RNG Alternative Fuel

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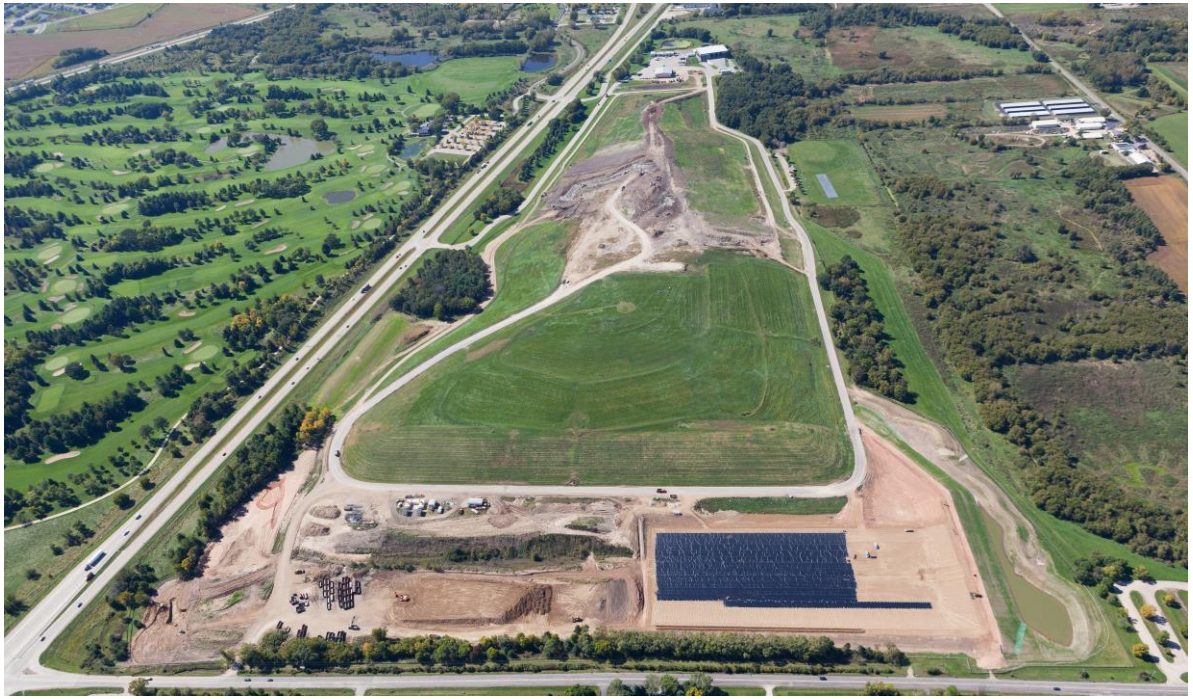
Director

Department of Waste & Renewables

Dane County Waste & Renewables

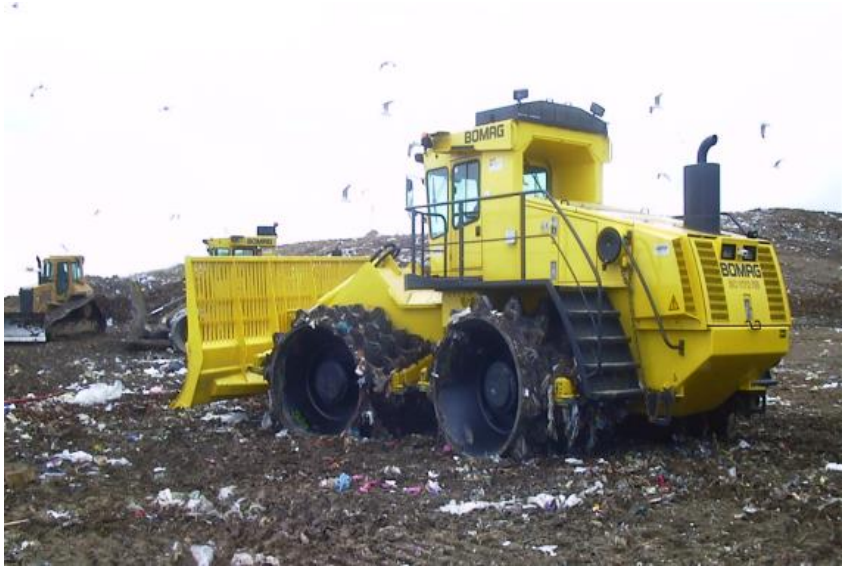


Mission Statement:

To provide an efficient and cost effective solid waste management program which protects the environment and conserves natural resources.

Waste & Renewables Operations

- 1 Active landfill & 2 closed landfills
  - 250,000 tons/yr
- 2 landfill gas facilities
  - LFGTE, CHP, CO2, RNG
- C&D MRF
- Clean Sweep
- Brush/logs program
- Tours, recycling events, needles program, etc

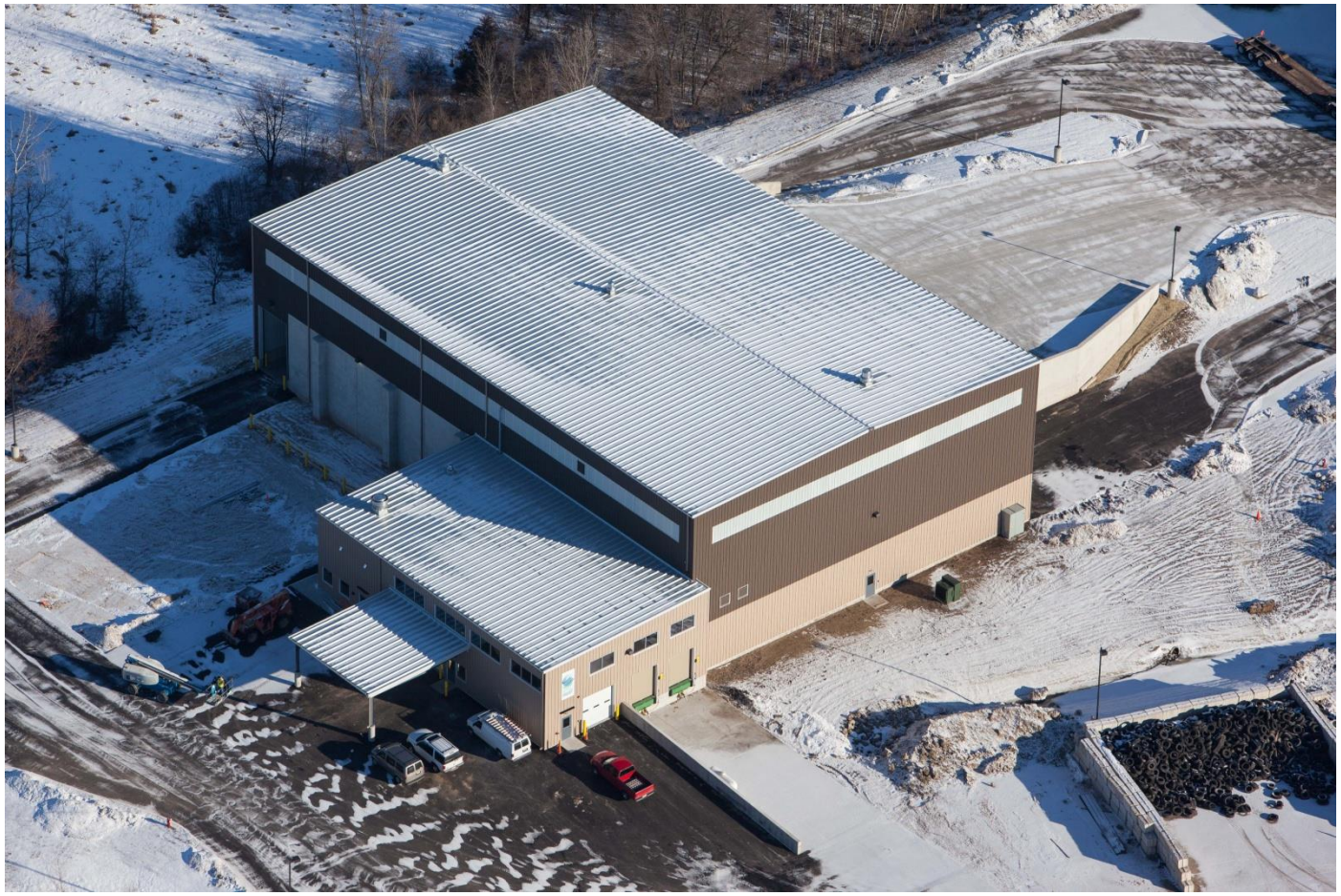


We've Been Busy!

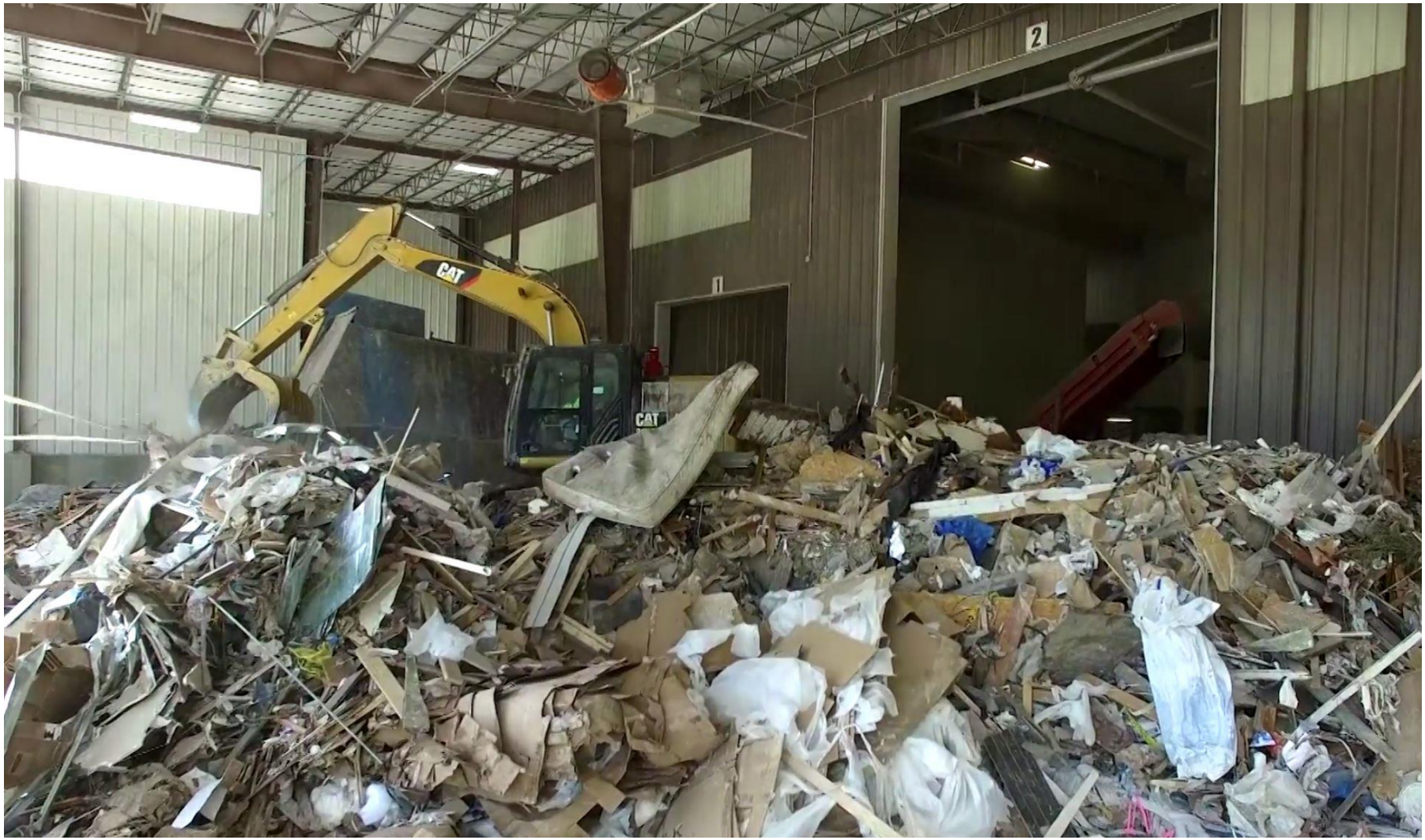
Since 2012

- Rapid Landfill Expansion Permitting
- New HHW Facility
- C&D Transfer Station
- New C&D MRF
- Constructed 4 Cells
- Capped 40 Acres
- 100 acres of Prairie
- Biogas Projects

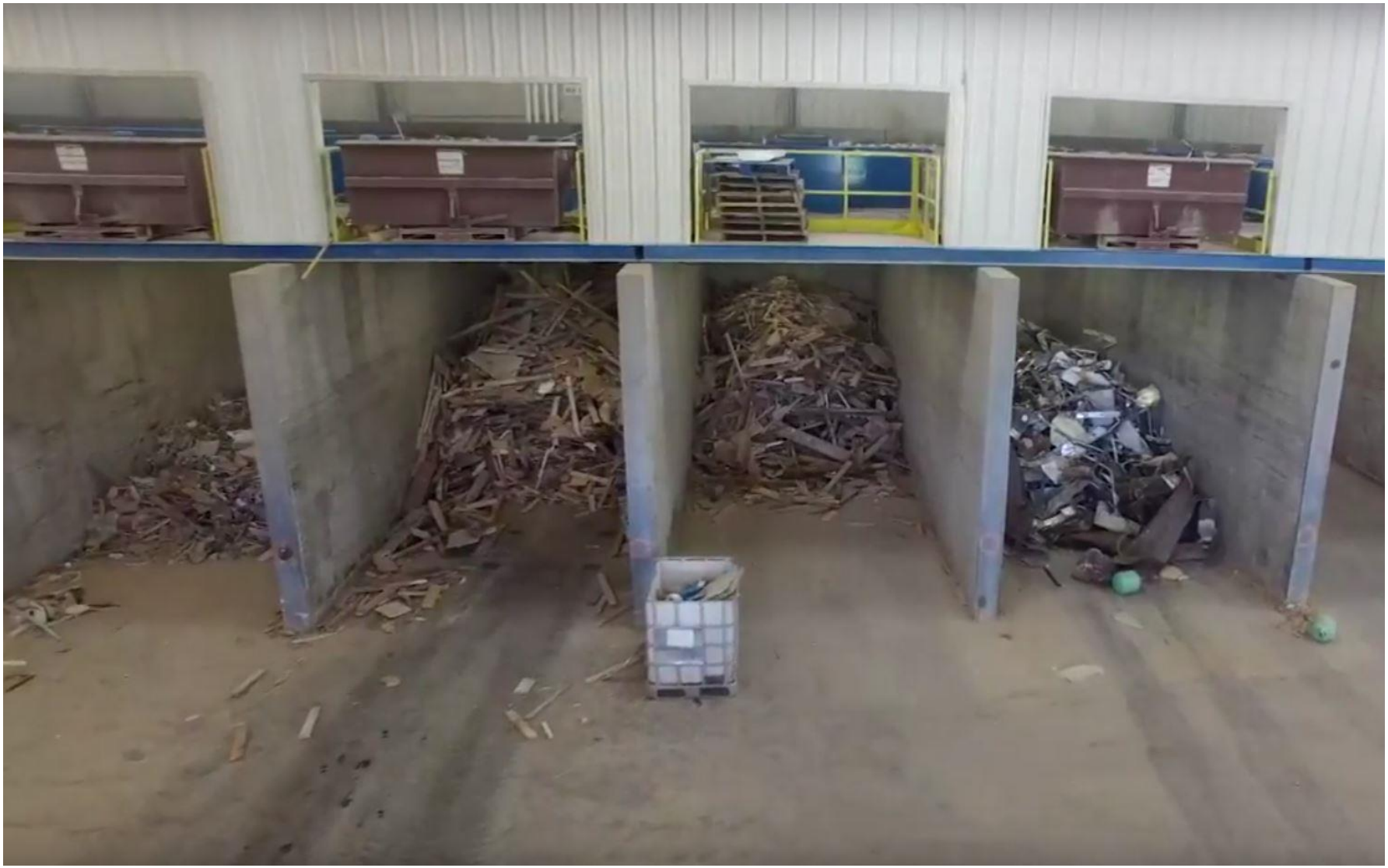
C&D MRF / Clean Sweep



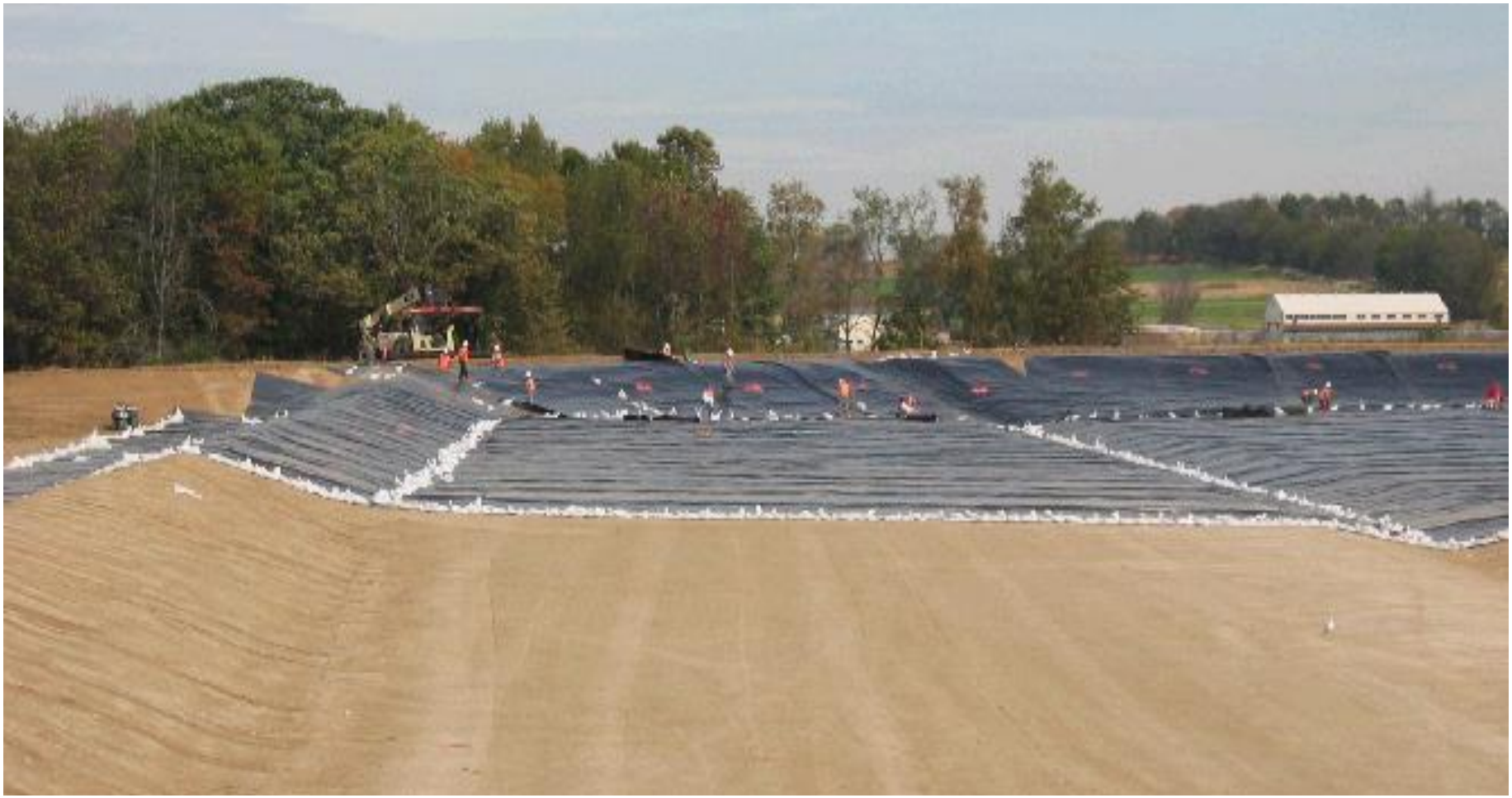
C&D MRF



C&D MRF



Liner Construction

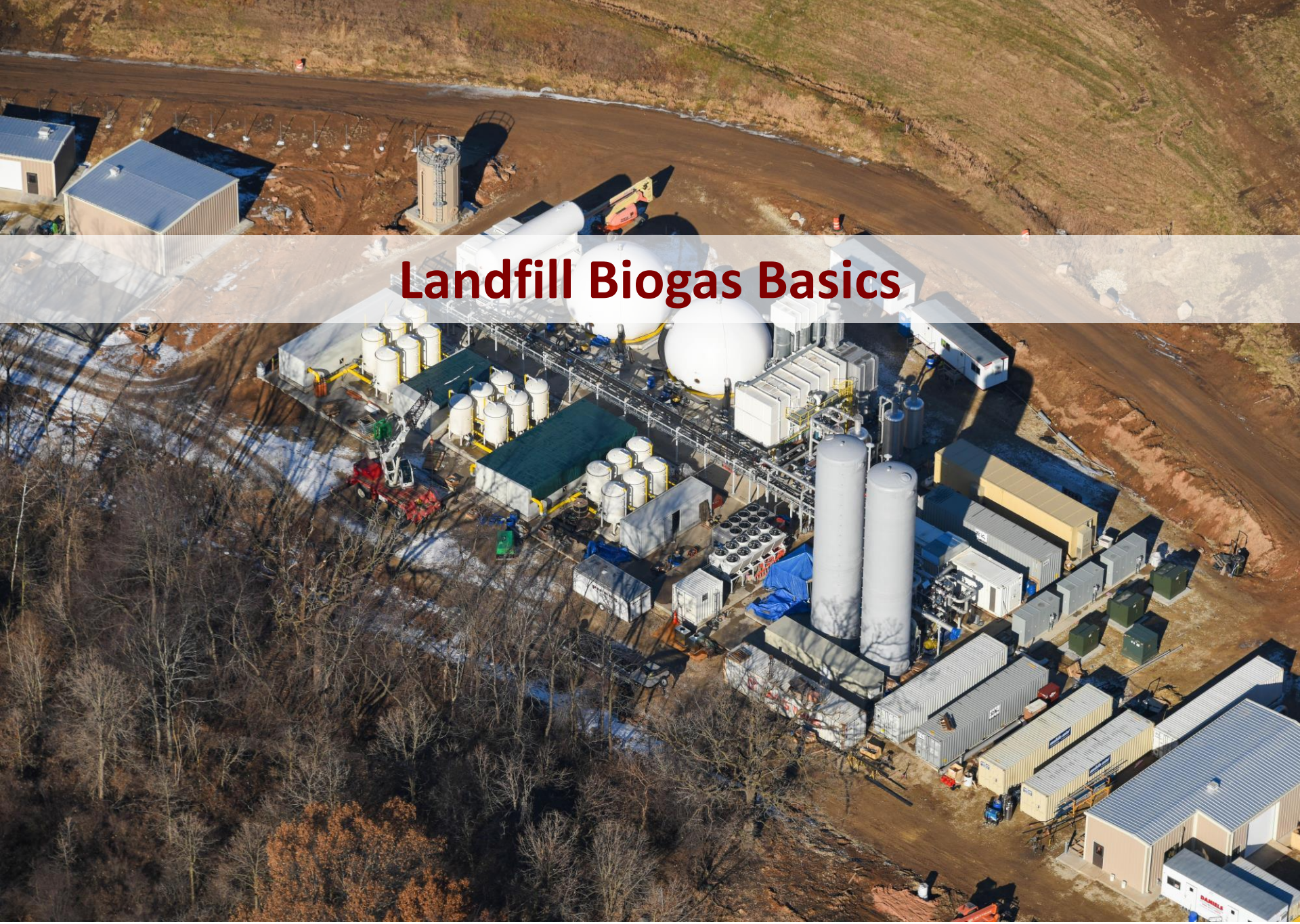


Cap Construction

Dane County Biogas History

- Landfill Gas to Energy (LFGTE)
- Waste heat – multiple buildings
- Manure digester projects
- Evaluated food waste digester
- RNG fueling station – Pilot system & expansion
- High BTU pipeline grade gas
- CO2 Sequestration Pilot Project

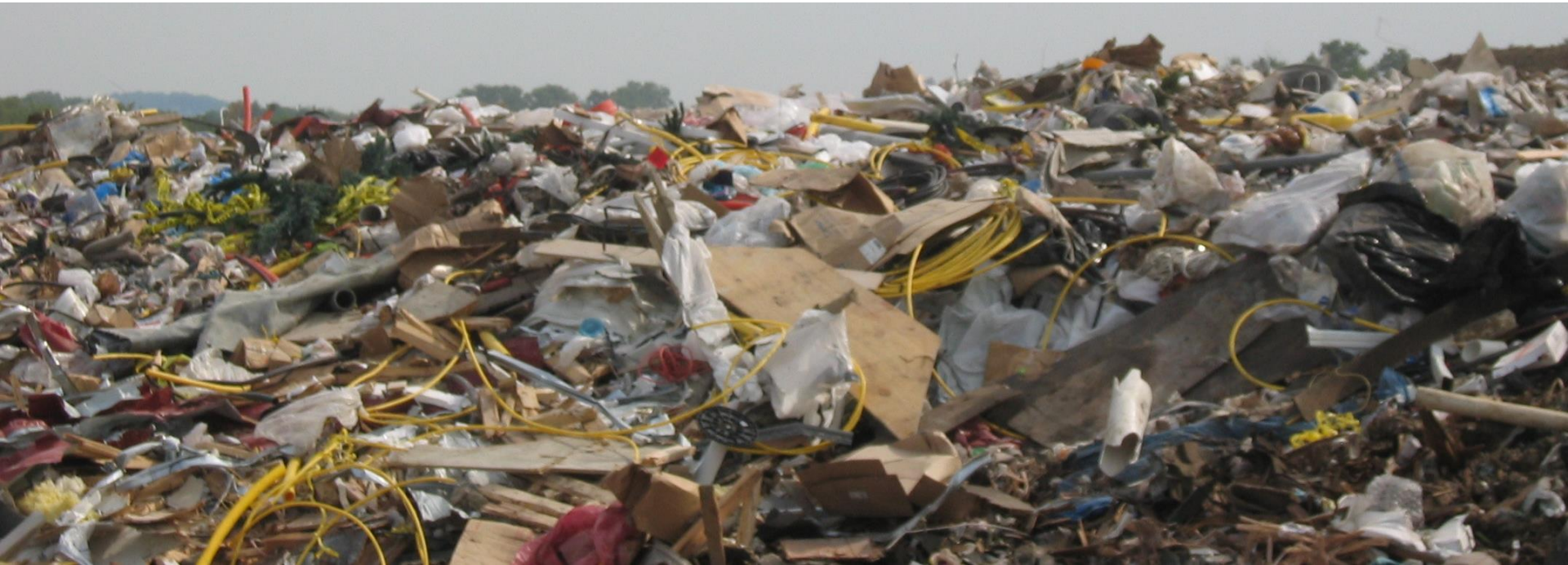
Landfill Biogas Basics



Decomposing Waste Produces Landfill Gas

- Landfill Gas Components
  - Methane – 55% ← Energy!!!
  - Carbon Dioxide – 40%
  - Nitrogen – 5%

  } Added Value?
  - Oxygen – Less than 0.5%
  - VOCs, H2S, Siloxanes, H2O, etc
- Gas Temperature 80-120 F



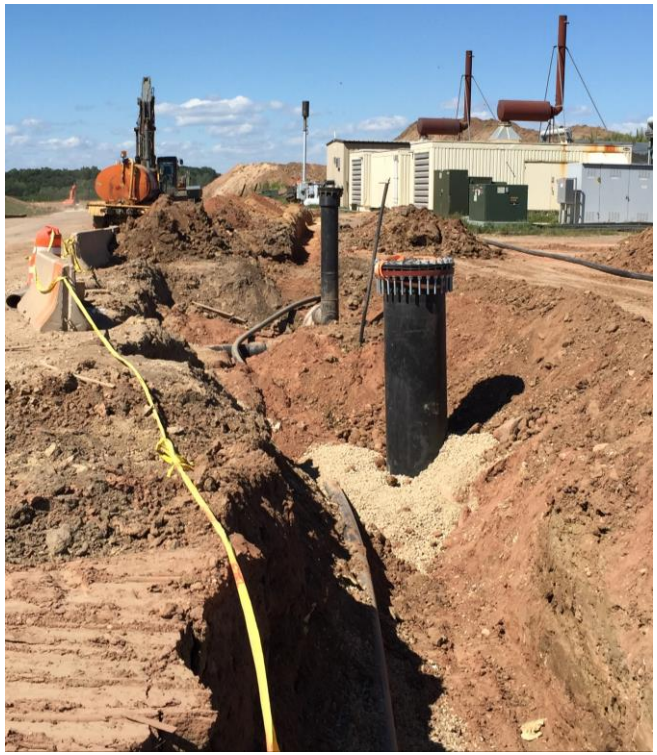
Gas Collection

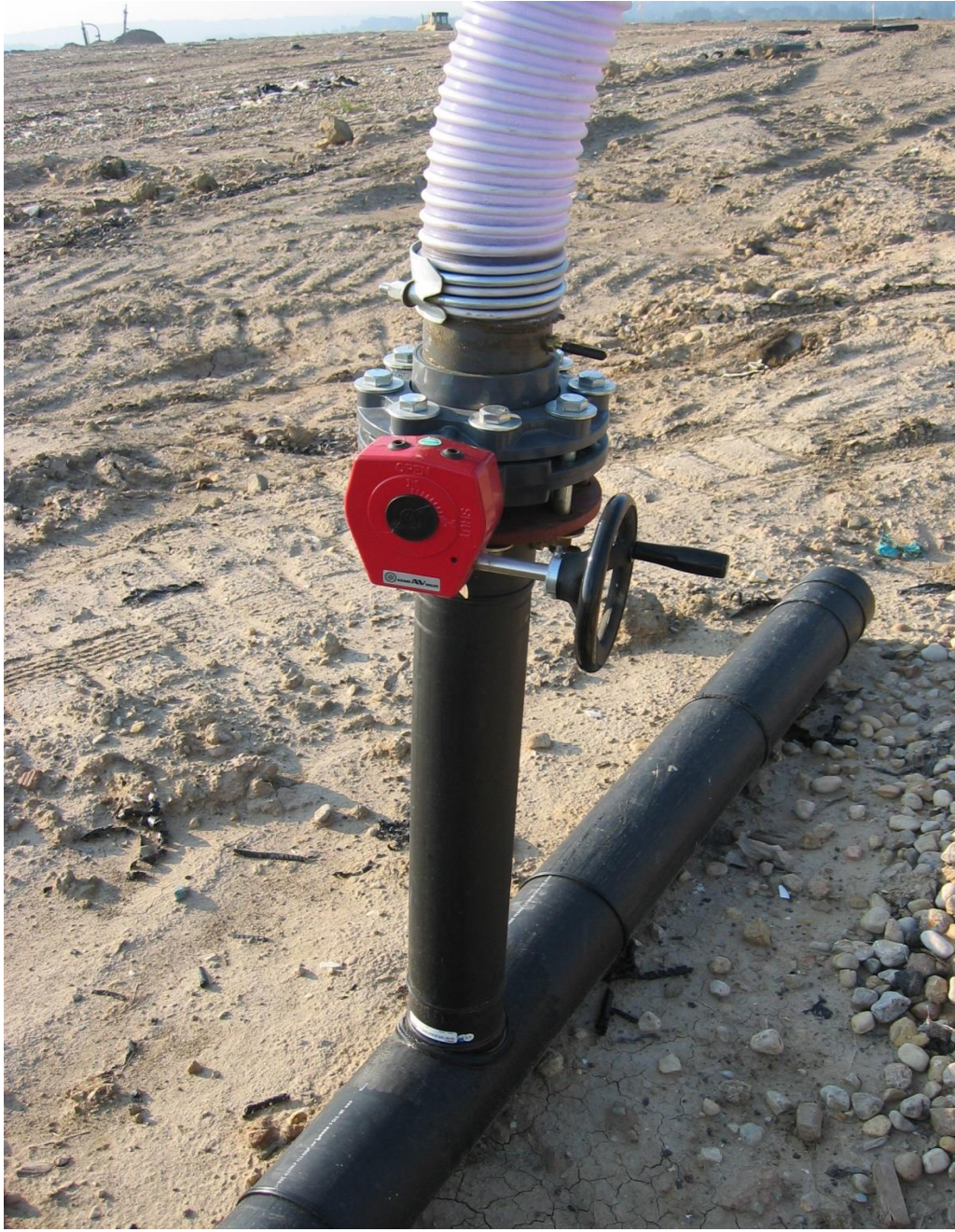
Gas extracted via wells

Gas Collection

Collection Pipes

- Header Pipe
- Condensate
- Clean Outs

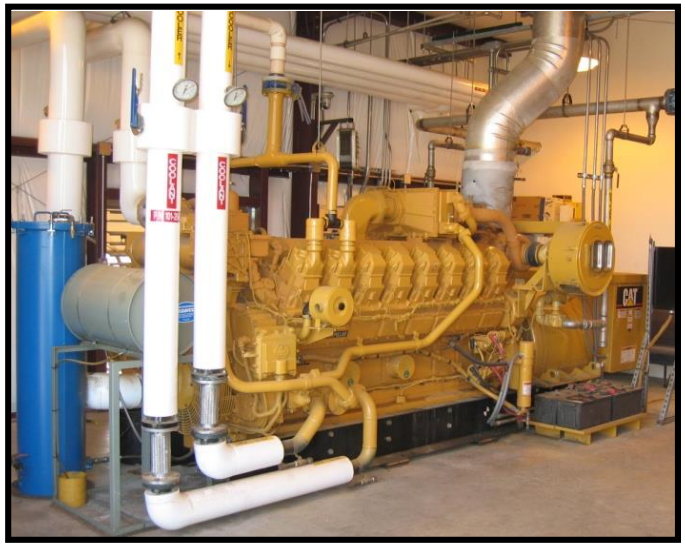




Options for Biogas Use

- Medium BTU – Direct Use
- LFGTE – Electric Production
- High BTU / Pipeline Grade Gas/RNG
- Other Technologies
  - Waste Heat
  - Syngas / biodiesel
  - CO2, N2 Capture
    - EOR, dry ice, methanization

Use of Biogas as a Resource



What is CNG?

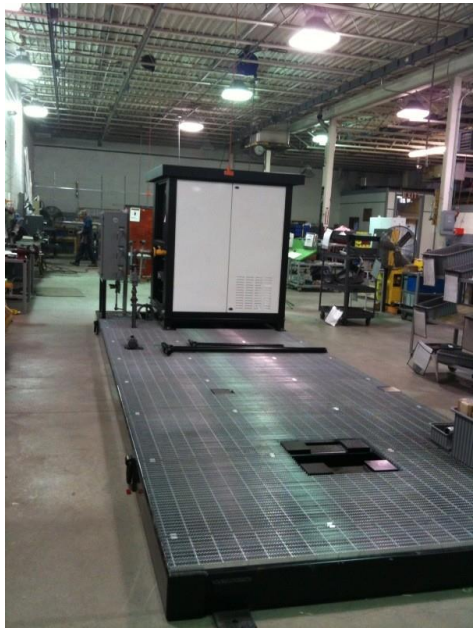
- CNG - Compressed Natural Gas (methane)
- Compressed to 3600 psi
- Used as vehicle fuel

What is RNG?

- CNG derived from biogas
- WWTP, digesters, landfills, etc

Why RNG?

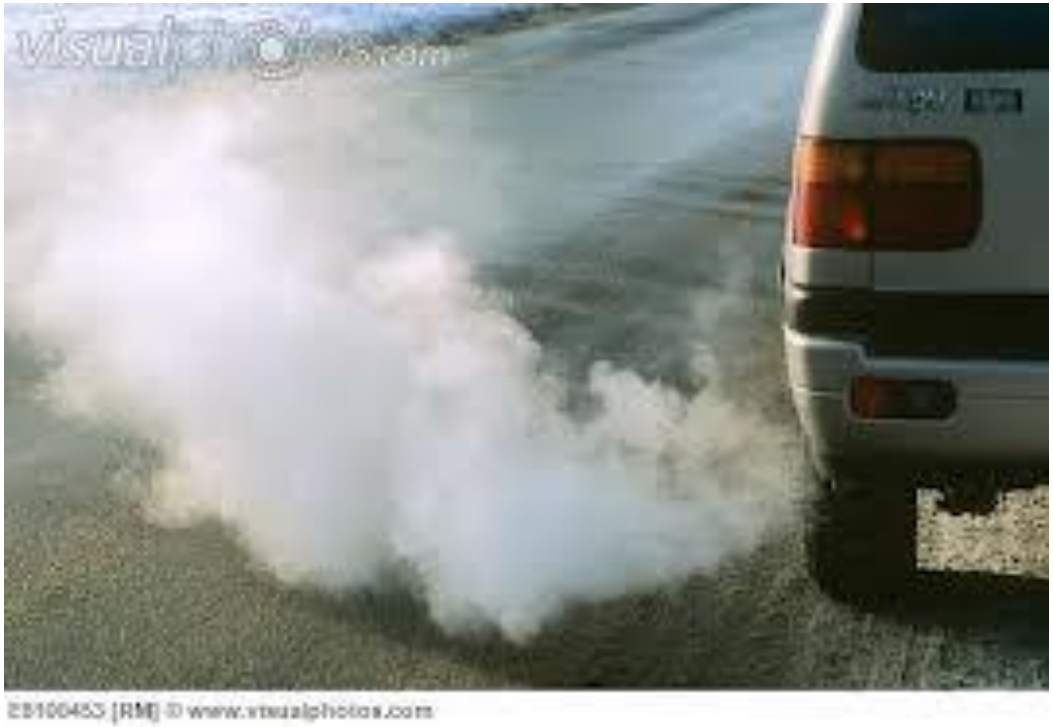
- Financial
  - Less than $2.00/gallon
  - Less price fluctuation
  - Revenue source for landfills
- Domestic Fuel Source
  - Security
  - Local jobs
- Noise – 80-90% reduction
- Safe
- Environmental Benefits



Environmental Benefits

Burns Cleaner

- Vehicle maintenance
- 60–90% less smog-producing pollutants
- 30–40% less GHG emissions
- Lower carbon intensity

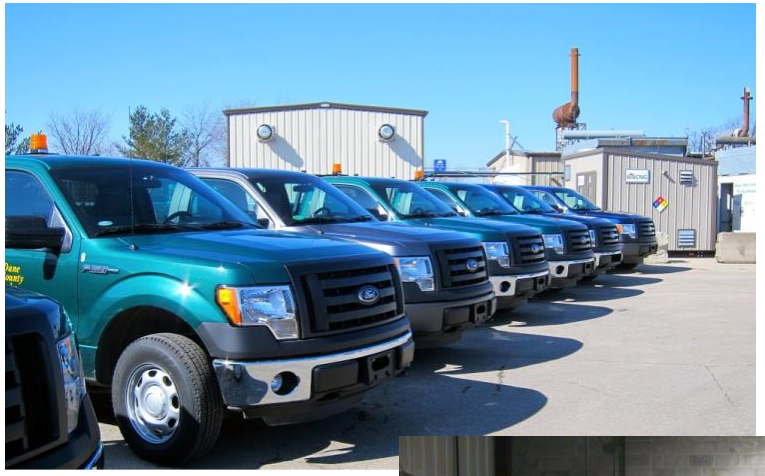


Environmental Benefits

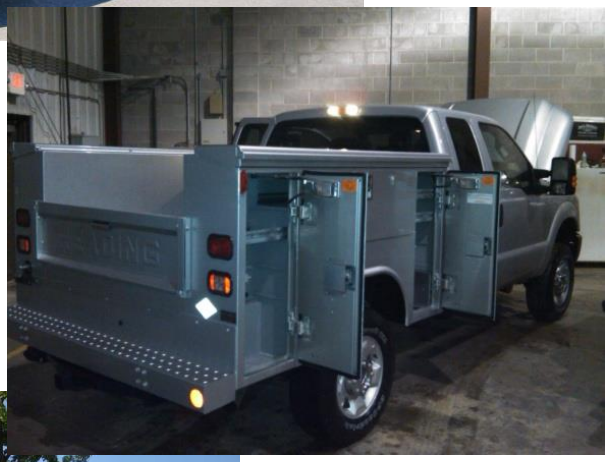
Fuel	Carbon Intensity (gCO2e/MJ)
Gasoline	95.86
CNG from Pipeline	68.00
CNG from Digester	13.45
CNG from Landfill	11.26

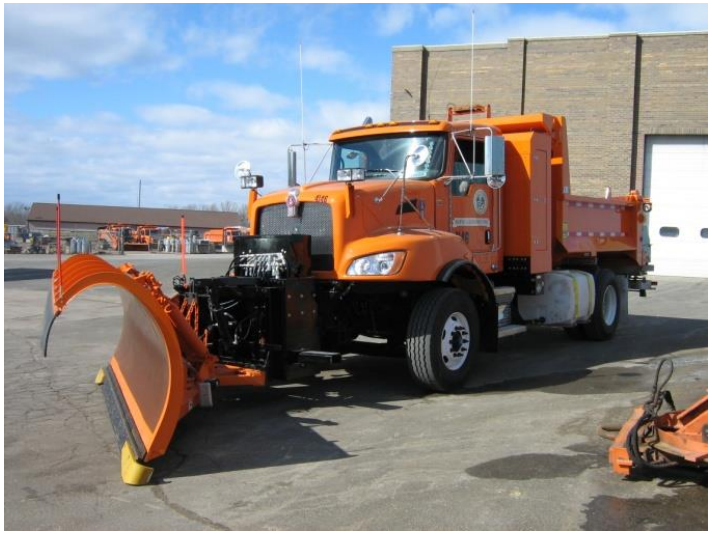
http://www.arb.ca.gov/fuels/lcfs/121409lcfs_lutables.pdf

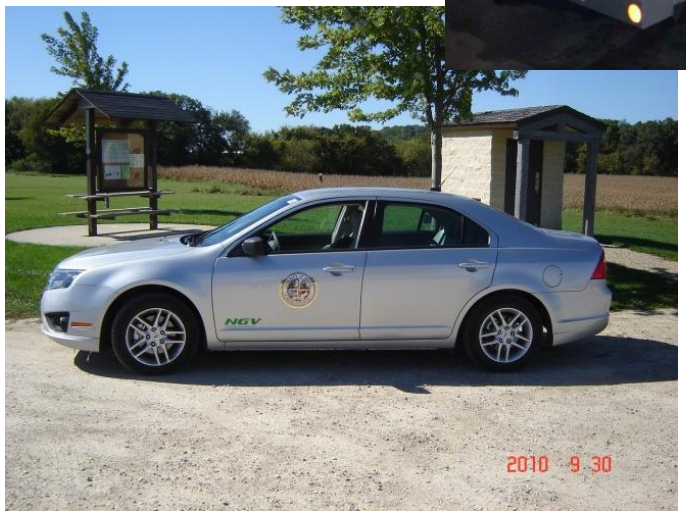
Vehicles



- 85+ vehicles in fleet
  - Some dedicated
  - F150s, F250s, F350s, Ford Fusion, Transit Connect, Plow Truck
  - 10 Departments



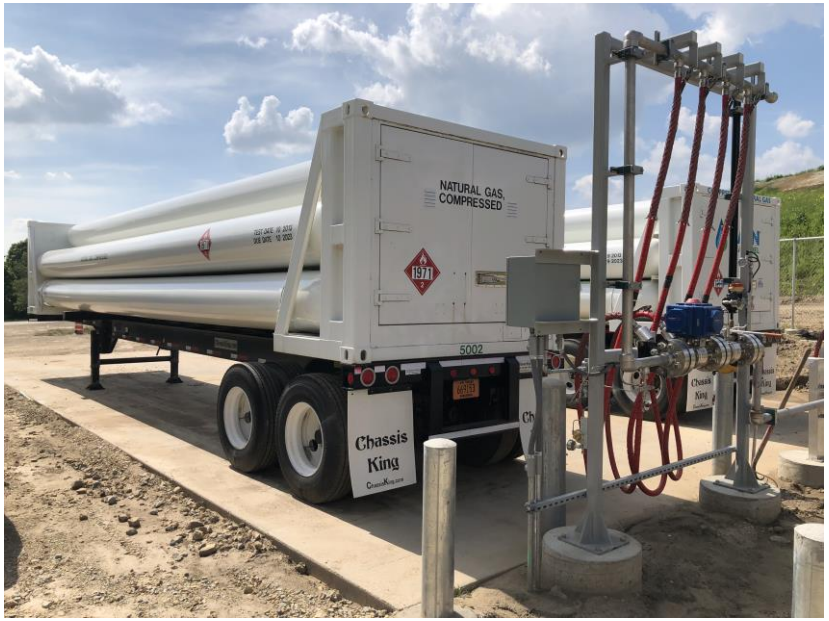




RNG Biogas Project Development

Dane County's Future – RNG

- Biogas from landfill and off-site biogas sources
- Gas is cleaned up
- Pipeline injection
- Off-load station – clean lakes
- Started project January 2017
- Completion expected July 2019
  - already injecting gas today



Dane County's Future – RNG

- County ownership
- Private O&M for first 3 years
- $29M capital
- ~4 year pay back – RIN markets fluctuate
- Revenue streams
  - Gas – compared to frac gas
  - RINs (Renewable Identification Number)
    - Federal program: Renewable Fuels Standard (RFS)
  - ~~LCFS (Low Carbon Fuels Standard)~~
    - ~~California program~~

Financial Pro Forma - RINS and LCFS

RINs

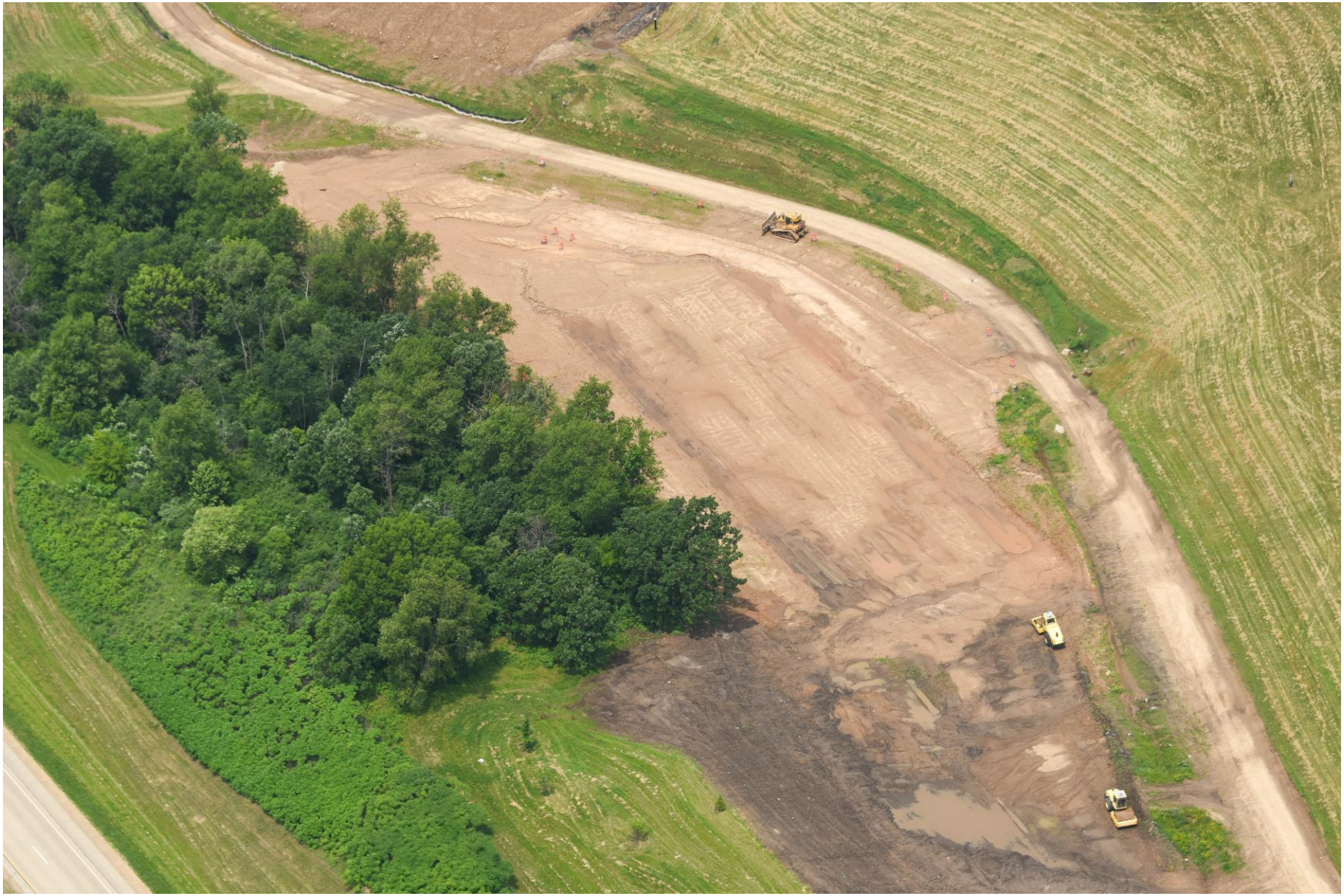
- Renewable Identification Number
- EPA Renewable Fuel Standard (RFS) Program
- Energy Policy Act of 2005 & Energy Independence and Security Act of 2007 – 2022 “sunset”
- Requires a percentage of fuels sold in US to be renewable
- Very complex program for beginners
  - D3 v D5, nesting, cellulosic waiver credit, annual targets
  - Registration process, contracting process
- How it works on a project

Financial Pro Forma - RINS and LCFS

LCFS

- Low Carbon Fuel Standard
- California Program
- Reduce carbon intensity (CI) of transportation fuels
- Credits based on amount of carbon reduction
- CI score
- Market becoming flooded
- How it works on a project

RNG Facility Development



RNG Facility Development

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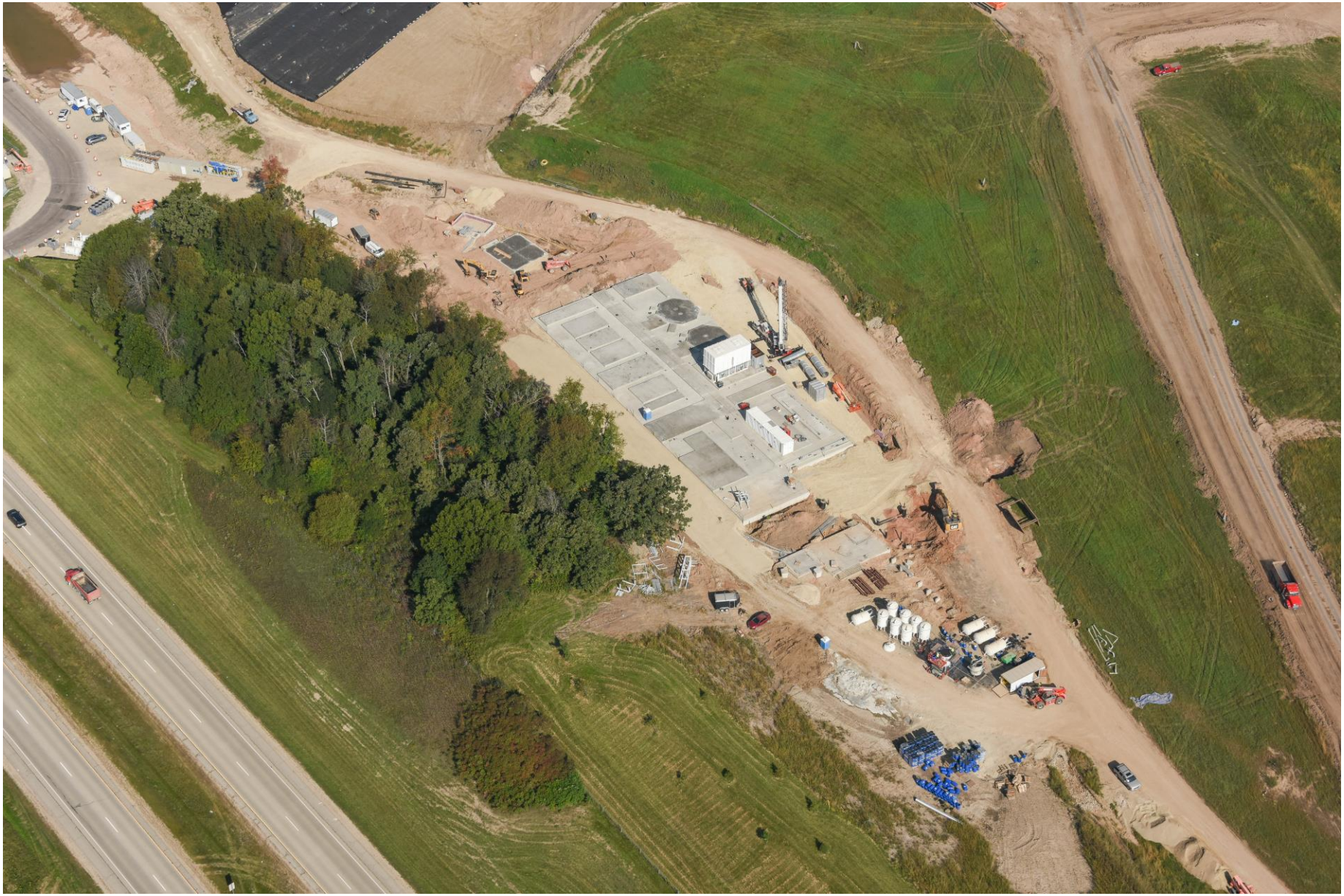

RNG Facility Development

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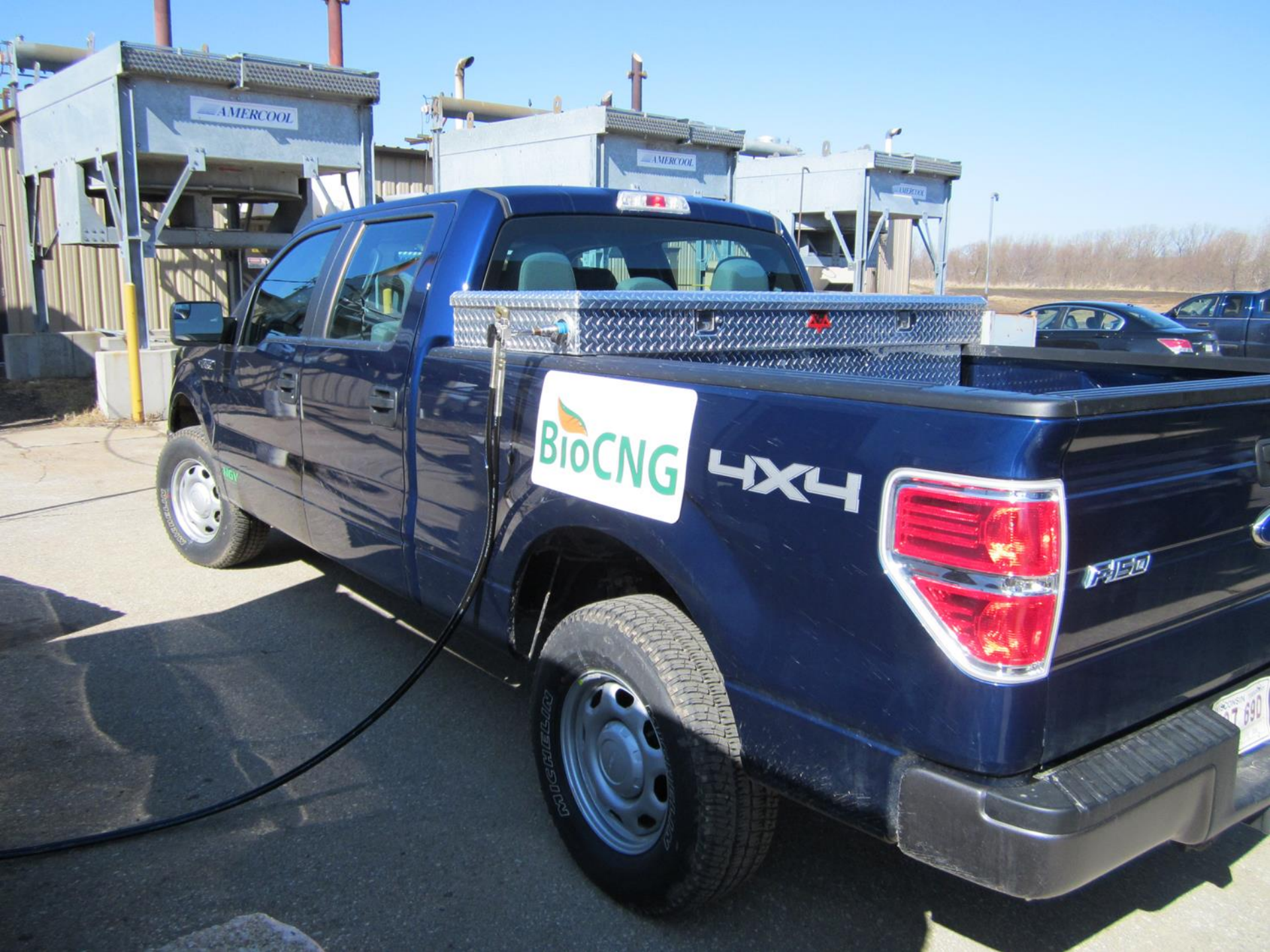
AMERCOOL
AMERCOOL
BioCNG
4X4
F150
MICHELIN

Questions?

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Director

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