



DOE Bioenergy Technologies Office (BETO) 2023 Project Peer Review

Waste-to-Energy Technical Assistance for Local Governments

April 7, 2023

Organic Waste Conversion

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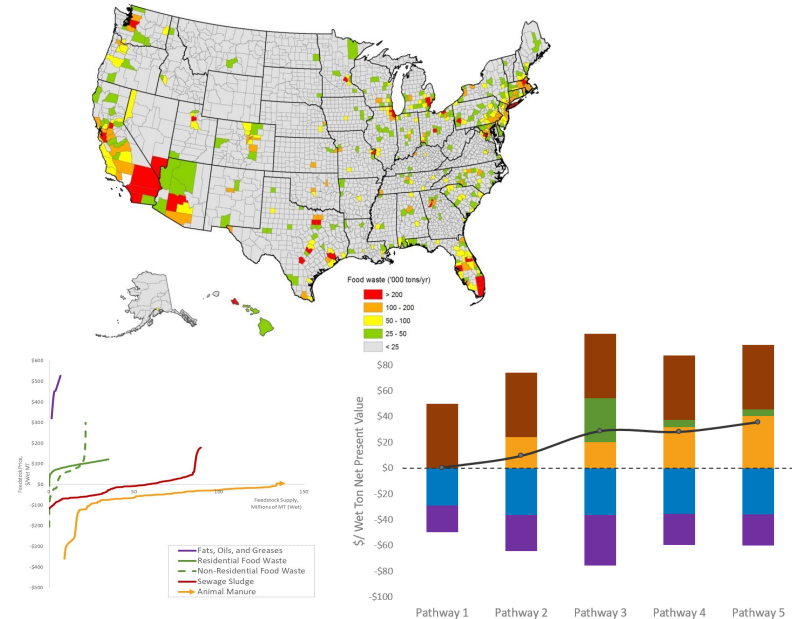
Project Overview

History: Data, information, and knowledge generated about organic waste streams during the 2015–2021 period; next step – data/knowledge transfer and dissemination

Goal: Mobilize data, information, and knowledge about organic waste streams to local governments to support decision-making

State of the Art: First (and only) dedicated WTE technical assistance (TA) for local governments

Relevance: 1). Improved understanding of local waste challenges and priorities to inform BETO’s R&D strategies and decision-making. 2). Support local governments’ goals and plans related to sustainable waste management (their staff capacity can often be limited).



1. Approach – Management

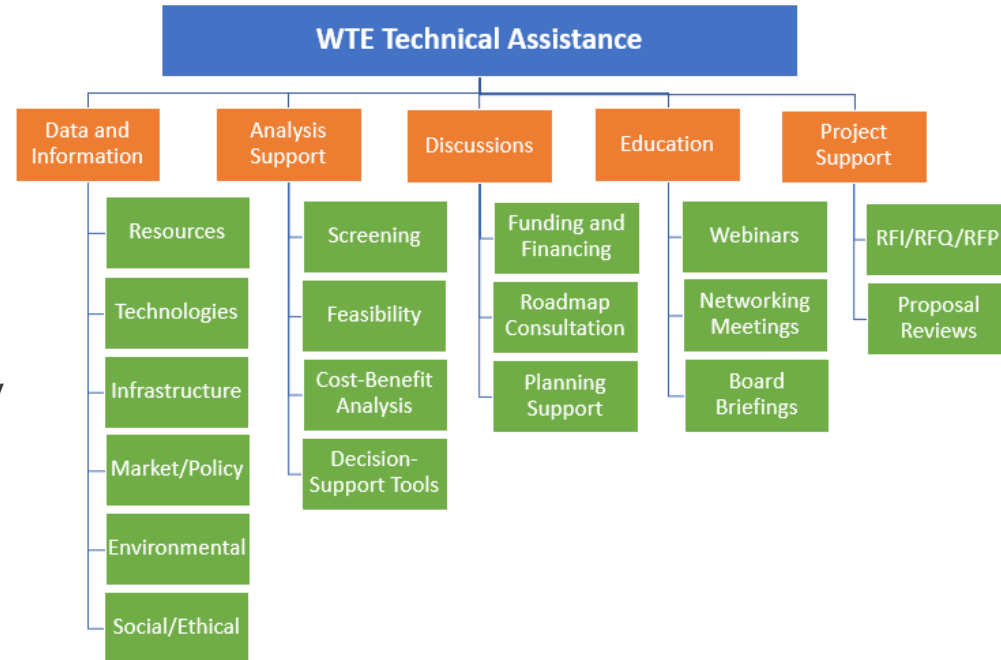
- **NREL's WTE TA Team** – expert scientists, engineers, and analysts with skill diversity
- **Risks:**
 - Staff availability (e.g., overload, losing a team member)
 - Scope change
- **Risk-mitigation strategies:**
 - Clear communication about expectations and expected delays
 - Flexibility (e.g., communities' priorities change, staffing shortages and changes)
- **DEI:** Diverse NREL team and participating communities (e.g., urban/rural, small/large, socio-economic status, geographic location)

Strong communication between team members, BETO management, and participating communities:

- Frequent team meetings and communication
- Monthly meetings with BETO management
- Regular communication with TA applicants via email and/or video calls

1. Approach – Technical

- **Objective:** Provide support to local governments through various activities and access to subject matter experts (up to 40hrs per request, no cost to applicants)
- **State of the Art:** First (and only) dedicated WTE TA for local governments
- **Innovation potential:** Support deployment of advanced conversion technologies via knowledge transfer and partnerships
- **Key challenge:** More activities requested by entities than program allows (mitigated by prioritization)
- **Go/No-Go:** Measuring communities' interest in the program: received a high number of applications in FY21 and FY22
- **Metrics to measure progress:** Track % completion for each request on a monthly basis



1. Approach – Technical (cont.)

- Timeline and process:

February: Program promotion (DOE/NREL newsletters and social media, external newsletters, targeted emails, etc.)

March-April: Application window (open for 30-45 days)

April-May: Applications review (2-4 weeks)

June: Begin kick off meetings to establish Scope of Work

January-February: TAs completed

- Applications review process:
 - 3rd party reviewers assess the merit and potential impact of the applications and provide a score of 1 to 10 for each request (maximum possible score 20)
 - Reviewers from various DOE offices, e.g., BETO, SCEP, AMO
 - Additional factors considered in the review process include geographic diversity, community size, demographic diversity, socio-economic status of the community, uniqueness of the requested topic(s), etc.

2. Progress and Outcomes

WTE TA recipients:

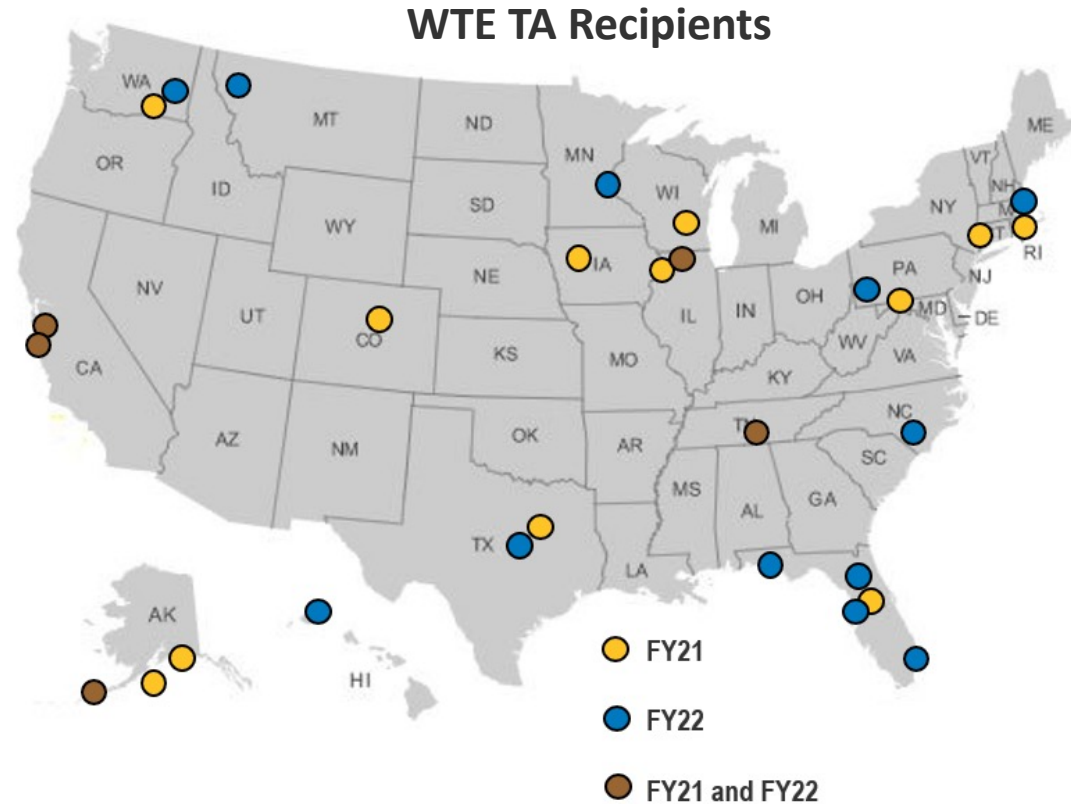
- FY21 – 17 communities
- FY22 – 17 communities
 - 5 returning communities from FY21

Status:

- All FY21 requests completed
- All FY22 requests completed
- FY23 – receiving applications

Key outcomes:

- Strong community participation since inception of the program
- Dedicated program web site
- Tailored deliverables
- Shared resources, e.g., fact sheets, brochures

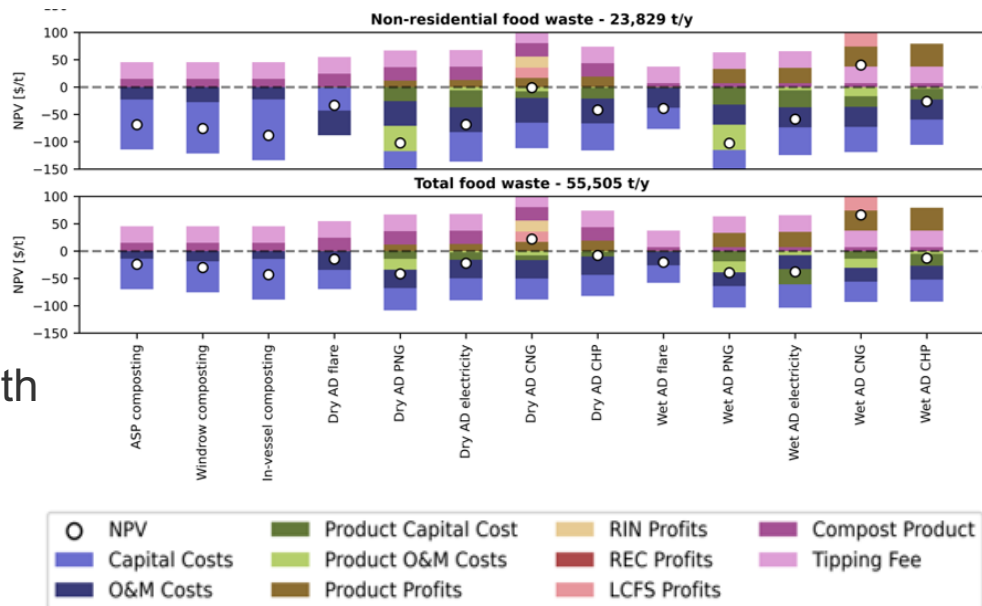


2. Progress and Outcomes (cont.)

Technical accomplishment #1: 34

requests managed. Most frequent requests:

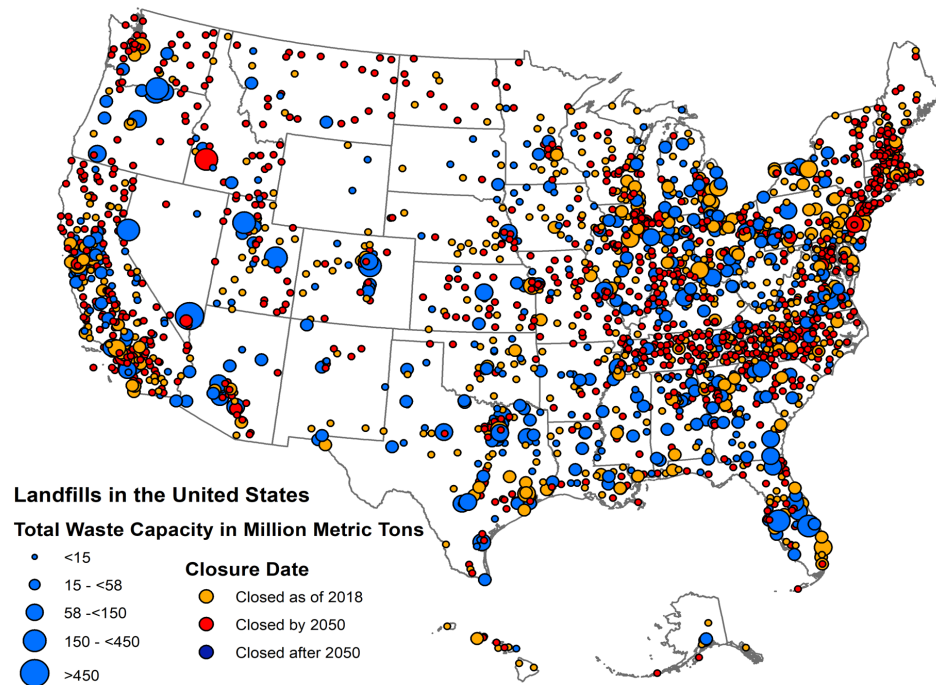
- **Cost-benefit analysis** of food waste comparing landfilling, anaerobic digestion, and composting
- **Technology reviews** (e.g., comparing different pathways, SWOT analysis, overview of emerging technologies)
- **Case studies** of a given technology with local governments participation
- **On-site evaluation** (e.g., resource assessment, technology options)
- **Outreach materials** (e.g., slide deck on a given topic for staff to present to leadership or presented by NREL staff)



2. Progress and Outcomes (cont.)

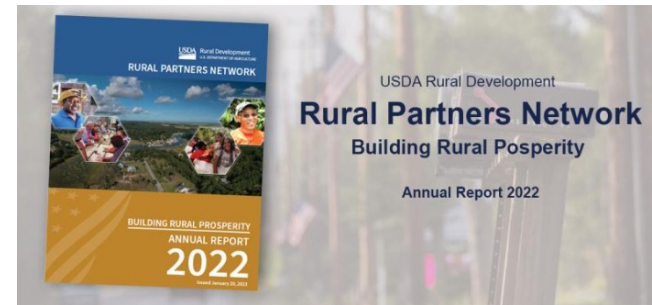
Technical accomplishment #2: Distilled key challenges faced by communities:

- Diminishing landfill space
- Land constraints
- Energy/environmental justice issues
- Strategic planning, e.g., climate action plans, sustainability goals, circular economy objectives, waste reduction goals, etc.
- Organic waste diversion legislation (e.g., in California, SB 1383 regulation went into effect in early 2022)



3. Impact - BETO

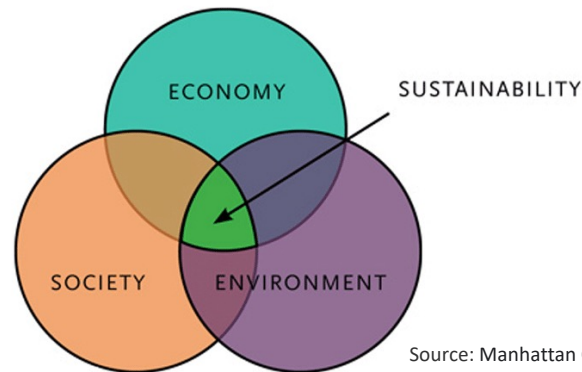
- Inform **BETO's R&D strategies and decision-making** by providing better understanding of communities' challenges and priorities related to waste management
- Insights from a diverse range of communities helps **refine BETO's data** about regional factors, policy effectiveness, market size, etc.
- Support **BETO's Key Performance Goals For 2030** related to SAF and materials/chemicals production by supporting waste resources and technologies development at community level
- Enable BETO participation in the **Rural Partners Network**, a new collaboration to strengthen the link between federal agencies and rural communities
- **Leverage** previous and existing work (deploy analyses and test applications in real world)
- **Partnerships and collaborations** with more communities



<https://www.rural.gov/>

3. Impact (cont.) – Local Governments

- Support decision-making related to sustainable waste management
- Address specific waste management challenges and opportunities
- Provide access to subject matter experts and address limited staff capacity
- Enable energy and/or resource recovery project development:
 - TA supported RFP/RFI development
 - Several TA applicants received additional funds through FOA/FY23 omnibus
- Foster public-private partnerships



Source: Manhattan College



Source: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), Germany; ooyoo/gettyimages.

Testament for Impact: Continued strong community participation, returning applicants, positive feedback, and entities able to translate the information gained from the program into actions or additional funding to pursue projects.

3. Impact (cont.)

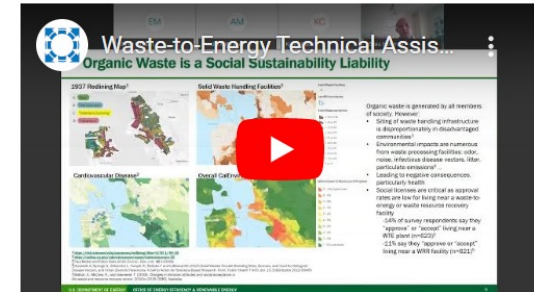
Industry Impact

- Community partners to test/pilot technologies (reduced project risk)
- Local data to support decision-making
- Knowledge transfer

Stakeholder Outreach and Engagement

- Direct work with municipalities and industry partners
- Tailored deliverables to communities addressing their needs
- Shared resources, e.g., fact sheets/brochures and other easily-digestible documents
- Informational webinars and community briefings
- Web site with detailed information about the program (e.g., eligibility, FAQ, publications, etc.)

Waste-to-Energy Technical Assistance for Local Governments



Text version. [Download presentation slides](#)

Featured Publications

[Anaerobic Digestion of Food Waste: Products and Their Uses](#), NREL Brochure (2022)

[Comparison of Select Food Waste Utilization Options](#), NREL Brochure (2021)



<https://www.nrel.gov/bioenergy/waste-to-energy-technical-assistance.html>

Summary

Management: Strong communication, solid PMP including risk identification and mitigation strategies, close monitoring of budget and schedule

Technical Approach: First (and only) dedicated WTE TA Program providing collaborative and customized support to local governments

Progress and Outcomes:

- All milestones completed
- Meeting our goal: provided support to 34 communities during FY21 and FY22

Impact:

- Support local governments, BETO, and industry strategic decisions
- Direct interactions with municipalities support work on the ground for real world impact
- Foster public-private partnerships

Acknowledgments - NREL WTE Team



Anelia Milbrandt



Alex Badgett



Kelcie Kraft



Ricardo Castillo



Jenny Heeter



Edward Settle



Bob Baldwin



Kim Magrini



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Jason Coughlin



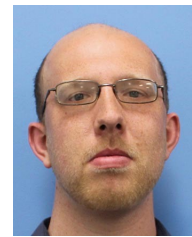
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David Greene



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BETO

Beau Hoffman

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Shannon Zaret

Chelsea Mervenne

EERE's Strategic Analysis

Kara Podkaminer

Indian Energy

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Lizana Pierce

Arctic Energy

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NREL Communication Team

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Erik Ringle

Quad Chart Overview

Timeline

- Project start date: 10/1/2020
- Project end date: 9/30/2023

Project Goal

Mobilize data, information, and knowledge about organic waste streams to local governments to support decision-making

FY22 Costed

Total Award

DOE
Funding

Project
Cost
Share*

End of Project Milestone

Deliver white paper to BETO summarizing key results from the 3-year WTE TA program, near- and mid-term opportunities for technology development and technology deployment.

Funding Mechanism

Lab Call, DE-LC-000L079, Spring 2020

TRL at Project Start: n/a
TRL at Project End: n/a

Project Partners

- City, town, and county governments



Thank you!

www.nrel.gov

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Additional Slides

Responses to Previous Reviewers' Comments

- **Reviewer Comment:** It appears that the WTE technical assistance will be a tangible way to bring the results of this project to local government stakeholders to not only make them aware of the benefits of the tools developed for optimizing their waste management, but also in providing the necessary assistance on how to use these tools. The only concern is whether NREL team will be prepared to handle the volume of work that may occur if interest in the WTE technical assistance is as strong as its potential should demand. *Response: This is a valid concern which is why we are adopting a phased approach so we can focus on a number of technical assistance projects that we can accomplish within a given period.*
- **Go/No-Go Review:** Measuring communities' interest in the program: received a high number of applications in FY21 and FY22. BETO decision: Proceed.

Milestones and Metrics

Milestone	Title/Description	Due Date	Completed
FY21 Q1	Mockup of the technical assistance (TA) web site which will include information about the program, description of assistance types, and an online application form.	12/31/2020	On time
FY21 Q2	Launch of the TA web site and summarize initial responses (e.g. number of requests, type of requests, etc.).	3/31/2021	On time
FY21 Q3	Summarize information about received applications such as location, size of community, request type, etc.	6/30/2021	On time
Annual	Complete TA for as many awardees as budget allows (between 10 and 20) and summarize key results (e.g., most frequent requests, biggest issues faced by municipalities, participants feedback, etc.).	12/31/2021	On time
FY22 Q1	Update the WTE TA web site and prepare for program promotion in Q2.	12/31/2021	On time
FY22 Q2	Launch FY22 WTE TA, review applications and select up to 15 new applicants and up to 5 returning applicants.	4/30/2022	On time
FY22 Q3	Summarize information about received FY22 applications (e.g., location, size of community, request type, notes from kickoff meetings, etc.).	6/30/2022	On time
Annual	Summarize key results from FY22 WTE TA (e.g., most frequent requests, biggest issues faced by municipalities, etc.).	2/28/2023 or when last TA is complete	On time
FY23 Q1	Update the WTE TA web site and prepare for program promotion in Q2.	1/30/2023	On time
FY23 Q2	Launch FY23 WTE TA, review applications, and select between 15 and 20 applicants or as many as budget allows.	4/30/2023	
FY23 Q3	Publish at least 1-2 fact sheets on a topic of high interest to local communities.	6/30/2023	
Annual	Summarize key results from FY23 WTE TA (e.g., most frequent requests, biggest issues faced by municipalities, etc.).	12/31/2023	
End of Project	Deliver white paper to BETO summarizing key results from the 3-year WTE TA program, near- and mid-term opportunities for technology development and technology deployment.	1/30/2024	

Publications, Patents, Presentations, Awards, and Commercialization

- Milbrandt, A., Hoffman, B. “Overview of the Waste-to-Energy Technical Assistance Program for Local Governments”. Walking Mountains Climate Action Collaborative Quarterly Meeting. November 14, 2022. Avon, Colorado (virtual presentation).
- Milbrandt, A., Coney, K., Badgett, A., Beckham, G. T. " Quantification and evaluation of plastic waste in the United States". *Resources, Conservation and Recycling*, 183, August 2022
- Decker, S., Milbrandt, A. “Anaerobic Digestion of Food Waste: Products and Their Uses”. January 2022. <https://www.nrel.gov/docs/fy22osti/81676.pdf>
- Milbrandt, A. “Comparison of Select Food Waste Utilization Option”. November 2021. <https://www.nrel.gov/docs/fy22osti/81024.pdf>
- Hoffman, B., Best, S., Johnson, B., Swarr, T., Larsen, L., Davies, R. “Community Waste Management Technical Assistance Forum: Exploring Solutions to Convert Waste to Energy and Products”. November 4, 2021. <https://www.nrel.gov/bioenergy/waste-to-energy-technical-assistance.html>
- Badgett, A., Milbrandt, A. “Food waste disposal and utilization in the United States: A spatial cost benefit analysis”. *Journal of Cleaner Production*, 314, September 2021.
- Hoffman, B., Milbrandt, A. “Waste-to-Energy Technical Assistance Program for Local Governments”. Informational webinar. March 18, 2021. <https://www.nrel.gov/bioenergy/waste-to-energy-technical-assistance.html>
- Milbrandt, A.; Zuboy, J.; Coney, K.; Badgett, A. “Paper and cardboard waste in the United States: geographic, market, and energy assessment”. Submitted to *Resources, Conservation and Recycling*.

Abbreviations and Acronyms

AD: Anaerobic digestion
AMO: Advanced Manufacturing Office
ASP: Aerated static pile (composting)
BETO: Bioenergy Technologies Office
CHP: Combined heat and power
CNG: Compressed natural gas
FOA: Funding opportunity announcement
NPV: Net present value
NREL: National Renewable Energy Laboratory
PMP: Project management plan
PNG: Pipeline natural gas
PNNL: Pacific Northwest National Laboratory
RFI: Request for Information
RFP: Request for Proposals
RFQ: Request for Qualifications
SAF: Sustainable aviation fuel
SB: Senate Bill
SCEP: State and Community Energy Programs
SWOT: Strengths, weaknesses, opportunities, and threats
TA: Technical assistance
WTE: Waste-to-Energy