

Community Waste Management Technical Assistance Forum: *Exploring Solutions to Convert Waste to Energy and Products*

Presenters: Beau Hoffman, Shelby Best, Breanne Johnson, Thomas Swarr, Lance Larsen, and Rob Davies



Feedstock



Algae



Conversion



Systems



Data

November 4, 2021

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About the Bioenergy Communicators (BioComms) Working Group

Sponsor:

- U.S. Department of Energy (DOE)
Bioenergy Technologies Office (BETO)



BETO & DOE National Laboratory Members:

- Bioenergy communicators, laboratory relationship managers, BETO tech team, and education and workforce development professionals



Purpose:

- Communications strategy for BETO-funded bioenergy research and development

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Today's Agenda

- I. Beau Hoffman: Overview of DOE-BETO-NREL Waste-to-Energy Technical Assistance for Local Governments Program
- II. Thomas Swarr: Hartford Solid Waste
- III. Rob Davies and Lance Larsen: Odyssey Renewables and Jo-Carroll Depot Local Redevelopment Authority
- IV. Shelby Best: Region 1 Planning Council
- V. Breanne Johnson: North Central Texas Council of Governments

Photo courtesy of iStock

Today's Presenters



Beau Hoffman
DOE BETO
Moderator



Shelby Best
Region 1 Planning
Council; *Rockford, IL*



Breanne Johnson
North Central Texas Council
of Governments; *Arlington, TX*



Thomas Swarr
Hartford Solid Waste
Task Force, *Hartford, CT*



Lance Larsen and Rob Davies
Odyssey Renewable Energy / Jo-Carroll Depot Local
Redevelopment Authority; *Savanna, IL*





Beau Hoffman

Technology Manager

DOE BETO

Moderator for Today's Forum

Overview of DOE-BETO-NREL Waste-to-Energy Technical Assistance for Local Governments Program

November 4, 2021



Acknowledgements

National Renewable Energy Laboratory (NREL) Subject Matter Experts:



Anelia Milbrandt



Alex Badgett



Jacq Streur



Ling Tao



Jenny Heeter



Edward Settle



Bob Baldwin



Kim Magrini



Jennifer Daw



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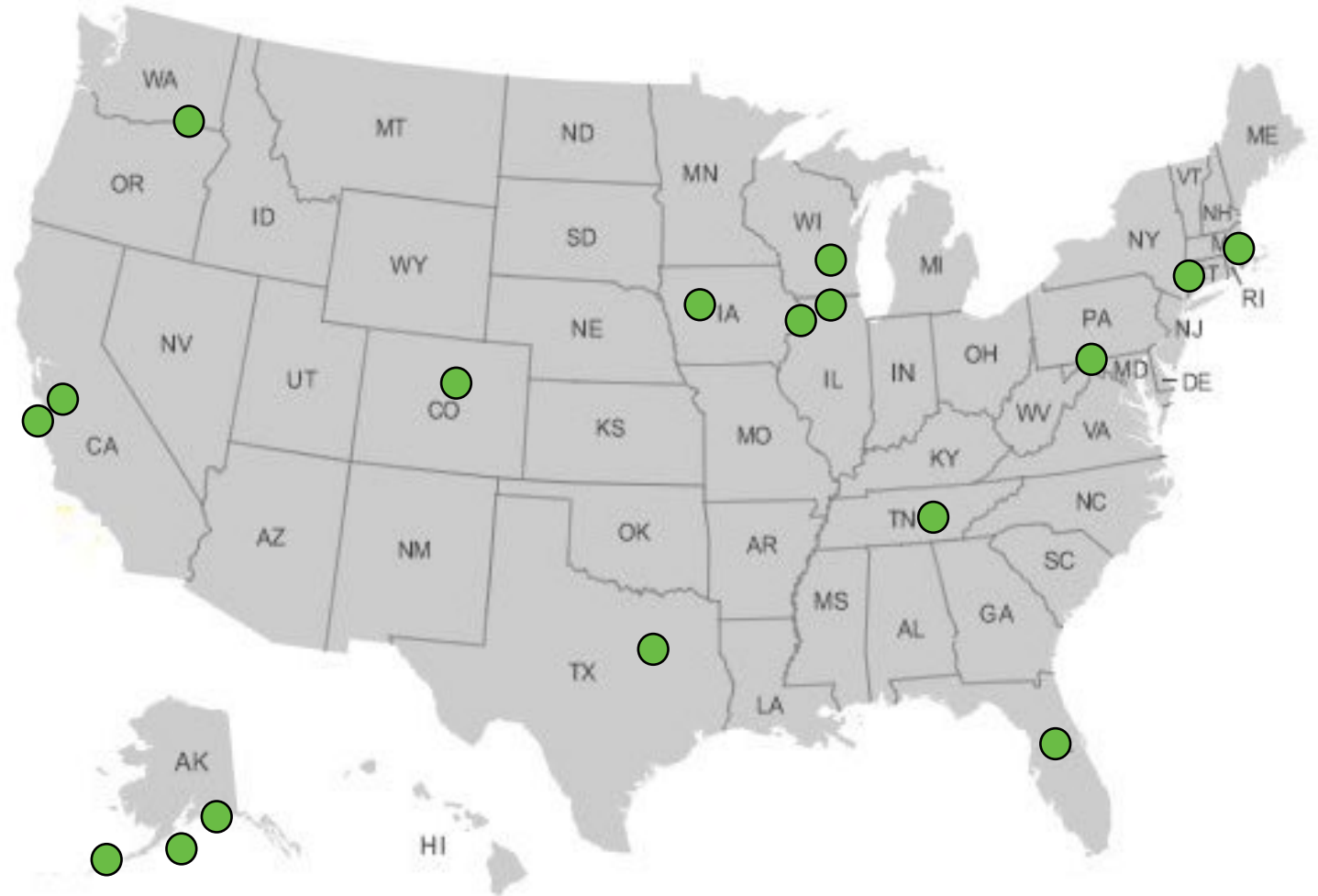
Shanti Pless

About our FY21 Cohort of Partnerships

17 Communities from 13 states

Program was launched in March 2021

- Application phase: late March – early April
- Review phase: late April
- Announcements made: April-May
- All projects have “kicked off” at this point



About Our FY21 Cohort of Partnerships

What types of assistance were most requested?

- **Cost-benefit analysis**
- **Navigating policies and incentives**
- **Evaluation of options for treating difficult-to-manage streams**
- **3rd party support in briefing other local decision makers and officials**

What other themes emerged?

- **Urgent need for new resource/energy recovery strategies (i.e., due to landfill or incinerator closure)**
- **Food waste and municipal wastewater residues are a priority**
- **Further assistance is welcomed**



What's New in 2022...? (and what's not)

Under consideration for 2022*:

- Longer application window
- County-level participation
- Two ‘phases’ of technical assistance available:
 - New partnerships
 - Follow-on assistance for previous participants

What’s staying the same:

- Length of application (short!)
- Staying focused on organic waste fractions
- Any stage of community planning is welcomed
- NREL subject matter experts

*Subject to appropriations

What type(s) of WTE technical assistance are you interested in receiving? Check all that apply. (Required)

☐ Resource information (e.g., quantity, current use, availability, economics, logistics, etc.)

☐ Technology options for energy recovery, product considerations

☐ Market/policy considerations

☐ Social and ethical considerations (e.g., jobs development, equity assessment)

☐ Environmental considerations

☐ Analysis support (e.g., cost-benefit analysis, feasibility studies, project screening, etc.)

☐ Discuss project financing options

☐ Roadmap consultation, energy/waste management planning support, resilience planning assistance

☐ Education (e.g., webinars, networking meetings)

☐ Other

If other, please describe.

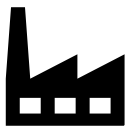
Briefly provide more specific information about the WTE technical assistance you need. (Required)

Please provide any additional background information relevant to this request, such as energy goals, past studies, initiatives the technical assistance will support, and timeframe considerations, etc. (Required)

SUBMIT



Food Waste



Sewage Sludge



Animal Manure



Fats, Oils & Greases

Other Opportunities



**12–18 month technical assistance program
on a variety of areas of Planning and Development:**

- Clean Energy
- Energy Efficient Buildings and Electrification
- Clean Transportation
- Carbon Capture / Storage
- Energy Site Reclamation and Critical Materials Processing
- Community Resilience Microgrids
- New / Enhanced Manufacturing

Application window opened on 10/25, due 12/17/21



Inclusive Energy Innovation Prize

\$2.5M prize pool

- Increase participation in clean energy and climate-smart job training
- Fund activities to help disadvantaged communities become aware of, apply into or secure DOE funding (or other funding)
- Enable the development of replicable clean energy transitions

Application window opened in September 2021, due 2/25/22

Other Opportunities



Sustainable Wastewater of the Future (SWIFt) Accelerator

Customized Toolkit Training

DOE is offering customized training on the use and implementation of the Wastewater Energy Management (SWIFt) Toolkit to help more facilities set and achieve their energy efficiency goals. Get access to resources, networking, technical support, and recognition.

[Get Started](#)



Data Management

The **Energy Data Management Manual** provides clear, step-by-step guidance to track energy performance and compares publicly available energy data management tools.

Measure Planning

The **Measures Checklist** includes no-and low-cost energy savings options and identifies 23 high impact innovative energy conservation and resource recovery measures. The **Measure Planning Workbook** is an automated tool that can help facilities decide whether and how to implement one of the 23 measures.

Project Financing

The **Financing Matrix** highlights available financing and funding programs and mechanisms for the wastewater sector. The **Energy Savings Performance Contracting Guide** helps decision makers consider this option for wastewater infrastructure improvements.

Plan Development

The **Infrastructure Improvement Plan Template** outlines topics a facility may consider including in their own plan. Several example plans are also available.

For more information:

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Questions / Feedback / How to Stay in Touch?



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Thomas Swarr

Hartford Solid Waste
Task Force
Hartford, CT

Hartford, CT - Finding a Sustainable & Just Solution for Solid Waste

Thomas Swarr

Co- Chair Hartford Solid Waste Task Force

4 November 2021

A Looming Crisis



- ▶ Proposal to refurbish failing trash-to-energy plant rejected - 30 yr. commitment @\$145/ton
- ▶ Plant scheduled for shutdown by 30 June 2022
- ▶ City seeking to recover riverfront property for potential economic development
- ▶ Regional authority (MIRA) obligated to provide waste disposal services through FY 2027
- ▶ Strong opposition to any waste operations in Hartford due to past environmental injustices
- ▶ State will resort to transferring waste to out-of-state landfills

CT Coalition for Sustainable Materials Management

- ▶ >80 CT municipalities joined
- ▶ Working groups
 - ▶ Food scraps / Organics collection & diversion
 - ▶ Increase recycling
 - ▶ Unit-based pricing
 - ▶ Extended producer responsibility
- ▶ No substantive discussion of new disposal infrastructure
 - ▶ Anaerobic digestion / composting of food scraps

Hartford Solid Waste Task Force

- ▶ Original focus on opposing redevelopment of MIRA trash-to-energy facility
- ▶ Moving from NIMBY to YIMBY
 - ▶ Mixed waste processing plant 100,000 to 200,000 tons per year to sort raw municipal solid waste (MSW) to recover organics & potentially recyclable materials
 - ▶ Smaller, distributed plants to address environmental justice concerns, reduce truck transport, & associated emissions
 - ▶ Reduces, but does not solve need for additional disposal capacity
 - ▶ Public support? Political support?

Goals for NREL Technical Assistance

- ▶ Instigate more robust discussion of long-term solution for Connecticut waste management
- ▶ Reframe problem from waste that needs to be disposed in most cost-effective manner to potential resource stream to be processed into more valuable outputs
- ▶ Highlight need for public policy reform to make recovery of fuels/materials financially feasible

Acknowledgements

► Solid Waste Task Force

- Thomas Swarr, Co- Chair
- Clarence Corbin, Co-Chair
- Sam King
- Mark Mitchell, MD
- William Diaz
- James Sandler, Esq.
- Councilman James Sanchez

► City Staff

- Mayor Luke Bronin
- Mike Looney
- Mike Zembruski
- Haylee Green - Ortiz

► MIRA

- Thomas Kirk
- Peter Eagan
- Thomas Gaffey
- David Bodendorf
- Roger Guzowski

► Gershman, Brickner & Bratton

- Steve Simmons
- Harvey Gershman

► And many more!



Lance Larsen

Odyssey Renewable Energy



Rob Davies

Jo-Carroll Depot Local
Redevelopment Authority
Savanna, IL

Landfill Diversion and Rural Economic Development via Anaerobic Digestion of Organic Waste Streams



Odyssey
renewable energy

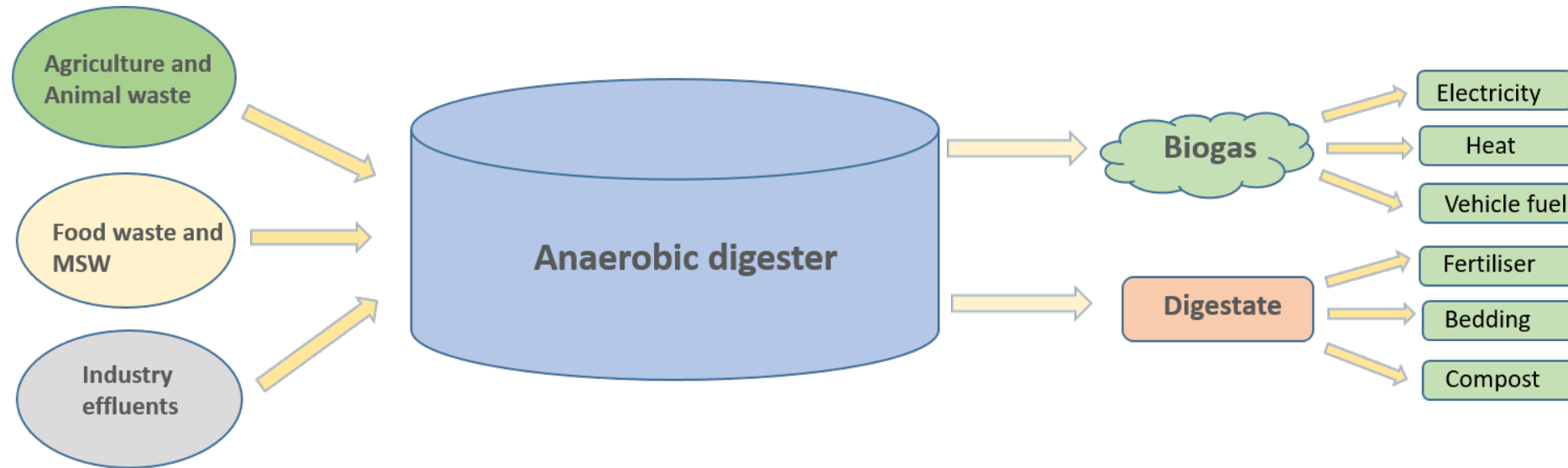
⊗ SAVANNA ⊗
INDUSTRIAL PARK

Overview of the Project

- Public-Private Partnership between Savanna Industrial Park and Odyssey Renewable Energy
- Absence of natural gas service due to prohibitive cost of pipeline
- Missed opportunities for development, job creation
- Proposal to generate renewable natural gas (RNG) through anaerobic digestion (AD) fills the energy gap for industrial development
- Impetus to establish public intermodal / waterside port facility
- June 2021: NREL Technical Assistance Grant

What is Anaerobic Digestion?

Anaerobic Digestion is a natural, biological process that breaks down organic matter without oxygen. The by-products of the process are biogas and nutrient-rich digestate. The biogas can be upgraded into a substitute (RNG) for fossil natural gas, while digestate can enhance soils.



Organic Waste Streams

Food waste - single largest solid waste stream reaching landfills

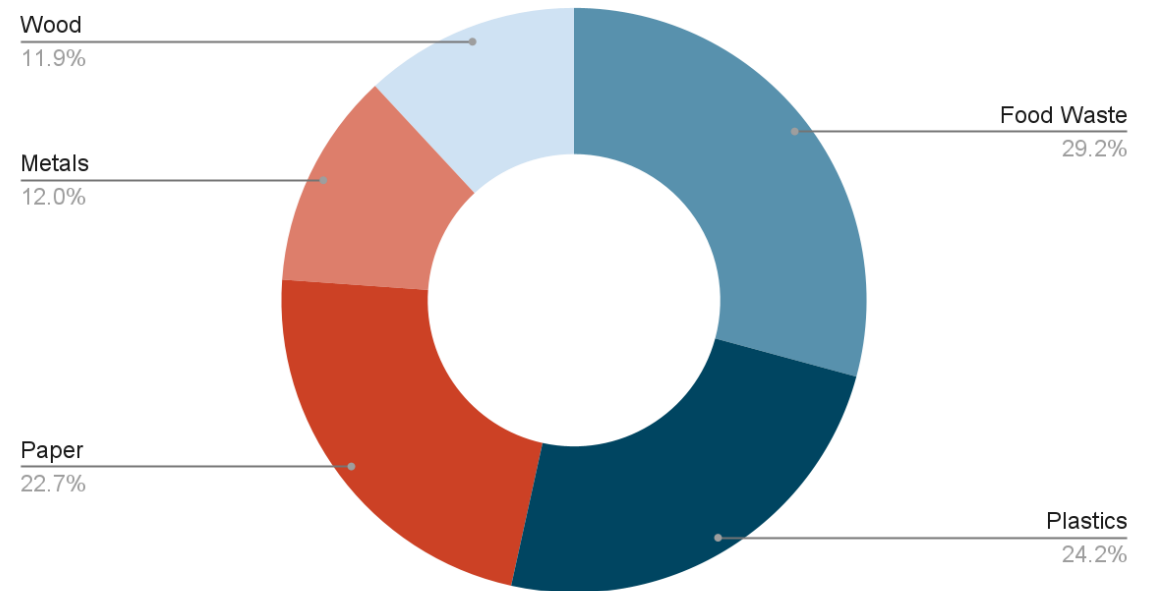
- Industrial / Manufacturing
- Stillage / dried distillers grain
- Organic portion of MSW

Agricultural waste

- Corn stover
- Industrial Hemp - Develop into rotational commodity

Slaughterhouse waste and Deadstock

Problem: Food Waste



Landfill Diversion

A growing number of states and municipalities are implementing organic waste bans or mandates.

- 24 States on Yard Waste: Arkansas, Delaware, Florida*, Georgia*, **Illinois**, Indiana, Iowa*, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska*, New Hampshire, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia, Wisconsin. (*Allow garden waste disposal if the landfill generates energy)
- 8 States on Food Waste: California, Connecticut, Maryland, Massachusetts, Oregon, Rhode Island, Vermont, Washington. (Also of note: New York City, Seattle)

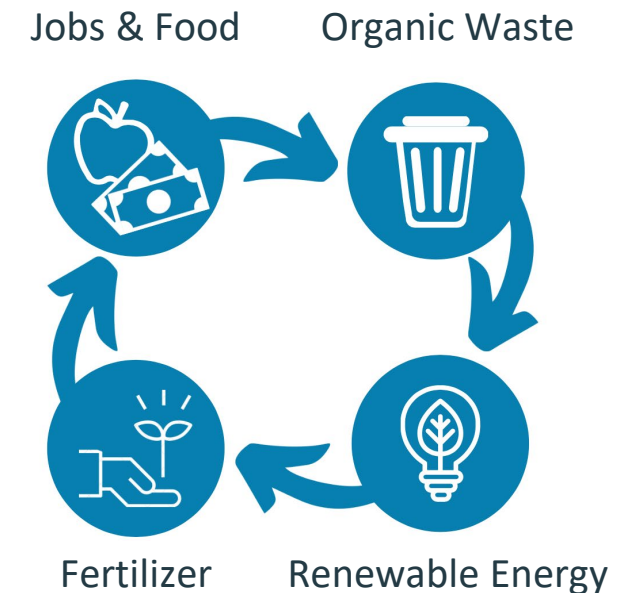
Municipalities that do not proactively seek to minimize and sustainably manage organic waste streams will likely face fiscal challenges in the form of rising tipping fees and transportation costs.

Rural Economic Development

- The Project will spur economic development along a disinvested area of rural NW Illinois
 - Encourage development of productive infrastructure
 - Renewable fuels for transportation
 - Advantage of sourcing feedstock via rail and barge

- Communities and social impact
 - Job training and workforce development
 - Community engagement and outreach, social uplift
 - Youth programs, rural-urban connection

- Environmental Conservation and Sustainability
 - Reduce chemical and nutrient runoff into local watersheds
 - Offer farming inputs that are sustainable and regenerate soils to support a healthier and overall more productive output





Shelby Best

Region 1 Planning
Council

Rockford, IL

Community Waste Planning in Northern Illinois

Addressing barriers and opportunities for waste management

11/4/21



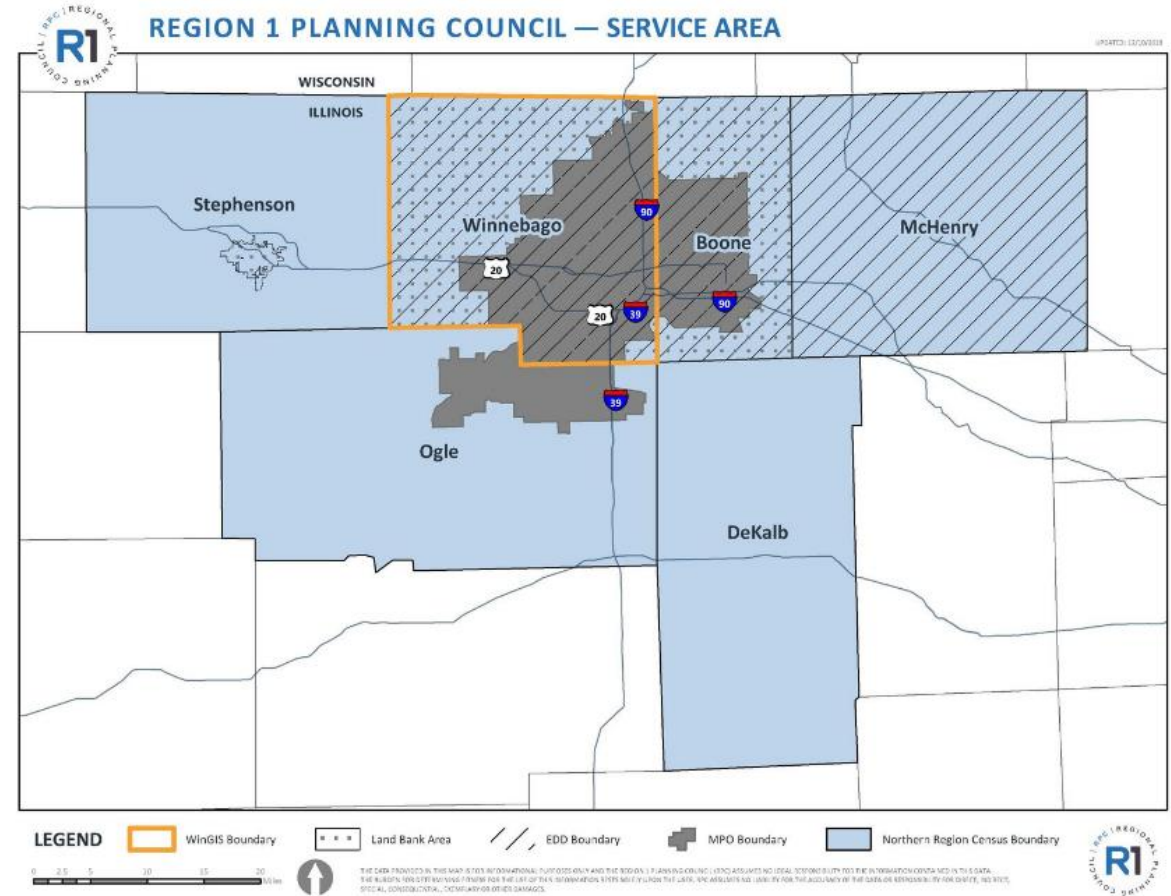
BACKGROUND & CONTEXT

Region 1 Planning Council



WHO, WHERE, WHY

- Region 1 Planning Council is a special-purpose, regional government agency located in Northern Illinois.
- We collaborate and convene with local governments, addressing regional issues on a long-term horizon.
- R1 is currently working on an updated Solid Waste Management Plan for Boone and Winnebago Counties.



ISSUES

Regional Constraints



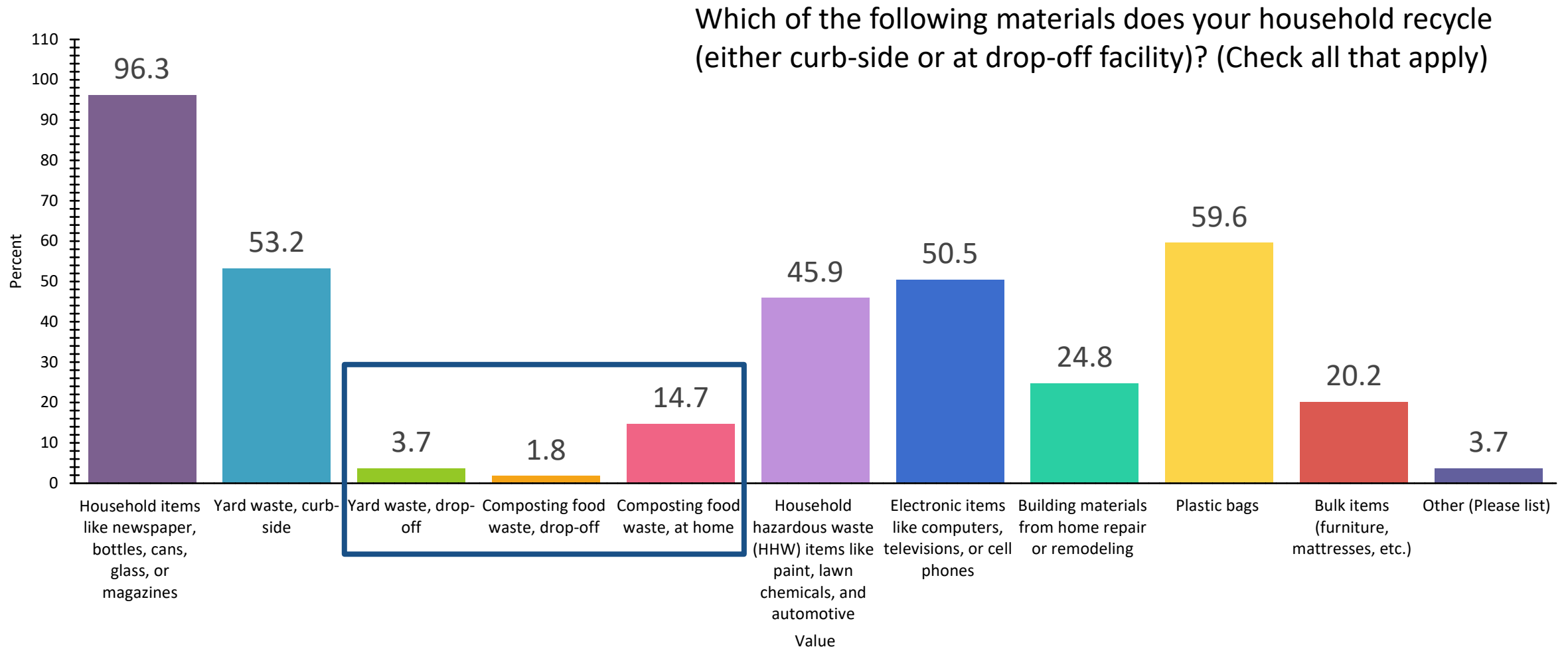
WASTE CHALLENGES IN NORTHERN ILLINOIS

- The region has multiple landfills that are running out of space.
- The Chicago Rockford International Airport is one of the fastest growing cargo airports in the world.
- We need to prepare for an increase in economic activity as a result of a growing airport and economy.



ISSUES

Community Survey Results (Boone & Winnebago Counties) | Most Materials Recycled

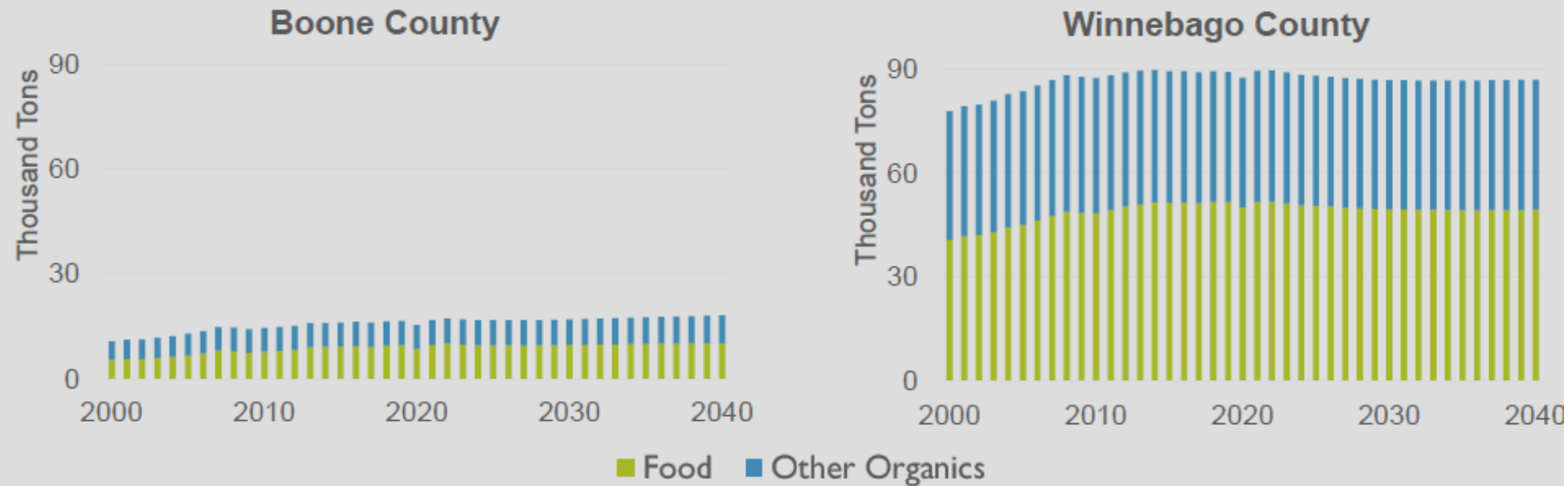


NEEDS & OPPORTUNITIES

Organic Waste Generation & Diversion Potential (Credit: University of Illinois Chicago Unpublished)



Organic Waste Generation (2000-2040)



Reference Diversion Rates

	Food	Non-food	Total Organic
Illinois state (2009)	0.0%	28.0%	14.0%
Illinois state (2015)	1.3%	29.8%	14.3%
U.S. Average (2018)	31.3%	70.2%	46.0%

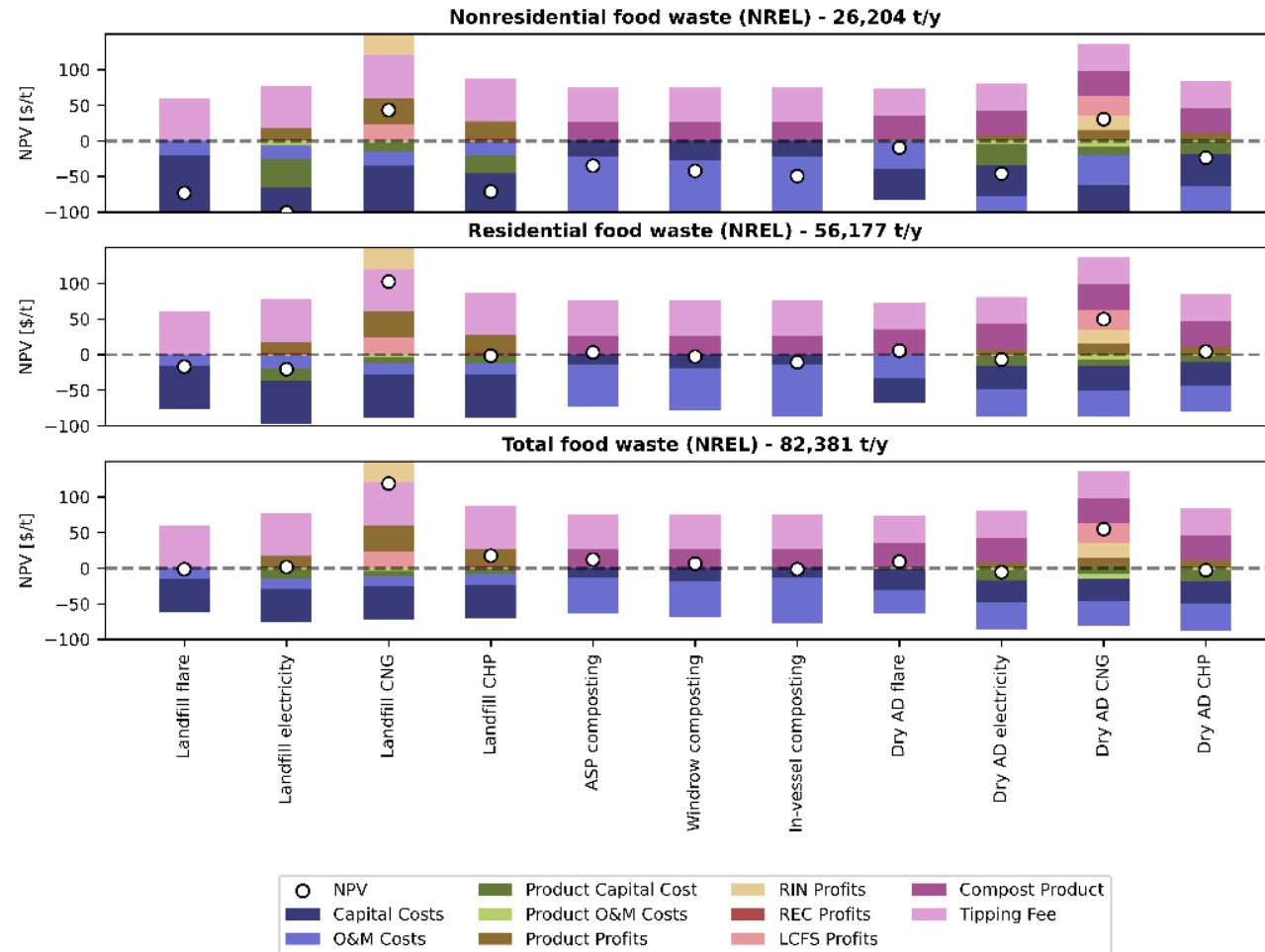
Estimated Diversion Potential (tons/year)

- 30% for food and 70% for non-food organic waste

	Boone	Winnebago	Total
2020	7,255	41,460	48,714
2040	8,584	41,001	49,585

NREL TECHNICAL ASSISTANCE PROGRAM

Cost Benefit Analysis of Food Waste



ASP = aerated static pile | CHP = combined heat and power | CNG = compressed natural gas |
 | LCFS = low carbon fuel standard | NPV = net present value | O&M = operations and maintenance | PNG = pipeline natural gas
 | REC = renewable energy credits | RIN = renewable identification numbers | t/y = tons per year

FUTURE PLANS

Plans for a zero-waste region



MOVING FORWARD

- Complete the Regional Solid Waste Management Plan.
- Continue to explore Waste-to-Energy technology options and feasibility, particularly as it relates to organic waste.
- Engage the community throughout the planning process.





Breanne Johnson

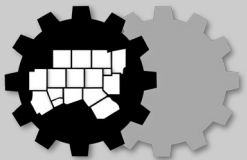
North Central Texas Council
of Governments
Arlington, TX

Organic Waste to Renewable Natural Gas: Regional Efforts in North Texas

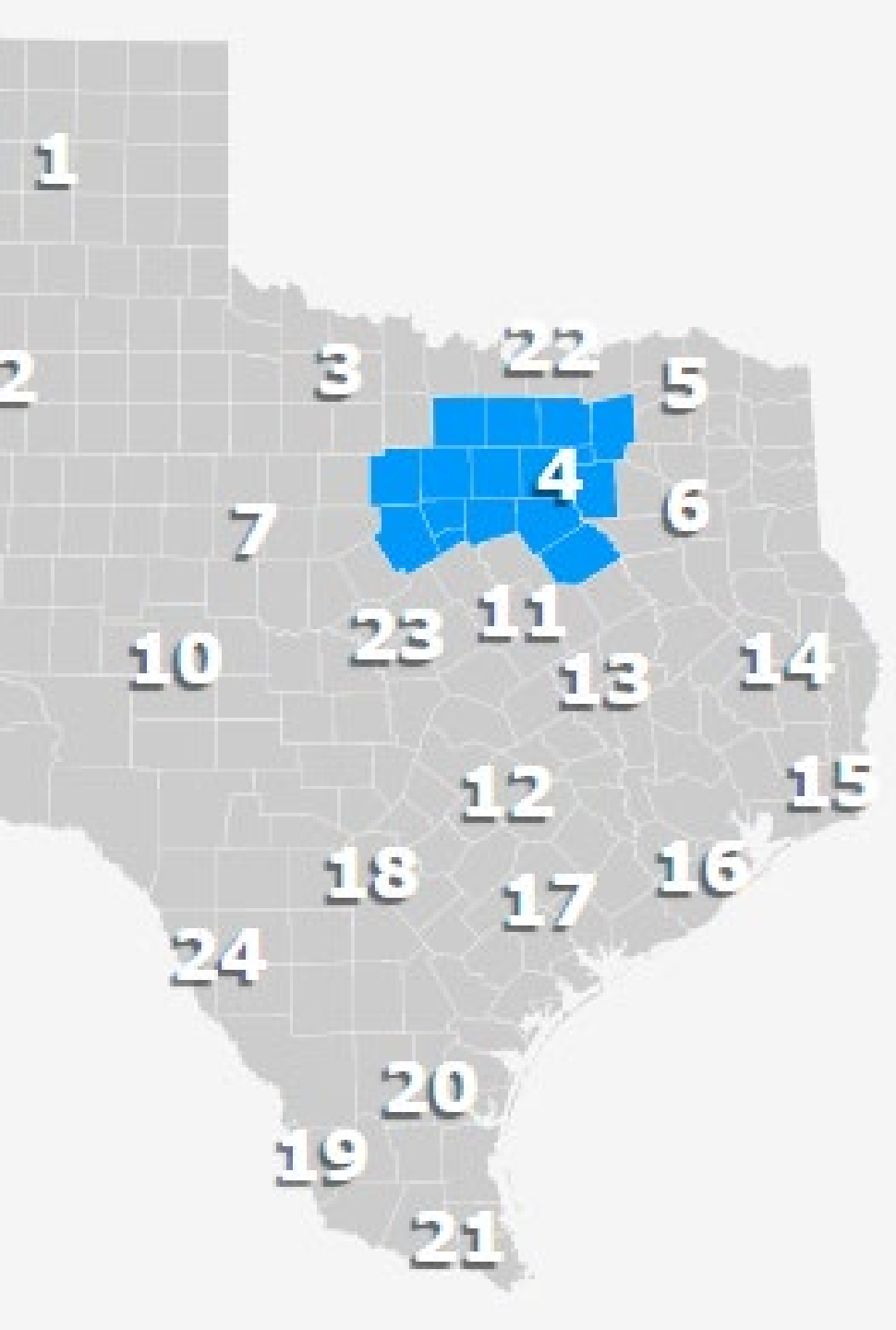
U.S. Department of Energy Bioenergy Technologies Office

*Community Waste Management Technical Assistance Forum:
Exploring Solutions to Convert Waste to Energy and Bioproducts*

November 4, 2021



North Central Texas
Council of Governments



Large Region and Growing

- **Quasi-governmental, voluntary association of local governments**
- **Assists local governments in:**
 - Planning for common needs
 - Cooperating for mutual benefit
 - Recognizing regional opportunities
 - Resolving regional problems
 - Making joint decisions
- **No regulatory authority**
- **4th largest metropolitan region in the United States – centered around cities of Dallas and Fort Worth**
- **Population: 7.7 million people currently (larger than 37 states in population); projected 11.3 million in 2045**
- **Area Served: 12,797 sq. miles – larger than nine states in area**

North Central Texas has
~36 years
of remaining landfill
capacity.¹

50%
of NCT waste stream is
organic waste;
31% is food waste.

RNG use accounted for
25%
of GHG emissions
reductions from DFW fleets
in 2019.²

Challenges and Opportunities Driving Change in North Texas

- Waste capacity – landfills are filling up
- Organic waste – above national average food waste
- Biosolid management is increasingly difficult issue
- Zero-waste and other materials management goals
- Long-term greenhouse gas emission reductions – climate goals
- Production of biogas (renewable energy) and renewable fleet fuel – energy resilience

**Need for New Approaches to
Address Challenges!**

North Central Texas Organic Waste to RNG Opportunities

EPA Funded North Texas Organic Waste to Renewable Natural Gas

Evaluate Organic Waste Supply
Feedstocks (food waste/biosolids)

Identify Regional Feedstock
Collection Models

Evaluate Existing and Future Demand
RNG Vehicle Fuel

Identify Potential AD Locations
Based on Costs/Benefits and
Emissions Reductions

DOE Technical Assistance Opportunity

Evaluate Potential Location Along
SH121 Corridor

High-Level Screening/Feasibility
Analysis of Food Waste Pathways

Provide Cost-benefit Analysis for
Potential Anaerobic Digester
Location

- Process Dewatered Sludge

- Process Food Wastes

Evaluate Potential Energy/Biogas
Produced

Moving Forward

Complete Regional Organic Waste to
Renewable Natural Gas Study –
Summer 2022

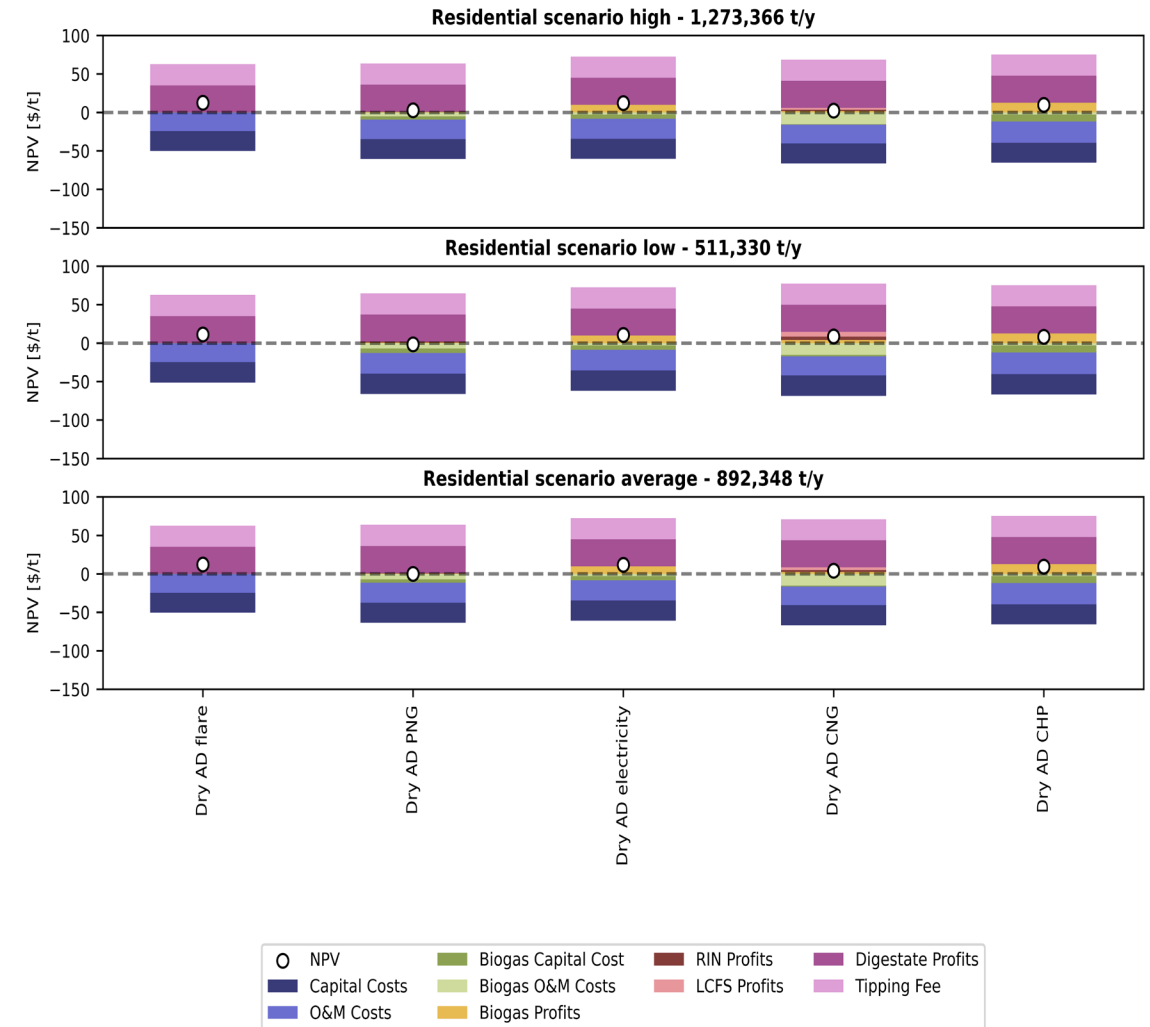
Continue Growing Partnership
Opportunities Based on Outcomes of
DOE Technical Assistance

Look For Potential Funding to Move a
Project Forward

DOE/NREL Waste-to-Energy Technical Assistance

- The large amounts of residential and nonresidential food waste in surrounding counties help AD systems maximize economies of scale, and make them less sensitive to changes in waste availability
- Multiple possible pathways to managing food waste via AD exist and could be economically viable solutions
- Waste-to-energy systems and incentives such as RINs and LCFS could represent significant revenue streams, but depend on accessing appropriate markets and managing products effectively
- Understanding how biogas systems scale to the large digester sizes shown here is a key opportunity for future work to consider.

NREL Sensitivity Analysis: Residential Food Waste



Contacts

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NCTCOG Organic Waste to Renewable Natural Gas Regional Study Website:

<https://www.nctcog.org/envir/materials-management/materials-management-plan-1>

Thank you!

Waste-to-Energy Technical Assistance for Local Governments

nrel.gov/bioenergy/waste-to-energy-technical-assistance.html

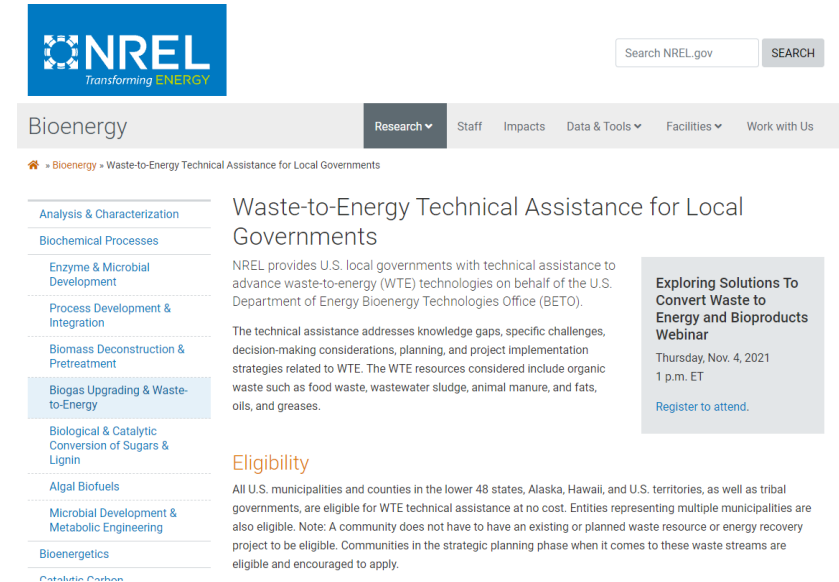
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