



# **RAMSEY/WASHINGTON RECYCLING & ENERGY**

CONNECTING VALUE TO WASTE

## **Ramsey/Washington Recycling & Energy Board (R&E Board) Workshop: Future Management of Refuse-Derived Fuel (RDF)**

---

**July 25, 2024**

# R&E Board Workshop Agenda

**Date:** Thursday, July 25, 2024

**Time:** 11 a.m. – 12 p.m.

**Commissioners, Key staff, Presenters:**

Ramsey County Environmental Health | 2785 White Bear Ave N. | 2<sup>nd</sup> Floor Conference Room, Maplewood, MN | 55109 | [Map](#)

**Public:** Members of the public are encouraged to participate remotely or may attend at the Maplewood address

[Microsoft TEAMS](#) | Phone Conference ID: 257 206 858# | Call In (audio only): 1-323-792-6297

## AGENDA

1. Call to order
2. Approval of agenda Action
3. Introduction of workshop purpose
4. Workshop

## Workshop Purpose

This workshop aims to equip board members with foundational information for upcoming decisions and gather input. During the workshop, board members will receive:

- An overview of R&E's comprehensive approach to addressing waste
- A staff report and updates on the evaluation of future uses of refuse-derived fuel (RDF) and technologies and management of priorities
- Opportunity for questions and discussion

## Workshop Outline

- I. Overview of R&E and counties' solid waste management strategies
  - a. Board guiding principles and strategic frameworks
  - b. Progress on the scope of resource management
- II. Current state & technology review
  - a. Current financial commitments
    1. Anaerobic digestion
    2. Transfer station food scrap bag sortation
    3. RDF end markets
  - b. Partnership with Xcel Energy (Xcel)
  - c. Alternative RDF management technologies
- III. Review of plan and strategy
  - a. Managing priorities
  - b. Cost & environmental considerations
  - c. RDF uses procurement next steps & timelines
- IV. Board member questions and discussion
- V. Adjourn

July 18, 2024

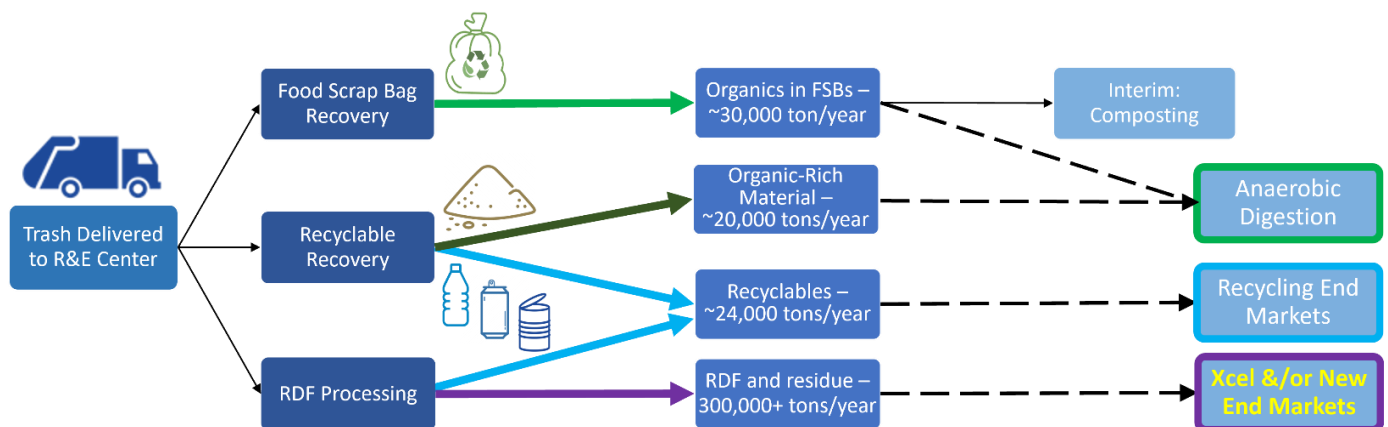
**To:** Ramsey/Washington Recycling & Energy (R&E) Board  
**From:** Sam Holl, Facility Manager, and Leigh Behrens, Planning Manager  
**Re:** **Future Management of Refuse-Derived Fuel**

### Background

Ramsey and Washington Counties have been evaluating alternative solid waste management technologies for nearly two decades. Through the R&E Board, the counties have prioritized efforts to move high-value materials in waste up the solid waste management hierarchy. In 2019, the R&E Board reaffirmed the direction initially set in 2014, which envisioned a higher use for waste materials. The aim of this work is to achieve environmental, economic and community benefits for the East Metro for the next 20 to 30 years and beyond.

The R&E Center manages about 450,000 tons per year of municipal solid waste (MSW) generated by residents and businesses in Ramsey and Washington Counties. The primary product manufactured from MSW at the R&E Center is refuse-derived fuel (RDF). R&E and the counties move waste up the hierarchy through waste reduction and reuse programs, food scraps recycling, recyclables recovery and the production of RDF as a “value-add” to minimize landfilling.

The diagram below depicts the current system design for the flow of waste delivered to the R&E Center, including planned end markets (indicated by dashed lines).



Over 330,000 tons of RDF are manufactured at the R&E Center annually, diverting this material from landfills. R&E holds an agreement with Xcel Energy (Xcel) for the management of RDF via combustion for electricity generation at two facilities. The fees the R&E Center pays to Xcel under this agreement equate to about \$6.5 million per year. The electricity generated from RDF is enough to power over 13,000 homes annually. This agreement expires on December 31, 2027.

The R&E Board directed staff to pursue opportunities for RDF management beyond 2027, including alternatives to combustion. Work on these solutions included research, analysis, vendor engagement, reference facility site visits and the release of solicitations. These solicitations include:

## R&E Board Workshop - Future Management of Refuse-Derived Fuel

- **June 2014:** Request for Expressions of Interest – Technologies to Process RDF
- **March 2018:** Phase 1 Request for Proposals (RFP) – Acceptance of RDF for Use in a Gasification Facility
- **October 2018:** Phase 2 RFP – Acceptance of RDF for Use in a Gasification Facility
- **August 2020:** Phase 1 RFP – End-Use Markets for Byproducts from the R&E Center
- **March 2021:** Phase 2 RFP – End-Use Markets for Byproducts from the R&E Center
- *(Current solicitation)* **November 2022:** Request for Information (RFI) – End Markets for RDF from the R&E Center

In the previous procurement efforts, R&E engaged with several interested parties but did not identify an alternative outlet for RDF that met R&E's needs.

In November 2022, following robust vendor outreach efforts, R&E released the RFI for providers capable of meeting the R&E Board's need for RDF end markets. The intent of this solicitation was to re-engage with prior and new vendors throughout the end market technologies industry. Responses were received in spring 2023, and additional engagement has been ongoing. R&E staff and consultants evaluating opportunities have identified the need for direction from the R&E Board regarding considerations and priorities for the future management of RDF, including cost implications, environmental benefits and potential to mitigate pollutants of concern.

### **Strategic Foundations for RDF Management**

The approach to future RDF management is grounded in several elements of established R&E Board strategic direction, including the board principles, vision and mission statements and the scope for resource management.

The R&E Board principles were established in 2014, leading up to the purchase of the R&E Center. These principles are used to frame analysis and decision-making across the organization.

#### ***R&E Board Principles***

- Plan for a 20- to 30-year horizon
- Assure flexibility
- Manage risk
- Pivot the view from "waste" to "resources" to add value to the local economy and environment
- Move resources up the waste hierarchy

The R&E vision and mission, established in 2019, are also important to how staff look at issues and decisions. The vision provides the strategic aim for the organization, and the mission describes how to embody the vision day-to-day.

***R&E Vision***      Vibrant, healthy communities without waste

***R&E Mission***    Enhancing public health and the environment by creating value from waste through partnerships

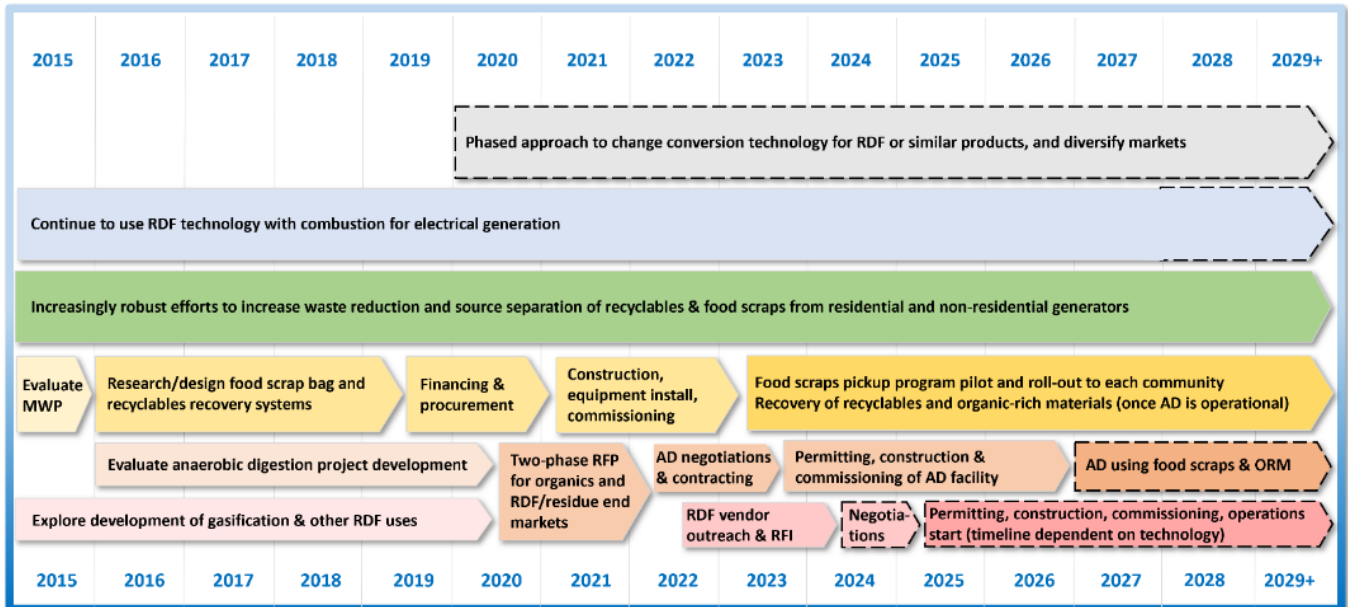
The vision's use of the phrase "without waste" refers to both reducing waste at the source and the use of discarded materials as valuable resources that benefit the community. The mission's use of the phrase "through partnerships" refers to R&E's collaborative approach, such as with the counties, other public entities and the private sector to achieve the R&E vision. This approach gives the counties access to opportunities that would otherwise be out of reach if approaching these goals individually. Both the vision and mission statements ground R&E in the public health lens.

## R&E Board Workshop - Future Management of Refuse-Derived Fuel

The Scope for Resource Management was established in 2014 to create a roadmap for R&E to transform how discarded materials are managed in the East Metro. The counties' plan has always been to do more to manage waste resources higher on the waste management hierarchy. Using this roadmap, the counties, through R&E, have made intentional investments in research, engineering, capital improvements, new programs and public-private partnerships over the past decade.

### Revised\* Scope for Resource Management

*R&E's Roadmap to an East Metro Without Waste*



\* Version 3.0 revised October 2023. Exact dates are subject to change.

Note: Steps with dashed outlines represent uncertainty in timing and the need for the previous step to be successful.

The green bar (third from the top) depicts R&E's continuous efforts on waste reduction and recycling at the source – R&E's highest priority. The yellow bar (fourth from the top) shows the R&E Center enhancements, which include the recyclables recovery system and sorting of food scrap bags. Anaerobic digestion, shown in orange (second from the bottom), is anticipated to be operational in 2027.

The red-colored bars (bottom row of the graphic) depict the exploration of RDF management opportunities. Work to explore new, higher uses for RDF began before purchasing the R&E Center. Ramsey and Washington Counties, through the Resource Recovery Project Board at the time and the R&E Board to present, directed staff to explore and evaluate technologies that capture more value from waste beyond combustion for electrical generation.

The culmination of the R&E Board principles, vision, mission and scope for resource management results in an East Metro solid waste management system that delivers clear value to the community, economy and environment. Recent efforts, including facility enhancements and the launch of the Food Scraps Pickup Program, recover valuable components from waste for recycling, composting and, in the future, anaerobic digestion. The next step is to determine how the R&E Center's RDF will be managed to benefit communities and the environment for the next generation.

### Current State of East Metro Waste System

The counties have developed a comprehensive approach to addressing waste in the East Metro. By implementing systems that facilitate recycling and processing of high-value waste materials, less materials go to landfills and are instead converted into new products and renewable energy. This has

## **R&E Board Workshop - Future Management of Refuse-Derived Fuel**

contributed to a combined recycling rate in the East Metro of over 51% (as of 2022). It also has a substantial climate action benefit, reducing the greenhouse gas (GHG) emissions generated by waste.

Through R&E, the counties are currently rolling out the Food Scraps Pickup Program, which will enable at-home food scrap recycling to all East Metro households, regardless of city, hauler or housing type. This approach uses co-collection of food scraps bags with MSW at no additional cost to participants. Managing organic waste is critical to reaching the state's 75% recycling goal and climate action goals at the county and state level. Implementing this system requires R&E to facilitate new infrastructure to sort food scrap bags and process organics. This is being done by implementing public-private partnerships with waste industry partners.

One such partnership entails sortation of food scrap bags from MSW delivered to transfer stations. As of June 27, 2024, the board has selected Walters Refuse & Recycling and WM to provide this service to the north and central zones of the two counties, respectively. About 67% of residential and multi-unit MSW is delivered to transfer stations, and 33% is hauled directly to the R&E Center. The sortation agreements include a fee that R&E will pay to the two transfer stations to sort MSW containing food scrap bags. R&E will continue to manage the transportation of MSW to the R&E Center after sortation, as well as the delivery of sorted food scraps to a composting or anaerobic digestion facility.

Another public-private partnership for the management of organic waste is with Dem-Con HZI Bioenergy (DCHZI). The agreement signed in September 2023 sets the structure for using anaerobic digestion and a biochar process to manage 50,000 tons of food scraps and organic-rich materials per year. This partnership will generate renewable natural gas and 10,000 tons of biochar and result in a significant reduction of GHG emissions, about 30,000 metric tons of CO<sub>2</sub>e annually, compared to if the organic waste went to a landfill. This is equivalent to the emissions of 7,600 cars taken off the road every year. Under the agreement with DCHZI, R&E will pay a tipping fee for the delivery of organic feedstocks for anaerobic digestion.

The agreement with Xcel is the main partnership between R&E and the private sector to manage solid waste responsibly. Under the current contract with Xcel, the R&E Center delivers a minimum of 300,000 tons of RDF annually to waste-to-energy (WTE) facilities in Red Wing and Mankato. This arrangement, combined with robust recycling and education efforts, allows Ramsey and Washington Counties to avoid landfill disposal for nearly 90% of all MSW generated in the counties, one of the highest landfill diversion rates in the state.

The operation of the R&E Center, including the processing and transportation of waste, combined with R&E's cost commitments for loan repayment and fees from partner agreements, calculate into the tipping fee the R&E Center charges to haulers delivering MSW from the two counties' communities. The projection of current commitments is anticipated to translate into an approximate \$160 per ton tipping fee by 2028 (not including consumer price index increases). This provides the starting point for analyzing the cost to transition to new agreements to manage RDF past 2027.

### **Review of RDF Management Technologies**

#### *Combustion with Electricity Generation*

In December 2023, the board approved a letter of intent for R&E staff and Xcel to negotiate terms for the continuation of the current agreement for an additional 10 years. Such an agreement would allow the R&E Center to continue delivering RDF to the Red Wing and Mankato WTE facilities through the end of 2037. A new contract is anticipated to include a higher Xcel tipping fee than the current fee

## R&E Board Workshop - Future Management of Refuse-Derived Fuel

(averaging out at \$18 per ton). The new fee will likely be approximately \$43 per ton, which will translate to an estimated \$13 cost impact to the R&E Center tipping fee.

There are benefits to continuing a partnership with Xcel. A substantial benefit is that these facilities are currently operational, while non-combustion alternatives do not yet exist in Minnesota. It is anticipated to take several years for new facilities to be designed, financed, permitted, constructed and commissioned. Continuing the partnership with Xcel ensures no disruption in the delivery of RDF to an end market facility between 2027 and 2037, while still allowing for exploration of new partnerships.

WTE facilities also reduce the volume of waste that needs to be landfilled – by 72% compared to if unprocessed MSW were delivered directly to landfill. Further, waste combustion has been shown to mitigate per- and polyfluoroalkyl substances (PFAS) in solid waste due to high heat destroying the chemical bonds. Additional benefits to WTE over landfilling of RDF includes GHG emission reductions. New opportunities for carbon capture are also on the horizon for WTE, which would provide additional carbon reduction benefits.

### *Non-Combustion Alternative Technologies*

Beyond combustion, R&E has evaluated alternative technologies that can receive RDF, generate renewable energy and have the added benefit of capturing additional materials for recycling. These technologies involve proprietary processes to sort and recover materials from trash. Examples of these technologies include:

- Advanced pre-processing and anaerobic digestion of RDF
- Advanced pre-processing and secondary material sortation of RDF to recover paper fiber and additional recyclable material

Partnering with a vendor with either type of technology provides several benefits to R&E in alignment with the board's strategic foundations. Transition to a non-combustion technology for RDF realizes the scope of resource management's plan for a "phased approach to change conversion technology for RDF or similar products." Following this phased approach, a new contract with Xcel could allow for a certain proportion of RDF to be delivered elsewhere without a put-or-pay implication. Essentially, such an arrangement would allow for a "ramp-down" of RDF for combustion and a "ramp-up" of delivering RDF to a new facility over several years.

Another major benefit is the ability to recover additional valuable products from waste. RDF can generate renewable energy products such as biogas or other fuel sources. Additionally, proprietary pre-processing and sortation techniques can recover additional recyclables from RDF, an added 10–16% of materials that could be recycled into new products. This, combined with anaerobic digestion and other techniques, reduces the volume of RDF needing additional management by about 50–75%.

The most substantial challenges of adopting a non-combustion alternative for RDF are related to cost implications and the management of byproducts. Based on the evaluation of current options, the cost to deliver RDF to an alternative facility is anticipated to be higher than Xcel fees. At a high level, initial calculations project an increase of around \$50–75 to R&E Center tipping fees upon the full transition to an alternative facility, not including inflation or consumer price index (CPI) changes. Additionally, because these alternatives use a biological and/or mechanical process to manage RDF, the remaining material consists largely of non-recyclable plastics and other materials that produce a substantial amount of heat when combusted (measured in British thermal units, or BTU). This byproduct may not be suitable for combustion due to how WTE facilities are designed, which means it may need to be landfilled instead.

## R&E Board Workshop - Future Management of Refuse-Derived Fuel

In both combustion and non-combustion scenarios, the R&E Center process of using RDF to generate energy provides a net benefit to public health, the environment and climate action by reducing the amount of GHG emissions generated from Ramsey and Washington County waste. GHG reduction calculations by technology type are being finalized as of this memorandum being published and will be provided to the committee at the July 25, 2024, R&E Board meeting.

The table in **Appendix A** summarizes the options described above. These data points are all approximate and are based on the “baseline” costs post-2027, not including increases due to inflation or CPI.

### Review of Strategic Direction

An objective of the July 25, 2024, R&E Board workshop will be for the board to discuss the prioritization of considerations for determining the future management of RDF, recognizing trade-offs that prevent all considerations from being equally applied. The following is the list of considerations for the evaluation of technologies and vendors to manage RDF over the next 10 to 20 or more years.

- Maximizing recycling of materials from MSW
- Reducing the use of combustion
- Continuing to minimize landfilling
- Greenhouse gas emission reduction and state carbon-free requirements
- Community impacts
- Production of renewable energy and beneficial products from waste
- Pollutant reduction (e.g., PFAS management)
- Cost (impact to R&E Center tipping fees)

R&E staff received feedback on this list, the draft workshop agenda and the overall approach at the June 13, 2024, Facility & Finance Committee meeting.

### Timeline and Next Steps

The graphic below provides the timeline to date for the current effort to procure future RDF management services.



Following the July 25, 2024, R&E Board workshop, the evaluation team for the RDF management RFI will re-engage with proposers based on the direction from the board. Renewed engagement will include the tolerances and priorities identified by the board to determine the vendor or vendors to be engaged toward securing one or more public-private partnerships to manage RDF post-2027.



## **R&E Board Workshop - Future Management of Refuse-Derived Fuel**

Before the end of 2024, staff plan to bring forward a recommendation, first to the Facility & Finance Committee followed by the full board, for selection of one or more vendors to manage RDF. If approved by the board, this will lead to negotiations with vendor(s) for a term sheet, similar to the process for securing a vendor for anaerobic digestion.

The resulting term sheet(s) will come back to the Facility & Finance Committee and R&E Board for approval to enter into negotiations for one or more agreements with vendors. Once consensus on an agreement is reached, it will be brought forward to the board for final approval. If an agreement requires the construction of a new facility to receive RDF, contract execution will start the process of land acquisition, final design, permitting, construction and commissioning. Depending on the type of facility, it is anticipated that this will be a multi-year process.



RAMSEY/WASHINGTON  
RECYCLING & ENERGY  
CONNECTING VALUE TO WASTE

## Appendix A

	Xcel Energy (RDF combustion with electricity generation)	Xcel Energy post-2027	Pre-processing and digestion of RDF	Pre-processing and sortation of RDF for paper/add'l recycling	Landfill only (for comparison, not recommendation)
Approx. cost/ton to deliver RDF to end facility	\$18/ton (avg.)	\$43/ton	\$105/ton	\$150-170/ton	\$82/ton
Annual cost to transport	\$5M to transport to Red Wing & Mankato		TBD based on facility location	NM (non-measurable): assumes location near R&E Center	\$3M to transport to WM Burnsville Landfill
Annual cost to R&E Facility Budget	\$11.5M	\$17M	\$34.5M	\$45M	\$27M
R&E Center tipping fee impact (current \$25/ton)	\$0/ton	+\$13/ton	+52/ton	+\$75/ton	+\$30/ton
Future R&E Center tipping fee	\$130/ton (2025)	\$173/ton*	\$212/ton*	\$235/ton*	\$190/ton*
Additional recycling**	No		Yes - 30% <sup>††</sup>	Yes –26% <sup>††</sup>	No
Volume reduction <sup>†</sup>	Yes - 72%				No
High BTU fuel byproduct (hard to manage material)	No – converted to ash for landfill disposal		Yes – 47% of feedstock	Yes – 53% of feedstock	No
GHG reduction vs landfill	To be provided – calculations being finalized (anticipated favorable in all cases)				N/A
PFAS reduction	Yes		No	No	No
Carbon capture	Possible		No	No	No

\*Assumes base tipping fee of \$160.

\*\* Percent of delivered RDF that is recycled.

<sup>†</sup> Reduction in materials landfilled compared to tons delivered to end market facility.

<sup>††</sup> High BTU fuel byproduct not included in these datapoints; assumed landfilled for purpose of this table.