Waste to Energy Projects in Kansas

Frito-Lay, Inc. – Topeka Energy Center

David Knapp, P.E.
Sr. Project Manager

March 23, 2010

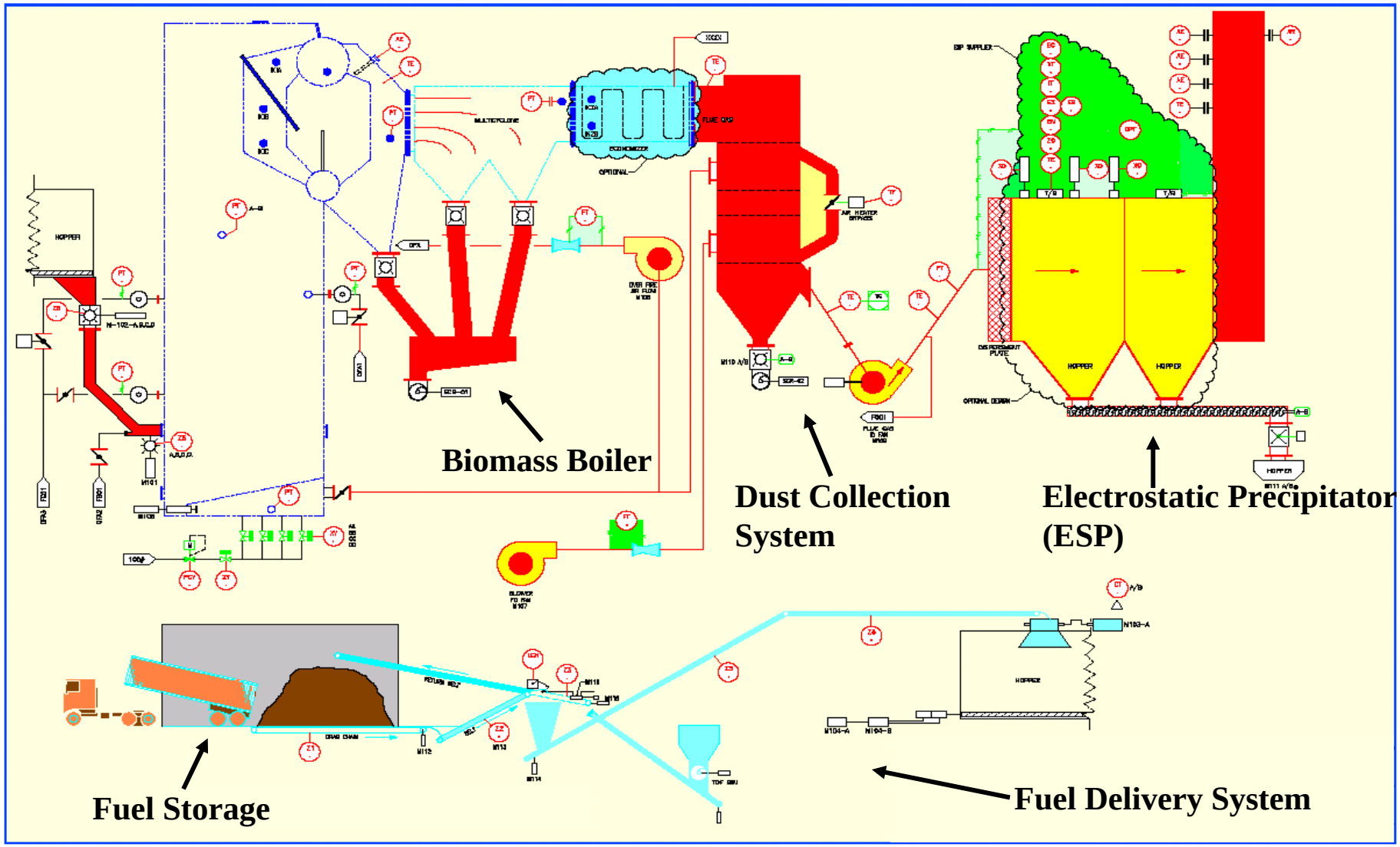
Performance with Purpose

- A vision for the future at Frito-Lay and PepsiCo
- Commitment to reduce environmental footprint from energy and water use
  - Zero Landfill
  - Compostable Bags
  - Membrane Bioreactor
  - Solar Energy
  - Landfill Gas
  - Biomass Boiler
  - Combined Heat & Power
  - High MPG Route Trucks
  - LEED Certification

Topeka Biomass Boiler

- Wood fuel fired
- Steam output ~ 60,000 #/hr (78.3 MMBTU/hr)
- Steam pressure ~ 410 psig
- Steam temperature ~ 450°F
- Efficiency ~ 70%
- Fuel as fired ~ 17,000 #/hr calculated
- Ash as fired ~ 520 #/hr calculated

Core Technology



Fuel Supply and Specification

Fuel Input ~ 360,000 MMBTU/year;
Fuel Supply ~ 35,000 tons/year;
Deliveries ~ 5/day

- Green wood (tree clippings, limbs, cuttings, chipped bark, chipped forest product waste)
  - 3900 to 4500 BTU/lb
  - 45 to 50% moisture (55% max)
- Dried chipped wood
  - 7000 to 9000 BTU/lb
  - 10% moisture
- Demolished building materials (pallets)
  - 4500 to 8000 BTU/lb
  - 12 to 40% moisture
- Tire derived fuel
  - 10,900 to 13,500 BTU/lb
  - Dry to 10% moisture
- Sawdust and sander dust
  - 8500 to 9000 BTU/lb
  - 5% moisture
- Pelletized grass and leaves
  - 5000 to 6500 BTU/lb
  - 10 to 20% moisture

Site Development September/October 2009

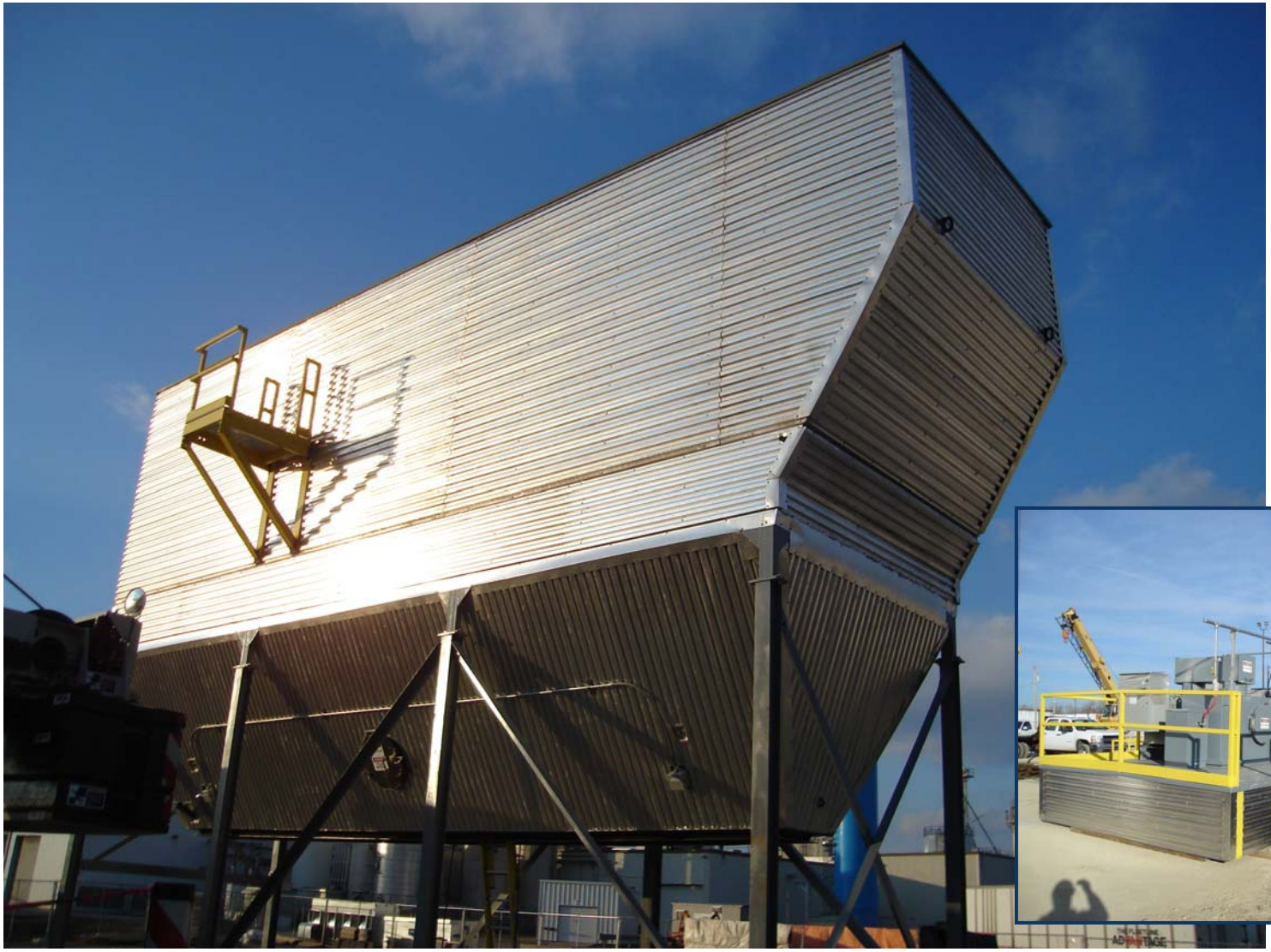
Equipment Deliveries December 2009

ESP Inlet

ESP Hopper

OFA Fan

Precipitator Installation December 2009



Boiler Foundation & Chain Wall December 2009

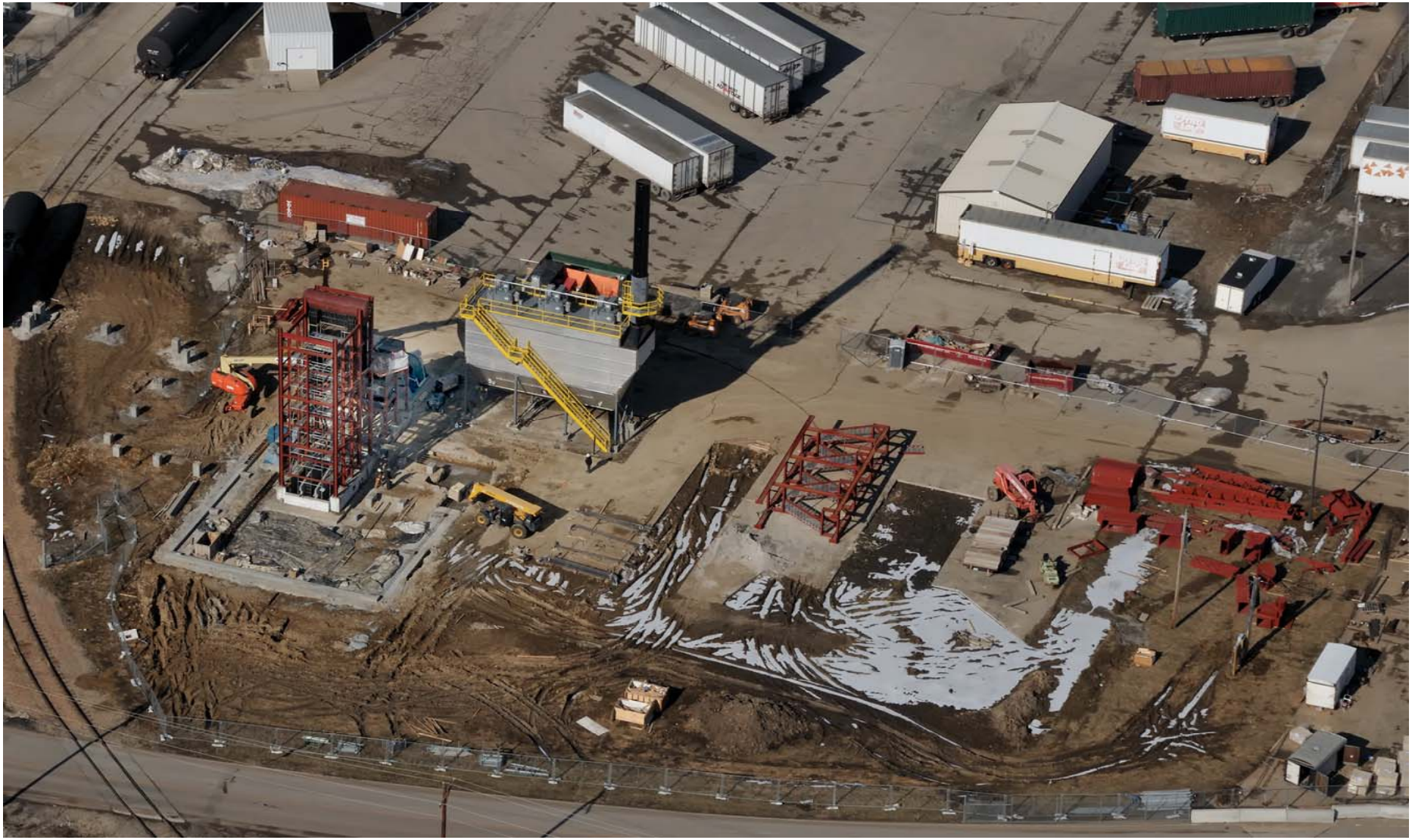
Site Progress
December 31, 2009

Boiler Tubing & Structural Steel
January 2010

Tube Installation 1-15-10

Air Heater Structural Steel 2-1-10

Site Aerial Layout
February 2010



Access Stairs & Platforms
February 2010

West Catwalk Knee Brace Installation 2-2-10

Erecting the Stair Tower 2-4-10

Dust Collector Installation Progress 2-3-10

Platform and Air Heater Structural Steel 2-3-10

Progress Photos
February 2010

Handrail Installation
2-8-10

Air Heater Fabrication
2-26-10

Air Heater Wall Assembly
2-12-10

Site Overview
March 1, 2010

Pipe Bridge Erection
March 2010

Boiler Details
March 2010

Air Heater Tube Installation 3-04-10

Rolled Tubes at Steam Drum 3-5-10

Bark Bin Structural Steel 3-4-10

East Header & Side Tubes March 2010

West Side Tubes
March 2010

Tube Installation 3-07-10

Tubes and Header 3-08-10

Fuel Conveyance March 2010

Rail Spur

Dust Collector Duct Installation

30 Inch Belt Conveyor

Fuel Delivery Chute Installation

Bark Bin, Flue Gas Duct & Tubing March 2010

Bark Bin Screws

Primary & Secondary Dust Collectors

Side Wall Water Tubes

Top of Bark Bin

Top Steam Drum

Key Project Milestones

- **Key Schedule and Deliverables**
  - Feasibility Study: Spring 2008
  - Project Definition: Fall 2008
  - Project Kickoff: March 2009
  - Design Completion: July 2009
  - Started Construction: October 2009
  - Startup & Commissioning: July 2010
  - Commercial Operation: August 2010
  - Performance Assessment: August 2010 – January 2012

Project Team

- Frito-Lay, Inc.
  - Topeka, KS Manufacturing Facility
- Burns & McDonnell Engineering, Inc.
  - Engineering, Architecture, Construction, Environmental & Consulting
- CPL Systems, Inc.
  - Leader in combustion control design and technology for over 15 years for biomass, landfill gas, bio-gas, multi-fuel boilers
- Alpha Boilers, Inc.
  - Over 30 years of experience with boilers ranging from 60,000 lbs/hr to 900,000 lbs/hr for the sugar, power, paper and wood industries
- PPC Industries
  - Pre-engineered factory built precipitators with gas flows to 30,000 ACFM
  - Dry electrostatic precipitator normally considered the best available control technology for wood fired boiler emissions

PPC INDUSTRIES
ELECTROSTATIC PRECIPITATORS