Renewable Natural Gas

Project Development & Regulatory Considerations

West Michigan Chapter – Air & Waste Management Association
June 9, 2022

Agenda

- What is RNG?
- Project Examples
- Permitting & Regulatory Considerations
- Project Development
- Q&A

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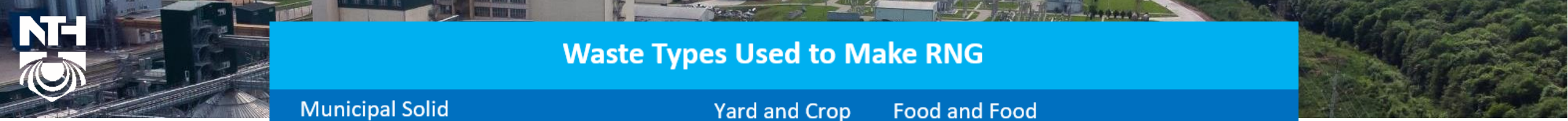
“One man’s trash…”

Renewable Natural Gas
(Biomethane)

Methane captured from organic material:

- Landfills
- Anaerobic Digestion:
  - Livestock operations
  - WWTP (sewage sludge)
  - Food waste operations



Waste Types Used to Make RNG

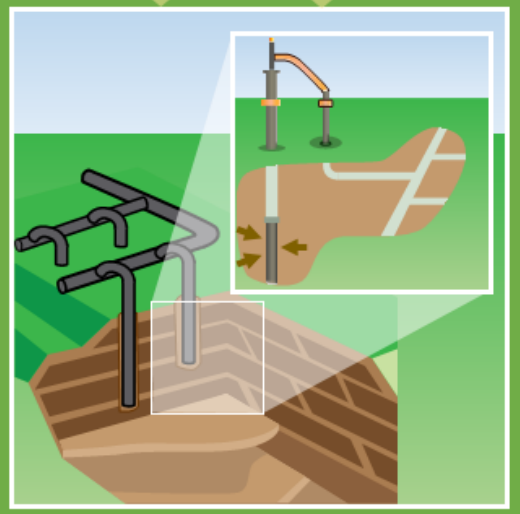
Municipal Solid Waste

Sewage Sludge

Yard and Crop Wastes

Food and Food Processing Wastes

Manure

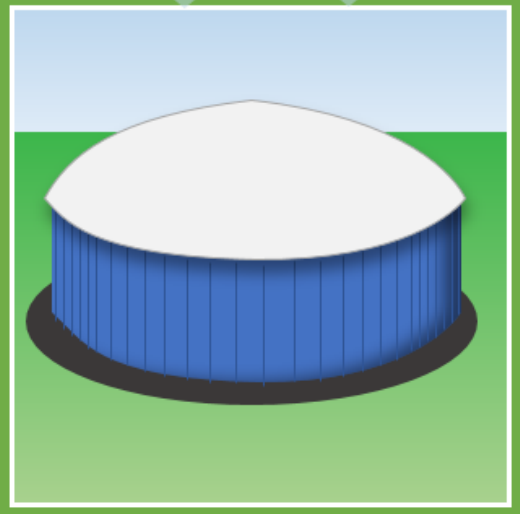


Landfills

Biogas made from organic sources through anaerobic processes contains 45–65% methane.

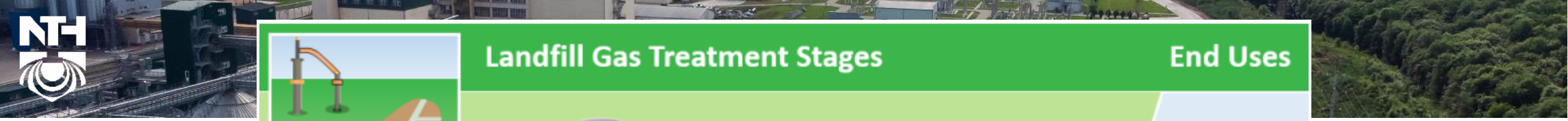
Biogas is treated to remove moisture, particulates, contaminants and other gases (CO_2, O_2, N_2 and VOCs); this increases the methane content to 90% or greater—typically 96–98% for pipeline injection.

The resulting product is **renewable natural gas (RNG)**.



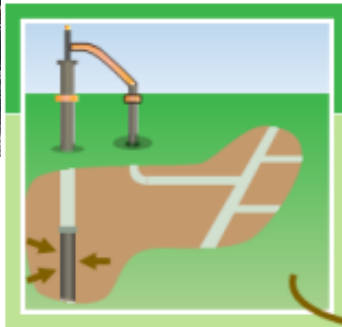
Anaerobic Digesters

EPA 456-R-20-001



Landfill Gas Treatment Stages

End Uses



GAS

PRIMARY TREATMENT
Moisture and particulate removal

Knockout Pot

Filter

Blower

Flare

SECONDARY TREATMENT
Contaminant removal and compression

Moisture Removal

Siloxane/Sulfur Removal

Compressor

Biogas

ADVANCED TREATMENT
Upgrade to pipeline quality or vehicle fuel

Flare/Thermal Oxidizer for Waste/Tail Gas

Removal of CO_2, O_2, N_2 and VOCs

Compressor

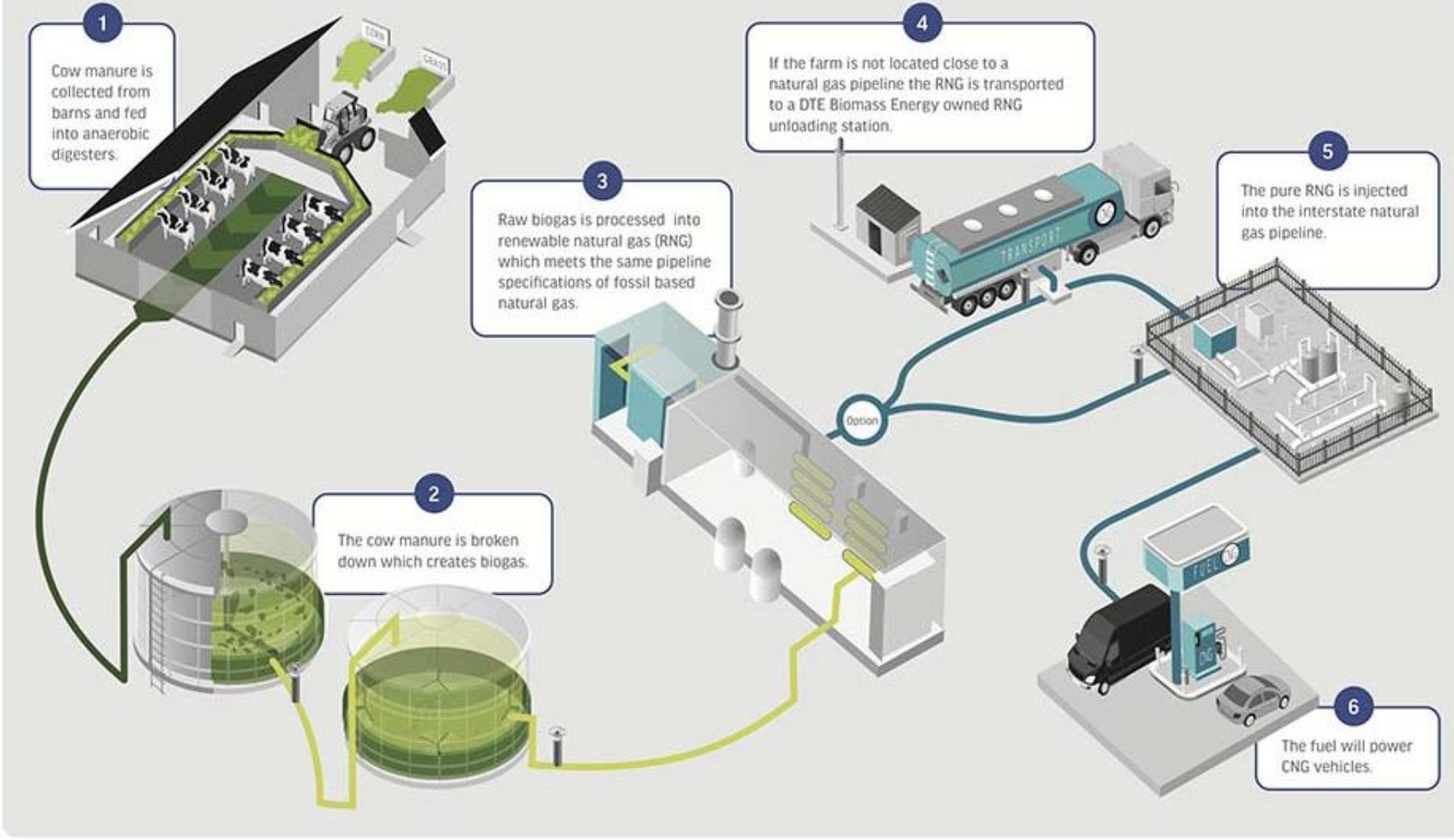
RNG

Heating

Electricity

Other Industrial Uses

EPA 456-R-20-001


1
Cow manure is collected from barns and fed into anaerobic digesters.
2
The cow manure is broken down which creates biogas.
3
Raw biogas is processed into renewable natural gas (RNG) which meets the same pipeline specifications of fossil based natural gas.
4
If the farm is not located close to a natural gas pipeline the RNG is transported to a DTE Biomass Energy owned RNG unloading station.
TRANSPORT
5
The pure RNG is injected into the interstate natural gas pipeline.
Option
FUEL
6
The fuel will power CNG vehicles.

DTE VANTAGE

Woodland Meadows (WM/Ameresco)

- Commissioned: 2017 in Wayne County, MI
- 6,600 CFM LFG to 3,500 dekatherms/day RNG
- Pressure swing absorption (PSA)
- 3-mile pipeline to interstate pipeline

Westside Gas Producers (DTE Vantage)

- Commissioned: 2001 in Three Rivers, MI
- Processes ~3,000 CFM LFG
- Solvent Absorption
- Sister plant near Dayton, OH

Wood Road RNG (Granger/EDL)

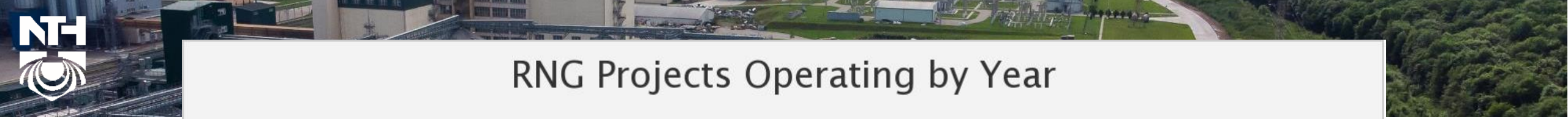
- Commissioned: 2021 in Lansing, MI
- Produces ~2,500 dekatherms/day RNG
- Membrane with Thermal Oxidizer
- Replaced LFG-to-Energy Facility

Dairy Dreams Renewable Energy (DTE Vantage)

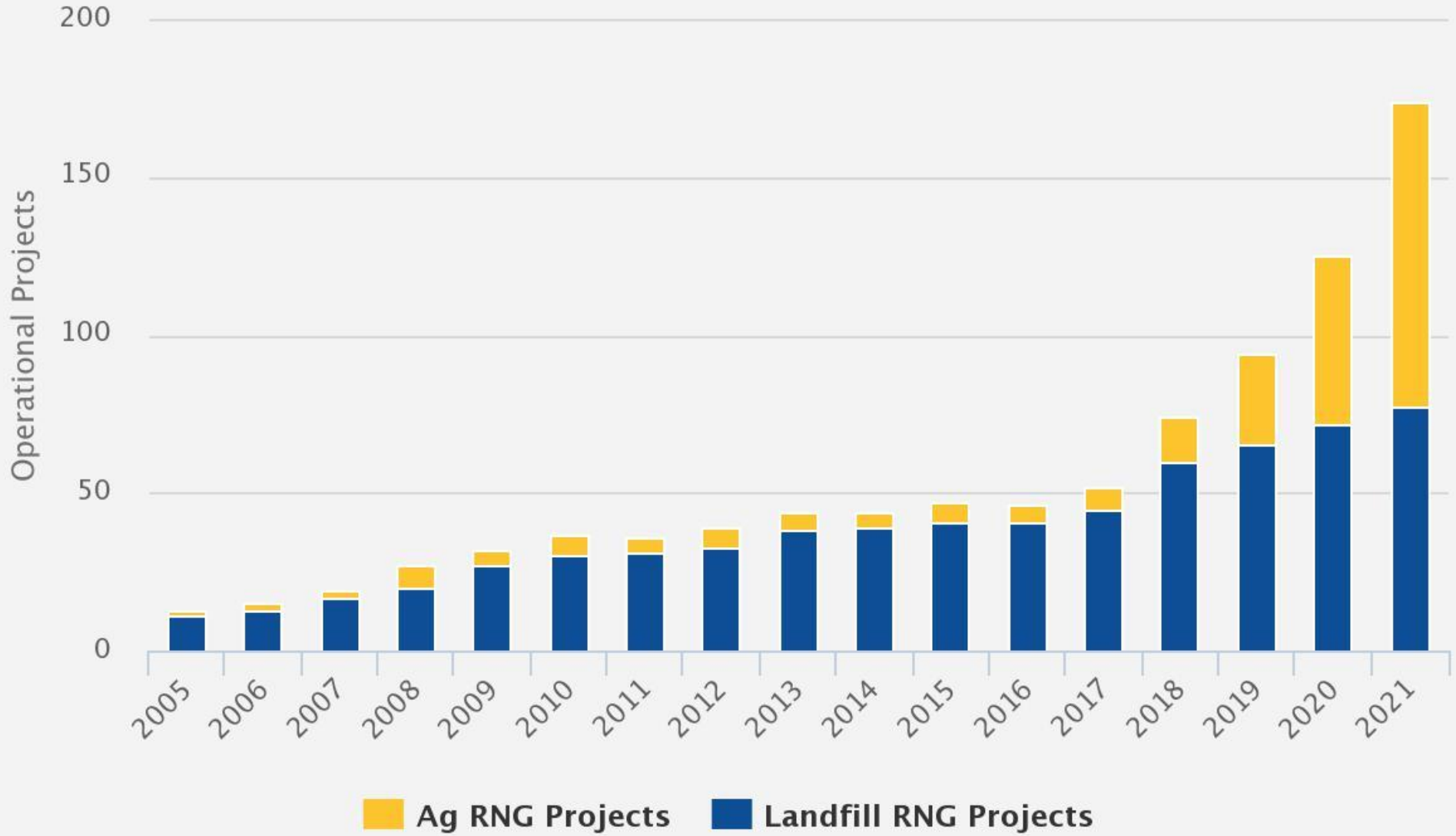
- DTE's first dairy-based RNG Project
- Commissioned: 2019 in Wisconsin
- To Produce ~500 dekatherms/day RNG
- Virtual Pipeline (via tube trailers) to interstate injection site

City of Grand Rapids, MI – Biodigester

- Anaerobic Digesters to reduce waste
- Offset cost of biodigester by selling RNG and earning “RIN” credits
- CNG Fueling Facility powers city buses
- Odor control system, phosphorus recovery



RNG Projects Operating by Year



What's driving the market to RNG?

- "Race to net-zero carbon"
- Credits available for clean fuel
  - EPA Renewable Fuel Standard Program ("RIN" Market)
  - California Air Resources Board – Low Carbon Fuel Standard ("LCFS")
- Electric prices relatively low
- Utility and end user targets

MI HEALTHY CLIMATE PLAN

Michigan Public Service Commission

Regulatory Considerations

- [x] Air Permitting
- [x] Natural Resources
- [x] NPDES
- [x] Process Safety
- [x] Risk Management

RNG Requires an Air Permit

- Gas Cleaning Unit (GCU)
- Thermal oxidizer
- Flare
- Electric/Heating equipment
- Backup generator

Clean Air Act Permitting Process – Part 2 of Michigan Air Pollution Control Rules

1. **Evaluate exemption options**
   - 2-step evaluation

2. **Permit to Install**
   - Required prior to starting construction
   - Construction Waiver
   - Early engagement with agency

What will an Air Permit require?

- Enforceable limits to maintain minor source status
  - Emission Limit(s) at the flare (e.g., SO_2)
  - H_2S vented at the GCU
- Biogas Monitoring
  - H_2S in biogas
  - Material Limit on biogas to the flare
- Preventative Maintenance / Malfunction Abatement Plan
- Federal regulatory requirements (e.g., NSPS)

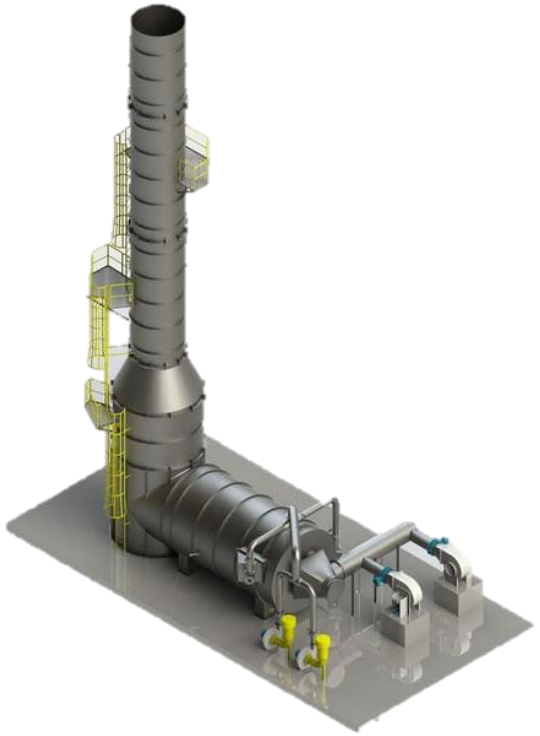
Nuisance Odors

- Feedstock dependent
- Odor control
- Odor complaints require an action by the regulatory agency
- Understand local policies

DEQ	AIR QUALITY DIVISION POLICY AND PROCEDURE		DEPARTMENT OF ENVIRONMENTAL QUALITY
Original Effective Date: July 2, 2013 Revised Date: Reformatted Date:	Subject: Application of Rule 901(b) in the Permit to Install Review Process Program Name: Air Permits to Install		Category: ☐ Internal/Administrative ☒ External/Non-Interpretive ☐ External/Interpretive
	Number: AQD-021	Page: 1 of 5	

[…] a person shall not cause or permit the emission of an air contaminant in quantities that cause, alone or in reaction with other air contaminants, […]:
(b) Unreasonable interference with the comfortable enjoyment of life and property

Air Permitting for Special Design/Operating Considerations



- Commissioning (startup/shutdown)
- Account for variation in biogas composition and short-term “spikes” or upset conditions
- Stack parameters / equipment layout to satisfy dispersion modeling (if required)
- Equipment specifications

Stationary Source Determination

- RNG Facility and Feedstock Provider (e.g., landfill)
- Dictates source status
- Scope of “on-site” modeled sources, footprint and fence line
- Compliance responsibility once the permit is issued

NPDES Permitting

- EGLE implements NPDES for CAFOs (Part 31)
- 2020 CAFO General Permit is being contested and is stayed
- 2015 CAFO General Permit cannot be modified to include greater allowances at digesters
- EGLE is issuing CAFO Individual Permits

Physical Pipeline RNG to Injection site

- Natural Resources
  - Wetlands
  - Ecological

- Engineering/Geophysical

OSHA Process Safety and EPA Risk Management

- Based on quantity of hazardous or flammable material stored on-site

- Process materials
  - Methane (biogas or RNG)
  - Solvent (e.g., methanol)

- “Virtual Pipeline” Tube Trailer to transport RNG
  - Each trailer holds 350-450,000 scf of gas

Process Safety Management (PSM)

On-site Storage Applicability:

1. Category 1 flammable gas ≥ 10,000 lbs Methane stored on-site
2. Flammable liquid with flashpoint below 100 F (37.8 C) ≥ 10,000 lbs
3. Highly hazardous chemical at or above threshold quantity

OSHA®

Process Safety Management (PSM)

Program Requirements:

- Employee participation and training
- Safety and operating/inspection procedures
- **Process hazard analysis – Failure mode (“What-if”) analysis**
- Emergency planning and response
- Compliance audits

Risk Management Plan (RMP)

Section 112(r) of Clean Air Act

List of Regulated Substances including Methane

- Hazard assessment for an accidental release
- Accident prevention
- Emergency response

Regulatory - Key Takeaways

- RNG has significant growth potential and can be derived from organic waste
- Permitting and regulatory compliance can impact project timing and design
- Early engagement on developing projects is key to success

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