2013 DOE Bioenergy Technologies Office (BETO) Project Peer Review

Hydrothermal Decomposition & Resource Recycling

Date: May 21st, 2013

Technology Area Review: BETO

Principal Investigator: City of Allentown & Delta Thermo Energy

Organization: City of Allentown

Goal Statement

- Research & design an innovative solution using “Hydrothermal Decomposition” technology to transform municipal solid waste, biomass, biosolids waste into a renewable clean fuel to produce clean energy.

- This will help encourage the creation of a new domestic bioenergy industry supporting:
  - Reduction of U.S. Dependence on Oil (less diesel used by trucks),
  - Diversification of energy resources,
  - Development and deployment of commercially viable, high-performance biofuels, bioproducts, & biopower.

Quad Chart Overview

Timeline

- Project start date: Dec.1.10
- Project end date: March.31.13
- Percent complete: 100%

Barriers

- Barriers addressed
  - Proven to meet USA air emissions
  - Test chemical and elemental composition of the pulverized fuel
  - Engineering design to meet operating target & produce 3-4 MW of energy.

Budget

- Funding for FY 2012: $685K/$600K
- Funding for FY 2013: $315K/$480
- FY 2014 projected budget: $ 0
- Years the project has been funded/average annual funding:
  - 2 Years/$500,000

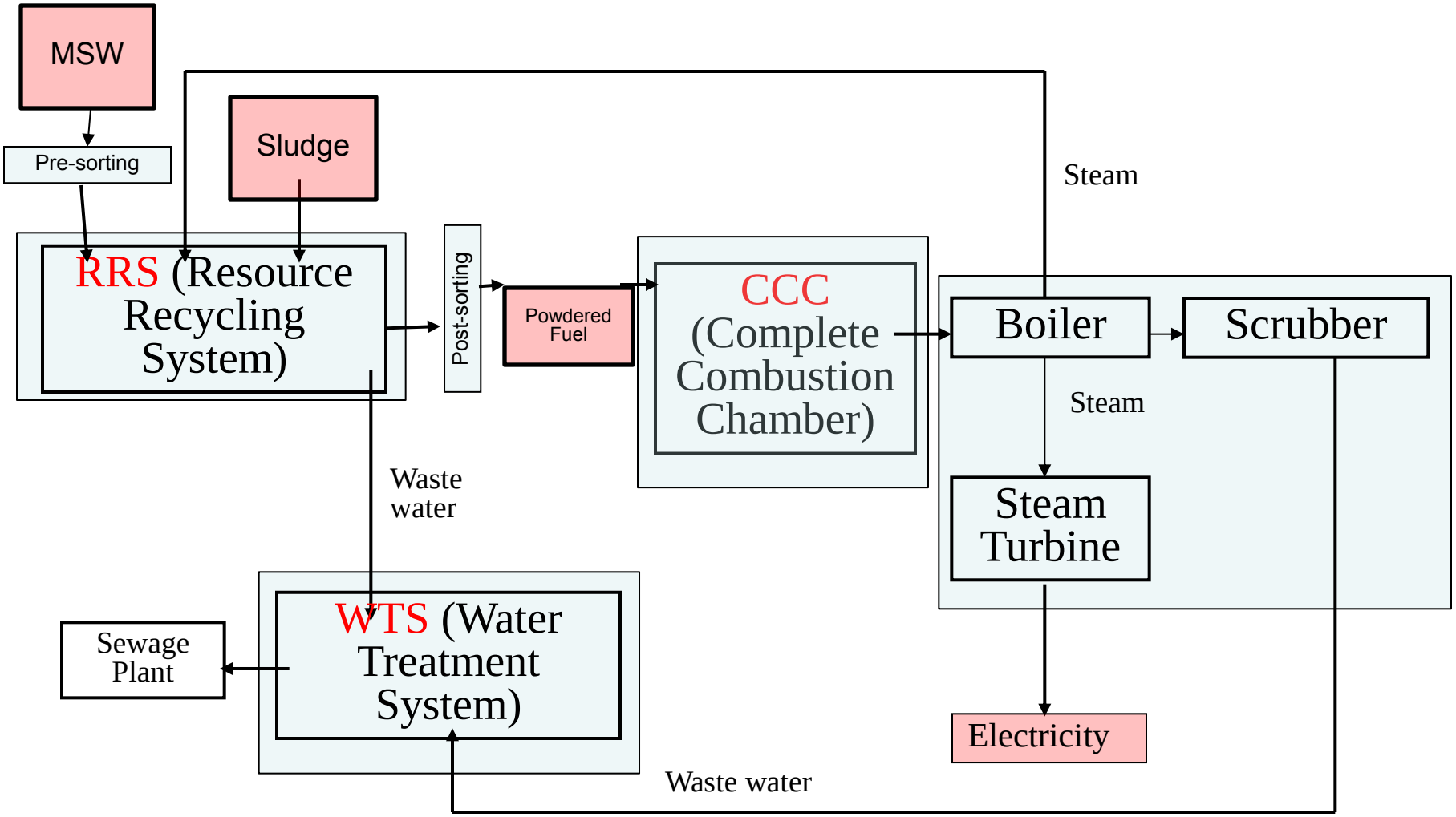
Partners

- City of Allentown
- Delta Thermo Energy, Inc.
- Atlantic County Utility Authority

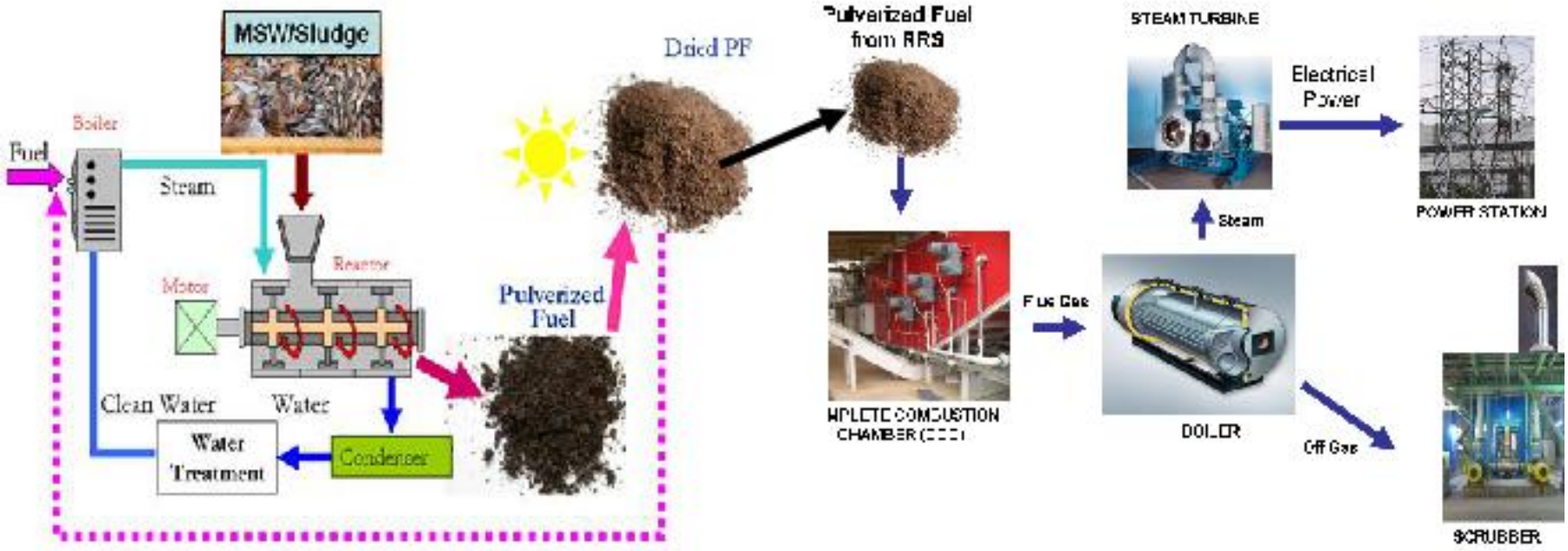
Project Overview

- Delta Thermo Energy seeking partners for sustainable energy solutions:
  - Using selected 3 key technologies operating abroad.
- Research & design the development of an innovative cost effective solution for the USA market.
- Design and build pilot test system.
- Installed pilot test system: December 2011.
- Permits issued & tests started: January 2012.
- Process engineering design complete: 3.31.13

1 - Approach


MSW
Pre-sorting
Sludge
RRS (Resource Recycling System)
Post-sorting
Powdered Fuel
CCC (Complete Combustion Chamber)
Steam
Boiler
Scrubber
Steam
Steam Turbine
Electricity
Waste water
WTS (Water Treatment System)
Sewage Plant
Waste water

1 - Approach



- MSW/Biosolids processed using Hydrothermal Decomposition technology (RRS); producing renewable clean fuel.
- Use proven solutions already commercially operating in other countries.
- Technology due diligence with operating experts key to achieving success.

2 - Technical Accomplishments/ Progress/Results

- Designed, built and installed scale pilot test system.
  - Designed and built abroad
  - Asssembled and tested
  - Built and installed in New Jersey
- Conducted 26 feedstock tests:
  - Two EPA certified labs used
  - Two international labs
  - Average caloric content of the fuel: 9,050 Btu/lb
- Process-patent filed in the USA

3 - Relevance

GOALS

To develop commercially viable biomass utilization technologies to:

- Enable sustainable, nationwide production of advanced biofuels that can displace a share of petroleum-derived fuels to reduce U.S. dependence on oil.
- Encourage the creation of a new domestic bioenergy industry supporting the Energy Independence & Security Act of 2007.

ALLENTOWN PROJECT

- Saving Allentown millions: ~$40 M
- Eliminating 3 hauling trucks/day
- Produces advanced clean pulverized fuel: 9,050 Btu/lb average
- Generates 4 MW of electricity without fossil fuels.
- Feasibly implementable in 10,000 cities.
- Can substitute coal in a number of existing coal burning boilers.
- Saves over 200,000 miles in diesel truck driving per year.

4 - Critical Success Factors

- Testing transformation of feedstock from Allentown.
- Successfully addressing key challenges:
  - Air emissions
  - Clean waste water
  - Manufacture key technologies in the USA.
- Design innovative plant tailored to meet USA requirements
- Analyze initial design an economics applicable to multiple locations and capacities:
  - Feedstock compositions
  - Project proforma analysis
  - Proof of financing availability.

5. Future Work

- Continue to full plant design, construction and implementation.

- Implement 160 ton/day project at the City of Allentown plant.

	Time in month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Jasper / Hokuto, ETC	Basis engineering	■	■	■														
DTE	Order key parts, like Turbine, RRS, WWTS, Boiler		■															
to Penntex	Data exchange to Penntex, hall size																	
Jasper	Detailed engineering				■	■												
DTE	Order specified parts with shorter delivery time				■	■	■											
Jasper	Detailed engineering Control System, Plant Software				■	■	■											
Jasper	Supervising Indoor Installation work							■	■	■	■	■	■	■				
Jasper / Hokuto, ETC	Premounting					■	■	■										
Hokuto	Delivery time RRS, Installation													■				
Jasper	Delivery time CCC, Installation												■					
ETC	Delivery time WWTS equipment, Installation										■							
Boiler	Delivery time Boiler, Installation												■					
Turbine	Delivery time Turbine, Installation													■				
Equipment	Delivery time other equipment, Installation										■	■						
All	Start up System, test run														■			
Jasper / Hokuto, ETC	Operating Attendance															■	■	

- Implement at other locations.

Summary

A unique solution transforming waste into a renewable clean fuel:

1) Hydrothermal Decomposition as a means to transform waste resources to produce an environmentally clean fuel.
    - Create 25 new green jobs per plant.
2) Patent pending plant process.
3) A proven solution implementable nationwide.
4) Already commercially working outside the USA.
5) Implement the first plant in Allentown by next year.
6) Manufacture the key technologies in the USA.