

# North Central Texas Organic Waste to Fuel Feasibility Study

Project Advisory Group  
Kick-Off Workshop  
November 30, 2021



# AGENDA

- ▶ Safety Moment
- ▶ Welcome & Introductions
- ▶ Project Overview
- ▶ Real World Perspectives
- ▶ SWOT Analysis
- ▶ Final Thoughts & Questions
- ▶ Next Steps

# Virtual Meeting Reminders

**1**

Please leave your microphone muted unless speaking

**2**

Use the chat box or raise hand button to ask a question or provide a comment

**3**

Please state your name prior to asking a question or making a comment

**4**

Please note that the presentation is being recorded

# Safety Moment


## Biogas Safety Awareness

Gas	Health Effects		
	Low	Medium	High
<b>Hydrogen Sulfide (H<sub>2</sub>S)</b>	2-20 ppm: nausea, headache, dizziness	100-300 ppm: altered breathing, fluid in lung	500-700 ppm: collapse, death
<b>Methane (CH<sub>4</sub>, LEL)</b>	< 0.1% (1000 ppm): not harmful	< 1% (10,000 ppm): no known toxicity	5-15% (50,000 ppm): explosive
<b>Ammonia (NH<sub>3</sub>)</b>	5-20 ppm: odor, eye irritation	20-50 ppm: Moderate eye and upper respiratory tract irritation	2500 ppm: chemical pneumonitis, edema, cyanosis, death
<b>Carbon Dioxide (CO<sub>2</sub>)</b>	600-2000 ppm: muscle stiffness, drowsiness, poor judgement	5000 ppm: 8-hr maximum	30,000 ppm (3%): increased pulse rate, nausea, mental impairment
<b>Carbon Monoxide (CO)</b>	<9 ppm: comfortable living concentration (35 ppm = 8-hr allowable)	200 ppm: headache, dizziness, nausea in 2 hours	400 ppm: life threatening in 3 hours

*Children, elderly, pregnant women are at risk at lower CO concentrations. The concentrations are relevant only at "sea level."*

[www.gpcach.org](http://www.gpcach.org)

### Livestock Production



**Manure Storage**  
Under slatted floor  
Outside lagoon, pit, or tank

**Manure Pumping**  
Under slatted floor  
Outside lagoon, pit, or tank

**Foaming Manure**  
If foaming is present, significant methane risk (see additional materials)

**Pressure Washing**  
Inside building

### Sensor Types

H <sub>2</sub> S	LEL	NH <sub>3</sub>
H <sub>2</sub> S	LEL	
H <sub>2</sub> S	LEL	
H <sub>2</sub> S	LEL	NH <sub>3</sub>

## WARNING

**HYDROGEN SULFIDE PRESENT IN LANDFILL IF LEAK DETECTED PROMPTLY EXIT AREA AND NOTIFY SUPERVISOR**

BURNS & MCDONNELL 03-905-13210

# **WELCOME & INTRODUCTIONS**

# Introductions

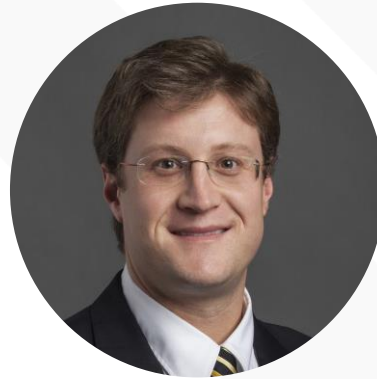
- ▶ **Breanne Johnson**  
Environment & Development Planner  
NCTCOG
- ▶ **Lori Clark**  
Air Quality Program Manager  
NCTCOG
- ▶ **Soria Adibi**  
Senior Air Quality Planner  
NCTCOG
- ▶ **Melanie Sattler**  
Civil Engineering Professor & Researcher  
University of Texas at Arlington

# Introductions



**Scott Pasternak**

Project Manager  
Burns & McDonnell



**Scott Martin**

Deputy Project Manager  
Burns & McDonnell



**Tiffany Moss**

Strategic Communications  
Burns & McDonnell



**Drew Mitrison**

Transportation Planning & Policy  
Burns & McDonnell



**Matt Tomich**

President  
Energy Vision



**Phil Vos**

Program Director  
Energy Vision

# Project Advisory Group

- ▶ Joao Pimentel, City of Fort Worth  
*This has the potential to benefit the whole Metroplex, and, consequently, Fort Worth.*
- ▶ Katelyn Hearon, City of Lewisville  
*The City of Lewisville is interested in finding sustainable options for sludge disposal.*
- ▶ Kathy Fonville, City of Mesquite  
*Chair of Resource Conservation Council at NCTCOG--interested in how RCC can support this regional initiative.*
- ▶ Yarcus Lewis, City of Plano  
*Achieving greater emissions reductions from the dual benefits of redirecting organic waste emissions to displace fossil fuel usage.*
- ▶ Jaime Bretzmann, City of Plano  
*Interested to learn more about the regional opportunities for waste organics and also about use of the generated fuel gas and digestate.*
- ▶ Brendan Lavy, Texas Christian University  
*Assistant Professor of Sustainability Science at TCU and interested in research that supports sustainability transitions in North Texas.*
- ▶ Courtney Carroll, Fort Worth ISD  
*Would like to better understand the possible uses of all the organic waste produced in school cafeterias.*
- ▶ Sahana Prabhu, Texan by Nature  
*I am interested to learn about anaerobic digestion and renewable energy potentials in North Texas.*
- ▶ Lynn Lyon, US Gain

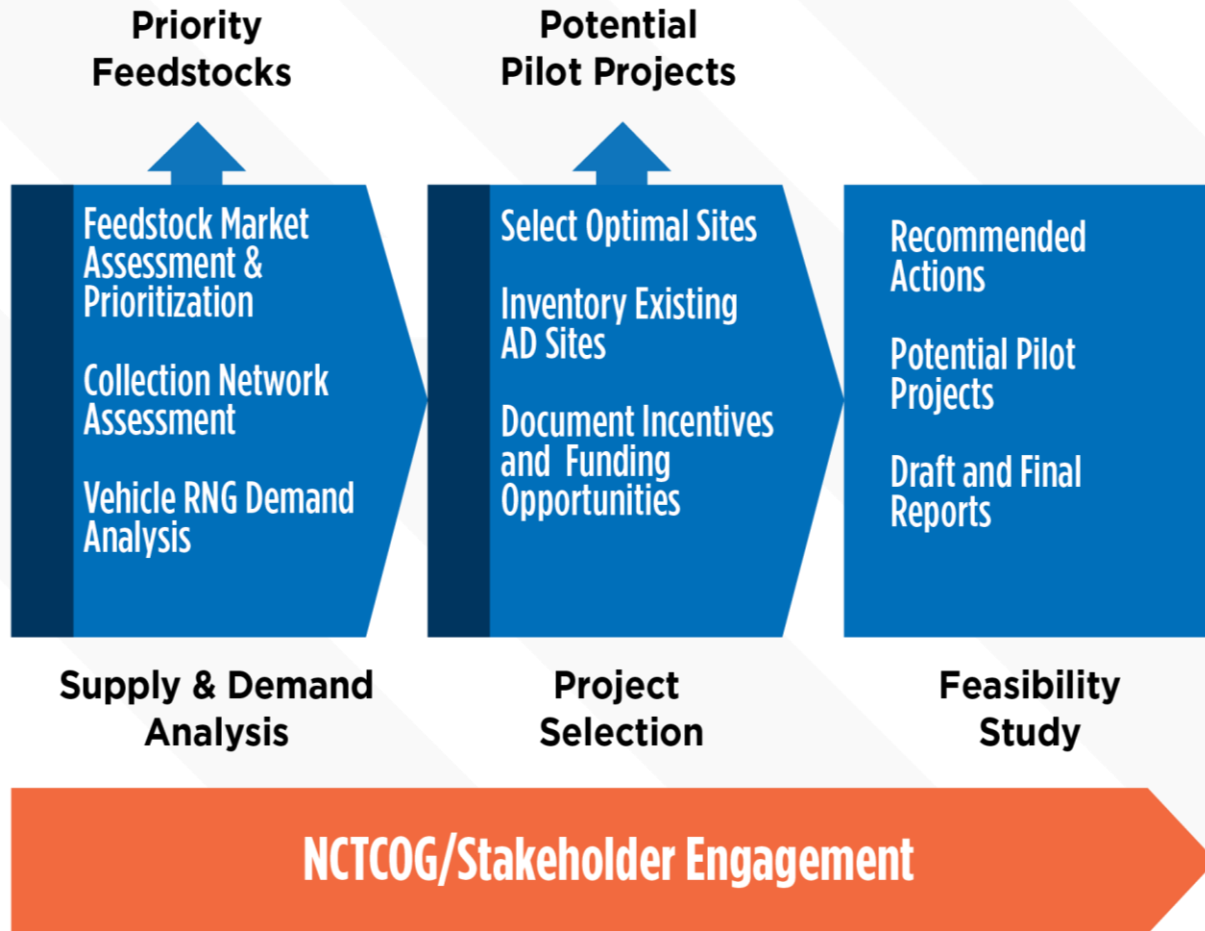


# PROJECT OVERVIEW

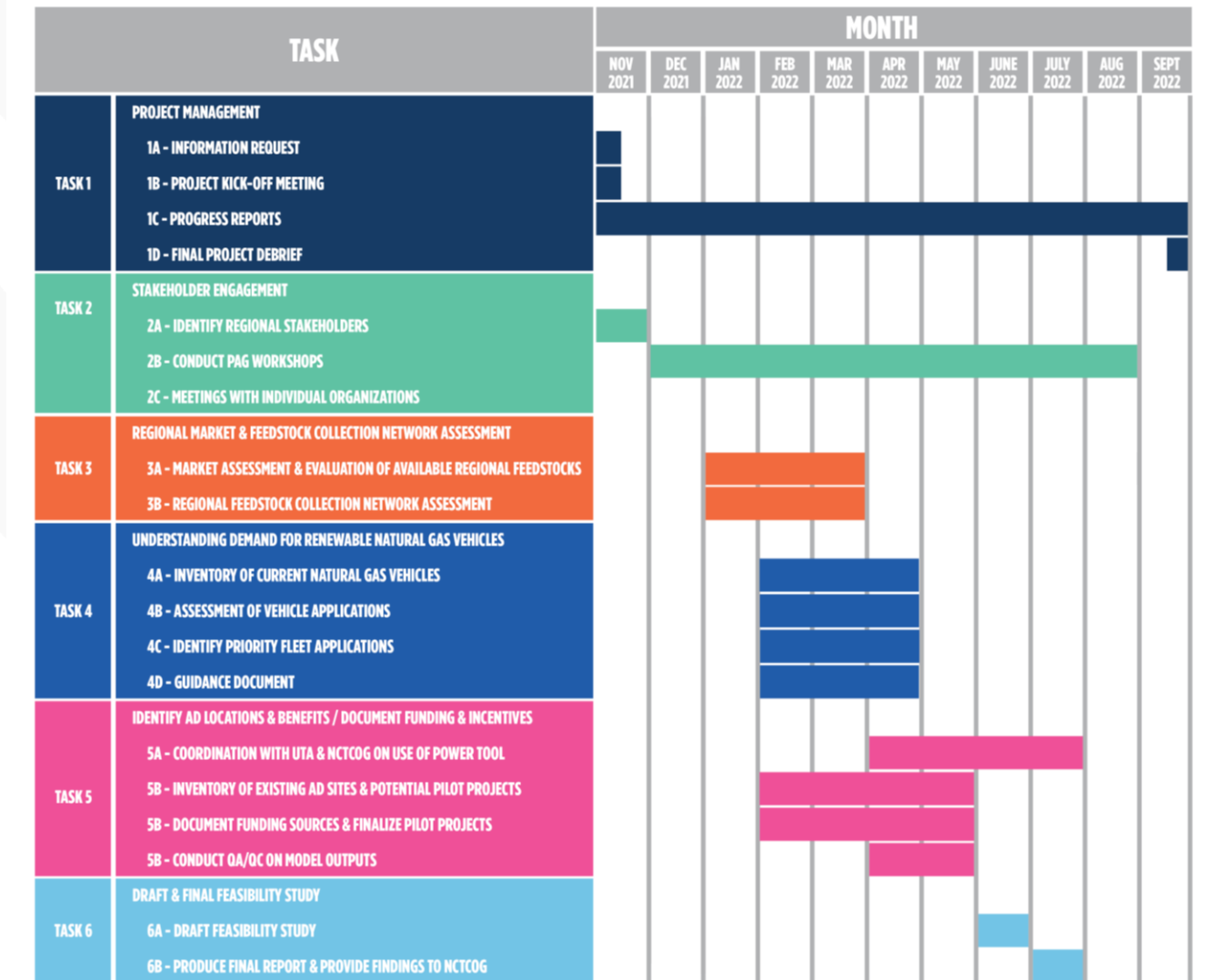
# Project Background

- ▶ Goal of the study is to assess the feasibility of using of local organic wastes to produce renewable natural gas (RNG) in new or existing digesters within the region and use the RNG as a transportation fuel.
- ▶ NCTCOG and UTA partnering on the study which is supported by a grant from the Environmental Protection Agency (EPA).
- ▶ Prior to the study, NCTCOG hosted a series of virtual roundtables to share existing anaerobic digestion and organic waste collection efforts in the region.
- ▶ As North Central Texas continues to grow, waste diversion will become increasingly important to both retain landfill capacity and reduce methane emissions.

# Project Approach



# Project Schedule



# **REAL WORLD PERSPECTIVES**

# Expansion of U.S. RNG Projects



There are now ~200 operating projects,  
up from just ~40 RNG facilities in 2015



# Federal Policy Driver

## Renewable Fuel Standard

- ▶ **Enacted in 2005 and Amended in 2007**

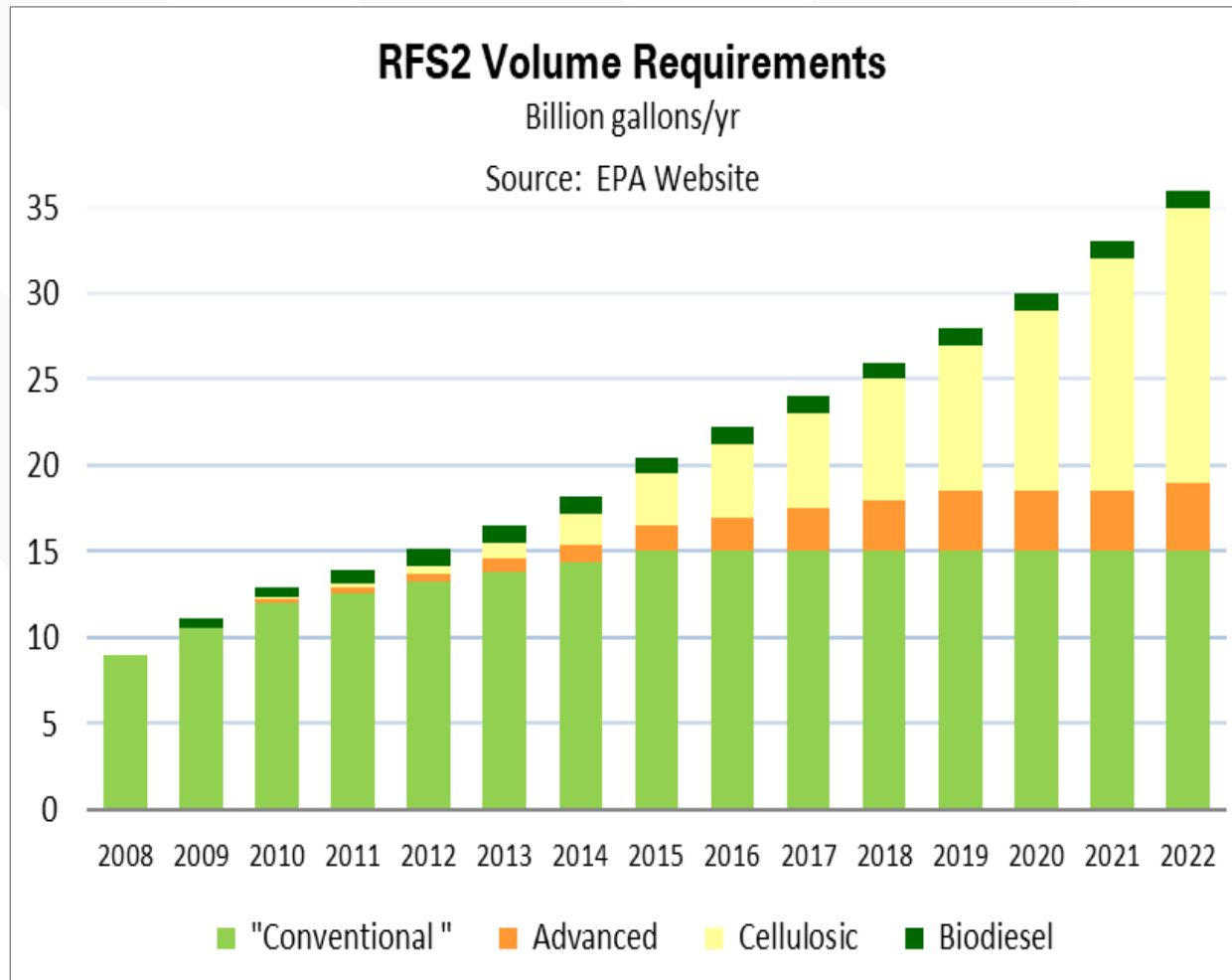
“The Ethanol Mandate” but also a push to develop waste-derived fuels

- ▶ **Designed to Incent Biofuel Production**

Requires “Obligated Parties” (e.g., oil producers and refiners) to produce/blend biofuels OR purchase credits (RINs) to meet yearly Obligations

# Federal Policy Driver

## Renewable Fuel Standard

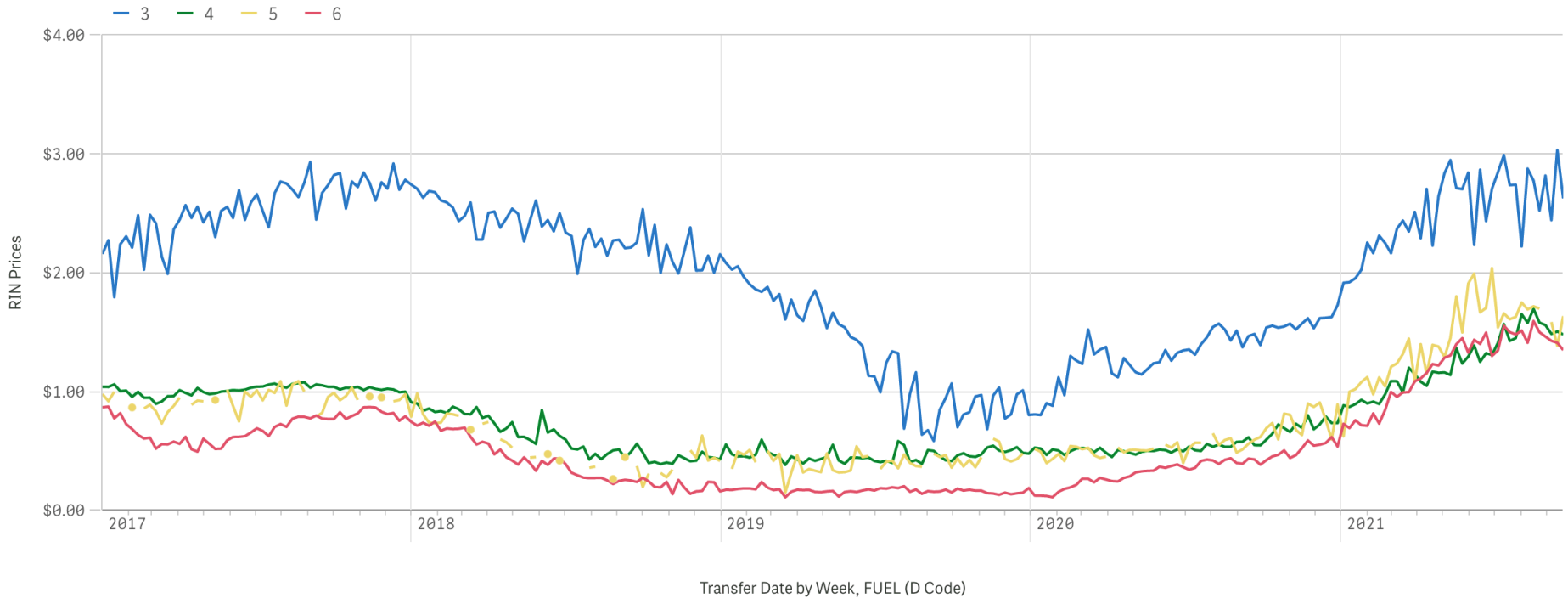




# Federal Policy Driver

## Renewable Fuel Standard

Weekly D3, D4, D5 and D6 RINs Prices



# State Policy Drivers

## Low Carbon Fuel Standards (LCFS)

### Existing Policies

- ▶ **California**  
First state to implement a LSFS in 2009. Achieved 10% reduction in transport fuels “carbon intensity” in 10 years; mandated 20% target by 2030.
- ▶ **Oregon**  
“Clean Fuels Program” passed in 2016. Mirrored after California program and ramping up.
- ▶ **Washington**  
Passed LCFS Legislation in 2021

### Pending Programs

- ▶ **New York State**  
Legislation first introduced in 2019 (pending)
- ▶ **New Mexico**
- ▶ **Upper Midwest Regional LCFS**  
Legislation introduced in 2021 (pending)

A **Low Carbon Fuel Standard** is a market-based program that mandates reductions in the overall carbon intensity (CI) of fuels used within a given region.

# Real World Examples: Two Waste-to-Fuel Case Studies



## South San Francisco Scavengers

- ▶ Small-scale, closed-loop food and green waste-to-RNG project
- ▶ Fueling 10-12 private refuse collection trucks
- ▶ “High Solids” in-vessel AD plant equipped to process ~12,000 tons of food and green waste;
- ▶ Displacing ~120,000 gallons of diesel fuel per year in the local private refuse fleet



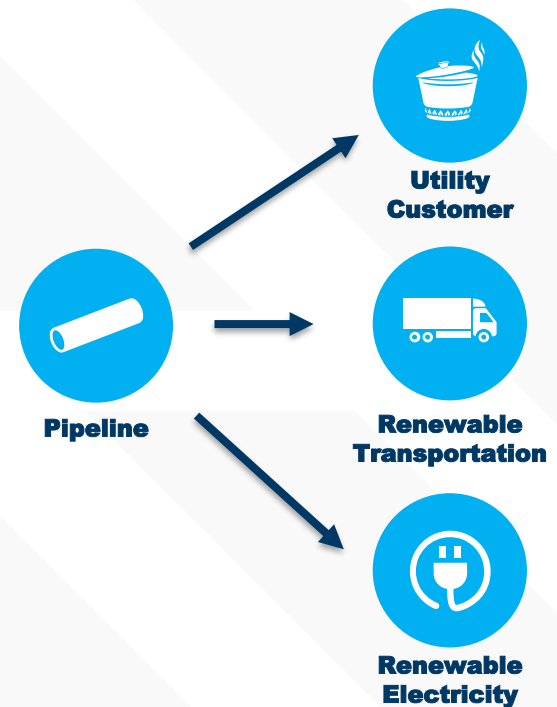
## Grand Junction, CO

- ▶ 8 MGD Wastewater Biogas-to-RNG for Local Fleets
- ▶ Fueling ~40 municipal/county NGVs
- ▶ \$3M project with anticipated 7-year payback
- ▶ Displacing 170,000 gallons of diesel per year

Many additional WWTP co-digestion projects

# RNG End Markets

- ▶ Commercial CNG Fleets (e.g., UPS, Waste Management)
- ▶ CNG Fueling Station Companies (e.g., Trillium, US Gain, Clean Energy)
  - California
  - Oregon
  - Washington
- ▶ Renewable Fuel Production Facilities
  - Ethanol, Renewable Diesel
- ▶ Natural Gas Utilities
  - Cost Recovery States
  - Individual Consumers (voluntary, state based)
    - Institutional Facilities (Universities, Health Care, etc.)
    - Commercial Entities with ESG Commitments / Goals



# Institutional O&G – Renewable Investments

## ▶ Approximately 20 Natural Gas Utilities

- Operating in approximately 40 States

## ▶ Midstream Companies

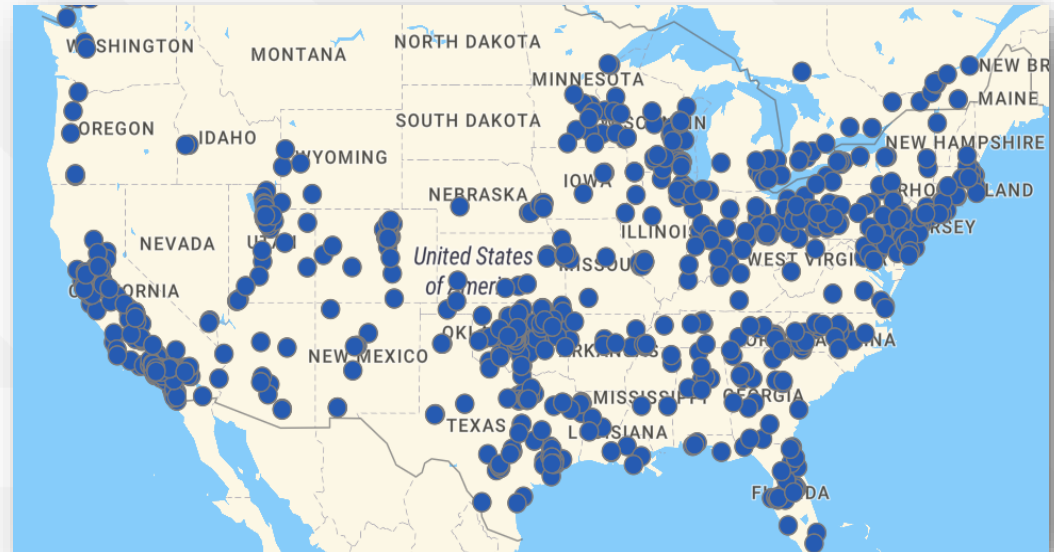
- Corporations and MLP's

## ▶ Major Oil Companies

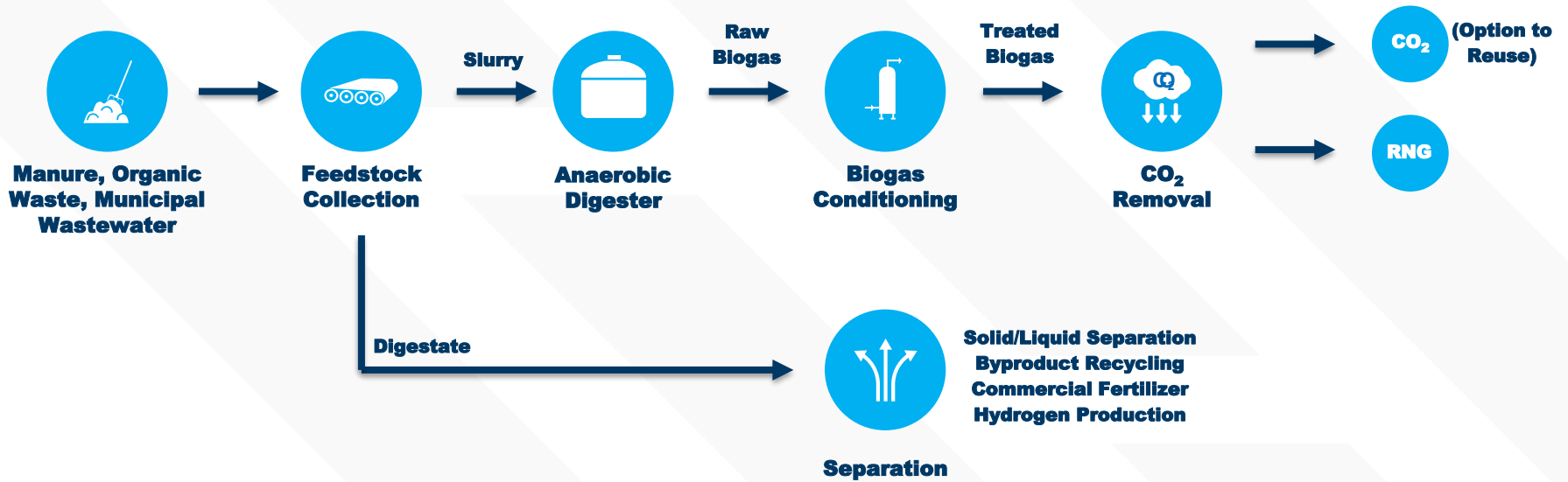
- BP
- Chevron
- Marathon
- Shell
- Valero

## ▶ Commercial Supply

- Graphics:
  - ▶ USDOE AFDC
  - ▶ Clean Cities



# Anaerobic Digestion Process Overview



# General AD Considerations

## ▶ Manure AD

- Routine collection / conveyance optimizes gas production
- Water usage drives digester sizing
- Farmers don't like to be told what to do on their farms
- Understand nutrient management plan requirements

## ▶ Food Waste / Organics AD

- Contamination in = Contamination out
- Digestate marketability depends on the quality of the digestate and proximity to end markets
- State regulations are variable with respect to composting

## ▶ Both

- Develop a robust contingency plans for odor management and facility O&M

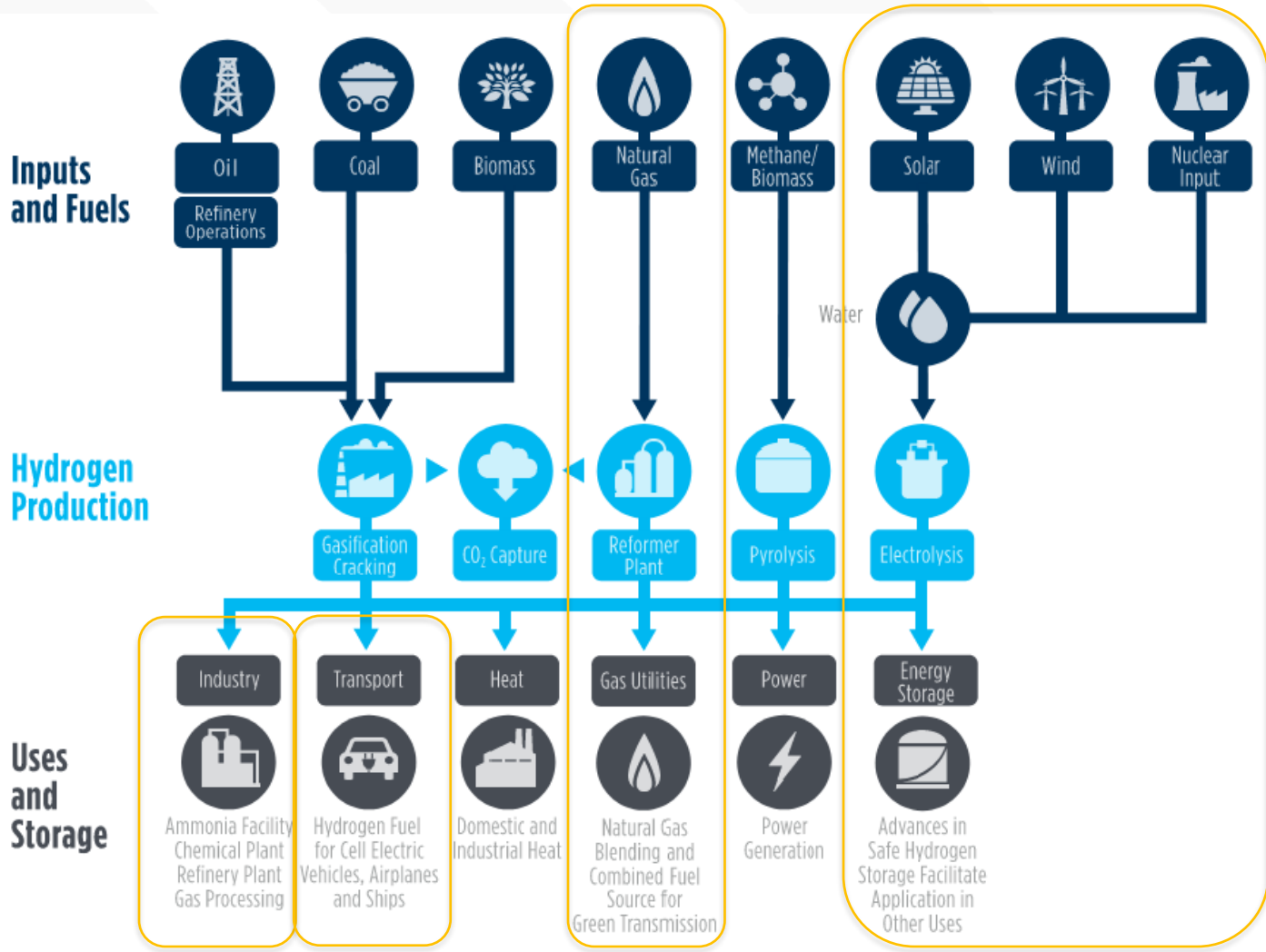


# Summary

- ▶ Agricultural wastes are the fastest growing types of RNG projects
- ▶ Food waste / co-digestion starting to gain momentum due to regional food waste policy drivers
- ▶ Biogas to Electricity Projects are being converted to RNG Upgrading Projects due to:
  - Decreased market value of renewable electricity
  - Improved ROI given the available market incentives
- ▶ Multiple end markets for RNG are considered technically viable
  - Transportation
  - Power (select locations)
  - Commercial/residential use (ESG)
- ▶ Feedstock processing and digestate management represent large project costs
- ▶ Viable recovery and reuse opportunities of digestate is not a given
- ▶ Effective biogas conditioning/treatment is critical to successful project outcomes



# Hydrogen Overview



# Hydrogen Project Examples



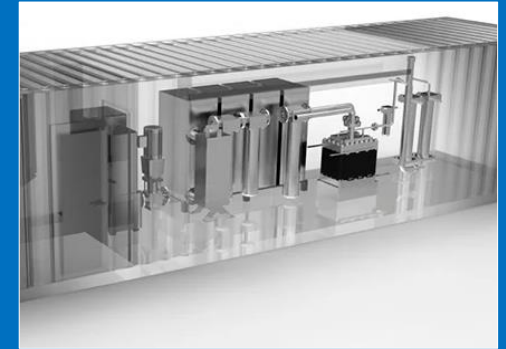
## Gas Utility P2H Conceptual Design and Siting Study

- Evaluated the market for P2H and P2G applications identifying electrical and natural gas interconnection facilities for a 10 MW electrolyzer at locations along the distribution system
- 21 locations identified and ranked with an agreed upon site selection criteria
- Two locations chosen to complete a conceptual design and economic study



## H2 Blending and Fueling Facility

- Providing detailed design and turn-key pricing on a 2MW Electrolyzer and storage system to blend 10% hydrogen into gas compressor fuel gas
- Includes Engine testing with H2 Blend
- Includes a H2 fueling station for company fleet private use



## H2 Pilot Project *Orlando Utilities Commission*

- Providing detailed engineering for the overall plant integration of a hydrogen pilot project
- System includes a 90 Nm<sup>3</sup>/hr electrolyzer, hydrogen compressor, tube trailers for storage, FCEV fueling station, and a 600-kW fuel cell for electricity production

# SWOT ANALYSIS

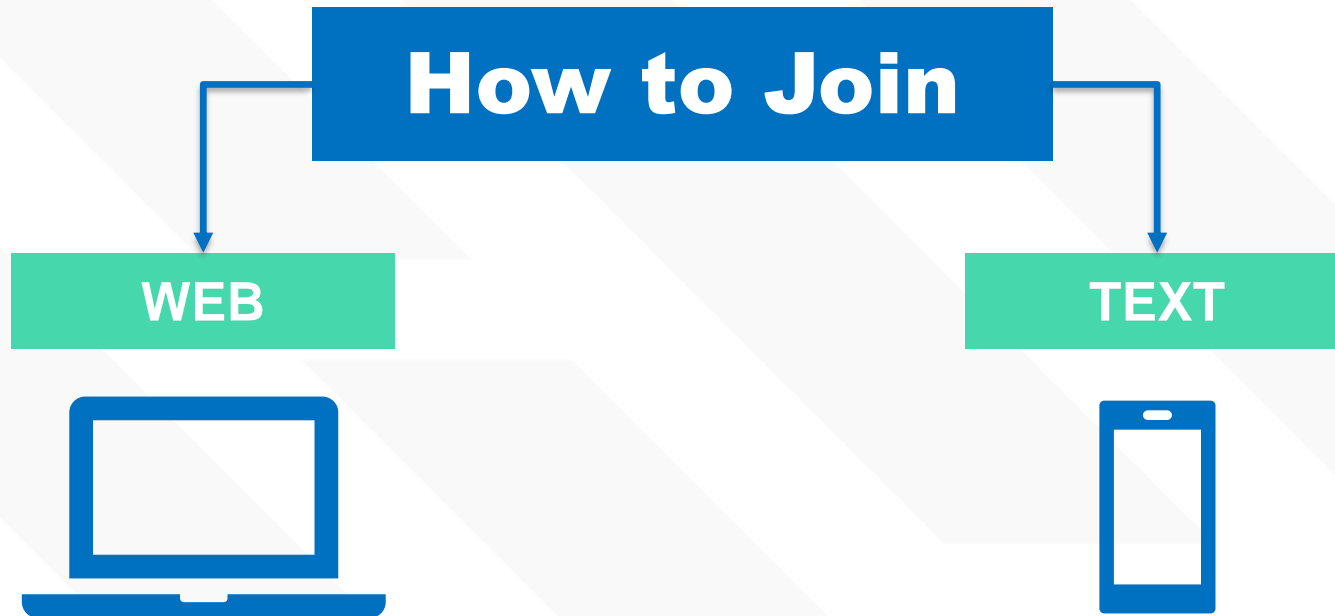
# SWOT Analysis



A SWOT analysis is a strategic planning tool used to identify **Strengths, Weaknesses, Opportunities, and Threats for a specific project or situation.**

Information gathered during the SWOT analysis will be used to identify key issues that will need to be evaluated during the study.

# Poll Everywhere



- 1 Go to [PolleEv.com/bmcdonnell555](https://PolleEv.com/bmcdonnell555)
- 2 Enter your name
- 3 Type your response

- 1 Text **bmcdonnell555** to **22333** once to join
- 2 Text your response

“ air quality betterment in a non-compliant region ”

“ Regarding food waste, it seems like contamination is the trickiest part of collection. ”

“ food/organic composition of the  
region ”

“ Would echo mention of  
"greenwashing" critique of RNG ”

“ WWTPs hesitant to accept food  
waste or require major capital  
upgrades to process into RNG ”

“ No statewide RNG incentive  
programs ”

What are some opportunities within the region to divert organic waste and generate RNG as a source of fuel?

“ Substantial wastewater infrastructure in DFW region ”

“ Commercial organics diversion (e.g. F&B, produce suppliers, etc.) ”

“ public/private partnerships ”

“ Lots of opportunities for



What are some threats within the region to divert organic waste and generate RNG as a source of fuel?

“ Advancement in electric vehicles. ”

“ Lack of political will ”

“ Lack of demand for digestate product ”

“ Misinformation about RNG ”

# **FINAL THOUGHTS QUESTIONS?**

# Next Steps

- ▶ Three additional workshops will be held to gather input from the Project Advisory Group
- ▶ Topics for each workshop:
  - Workshop #2 – Supply and Demand Analysis
  - Workshop #3 – Project Selection
  - Workshop #4 – Feasibility Study Conclusion
- ▶ Dates for the workshops have not yet been determined but will take place in the first half of 2022

**THANK YOU!**



CREATE AMAZING.