables: Beyond the Obvious...

China’s Ban on Recyclables: Beyond the Obvious...

NERC Bulletin

Money
Companies	Markets	Tech	Media

U.S.▼

China trash ban is a global recycling wake up call
by Ivana Kottasova @ivanakottasova
April 20, 2018: 11:08 AM ET

Recycling Chaos In U.S. As China Bans ‘Foreign Waste’
December 9, 2017: 8:00 AM ET
Heard on Morning Edition

CASSANDRA PROFITA	JES BURNS

ENVIRONMENT
FROM

Advancing Zero Waste Solutions
Advanced Waste Recycling and Recovery

To develop an environmentally-responsible, cost-effective solution to our growing solid waste challenges. This technology can be implemented to safely process household and commercial waste to produce a pathogen-free engineered fuel that can be used as a source of clean, renewable power.
Leveraging Innovation to Protect the Environment

Waste-to-Fuels Technology

• Developed through a Cooperative Research and Development Agreement (CRADA) with the US Department of Defense.

• System efficiencies and process enhancements completed through a partnership with the US Department of Energy.

• Fuel analysis completed through a partnership with the US Environmental Protection Agency.

• Supported by 21 US and 2 International patents.

• 10 years of operational data and maintenance records.
Tested & Validated in the US and in Canada

Environmentally responsible, scientifically proven, and economically viable.
Tested & Validated in the US and in Canada

Hydrothermal Processing of Base Camp Solid Wastes To Allow Onsite Recycling

Gary L. Gerdes, Deborah Curtin, and Christopher Gulkowski

September 2006

No-Hazardous Secondary Fuel

- Qualified as an “Non-Hazardous Secondary Fuel” by the USEPA.
- Tested & Validated in the US and in Canada.
- Advancing Zero Waste Solutions
- Stack Test results shows a 22% GHG reduction for our fuel users.
- Drop-in replacement for coal in a co-firing application or as a soil amendment.

Lehigh Cement
A division of Lehman Hanson Materials Limited

Lehman Hanson Materials Limited supports the construction of the Wasteaway materials recovery facility for processing municipal solid waste (MSW) into a low carbon alternative fuel source. Our company is committed to global sustainability which includes the usage of an alternative fuel to displace the consumption of a fossil fuel such as coal. In fact Lehigh has built an alternative fuel handling system in our Delta cement plant facility that would be able to use the processed MSW for combustion purposes.

- Demonstrates trial results done at the cement plant, one tonne of MSW based alternative fuel replaces 0.4 tonne of coal.
- The following table compares scenarios of the replacement of coal with alternative fuels and the significant reduction in greenhouse gas (GHG) emissions in combustion.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>MSW Alternative Fuel Consumption, MWh</th>
<th>Cost Equivalence, $/MWh</th>
<th>Percent Reduction in GHG Emissions in Combustion</th>
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<tr>
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If Lehigh has the ability to consume 10 mWh of this alternative fuel in their operation, there would be a 22% reduction in GHG emissions in combustion. Definitely this is step in the right direction for sustainability.

Lehigh looks forward to benefiting from National Energy’s venture in new material recovery facility to provide a low carbon alternative fuel.

Drop-in replacement for coal in a co-firing application or as a soil amendment.

Stack Test results shows a 22% GHG reduction for our fuel users.

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Zero-Waste-to-Landfill Campus (Pensacola, FL)

Phase I
If you need me, I’m at your disposal