



Material Recovery Facility Evaluation

Isabella County, Michigan
January 2023

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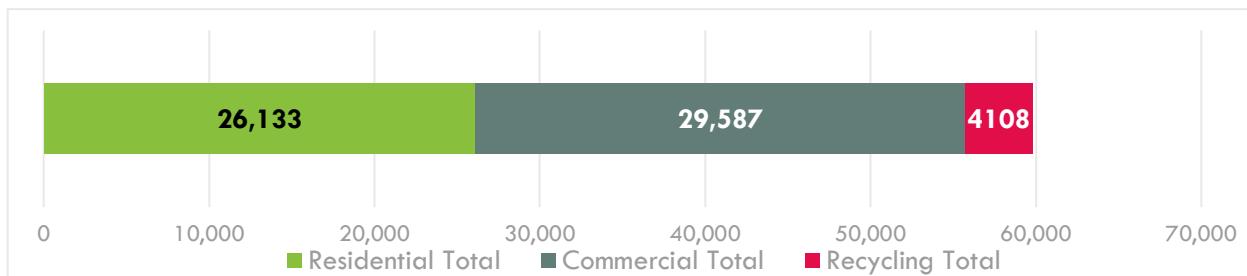
EXECUTIVE SUMMARY

Isabella County requested an assessment of its recycling program, operations, staffing levels, structure, equipment costs, automation potentials, and analysis of single stream system and its potential ramifications if implemented on through put and self-sustainability of the recycling system. RRS was engaged to develop an assessment of the Isabella County Materials Recovery Facility (MRF). RRS conducted:

- a comprehensive recyclable flow analysis (material characterization by recyclable material and potential stream growth) for a 10-year period.
- A facility needs assessment of the existing Materials Recovery Facility (MRF) and an evaluation of technical and marketplace risks to identify the critical equipment capital and operating costs necessary to meet the future needs of Isabella County and the region
- An evaluation of the current recycling systems and recommend alternative strategies to increase the programs efficiencies
- An evaluation of several funding scenarios, such as fee based, municipal bonds, state and federal grants, and private financing.

The vast majority, approximately 98 percent, of municipal waste (MSW) generated in Isabella County in 2021 was disposed of in three landfills located outside of the County. Isabella County's baseline generation is estimated to be approximately 55,720 tons of residential and commercial MSW annually, 26,133 tons and 29,587 tons respectively (Figure 3). RRS collected data and ascertained that the County's 2019 residential recovery of recyclables is 4,108 tons.

Figure ES-1. 2019 MSW Disposed in Tons



Note: Slight differences in values throughout this report are due to rounding.

Based on the waste characterization of waste disposed in an eight-county region, 23 percent is estimated to be single stream materials such as cardboard, office paper, aluminum and steel cans, glass bottles and jars, and plastic bottles and tubs. Approximately 40 percent of disposed material is compostable food waste, yard and wood waste, and compostable paper. And finally, 20 percent is considered other divertible material such as textiles, electronics, and appliances. Only 17 percent of the disposal stream is estimated to comprise of materials that cannot be reasonably recovered at this time (Figure 4).

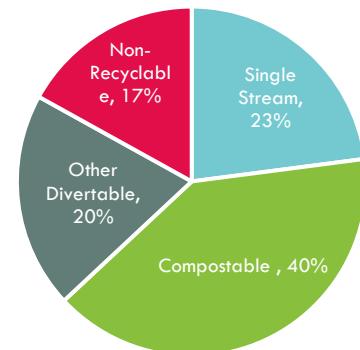


Table ES-1 estimates recycling diversion for current, low, medium, and high recovery scenarios. These estimated scenarios help determine the critical design decision of facility capacity. The estimated yearly recovery tonnage is calculated into daily and hourly recovery throughputs to show the MRF capacity each recovery scenario would support. At a low recovery scenario, it is estimated 5,300 tons per year would need a 7 TPH MRF. This would recover approximately 16.7 percent of the residential trash being landfilled and account for 34 percent of all single stream recyclables.

	Tons Per Year	Tons Per Day	Tons Per Hour
Current	4,100	15.8	3.0
Low Recovery - Growth In County	5,300	20.4	3.0
Medium Recovery - Regional Material @ 25%	8,700	33.5	5.0
High Recovery - County plus Regional and Clare/Midland	17,800	68.5	10.0

Table ES-1. Tons per Year at Varying Recovery Levels

The existing MRF was designed to process 7 tons per hour. The facility needs to be completely rebuilt because of decreasing feedstock density and changing composition and the need to accommodate single stream collection programs throughout both the County and the region. Accordingly, to manage the full volume of material in a single shift, the throughput capability would need to be increased. Given that the cost of upgrading the existing equipment in the MRF to handle more volume would likely be prohibitive and that one of the goals of the upgrade is to reduce labor dependence, RRS does not recommend increasing volume throughput of the existing equipment, but rather on developing a new single stream sort system.

RRS developed two design concepts for new equipment. These designs were then used to estimate the new capital and operating expense to accommodate new and increasing tons on the future. The following table provides the basic information for the two concepts

Table ES-2. Estimated Processing Capacity and Cost for New 7 and 10 TPH Facility

	7 TPH FACILITY	10 TPH FACILITY
Tons processed per hour	7	10
Tons processed per day (7.5 hours X 1 shift)	50	70
Tons processed per year (1 shift, 260 days)	13,100	18,700
Available capacity per year (if 2 shifts per day)	26,200	37,400
Square footage of tipping floor	7.000	10,000
ESTIMATED FINANCIALS		
Equipment capital	6,250,000	8,500,000
Building capital (does not include land)	5,070,000	5,070,000
Tip Floor Addition @ 7,000 sq. ft.	420,000	420,000
Tip Floor Addition @ 10,000 sq. ft.	1,750,000	1,750,000
TOTAL CAPITAL with 7,000 sq. ft. Yip Floor	11,740,000	13,990,000
TOTAL CAPITAL with 10,000 sq. ft. Yip Floor	13,070,000	15,320,000
ANNUALIZED COSTS		
Annual capital cost	1,281,800	2,229,800
Annual operating cost (1 shift per day)*	1,402,500	1,099,800
Cost per ton without Revenue	190	178

*Operating cost does not include profit, capital replacement, or management contingency. Based on a one-shift operation with approximately 17 employees for 7 TPH and 11 employees for a 10 TPH MRF. The total employees may be reduced based on the final design and level of automation.

The analysis of tonnage yielded a projected annual low to high recovery of roughly 5,300 tons of single-sort recyclables to a high of 17,800 tons per year. A standard 7 TPH single-sort processing system can process 13,100 tons per year and was used as a base system size for estimating costs. Equipment and building capital costs for the 7 TPH MRF are estimated at nearly \$1,281,800. Assuming a single 8-hour per day shift, 5 days a week, annual operating costs are estimated at \$1,402,500 with a cost of \$205/ton without revenues from material sales. (See Appendix F for Detail) Equipment and building capital costs for the 10 TPH MRF are estimated at nearly \$2,229,800.

Recommendation

The following is a suggested near-term phased Road Map to increase diversion in preparation to upgrading the existing MRF to meet the 7 or 10 TPH design basis. The County must work with jurisdictions in the county to increase the quantity of material collected through best practices curbside collection with cart based single stream programs. The County must also work to secure partnership or agreements with jurisdiction in adjacent counties to secure commitments for additional tonnage. RRS recommends a phased approach towards implementation. The development of the system in phases allows for funding to be implemented in stages and further evaluation and adjustment be conducted during each phase.

Table ES-3 Road Map

AREA	PHASE 1	PHASE 2	PHASE 3
COLLECTION	<ul style="list-style-type: none"> Identify Local Units of Governments (LUG) recycling contract expiration dates Develop contracting plan that results in synchronization of contracts within 3 years. Seek contract extension for communities with MRF processing contracts that expire in 2022-23. 	<ul style="list-style-type: none"> Sync up contract schedules for initial regional municipalities for collaboration on contracting for communities whose contracts expire in 2023 and 2024 Apply for grants to purchase curbside carts that coincides with new service contracts 	<ul style="list-style-type: none"> LUG recycling contract collaboration Implement Cart based recycling in LUGs with new contracts Evaluate coordinated contracting with MRF for all tons from collaborating LUGs
PROCESSING	<ul style="list-style-type: none"> Develop specific design for MRF Upgrade Initiate a dialogue with adjacent Counties related to the feasibility of providing additional material and developing the Isabell facility as a regional MRF 	<ul style="list-style-type: none"> Identify MRF partners for single stream processing in regional counties Evaluate coordinated contracting for all tons from collaborating LUGs 	<ul style="list-style-type: none"> Upgrade and construct the current facility based on the commitments from regional LUGs and increased recovery within the County
END MARKETS	<ul style="list-style-type: none"> Identify local markets for recyclable commodities, especially for non-curbside recyclable materials 	<ul style="list-style-type: none"> Coordinate with local end markets to provide local manufacturing inputs 	<ul style="list-style-type: none"> Work to supply material to local markets
EDUCATION & OUTREACH	<ul style="list-style-type: none"> Identify measurable goals to launch an outreach campaign Create a library of marketing collateral Improve online presence 	<ul style="list-style-type: none"> Countywide recycling education campaign Campaigns on target audiences/materials 	<ul style="list-style-type: none"> Incorporate social marketing tools such as prompts, effective messages, etc. Survey residents to gauge awareness Monitor participation and material quality (contamination)

MRF EVALUATION

Overview

Isabella County is centrally located in the middle of the Lower Peninsula of Michigan with 572.7 square miles of land area.¹ The county is adjacent to Montcalm, Gratiot, Midland, Gladwin, Clare, Osceola, and Mecosta Counties. There are two cities, three villages, and 16 townships in the county. It is majority rural with most of the county's population residing in the city of Mount Pleasant or Union Township.²

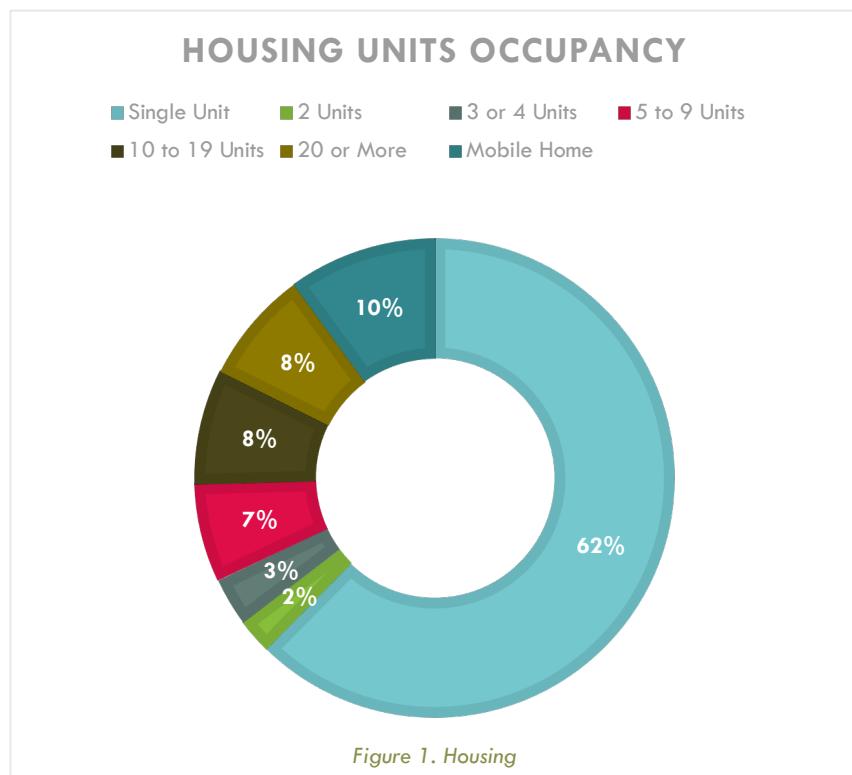
The County has multiple points of access via various transportation corridors.

There are two US highways that run through the county. US-127 runs vertically through the eastern half of the county going through Mount Pleasant, and US-10 clips the northeast corner of the county. Additionally, M-20 is situated laterally and runs through Mount Pleasant. In addition to automobile corridors, there are five local airports in Isabella County: Mount Pleasant Municipal Airport, Woodruff Lake Airport Association, Cal Brewer Memorial Airport, Ojibwa Airpark, and Denton Farms Airport. The Great Lakes Central Railroad operates on the railroad that runs through the County with stops in Shepard, Mount Pleasant, and Rosebush.³

Isabella County is home to approximately 64,813 residents with a population density of 112.4 people per square mile.¹ There are an estimated

28,616 housing units, distributed by single units, multiple units, and mobile homes. Single units make up most residential units in the county at 62%, multi-unit housing makes up 28% of the county's occupancy, and mobile homes make up 10%.⁴ The majority of the populations resides in owner occupied units (40,199) compared to rented units (23,722).⁵

There are 1,343 businesses operating in the county which roughly 25,057 employees.¹ The top employers are Central Michigan University, the Saginaw Chippewa Indian Tribe, McLaren Central Michigan, and Bandit Industries,



¹ census.gov/quickfacts/fact/table/isabellacountymichigan/PST045221

² isabellacounty.org/wp-content/uploads/2019/10/Master-Plan-2012-Amended-Border.pdf

³ glcrailroad.com/freight.php

⁴ data.census.gov/cedsci/table?q=isabella%20county%20housing%20unit&tid=ACSCP5Y2020.CP04

⁵ data.census.gov/cedsci/table?q=isabella%20county%20housing%20unit&tid=ACSDT5Y2020.B25008

Inc.⁶ The largest industries are education services, health care and social assistance, arts, entertainment, recreation, accommodations, and food services, and retail trade.⁷

Infrastructure and Wasteshed

Wasteshed is a term used in the materials management field to describe where, and how, materials ‘flow’ throughout a given geographical area. Much like a watershed, waste is not confined to city or county boundaries and can flow along multiple channels. Unlike water however, the flow of waste is based around economic drivers, the presence of facilities, roads and highways, and contracts between haulers and processors.

Isabella County’s wasteshed includes the residential and commercial material generated from cities, villages, and unincorporated areas. The facility that processes recyclables is operated by the County, and other hauling and waste transfers facilities is owned and conducted by the private sector. The County does not use any flow control measures (economic, contractual, or policy) to direct municipal solid waste, recyclables, or any other material type, to designated facilities. An overview of the County’s wasteshed is geographically represented in Figure 2.

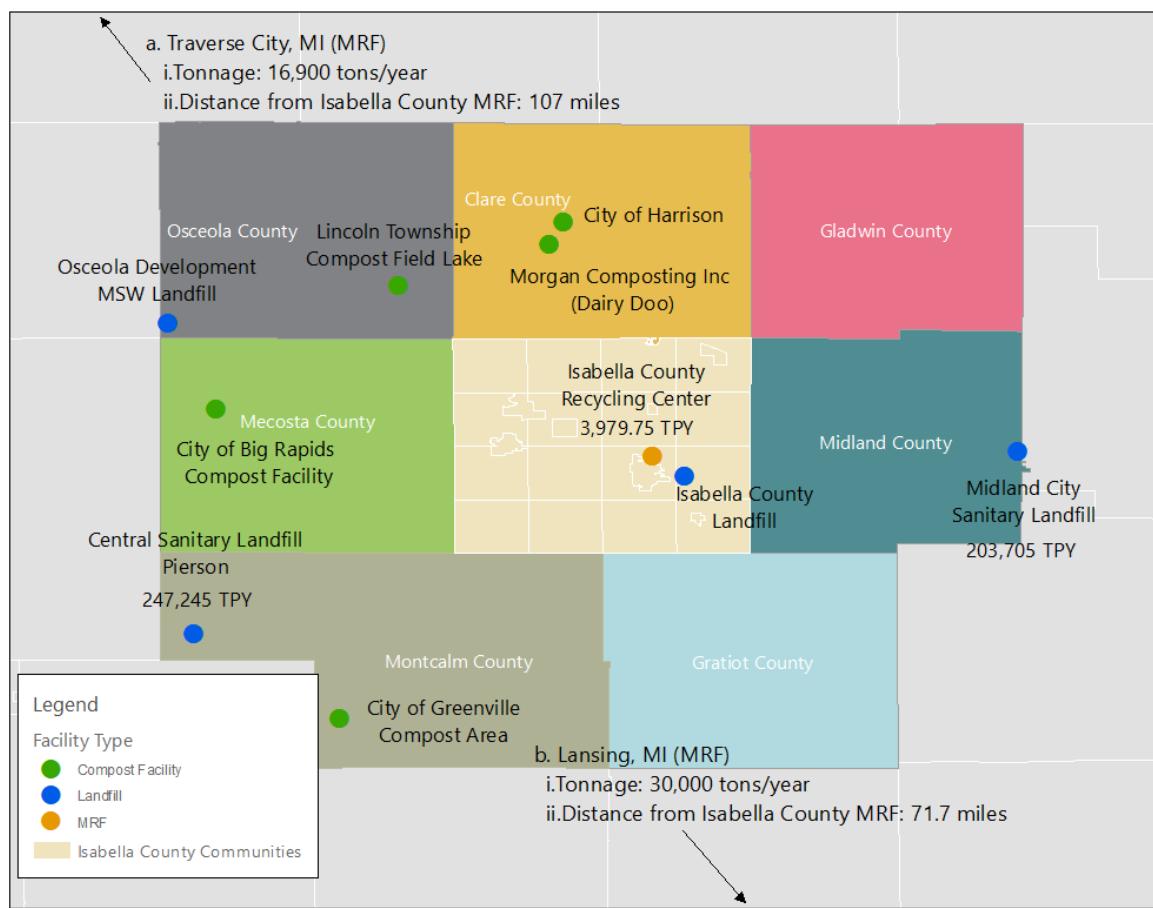


Figure 1. County Wasteshed

⁶ mmdc.org/explore/#:~:text=Top%20Employers&text=Our%20top%20companies%20in%20Isabella,Industries%2C%20Inc.%2C%20Mt

⁷ data.census.gov/cedsci/table?q=employment%20isabella%20county%20michigan&tid=ACSDP5Y2020.DP03

MUNICIPAL SOLID WASTE

The vast majority, approximately 98 percent, of municipal waste (MSW) generated in Isabella County in 2021 was disposed of in three landfills located outside of the County: Central Sanitary Landfill in Montcalm County, Granger Woods Street Landfill in Clinton County, and Northern Oaks Recycling and Disposal in Clare County. Additionally, between 1 percent and 2 percent of municipal and commercial waste generated in Isabella County was disposed in Saginaw County.

There is also one closed landfill in Isabella County. This site is located at the end of West Tomah Road and is a closed, unlined landfill historically licensed under the Garbage and Refuse Act, 1965 PA 87, and certified closed in 1989. A Consent Judgement and Remedial Action Plan were entered in 1994 which included groundwater monitoring for contaminants other than PFAS and installation of an air stripper system for those other contaminants. The air stripper system has not operated since 2011. The property is located on the Saginaw Chippewa Indian Tribe's Isabella Reservation. Isabella County is the listed owner and liable party for this site.

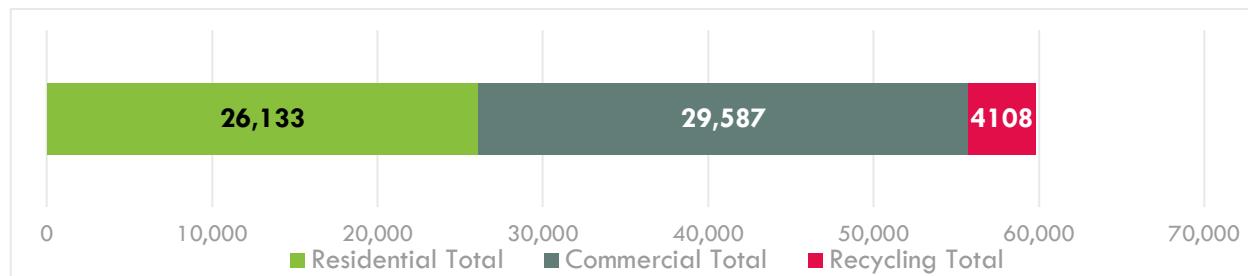
Over the past five years, annual disposal of waste generated within Isabella County fluctuated, but overall has averaged around 55K tons per year. The 2021 per capita disposal rate is 4.12 pounds per person per day.

Current and Potential Recovery

TOTAL GENERATION

Isabella County's baseline generation is estimated to be approximately 333,342 tons of residential and commercial MSW annually (Figure 3). RRS collected data and ascertained that the County's 2019 residential recovery of recyclables is 4,100 tons. A total of 55,720 tons of waste was landfilled from the residential and commercial sectors, 26,133 tons and 29,587 tons respectively (Figure 1). Applying the 2018 State of Michigan's waste characterization estimates to the landfilled tons provides an estimate of recyclable materials that could potentially be recovered (For example, approximately 34,608 tons of curbside recyclables are in the residential disposal stream, and 35,544 tons of curbside recyclables are in the commercial disposal stream. Taken together along with the 4,100 tons of already recycled material, Isabella County generates 21,320 tons of single stream recyclables. Given that 51 percent of the disposal stream is generated in the commercial sector and 49 percent in the residential sector, it is important to note that both the residential and commercial sectors play a role in Isabella County and must be considered in diversion programs.

Figure 3. 2019 MSW Disposed in Tons



Note: Slight differences in values throughout this report are due to rounding.

After gathering insights into the waste generation and composition of the waste stream, the next question the project team addressed was the potential volume of single stream recycling that could be reasonably collected within the County. This question is key to developing a properly sized and designed MRF. The quantity of materials, along with

the material types, dictates the size of the facility, the staffing requirements, and eventually the system costs and potential revenues.

RECYCLABLES

As shown in Figure 2, the Isabella County Recycling Center is the only MRF located in the County. Recyclables collected by the City of Mt. Pleasant and the waste haulers in the County are brought to the facility for processing. Through data collection efforts, it was ascertained that the County's 2021 residential recovery of recyclables is 6,700 tons.

DIVERSION POTENTIAL

Waste Characterization

The development of a waste characterization for Isabella County is based on a review of statewide and municipal waste characterization studies from across the country and then specifically designed for the Michigan disposal environment. Additionally, RRS completed a literature review for any new waste characterization studies. RRS developed a national landfill characterization estimation tool based on 83 different landfill characterization studies. These studies range from individual municipality studies to statewide studies. For each study, RRS standardized the list of materials and summarized the composition of the landfill by percentage of each material. The studies are categorized as coming from low-, medium-, or high-diversion communities, since as more material is diverted from the landfill the composition of the remaining material changes.



In characterizing landfill tonnages for the County and the eight county region (Isabella, Clare, Gladwin, Midland, Ionia, Mecosta, Montcalm, Osceola), disposed municipal solid waste (MSW) from the State of Michigan is reported in cubic yards (CY) and converted to tons using EGLE's methodology of 3 CY/ton of waste. It is worth noting that U.S. EPA uses a 3.3 CY/ton conversion factor; if the calculation used that conversion factor, disposal tonnages would decrease. Additionally, there is reason to believe that reported landfill tonnages may include substantial fractions of materials that fall outside of the classification of MSW, in effect inflating reported quantities of disposed MSW and lowering the calculated recycling rate.

Another key issue is the allocation of waste that is generated by commercial and institutional sectors versus the residential sector. County data on waste landfilled identifies both residential and commercial waste quantities. Table 1 identifies the estimated average weighted percent of residential and commercial and institutional waste in the MSW stream.

Table 1. Distribution of Residential, Commercial and Institutional of Statewide Disposed Municipal Waste

GENERATOR SECTOR	AVERAGE WEIGHTED PERCENT OF RESIDENTIAL AND ICI
Residential	49.3%
Commercial and Institutional	50.7%
Residential and Commercial and Institutional	100.0%

Based on the waste characterization estimate in Table 2, 23 percent is estimated to be single stream materials such as cardboard, office paper, aluminum and steel cans, glass bottles and jars, and plastic bottles and tubs. Approximately 40 percent of disposed material is compostable food waste, yard and wood waste, and compostable paper. And finally, 20 percent is considered other divertible material such as textiles, electronics, and appliances. Only 17 percent of the disposal stream is estimated to comprise of materials that cannot be reasonably recovered at this time (Figure 4).

Based on the studies, Table 2 estimates the eight-county region waste characterization.

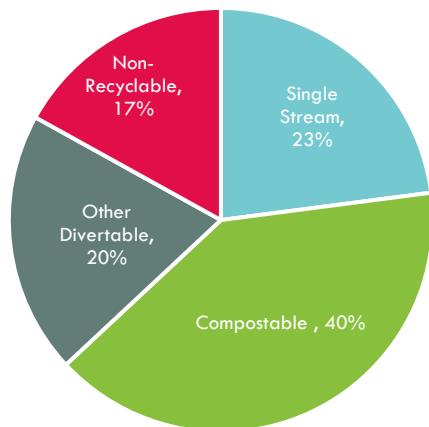


Figure 4. Disposal Stream Composition (2018 data)

Economic Value of Disposed Recyclables

The estimated value of recovering this potentially recyclable material from an eight County region would result in the addition of \$5 to \$11.1 million worth of valued recycled commodities to the regional economy annually, depending on the potential commodity value of material with values identified in known commodity price indexes. Guiding public and private investment to serve the public and private sector and maximize the value of material successfully diverting materials from the landfill is important to achieving goals that improve both Michigan's and Isabella County's economy and environment. The value of the avoided disposal cost for potential divertible material based on the average gate rate for disposal of \$15/ton is approximately \$2.5 million. See Appendix A for a detailed estimate of potential value.

Current and Potential Recycling

As outlined above, approximately 23 percent of the current disposal stream in the County could be diverted to single stream recycling. This includes paper, plastic bottles and tubs, metal cans and trays, and glass bottles and jars. Over the next several decades, the RRS team projects that 76,000 to 80,000 tons of single stream recyclables will be available for diversion within the eight-county region. Presently, 6,700 of the available tons are being diverted annually from within the county.

In 2022, the State of Michigan passed into law several requirements that will increase the quantity of recyclables that will be collected. The most important new requirements are the recycling standards stating that by January 1, 2026, at least 90% of single-family dwellings in urban areas, as defined by the most recent federal decennial census and, by January 1, 2028, at least 90% of single-family dwellings in municipalities with more than 5,000 residents have access to curbside recycling that meets all of the following criteria:

- One or more recyclable materials that are typically collected through curbside recycling programs are collected at least 2x/month
- If recyclable materials are not collected separately, the mixed load is delivered to a solid waste processing and transfer facility and the recyclable materials are separated from material to be sent to a solid waste disposal area

While it is not realistic to capture 100 percent of the recyclable and compostable material in the disposal stream, understanding the disposal composition allows the project team to frame realistic estimates of diversion rates and tonnages. To estimate the amount of single stream recyclables that could realistically be captured from the disposal stream, the RRS team created several recycling diversion scenarios that varied the recoverability rate based on material types. For example, items that are commonly generated at home or in the office and have long been part of recycling programs such as magazines, phonebooks, newsprint, and cardboard are given the highest recoverability rate from 30 percent for a low diversion program to 55 percent for a high diversion program. Descriptions of all the recovery rates are presented in the table below.

Table 2. Modeled Recovery Rates

MATERIAL DESCRIPTION	LOW RECYCLING DIVERSION	MEDIUM RECYCLING DIVERSION	HIGH RECYCLING DIVERSION
Items commonly generated at home or in the office and long part of recycling programs (ex: magazines, phonebooks, newsprint, cardboard)	30%	45%	55%
Items consumed both at home and on the go and long part of recycling programs (ex: plastic drinking bottles and jugs)	25%	35%	45%
Other plastic packaging and glass non-carbonated beverage containers	20%	25%	30%
Items that are newer to recycling programs (ex: milk cartons, plastic tubs, rigid containers)	15%	20%	25%

Once a higher performing recycling program is well established, it may be possible for Isabella County to push towards a high diversion program scenario. This would require continual implementation of the low and medium recovery activities, and additional resources devoted to consolidating residential collection, so all programs provide a similar and consistent service, mandated participation for both residential and commercial generators, requiring automated cart based collection service, and requirements for the commercial sector to recycle specific materials.

RRS estimates there is anywhere from 17,500 to 26,000 tons per year of recyclables available collectively from Clare, Gladwin, Ionia, Mecosta, Midland, Montcalm, and Osceola Counties, depending on the recovery rate of each of these jurisdictions. These counties annually recover approximately 6,300 tons of recyclable material.

Table 3: Estimated Regional Tonnage Data

County	Hauler(s)	Mixed Recycling POTENTIAL (Residential) - Tons	Mixed Recycling POTENTIAL (Commercial) - Tons	Possible Residential Recycling Tons @ 25%
Clare	Municipality-specific; Republic Services, Waste Management	1,611	2,278	403
Gladwin	Municipality-specific; Republic Services, Waste Management	1,328	1,875	332
Ionia	Municipality-specific; Republic Services, Granger, Lake Odessa	3,370	4,760	843
Mecosta	Municipality-specific; Republic Services	2,284	3,228	571
Midland	Municipality-specific; Republic Services	4,369	6,172	3,000
Montcalm	Municipality-specific; Republic Services, Waste Management, Granger, American Waste, Kings Disposal	3,356	4,743	839
Osceola	Municipality-specific; Republic Services, Ms. Green, GFL	1,222	1,728	306
Total		17,540	24,784	6,293

Table 4 estimates recycling diversion for current, low, medium, and high recovery scenarios. These estimated scenarios help determine the critical design decision of facility capacity. The estimated yearly recovery tonnage is calculated into daily and hourly recoveries throughputs to show the MRF capacity each recovery scenario would support. At a low recovery scenario, it is estimated 5,300 tons per year would need a 7 TPH MRF. This would recover approximately 16.7 percent of the residential trash being landfilled and account for 34 percent of all single stream recyclables.

	Tons Per Year	Tons Per Day	Tons Per Hour
Current	4,100	15.8	3.0
Low Recovery - Growth In County	5,300	20.4	3.0
Medium Recovery - Regional Material @ 25%	8,700	33.5	5.0
High Recovery - County plus Regional and Clare/Midland	17,800	68.5	10.0

Table 4. Tons per Year at Varying Recovery Levels

Note: Total tons per year for low, medium, and high recovery include current tons captured plus additional tons captured from the disposal stream (ex: 19,567 tons additional single stream recycling + 4,100 tons current single stream recycling = 11,400 total tons single stream recycling under the low recovery scenario). The percentage recovery is based on an average of various recovery levels for different recyclables based on RRS industry knowledge of recoverability. For example, under the low recovery scenario 40% of Old News Print (ONP) is recovered while only 15% of plastics #3-7 are recovered.

This is representative of what the County is likely to consider as the recycling program expands and matures. The projected recovery scenario represents “best practice” for County programs. It is higher than presently experienced and reflects various recovery scenarios the County should be aspiring too. The County could support a small 5-10 TPH MRF if the County were to recover approximately 35-40 percent of the available recyclables. However, it may be possible for the County to support a much larger MRF if a greater percentage of recyclables were recovered and/or if recyclables were secured from the surrounding counties under a contractual arrangement.

MRF PROCESSING

System Overview

MRF size is typically characterized by reference to the maximum throughput tonnages that the MRF is capable of processing. Increasing the quantity of commingled recyclables at the point of collection (single stream) means the need for more sophisticated processing equipment in MRFs compared to source separated materials, especially when the quantity of collected materials requires larger designed MRFs processing greater than 15 TPH (tons per hour).

A MRF cleans a mixed stream and creates material that reaches at least the minimum level of quality needed for recycling. Today's single stream MRF, frequently referred to as the modern MRF comes in all sizes, shapes, and forms with automated and more mechanized processing equipment. Research indicates operational effectiveness (reduced sorting and processing costs while maintaining the desired throughput of materials) for single stream facilities is 10 TPH or 20,000 tons per year (TPY) for a single shift. Recent designs with a single sort line appear to perform well in the 10 to 15 TPH-size ranges and as high as 50 TPH.

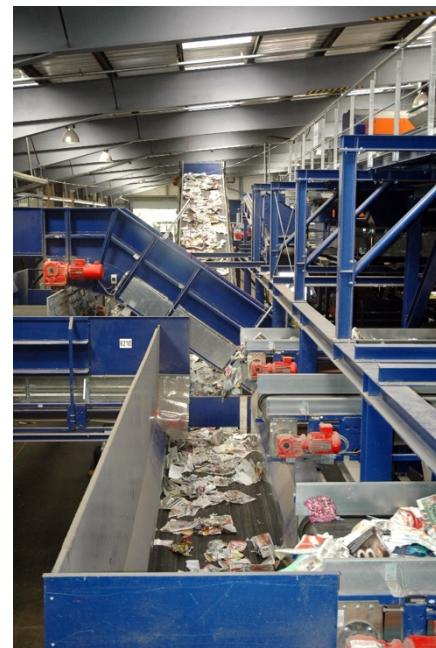
The MRF processing system analyzed for the County is a single stream processing system. Given the possibility that the County could increase recycling and/or secure contracts from surrounding counties to support a MRF for recyclables, this section describes a possible 7 TPH MRF and provides a financial model for both a 7 TPH and 10 TPH MRF (operating a single shift). The description and accompanying charts, figures, and illustrations are not intended to design a MRF for the County. Design is very specific and difficult to incorporate in a generic model. The information here is intended as a guide for an industry standard MRF appropriately sized to meet economies of scale and compete in the marketplace.

Single Stream MRF

A Material Recovery Facility (MRF) is a specialized plant that receives, separates, and prepares recyclables for marketing to end-user manufacturers. There are different MRF processing systems that operate as a function of the differing collection systems in place. This project assesses a commingled recyclables MRF receiving recyclables in a single stream which is the haulers current method of service collection. Recyclables are separated from trash and brought to the MRF for processing as single stream materials to be sorted into individual commodities and sold to market.

This report assumes the proposed MRF can sort and market those materials that fall into the category of materials that would be processed by a clean single stream MRF. These include:

- High Grade Paper - general with white and colored ledger
- Mixed/ Unspecified Office Paper
- Low Grade Paper - general old magazines (OMG), boxboard, paper bags, phonebooks, mixed office
- Old Newsprint (ONP)
- Old Corrugated Cardboard (OCC)
- Cartons, Aseptic and Poly-coated
- Polyethylene Terephthalate (PET) bottles and containers (#1)
- High Density Polyethylene (HDPE) bottles natural & colored (#2)



- Plastic bottles and #3-7 (general)
- Aluminum Cans
- Ferrous Metals (includes tin/steel cans, tin)
- Glass - bottles and jars

The list identified above are included materials referred to as recyclables. These materials are generally classified as curbside recyclables and are broadly referenced as paper, cardboard, plastics, glass, cans, and cartons. As technologies advance, sorting capabilities at MRFs will make it possible to process other materials through the MRF. Possible materials such as Bulky Rigid Plastics and various flexible packaging and films may become sortable in the future but are not included as curbside recyclable for this analysis.

One of the most critical design decision points relates to facility capacity. The equipment layout and design concern is tons per hour (TPH), but defining that parameter depends on a number of factors, including the total number of tons per year, the hours of operation (hours/week), operating one or multiple shifts, and whether sizing for peak periods is accommodated by top floor capacity, extra operating hours, or excess throughput capability. Additionally, the design must accommodate the particular stream composition and variations in that composition.

MRF equipment varies somewhat from one manufacturer to another, but with a few exceptions there is general agreement on the process sequence. This process sequence includes:

1. Tipping floor
2. Sorting area
 - a. In-feed conveyors
 - b. Sorting stations
 - c. Screens/separators
3. Baler area
4. Interim storage

The two areas where design sequences vary significantly are the placement and method of glass removal and the placement and method of small fiber recovery. Additionally, sorting systems may be completely automated, strictly manual, or a combination of the two. In short, product quality is more dependent on operational decisions than on technology; meaning that operating, maintaining, and appropriately staffing the MRF, along with minimizing inbound contamination are non-technology aspects that directly impact the performance of the technology used in the MRF. Technology and scale do play a major role in improving efficiency of sorting operations. The material flow through a MRF can vary and the steps, and equipment, described below may not be the most appropriate in the County's MRF application, depending on site location and other considerations.

Siting and designing a MRF considers efficiency and operational safety issues. Issues such as location, site characteristics, local zoning and permitting requirements that impact facility design, layout, and process/operational flow. A MRF is an industrial facility, like other manufacturing facilities. It is presumed a MRF would fall under industrial zoning requirements. Property size is an important consideration. Larger sites allow for buffering, truck queuing and maneuverability, and spacing for bale storage. Site utilities must accommodate the needed power for equipment. Additionally, adequate water supply for fire protection is needed. A MRF should be enclosed by a screened fence.

Based on RRS analysis, no increased capacity should be planned for the upgrade of the MRF.

- The Low Recovery is based on existing conditions with the possibility of processing up to 5,300 tons annually over one operating shifts. (See Appendices)
- The Medium Recovery drops that upper limit to 8,700 tons annually. That volume of materials can be processed in one shift if the upgraded MRF is able to process 5-10 tons per hour. Peak season periods

would likely require extended shifts. Alternatively, the MRF could be redesigned to run more tons per hour and fewer hours per day. This approach might make sense if the MRF is highly automated.

- Scenario 2 assumes that the County pursues regional volumes and works with other counties and municipalities. In that case, the upper limit on tons drops to 17,800 annually. At 10 tons per hour, that material could be processed in 7 production hours per day or within one shift 5 days per week. Alternatively, the MRF could be redesigned at a lower throughput rate and an additional shift, several days per week.

UPGRADE CONSIDERATIONS

Any upgrade to the MRF needs to achieve the following:

- Provide adequate throughput to allow the MRF to keep up during peak season even with typical equipment failures
- Make efficient use of capital investments and labor to achieve competitive processing costs
- Assure long equipment life if equipment is properly maintained
- Reduce dependence on an unreliable workforce
- Have reasonable maintenance requirements

UPGRADE STEPS

At a minimum, until more is known about the plans of large haulers, Isabella County needs to pursue a path that can provide a solution for either achieving Baseline Growth and collection modifications within municipal programs in the County or Scenario 2 where the County pursues additional material from regional haulers and municipal programs. This either means developing a plan to meet the needs of Scenario 2 and adjust operating hours as needed if reality proves closer to Scenario 1 or develop two separate upgrade plans with one being chosen based on events later in the process.

The recommended steps for the upgrade follow:

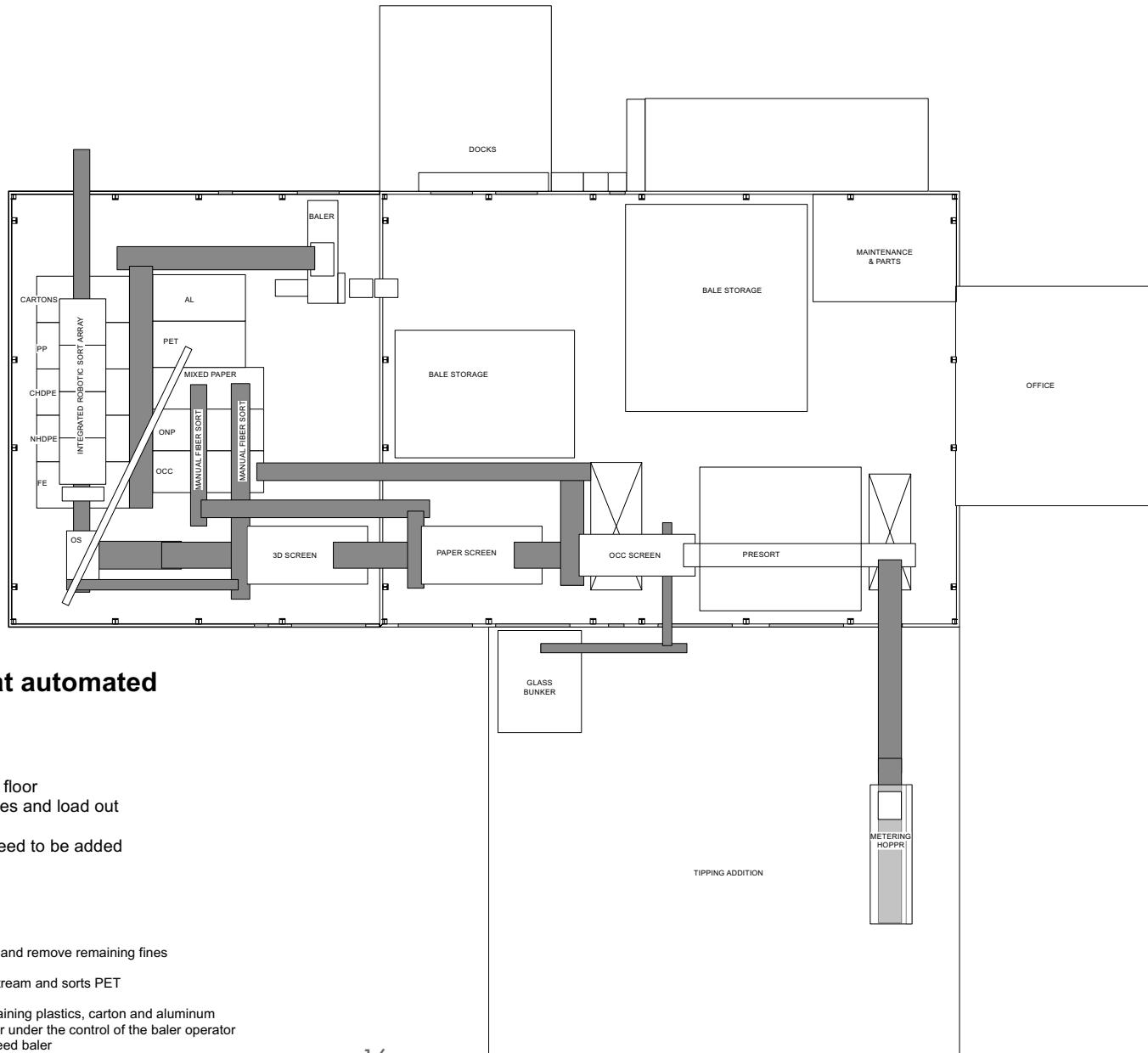
1. Develop preliminary plan for relevant scenarios identifying equipment that will be replaced.
2. Perform a detailed facility inspection to determine if any of the equipment being reused needs to be replaced or needs a major rebuild. This inspection can be limited to equipment targeted for reuse; however, it may be advantageous to have this inspection be part of a full MRF inspection that will be used to hold the existing contractor liable for failure to maintain and repair equipment per operating contract stipulations. In either case, this inspection should be performed by factory trained experts and should include removal of guards, and where necessary, belts to allow measurement of wear and identification of hidden damage.
3. Once the inspection is completed the upgrade plan will need to be updated to include additional equipment that needs to be replaced and to identify major facility modifications
4. Select appropriate equipment approach
5. Develop upgrade specifications for use in procurement documents

RECOMMENDED UPGRADES BY SCENARIO

The existing MRF was designed to process 7 tons per hour. It is likely that the facility needs to be completely rebuilt because of decreasing feedstock density and changing composition and the need to accommodate single stream collection programs throughout both the County and the region. Accordingly, to manage the full volume of material in a single shift, the throughput capability would need to be increased. Given that the cost of upgrading the existing equipment in the MRF to handle more volume would likely be prohibitive and that one of the goals of the upgrade is to reduce labor dependence, RRS does not recommend increasing volume throughput of the existing equipment, but rather on developing a single stream sort system. This also means that to meet the needs for Scenario 1 and 2 new equipment lines will be developed around different throughput capacity.

UPGRADE SCENARIOS

This section recommends specific equipment upgrades along the path of the recyclables in the MRF. The estimated pricing is volatile, and these numbers should not be used to set a budget ceiling. A more in-depth price analysis and preliminary discussion with equipment vendors will be needed after Isabella County determines the path to follow to make sure the planned budget is adequate.



Mid-Level - Somewhat automated

6-8 plus tons per hour
 4 workers at presort
 6 workers at paper QC
 1 worker at OCC QC
 1 loader operator manages tipping floor
 1 baler operator manages baler bales and load out

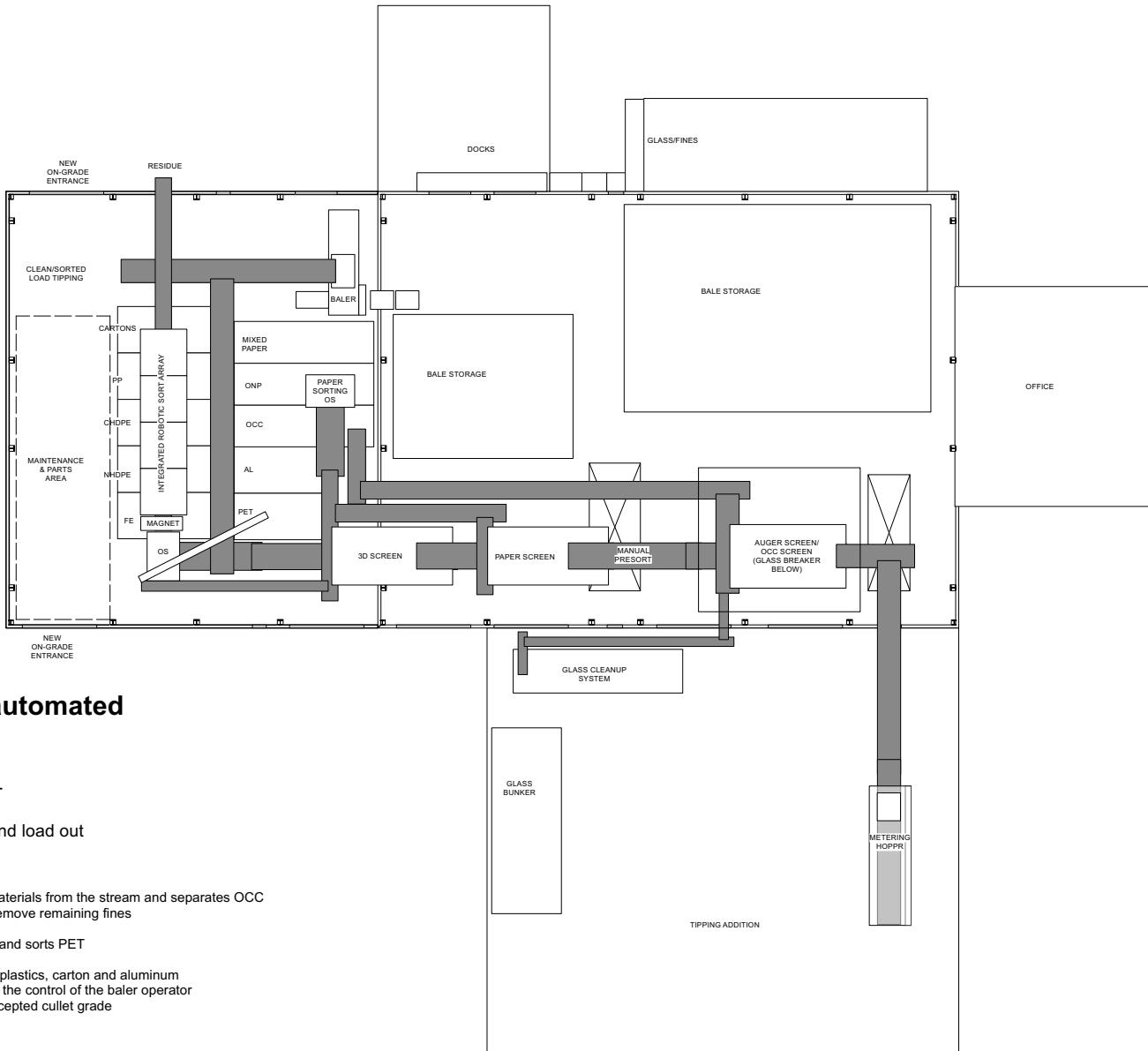
Some form of glass cleanup may need to be added

KEY FEATURES:

Fully manual presort
 Ballistic separators sort paper from containers and remove remaining fines
 Manual paper sort
 Optical sorter recovers paper from container stream and sorts PET
 Magnet captures steel cans
 Integrated robotic sorter (4 stations) sorts remaining plastics, carton and aluminum
 Sorted containers are mechanically fed to baler under the control of the baler operator
 Paper bunkers require loader push-through to feed baler
 No glass cleanup shown

Table 6. Capital Estimate 6-8 TPH

		Mid Level - Semi Automated 6-8 TPH	
ITEM		DESCRIPTION	ESTIMATED INSTALLED COST
INFEED SYSTEM			
Metering Hopper & Drum		30 cy capacity, hopper conveyor, guarding	\$ 400,000
Primary Infeed Conveyor		Steel belt	\$ 200,000
Auger Screen		Screen, discharge chutes and support structure	
FIBER SORT			
OCC Screen		Separates OCC from other materials	\$ -
Glass Breaker		2-stage mounted under Auger screen or OCC Screen	\$ 250,000
Primary Ballistic			\$ 450,000
Polishing Ballistic			\$ 450,000
Fiber Optical Sorter		Dual eject; Includes acceleration conveyor, compressor and plumbing	
CONTAINER SORT			
Container Optical Sorter		Dual eject; Includes acceleration conveyor, compressor and plumbing	\$ 900,000
PET Blower System			\$ 12,500
Magnet			\$ 27,000
Integrated Robot Array			\$ 1,600,000
MATERIAL STORAGE AND BALING			
3 Live-Bottom Fiber Bunkers		Includes hydraulic system	
3 Push-Thru Fiber Bunkers		Alternative to live bottom	\$ 250,000
7 Slope-Bottom Container Bunkers		Include hydraulic or chain winch operated doors	\$ 650,000
Baler			\$ 500,000
Baler Feed Conveyor			\$ 180,000
Glass Cleanup System			\$ 380,000
OTHER BUILDING AND SUPPORT INFRASTRUCTURE			
Other Conveyors			\$ 950,000
Platforms, Support Structures, Chutes, Railings & Stairs			\$ 800,000
Control System			\$ 800,000
Wiring			\$ 350,000
Electrical Upgrade to Building and Power Drops		Anticipate that building service will need to be increased to 1600 Amp	\$ 90,000
Mechanical Installation			\$ 1,200,000
Modifications to Existing Building Wall & Doors		Internal wall would be modified and doors removed, moved, or added	\$ 180,000
Initial Spare Parts			\$ 700,000
EQUIPMENT SUBTOTAL			\$ 11,319,500
TIP FLOOR			
Tipping Building		7,000 sf @ \$60/sf (sf cost varies with type of construction and durability requirements)	\$420,000
Tipping Building		10,000 sf @ \$175/sf (sf cost varies with type of construction and durability requirements)	\$1,750,000
TOTAL		EQUIPMENT PLUS 7,000 sf Tip Floor @ \$60/sf	\$ 11,739,500
		EQUIPMENT PLUS 10,000 sf Tip Float @ \$175/sf	\$ 13,069,500
ITEMS THAT MAY NOT BE NEEDED OR IMPLEMENTATION CAN BE DELAYED			
ITEMS WHERE COST MAY CHANGE BASED ON CONDITIONS			



High end - Nearly fully automated

- 10 plus tons per hour
- 2-3 workers at presort
- 1 worker at OCC QC
- 1 loader operator manages tipping floor and clean load feed to baler
- 1 baler operator manages baler bales and load out

KEY FEATURES:

- Auger screen on front end removes most problem materials from the stream and separates OCC
- Ballistic separators sort paper from containers and remove remaining fines
- Optical sorter sorts/cleans paper
- Optical sorter recovers paper from container stream and sorts PET
- Magnet captures steel cans
- Integrated robotic sorter (4 stations) sorts remaining plastics, carton and aluminum
- Sorted materials are mechanically fed to baler under the control of the baler operator
- Glass cleanup system (if needed) cleans glass to accepted cullet grade

Table 7. Capital Estimate 10 TPH

		High end - Nearly fully automated 10+ TPH	
ITEM		DESCRIPTION	ESTIMATED INSTALLED COST
INFEED SYSTEM			
Metering Hopper & Drum		30 cy capacity, hopper conveyor, guarding	\$ 400,000
Primary Infeed Conveyor		Steel belt	\$ 200,000
Auger Screen		Screen, discharge chutes and support structure	\$ 500,000
FIBER SORT			
OCC Screen		Separates OCC from other materials	
Glass Breaker		2-stage mounted under Auger screen or OCC Screen	\$ 250,000
Primary Ballistic			\$ 450,000
Polishing Ballistic			\$ 450,000
Fiber Optical Sorter		Dual eject; Includes acceleration conveyor, compressor and plumbing	\$ 1,000,000
CONTAINER SORT			
Container Optical Sorter		Dual eject; Includes acceleration conveyor, compressor and plumbing	\$ 900,000
PET Blower System			\$ 12,500
Magnet			\$ 27,000
Integrated Robot Array			\$ 1,600,000
MATERIAL STORAGE AND BALING			
3 Live-Bottom Fiber Bunkers		Includes hydraulic system	\$ 1,000,000
3 Push-Thru Fiber Bunkers		Alternative to live bottom	
7 Slope-Bottom Container Bunkers		Include hydraulic or chain winch operated doors	\$ 650,000
Baler			\$ 500,000
Baler Feed Conveyor			\$ 180,000
Glass Cleanup System			\$ 380,000
OTHER BUILDING AND SUPPORT INFRASTRUCTURE			
Other Conveyors			\$ 950,000
Platforms, Support Structures, Chutes, Railings & Stairs			\$ 800,000
Control System			\$ 800,000
Wiring			\$ 350,000
Electrical Upgrade to Building and Power Drops		Anticipate that building service will need to be increased to 1600 Amp	\$ 90,000
Mechanical Installation			\$ 1,200,000
Modifications to Existing Building Wall & Doors		Internal wall would be modified and doors removed, moved, or added	\$ 180,000
Initial Spare Parts			\$ 700,000
EQUIPMENT SUBTOTAL			\$ 13,569,500
TIP FLOOR			
Tipping Building		7,000 sf @ \$60/sf (sf cost varies with type of construction and durability requirements)	\$420,000
Tipping Building		10,000 sf @ \$175/sf (sf cost varies with type of construction and durability requirements)	\$1,750,000
TOTAL		EQUIPMENT PLUS 7,000 sf Tip Floor @ \$60/sf	\$ 13,989,500
		EQUIPMENT PLUS 10,000 sf Tip Floot @ \$175/sf	\$ 15,319,500
ITEMS THAT MAY NOT BE NEEDED OR IMPLEMENTATION CAN BE DELAYED			
ITEMS WHERE COST MAY CHANGE BASED ON CONDITIONS			

Financial Model

The following cost estimates are based on the development of a new MRF, either through public procurement, by the private sector or through public/private partnerships. A cost model for a particular design capacity provides the County with an estimate of capital and operating costs. The model can be investigated under a wide range of operating and design parameters. This model assumes:

- MRF design parameters shown in Table 8
- Single stream recyclables
- One eight-hour shift, five days/week
- All materials baled
- Minimal manual sorting
- No land cost

This estimate does not provide definitive cost comparisons based on specific equipment bids. It is representative of capital and operating costs for a 7 TPH and 10 TPH MRF. The primary intent is to provide the County with a cost estimate to evaluate various options for processing recyclables. Firm cost numbers can be developed by asking vendors for preliminary proposals.

Table 8. Estimated Processing Capacity and Cost for New 7 and 10 TPH Facility

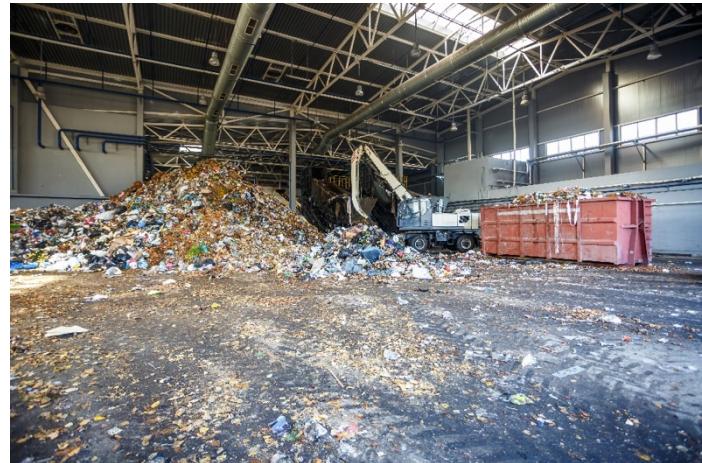
	7 TPH FACILITY	10 TPH FACILITY
Tons processed per hour	7	10
Tons processed per day (7.5 hours X 1 shift)	50	70
Tons processed per year (1 shift, 260 days)	13,100	18,700
Available capacity per year (if 2 shifts per day)	26,200	37,400
Square footage of tipping floor	7.000	10,000
ESTIMATED FINANCIALS		
Equipment capital	6,250,000	8,500,000
Building capital (does not include land)	5,070,000	5,070,000
Tip Floor Addition @ 7,000 sq. ft.	420,000	420,000
Tip Floor Addition @ 10,000 sq. ft.	1,750,000	1,750,000
TOTAL CAPITAL with 7,000 sq. ft. Yip Floor	11,740,000	13,990,000
TOTAL CAPITAL with 10,000 sq. ft. Yip Floor	13,070,000	15,320,000
ANNUALIZED COSTS		
Annual capital cost	1,281,800	2,229,800
Annual operating cost (1 shift per day)*	1,402,500	1,099,800
Cost per ton without Revenue	190	178

*Operating cost does not include profit, capital replacement, or management contingency. Based on a one-shift operation with approximately 17 employees for 7 TPH and 11 employees for a 10 TPH MRF. The total employees may be reduced based on the final design and level of automation.

The analysis of tonnage yielded a projected annual low to high recovery of roughly 5,300 tons of single-sort recyclables to a high of 17,800 tons per year. A standard 7 TPH single-sort processing system can process 13,100 tons per year and was used as a base system size for estimating costs. Equipment and building capital costs for the 7 TPH MRF are estimated at nearly \$1,281,800. Assuming a single 8-hour per day shift, 5 days a week, annual operating costs are estimated at \$1,402,500 with a cost of \$205/ton without revenues from material sales. (See Appendix E for Detail) Equipment and building capital costs for the 10 TPH MRF are estimated at nearly \$2,229,800.

Assuming a single 8-hour per day shift, 5 days a week, annual operating costs are estimated at \$1,099,800 with a cost of \$178/ton without revenues from material sales. (See Appendix F for Detail)

A 10 TPH MRF has the capacity to process the recyclable tons collected if the County were to increase its recovery to 25-40 percent of disposed available recyclable material and enter into processing agreements for regional material with either haulers or municipalities. Such a system would provide some capacity for supply growth within the eight hour per day shift. Additional tons and operating a second shift will lower the cost per ton operating cost. The additional capacity can be filled by single stream recyclables from other regional jurisdictions.



MARKETS

Market Risks

One of the considerations regarding the County's preferred method of facility processing ownership is risk. One risk area is the volatility of end markets and the value of specific grades of material.

As previously mentioned, a MRF cleans a mixed stream and creates material that reaches at least the minimum level of quality needed for recycling. MRFs then arrange markets for the materials. For materials to be marketable, they must be processed to meet quality and shipping standards established by the buyer. Material import bans and strict contamination limits (discussed extensively in Recycling Markets Trends) impacted the markets and thus commodity values. A modern MRF, can be designed to achieve quality standards specified by stringent limits; however, a MRF is designed to sort materials, not transform them. Mitigating price and capacity risks starts directly in the bin.

The more non target materials and contamination that a site must deal with the lower the output material quality, the bigger the cost and the higher the risk of end markets not being secured. Putting the correct materials in curbside bins is a critical program performance objective. Moisture content is also critical: bins without lids capture rainwater, affecting the ease of processing materials. Working with the County's LUGs can help mitigate contamination. Standardizing collection methods helps to balance the input.

Another consideration that complicates the development of processing facilities is the “evolving ton”, a term being used to describe the shift in the overall composition of the recyclable material stream over the past 20 years. One of the trends responsible for this evolution has been the light weighting of packaging, especially through the use of materials like plastics and aluminum that have displaced materials like glass and steel. More recently, even rigid plastic packaging formats have started to be displaced by rapidly growing formats in flexible packaging. Plastics are not alone in driving the waste shift: electronic media have played a major role in changing the composition of our recyclable stream by reducing the quantity of newspaper and office paper. In addition, there has been an increase in corrugated cardboard from the residential sector caused by an increase in online purchases that is shipped in boxes (“Amazon Effect”).



It's also critical to understand that while more types of plastics are getting collected, complexity has increased even within the resin types the recycling system has traditionally handled. In response to growing pressure to recycle more, many companies are shifting to “recyclable” materials, often defining them as those accepted in community recycling programs. One of the best examples of this trend has been Polyethylene Terephthalate (PET) replacing Polyvinyl Chloride (PVC) or Polystyrene (PS) thermoforms and heavier jar and container material like glass. The unforeseen consequence of this well-intentioned transition is the recent diversification of PET in the recycling stream, a phenomenon that has lowered the yield of usable materials (the PET used in plastic clamshell packages (ex: Strawberry container), blister packs (ex: over-the-counter medicine) and ketchup bottles is not the same as that used in a soda bottle).

To achieve higher diversion of materials, it will require the development of additional sorting abilities and marketing capacity in the regional waste shed that could support a MRF including IsabellaCounty. The number of products produced is a choice of the operator, based on trade-offs among several factors including marketability, price, cost of production and environmental values. For example, white office paper can be extracted from a mixed residential sort as part of Sorted Residential Papers and News (SRPN), part of a mixed paper grade, part of sorted office paper (SOP), or sorted white ledger (SWL). MRF operators can usually select how the fiber in the feedstock gets divided into end products.

Another factor in selecting what products to produce is the evolution of the consuming fiber mills. While recent single stream MRFs are now able to produce very clean SRPN, mills have also adapted to work well with a wider range

of feedstock. Few mills can afford to refuse SRPN and few if any offer a premium price based on origin. Some mills will pay a premium based on long-term consistent high quality, regardless of the MRF technology.

Recycling Market Trends

The orderly supply chain for the previously healthy recycling commodities market has experienced an overall price decline, as indicated in the Average Commodity Revenue (ACR) shown in Figure 6. Freight and shipping costs have spiked as new markets are developed that do not have the advantages related to the Chinese export market (demand, infrastructure, freight backhaul). In March 2020, the ACR was \$30.22 per ton, less than 25% of what it was at \$130.36 per ton in October of 2021. Commodities such as sorted news grade residential paper, corrugated containers (cardboard boxes), aluminum and steel cans, natural HDPE and PET are critical to maintaining a positive ACR value, while 3 mix glass (all colors mixed) and residue meaning items placed out at the curb that are not accepted at the MRF negatively contribute to the ACR value. For example, corrugated containers account for a positive 36.9% of the average commodity revenue value is a critical part of generating revenue for a MRF. At the same time, the value of 3 mix glass is negative 11% of the ACR which indicates managing this material comes at a cost to a MRF (decreases the ACR value).



Figure 6. Historic Composition Average Commodity Revenue

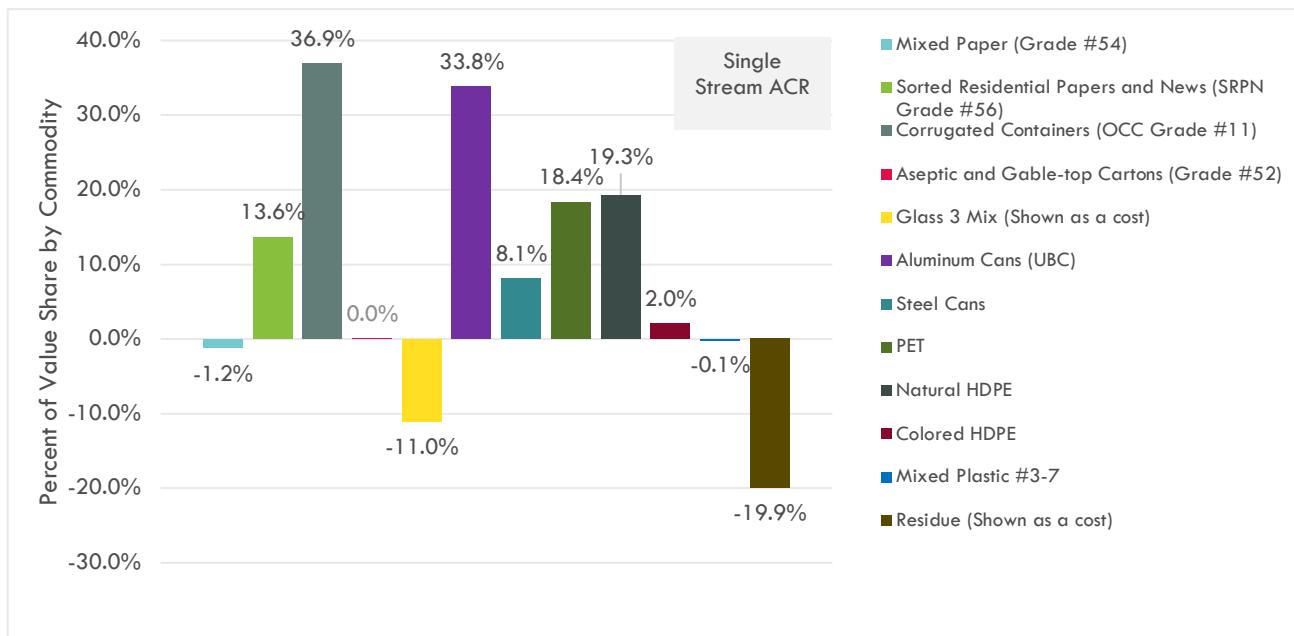


Figure 7. Value Share of Average Commodity Revenue by Commodity March 2021

The overriding story for recycled commodity markets has been the complete imposition of Chinese inspections and enforcement initiatives under the branded “National Sword” and “Blue Sky 2018” campaigns, and the Chinese World Trade Organization (WTO) ban on unsorted mixed recovered materials and all “human consumed” packaging and post-consumer plastic grades. These actions have effectively stopped Sorted Residential Paper and News (SRPN Grade 56), Mixed Paper (Grade 54) and Mixed Plastics from being shipped to China, the world’s biggest consumer of scrap recycling materials, for fear inspections will lead to rejection and demurrage charge backs.

Heavy rejections of all imported materials, especially bales from MRFs, along with lower import quotas given to Chinese mills, have even curtailed old corrugated container and aluminum scrap shipments to China. The Chinese ban has resulted in an oversupply of paper that has caused prices to plummet for all bulk paper grades by over 50 percent through March 2018, compared to 2017 prices. Additionally, the July 2018-announced WTO ban forced sellers to scramble for new homes. These conditions especially target and limit markets for post-consumer MRF materials.

Further, the United States, through current administration and court actions, has imposed a series of tariffs and trade sanctions affecting newsprint, aluminum, and steel. In addition, regulations that limit truck driver productivity has created shipping constraints that impact the supply chain. RRS has identified a looming freight crisis due to a severe domestic over-the-road driver shortage, with 500-900 thousand needed in the U.S. Coupled with the shortage is the new Electronic Log Devices that the U.S. implemented beginning in December 2017, which further restricted productive driver hours in the name of safety. Together these conditions are increasing costs and availability for reliable freight to move recovered materials. The short-term effect of these conditions is to price marginal markets out of both domestic and export opportunities.



These factors directly affect pricing for North American recovered materials and have caused unexpected market movement and profit changes; for instance, recovered paper producer costs have sharply risen with the need for more sorting and the higher freight; while, conversely, metal prices have spiked to record highs for all domestic scrap grades. The recycling commodities market is in a very volatile state. Dramatic price changes are the norm in this fractal space right now, and price conditions can quickly change. World demand and the world economy are still growing for consumer goods and recovered paper, yet prices are languishing under the above pressures. Major post-consumer polyolefin pricing (PET, HDPE, and PP) are rebounding domestically after initially dropping, despite being banned from China.

RRS further found in a study prepared for the Canadian Stewardship Services Alliance in late 2018 several other notable conditions which directly affect commodities markets, including:

- Confusion and fragmentation occurring within all the bulk paper grades, Sorted Residential Paper and News (SRPN), Old Corrugated Cardboard (OCC), and Mixed Paper (MP); and, a divergence in price for higher quality, China-ready material of up to \$100 per ton.
- With poor financial conditions, the MRF community is concerned about processing low or negative value materials and some markets have reverted to disposal for some grades of material.

THE IMPACT OF CHINA'S NATIONAL SWORD POLICY – CHINA'S REGULATION ON WASTE IMPORTS

Even though China is consuming over 75 million tons of recovered paper, plastics, and metals from containers, far and away the largest consumer, its use of imports has declined by 10 million tons (from 33 to 22 million tons) as domestic capacity grew.⁸ China's long-term intention has long-been to become a 'circular economy' and rely on its own collection/recovery infrastructure over time; banishing "loathsome foreign waste" scrap and "smuggled garbage" completely, as part of a massive campaign of environmental improvement.

China's National Sword regulatory and inspection policies, which began in February of 2017, and the WTO Trade ban on Foreign wastes (July 2017), and fully implemented March 1, 2018, continues to depress all MRF-derived material prices, and most of the recovered commodity market which makes up recycled commodities (apart from bottle grade plastics and UBC for the most part). Depending upon reporting source, 30-50 percent of all curbside materials from North America historically ended up in Chinese production with a downward trend in demand occurring before the ban.

The Chinese actions have severely depressed or disrupted commodity markets for mixed wastepaper grades (SRPN and MP), mixed and lower grades of plastics, and has increased freight costs for all commodities, due to the loss of

⁸ Moore, Bill, "Global Recovered Paper Market Trends, International Molded Fiber Seminar", Vancouver, British Columbia, 13 April 2016

the reverse haulage (the business model of moving goods from original destination and using the empty containers to move scrap back to source) and well-used freight lanes. Quality standards have also brought down OCC and metal pricing. The market is in a state of dramatic, high, downward volatility, despite the continuing high worldwide demand for almost all recovered materials in a good economy. With full implementation March 1, 2018, the world and China export market for bulk recycling commodities have experienced dramatic price decreases⁹ and the lowest prices in nine years, even for the most sought-after materials.

The heavily enforced import ban paired with license restrictions mean that many millions of tons of materials will not be allowed into Chinese ports and will have to find new end markets. The resultant flood of lower quality paper and plastics into the rest of the available markets has pushed pricing down to zero (no value) on mixed commodities like #1-7 plastics and SRPN, and reduced OCC prices to nine-year lows. Paper Industry stalwart Bill Moore projected in October 2017, “If recyclers can’t find new markets, or places to store the scrap they collect, some waste could end up in the landfill.”¹⁰ This practice is now being implemented in the U.S. Regulators in Oregon are allowing processors to landfill bales of mixed paper and plastic.¹¹



⁹ For instance, one of several articles per day now, “China demand plunge drops OCC to 9-yr low, domestic off \$5-30/ton, mixed being landfilled; white grades surge”, RISI 9 March 2018 Price alert

¹⁰ Phillips, Erica E., “Trash Talk: Price of Recyclables Sinks After China Bans U.S. Scrap”, Wall Street Journal, 20 October 2017

¹¹ Oregon DEQ Recycling Stakeholder Meeting, Attended 15 February 2018

MRF PROCUREMENT FRAMEWORK

This section examines options for procuring design/construction and ownership/operation of a MRF. RRS recommends the County consider and explore the mechanisms available for local units of government to work jointly to handle solid waste management responsibilities before moving forward with MRF procurement framework. The County would need to secure additional recyclables to operationally and cost effectively support a modern MRF as presented in this study. Some form of consolidation of services would secure an agreement for planning infrastructure.

Intergovernmental agencies can be formed under several different legal authorities in Michigan, where units of local government can contract and associate among themselves to obtain or share services and to exercise, combine, or transfer any power or function, in any manner not prohibited by law. State law also authorizes units of local government to exercise and enjoy jointly their powers, privileges, or authority and to enter into intergovernmental agreements for that purpose. In examining the options of MRF procurement, the County will want to examine MRF ownership options as that decision impacts procurement.

Design/Construction Procurement

There are three design construction alternatives for developing a public owned MRF.

1. Design/Bid/Build

The County would hire an architectural and engineering (A&E) firm to prepare design documents, plans and specifications. The plans detail each feature of the project to be constructed and the specifications include front-end administration/contract conditions as well as the technical specifications. The County then issues a Request for Proposal (RFP). Once awarded, the County or the A&E firm is responsible to provide construction oversight to ensure that construction conforms to the plans and specifications.

2. Design/Build

The County with its engineering consultant develops concept-level design plans and/or performance specifications and issues them in a RFP. An example of a performance specification is a facility that will process a minimum of 15 TPH of recyclables providing on-site storage for up to 5 days of processed material and is capable of sorting five materials for resale – cardboard, mixed paper, tin/steel, aluminum, and plastics. The RFP would require the selected contractor to provide the design and engineering, equipment, construction, and acceptance testing, all in one contract.

3. Design/Build/Operate

This is an extension of the design/build method and is often described as a full Public Private Partnership. The County would include in the RFP the contractor also operates the facility for an initial operating period. This option is becoming more popular in the public sector. The RFP would require all the above-mentioned requirements as well as annual operating and maintenance costs offset by commodity revenues.

Table 9. Advantages and Disadvantages of MRF Design/Construction

ADVANTAGES	DISADVANTAGES
DESIGN/BID/BUILD	
County maintains control of the entire design and construction process	A&E firm needs to have expertise of MRF process design or will need to hire additional expertise to ensure the technology-oriented success of the MRF.
	County accepts risk of operation and start-up
DESIGN/BUILD	
County reviews technical approach and costs to determine most cost effective and best	County has little control of MRF design
Responding contracts will have experience in designing and building MRFs	MRF designs proposed may be vastly different
Relatively quick process to construct and have operational	Contractor selection can be difficult
County can shift all design and construction responsibility/risk to contractor	Smaller pool of design/build contractors reduces competitiveness of bids and costs
Contractor responsible for MRF performance	
DESIGN/BUILD/OPERATE (same as design/build method, plus)	
Encourages the contractor to develop a project with its long-term performance in mind	Ties both the County and the contractor into a very long-term relationship that can be difficult to price.
Contractor's duties and responsibilities to the County do not end at final acceptance but continue through a defined operational term.	Contractors may price considerable risk into their offers, and so the County may not always achieve a best value outcome
Establish a long-term maintenance program up front	Miscommunication between the owner, the architect and the construction company is a common occurrence.
Ability to effectively fast-track projects	County will lose some control of the design process

Ownership/Operation

Isabella County faces a spectrum of procurement and ownership options: privatization, exclusive public enterprise, and a mix - a public/private partnership. A final decision regarding the County's preferred method of facility processing ownership will involve several considerations, such as:

- Control: Degree of control which the County wishes to maintain over an MRF, particularly determining what materials are recovered, and how they are marketed;
- Risk: Risk allocation between the private sector and the County; and
- Financial: The impact of capital and operating costs on the net cost of recycling for the County.

Recyclable processing can be offered through a variety of service structures. Privatization and public-private partnerships are the most common structures to provide services, and fully publicly owned and operated processing facility is also a viable potential option. Each of the different mechanisms for capital financing and on-going funding of infrastructure have advantages and disadvantages. The decision on which option to use depends on the resources and funding the County has available as well as the desired level of control, tolerance for risk, and community values. Resources that help communities make their decisions include in-house expertise, existing facilities, available land, equipment, and staff. Depending on how the services and facility agreements are structured, privatization and public-private partnerships can establish a competitive process to acquire capital funding as well as potentially lower processing fees. Local governments are the sole negotiators in the privatization or public-private partnership and as such, they have a responsibility to ensure all risks are vetted out on behalf of the community.

This study does not address the considerations regarding the question of ownership, but it is important for the County to evaluate the considerations and formulate its preferred ownership. The County needs to consider all the variables and risks in each of the scenarios to identify which scenario best suits their own circumstances and which clauses are included in the contract to achieve an equitable arrangement between both parties and encourage open communications, high quality outputs, efficient sorting, with low contamination and low processing losses and appropriate sharing of financial risks. Table 10 provides a quick summary of advantages and disadvantages of ownership options.

Table 10. Advantages and Disadvantages of Ownership Options

ADVANTAGES	DISADVANTAGES
PRIVATIZATION - The basic concept is that a private entity would develop, fund, and manage the MRF.	
No direct capex cost burden	Limited partnership “buy-in”
No burden to “promise” material delivery	Little negotiation power with private vendor
Limited management and oversight required	Fees and cost fluctuate
Strong policy measures are required for meaningful diversion	Tip fee/material market dependent
PUBLIC OWNED/PRIVATE OPERATED – A public jurisdiction (assumed IsabellaCounty) owns the MRF and contracts with the private sector for operation of the MRF.	
Get both public and private sector “buy-in”	Higher costs
Risk sharing (markets, capex/opex)	Complex contract negotiations/re-negotiations
Revenue sharing/stability	Private partner expects profits
Simplified administration with contract fee	
PUBLIC OWNED/PUBLIC OPERATED – A public jurisdiction (assumed IsabellaCounty) owns the MRF and operates the MRF.	
System needs policy for success	Cost of evaluating and sustaining markets
Keep revenue	Assume all risks/liabilities
Easily expand material types accepted	Higher capex/opex costs
Profit is not the bottom line	

Privatization - When contracting with a private MRF, the MRF operator typically will dictate what materials are acceptable, how they will be processed and what gate fee will be charged to the haulers or contracted authorities. Private MRFs may be an option for consideration, provided there is a MRF (or MRFs) within acceptable haulage distance to the County. In this case, the MRF will likely dictate what materials are acceptable and how they will be separated and marketed. The County is at risk if the private MRF is not capable of producing quality products and has little negotiating power over the gate fee charged at the MRF.

Public Ownership Privately Operated - The County owns the MRF and contracts with the private sector for operation of the MRF. In this case, the County would have an operating contract with the selected contractor and outline all of the appropriate contract conditions. There are a variety of options available on sharing risks and attracting additional tonnage. Often, the MRF will be procured through a design/build/operate or design/build/operate/maintain solicitation. An issue that needs to be addressed is how a facility is maintained if the operating contract is less than the useful life of the facility and the equipment. The County would need to ensure that the facility was well maintained if it is anticipated that the operator will change over the useful lifetime of the facility. Forecasting long term capacity needs for the County becomes critical and has a significant impact on the design capacity of the MRF and hence on its capital costs.

Public Ownership Publicly Operated – County owned MRF that is operated by County staff. In this instance, the County has control over all design and operating conditions and finances the entire project. A decision to procure a

Public Owned MRF assumes full capitalization of major facility assets such as building and processing equipment while giving the County complete control over what materials are to be processed, the degree of sorting capability, and ultimately how the MRF is designed. Procurement in this scenario is typically done through a design/build/operate contract, with the selected contractor given a relatively short (five-year) initial operating period. While this scenario puts full financial risk on the County, prudential borrowing will likely reduce financing costs for the capital assets and the County will have complete control of its own future.

One consideration to keep foremost in mind when making the public/private ownership decision, is that tax-exempt bond financing for publicly owned facilities - even those operated by private operators do not, require volume capital allocation (imposed on each State by the U.S. Internal Revenue Code to limit the amount of tax-exempt private activity bonds which can be issued each year). Generally, every state and U.S. possession is limited to a maximum amount of qualified private activity bonds that can be issued on an annual basis. This amount is based on the state's population and is computed annually. The amount allocated to each state is called the "state ceiling." The amount of the state ceiling is then allocated among the qualified private activity bond issuers within a state. This allocation is called the issuing authority's volume cap.

It is important for the County to address issues and begin to formulate their preferences with regard to ownership. Because of the relatively small difference in cost between public and private ownership of a MRF, questions of risk and control may become more important to a jurisdiction in determining its preference for ownership. There is no one simple answer of ownership as the County must continually evaluate the different areas of risk, both technical and economic, and then determine what best meets their overall objectives.

MRF Solicitation

The development of a new MRF will involve the design, procurement, construction, and operation. Table 11 outlines a draft MRF procurement schedule.

Table 11. Draft MRF Procurement Schedule

ACTIVITY	MONTH	TIME ALLOWANCE
Scope of Work	0	1 month
Pricing Approach/Evaluation Criteria	1	1 month
Technical Performance Criteria	1.5	2 weeks
Draft Agreement	2.5	1 month
Geotechnical Report	3.5	1 month
Final Pre-solicitation Meeting	3.5	After above tasks
Request for Proposals (RFP) from consultant	4.5	1 month
Final RFP Review	5	2 weeks
Release RFP	5	After RFP review
Pre-Proposal Meeting	5.5	2 weeks
Requests for Clarification	6.5	1 month
Proposer Questions Responses	6.5	Ongoing till requests for clarification ends
Proposals Due	8	3 months after RFP release
Technical Proposal Review	8.5	2 weeks
Selection Committee Meetings	9	Schedule for 2 weeks after technical proposal review
Selection Committee Ranking	9	Schedule for 2 weeks after technical proposal review
Contract Negotiations	10	1 month
Commission Policy Direction/Contract Execution	10	1 month
Design	14	4 months
Permit	15	1 month
Construction	20 months after award	
Performance/Acceptance Testing	24 months after award	
Acceptance	27 months after award	

MRF OWNERSHIP

Public Ownership

ADVANTAGES

The principal advantages associated with public ownership of a MRF are as follows:

1. The possible use of certificates of participation bonds (COPs)¹² to finance the MRF. The issuance of COPs can normally be expected to have a somewhat lower interest rate, lesser bond issuance expenses, and a lower annual debt service payment than the issuance of a similar amount of revenue bonds.

In addition, waste system revenue bonds might be used to finance the MRF on a tax-exempt basis. Although uncertainty in waste composition (especially over the long term) and marketing revenues do not make MRFs good candidates for project financing, the pledge of a jurisdiction's enterprise fund comprised of revenues from an integrated waste system can form the basis for issuing ratable, marketable tax-exempt bonds, which can be expected to have a lower interest rate than taxable borrowings by a private vendor for a private MRF.

Lastly, an important tax advantage should be highlighted: tax-exempt bonds issued for a publicly owned MRF, even though they may be private activity bonds because of long term operating agreements with private vendors, nevertheless do NOT require volume cap allocation from the State. (Private vendors which wish to borrow on a tax-exempt basis must compete with other private activities for a limited amount of the State's volume cap allocation, which restricts the amount of tax-exempt private activity bonds which can be issued annually within the State.)

2. The possibility of lower annual operating and maintenance expenses of the MRF as the MRF will not incur an annual management fee by a private vendor. A jurisdiction can anticipate that a management fee would cost from 10 to 20 percent of the annual operating and maintenance expenses of the MRF. However, such potential savings must be weighed against the facts that a private owner may have greater operating experience and perhaps greater incentive to efficiently operate the MRF. The effective management of a MRF requires certain specialized expertise which is not typically available. Furthermore, if the private operator knows that he/she is responsible for the operation of the MRF over the long term (e.g., a 10-20-year period), he/she may be more inclined to undertake all required maintenance, renewals, and replacements on a timely basis.
3. Continued ownership by a jurisdiction of a MRF upon termination of the service agreement Depending upon the quality of the equipment originally installed, if the MRF is properly operated and maintained on behalf of a jurisdiction, and if all required renewals and replacements are made on a timely basis, the MRF could be expected to have a useful life of 10 to 20 years. If a MRF is privately owned, a private party will own the MRF upon the termination of the Service Agreement which may terminate when the MRF has residual value and useful life remaining. (Note, however, that purchase options could be negotiated.)

If a jurisdiction has a service agreement with a private company, it might negotiate up front the option to renew the agreement for additional terms, corresponding with the remaining useful life of the MRF.

¹² The **certificate of participation** is an alternative to municipal **bonds** in which an investor buys a share in the improvements or infrastructure the government entity intends to fund. A **certificate of participation** is a tax-exempt lease-financing agreement that is sold to investors as securities resembling **bonds**.

Alternatively, in lieu of renewal, the jurisdiction might negotiate a purchase option, for a price equal to the unamortized portion of capital cost of the MRF, plus a bid residual value.

Many jurisdictions feel that without public ownership (or the sorts of renewal or purchase options just described), a private owner can exact huge fee increases at the end of a short or mid-term service agreement. The jurisdiction has no leverage at the end of the service agreement term. Contrarily, if the jurisdiction owns the facility and has an operating contract with a private operator, it can replace the operator at the end of the operating term more easily than it could find a nearby service provider.

4. The potential to realize increased operating revenues from the sale of materials in the event the price of materials should significantly increase. Such increase in the price of materials could result in a lower cost of waste disposal to the jurisdiction. It should be noted that there is also the potential risk of a future decrease in the price of materials which would cause the net cost of disposal to increase. Similarly, if a jurisdiction enters into a put-or-pay service agreement with a private MRF vendor and the agreement provides the fundamental credit for a private activity bond-issue to finance the private facility, then arguably the jurisdiction should be rewarded by keeping recovered materials revenues. (A put-or-pay agreement would provide that the contracting party assumes the risk of deliveries. Most public entities have legal constraints on the degree to which they can enter put-or-pay obligations which would result in payment for no services.)
5. Greater control over the actual operation of a MRF. This is perhaps more important in the case of a MRF than a landfill or waste-to-energy facility, because the jurisdiction is developing MRF capacity, whether at a large scale, centralized facility, or several smaller facilities, to help it meet waste diversion mandates, not merely to dispose of waste. A private vendor develops a MRF to create a successful, profitable business enterprise. Consequently, the interests of a public jurisdiction and private vendor differ, as do their economics. For example, a municipality might find it profitable to separate and sell certain component materials at a loss, which makes economic sense on an avoided cost basis (both alternative disposal costs and avoided penalties).
6. Greater flexibility in choosing a procurement approach when selecting a vendor to construct and operate a MRF, as it allows the jurisdiction to choose from among architectural and engineering, turnkey contractor, and full-service vendor approaches.
7. A less complicated financing, since debt issued to finance public facilities, paid as a general or enterprise fund obligation, for example, are less complex to structure and issue than private activity (industrial development) bonds, where vendor or project credit may be weaker and require credit support.

Private Ownership

ADVANTAGES

The potential advantages associated with private ownership of a MRF include the following:

1. Vendor performance guarantees, Whereby the vendor assumes the risk of technology failure and covenants to pay damages for failure to meet performance guarantees.
2. The private vendor will offer long-term performance guarantees for the operation of the MRF. Such long-term guarantees should include waste processing capability (including throughput and materials separation guarantees, by component and/or in aggregate, as well as the converse residue guarantees), plant availability, (especially if the municipality is not the vendor's only customer at the MRF) and environmental guarantees. (This advantage could also be made available under public ownership by entering into a long-term operating contract with the vendor).

3. Ability of the private owner, during the operating period, to utilize teams of technical specialists who are already employees of the private owner. Such technical specialists will be available to the MRF for both periodic and routine maintenance as well as for extraordinary repairs to the MRF. (This advantage could also be made available under public ownership by entering a long-term operating contract with the vendor).
4. Ability of the private owner to make use of the prior experience which the vendor has obtained in the operation and maintenance of similar facilities. This can be important, since MRF technology and operating records are relatively new and experience limited (although again, the municipality could obtain this advantage also through a long-term operating agreement).
5. Guaranteed operating and maintenance fee subject only to increase in some agreed upon index. Therefore, if a MRF is more expensive to operate than originally anticipated, the private vendor will have to pay such increased costs out of the management fee. (This advantage could also be made available under public ownership of the MRF by entering a long-term operating contract with the vendor).
6. Possible infusion of equity capital by the private owner as part of the financing of the MRF. Private owners can invest their own capital into the project, reducing the amount they need to borrow to complete construction. This reduces the aggregate amount of interest payments (debt service) and possibly the capital-cost. Since the Tax Reform Act of 1986 there are less tax advantages accruing from private ownership, so there are less tax reasons to own facilities and contribute equity.

However, equity may still be needed to fund issuance costs for private activity bonds, since the internal revenue code limits the amount of issuance costs payable from private activity bond proceeds to 2 percent. This limitation does not apply to tax-exempt bonds issued for a publicly owned MRF, which do not constitute private activity bonds e.g., by virtue of a long-term operating agreement with a private vendor.
7. The possibility for optimizing the efficiency and waste reduction capabilities of a MRF, if the contractor has an economic incentive tied to the ownership of the MRF. Of course, a private operator of a publicly owned MRF could also negotiate a revenue sharing arrangement to provide it with economic incentive.
8. If the MRF is financed with private activities (industrial development) bonds with repayment of the bonds guaranteed by the private vendor, the creditworthiness of a jurisdiction will be maintained by not relying on them to serve as the "deep pocket" (i.e., someone with large capital resources) for the financing. The ability to do this will be dependent upon the creditworthiness of the selected vendor.

There are several different options for a jurisdiction that should help manage the technical risk of a MRF, while at the same time maintain a significant level of control over the operation, would be the following:

1. A MRF could be publicly owned and operated.
2. A jurisdiction could negotiate a contract with a financially-sound vendor for the design, construction, and performance testing of a MRF for a fixed construction price. Such a contract should include performance level guarantees and the provision for the payment by the vendor of liquidated damages in the event of failure to meet the required levels of performance. The measure of such damages should include the alternative costs of processing, not merely disposal, if the jurisdiction needs the MRF to meet its diversion goals. In addition, if the jurisdiction shares revenues, it should be compensated for lost revenues.
3. A jurisdiction could also negotiate a long-term contract with the same vendor to operate a MRF for a fixed annual amount, subject to increase with changes in some index. The operating contract could also include certain performance incentives and perhaps materials revenue sharing provisions. However, even this option is not risk-free and is not likely to be the least expensive.

COLLECTION AND PROGRAM BENCHMARKING

RRS conducted this benchmarking study to determine any associations between communities demonstrating higher diversion rates. The goal was to benchmark metrics and service levels in a cross-section of Michigan communities to identify key characteristics in better performing communities. RRS collaborated and identified five communities for this study. The communities benchmarked include:

- Resource Recovery and Recycling Authority of Southwest Oakland County (RRRASOC), a municipal solid waste authority located in Oakland County.
- Southeastern Oakland County Resource Recovery Authority (SOCRRA), a municipal solid waste authority located in Oakland County.
- Emmet County, a single county located at the northern tip of the lower peninsula.
- Washtenaw County, a single county located south of in Southeast Michigan.
- City of Lansing, the State of Michigan's capital city located in Ingham County.

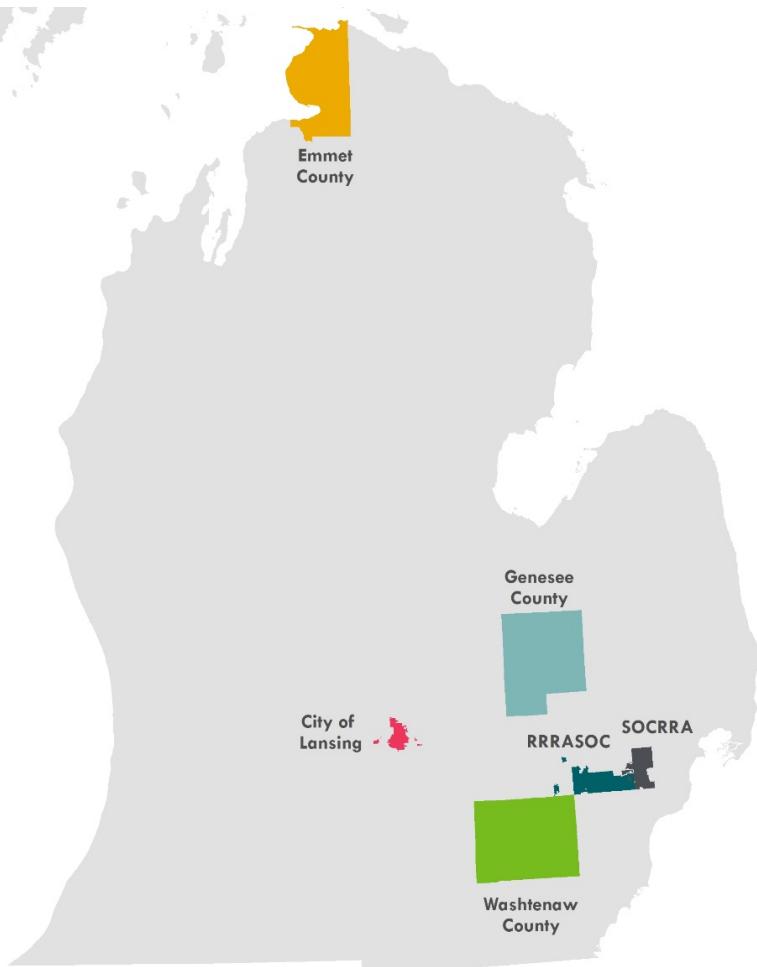


Figure 8. Benchmark Communities

Figure 8 shows the benchmark communities' location in relation to Isabella County. To collect metrics and program information, the RRS team performed web-based research, document screening, and quantitative surveys.

Benchmark Findings

The communities selected all demonstrate a diversion rate of 30 percent or higher. Varying in population and service size benchmarked data was normalized on a per capita basis for comparison purposes. Shown in Figure 9, across the benchmarked communities waste generation (waste landfilled plus waste diverted) varies. Socio and economic differences impact consumption and therefore waste generation so it's not unexpected. Isabella County generates over four pounds per person per day, second highest of the benchmarked communities. Notably, Emmet County the most rural of the benchmarked communities, demonstrates the highest per capita generation. It is possible metrics being attributed to Emmet's population might need to include a larger population base, since Emmet County's program reaches regionally beyond County borders. While this is noted, data was not obtained to make such adjustments.

Outside of Emmet County, the other communities throw away less than two pounds per person per day. While Emmet County is closer to 5-pounds per person per day they also divert about three pounds per person per day. This means the County throws more into the landfill than the benchmarked communities. The benchmarking study findings show Isabella County diversion rate (recyclables and organics) at 9 percent is the lowest. It is approximately 20 percent lower than the benchmarked communities. All the communities recover more recyclables per capita than the County.

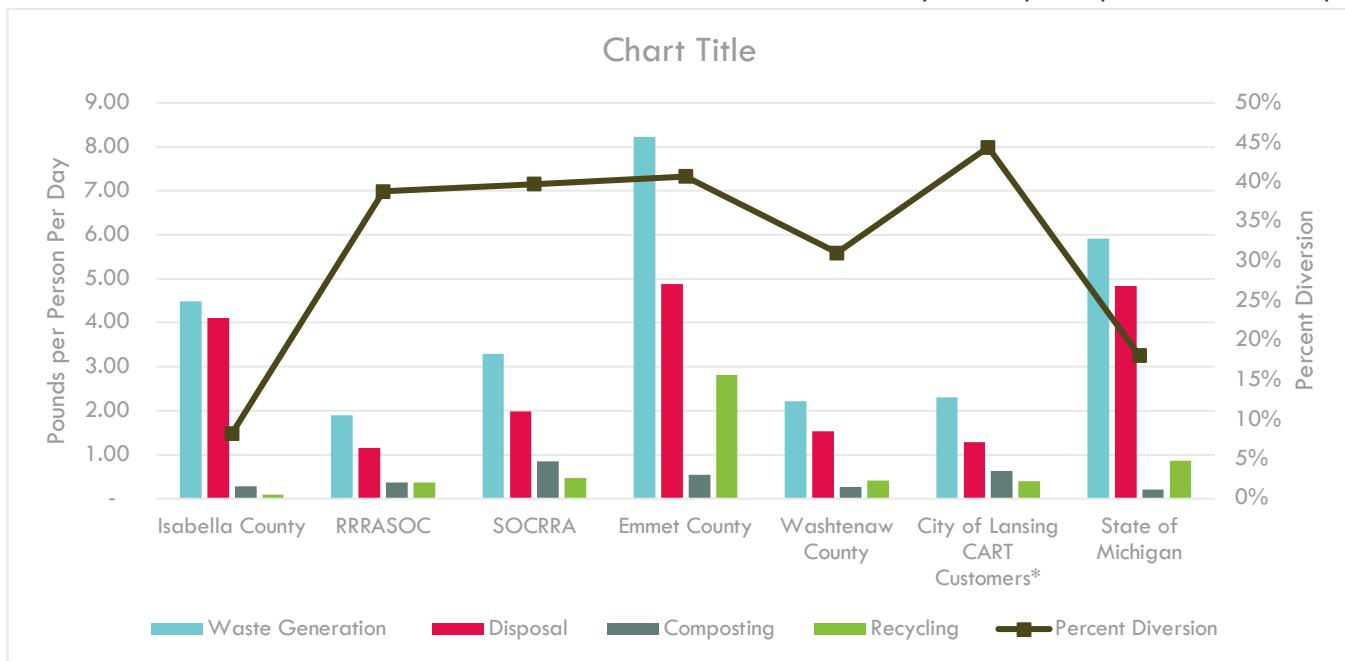


Figure 9. Per Capita Comparison

Notes:

*City of Lansing data reflects households serviced by City of Lansing, approx. 25% households for trash and 72% households for recycling. The State of Michigan data is sourced from Michigan's Waste Data Systems (WDS), and "Michigan Recycling Economic Impact & Recycled Commodities Market Assessment Report"¹³.

To further dive into why these benchmark communities are performing so well, RRS collected information on programs and service level offerings to look for correlations. Benchmark data is summarized in 12. To begin assessing the programs our project team first looked at population and population density. Isabella County is the least populated at approximately 65,000 persons and falls at the lower end when comparing density at 112.4 persons per square mile. This doesn't seem to impact curbside service reaching almost 100 percent of single-family households.

For the City of Lansing, the highest diversion community, the system for success is a pay-as-you-throw program, bi-weekly service, carts, and automatic provision of recycling service. Automatic provision of service means there is no need to opt-in/sign up to participate or request a cart to receive services. The next best performing community, Emmet County, demonstrates success with weekly curbside in the more densely populated areas and a robust drop-off program. Emmet County's service model is built on collection, cost efficiency and convenience. Building programs on this model and with goals prevalent, is where Emmet County attributes its success in diversion. The third highest

¹³ "Michigan Recycling Economic Impact & Recycled Commodities Market Assessment Report" calculated 18.1% diversion rate for the State determined from recovery of materials reported to the State of Michigan and the calculated capture of materials from organics recovery, take back programs and the container deposit program.

performing community is SOCRRRA. SOCRRRA checks the boxes when it comes to best practices. SOCRRRA is an authority with an advanced contract system where the authority contracts directly with haulers for weekly cart-based service with automatic recycling for all their communities.

At first glance, a direct correlation for diversion performance is not as obvious. As compared, it appears the main difference in service offerings is automatic recycling. According to a survey and report conducted by The Recycling Partnership (The Recycling Partnership), high performing communities capture approximately 160 pounds per person per year and the vast majority of those communities have universal (no request required) single-stream cart-based curbside programs with automatic collections¹⁴. The Recycling Partnership's report findings coupled with the higher performing benchmarked community service offerings demonstrates the type of collection container and requirement to request to participate in a program may be barriers to participation and higher diversion rates in Isabella County.

Table 12. Benchmark Service and Cost Comparison (2018 data)

	RRRASOC	SOCRRA	WASHTENAW COUNTY	CITY OF LANSING	EMMET COUNTY*
Population	281,964	283,000	359,454	116,986	33,193
Population Density (persons per sq. mile)	1,386	1,386	488	2,987	70
Percent Diversion	39%	40%	31%	44%	41%
Percent Single Family HHs with Curbside	100%	100%	100%	100%	60%
Service Frequency	Weekly	Weekly	Weekly	Bi-weekly	Weekly
Collection Container	58% Carts	100% Carts	55% Carts	100% Carts	Dual-stream Bins
Receptacle Access	100% Automatically Provided	100% Automatically Provided	73% Automatically Provided	100% Automatically Provided	100% Automatically Provided
Pay As You Throw	No	No	1 municipality	Yes	No
Robust Drop-off Program	2 Drop-off Locations	1 Drop-off Location	15 Drop-off Locations throughout the County	2 drop-off Locations in City	13 Drop-off Locations throughout County
Cost per Household per Year (average)	\$140 - \$217 ^a	\$ 121 - \$151 ^b	\$220 - \$296 ^c	\$110 plus cost for trash ^d	\$102 ^e

Notes:

Diversion includes recycling and composting.

Varied collection containers include carts, bin, or customer-owned container.

Population density of RRRASOC and SOCRRRA is reported as population density of Oakland County.

*Emmet County is a dual-stream program. All other programs are single stream.

^aCost includes what municipalities pay for trash, recycling, yard waste, and HHW services.

^bCost includes refuse, recycling, and yard waste only.

¹⁴ The 2016 State of Curbside Report by The Recycling Partnership: <https://recyclingpartnership.org/wp-content/uploads/2018/05/state-of-recycling-report-Jan2017.pdf>

^cCosts reflect cost to household where service provider contracts directly with customer. Research did not locate community contract costs for comparison.

^dCost only reflects recycling.

^eCosts include cost of operating dual stream drop-off, hard to recycle drop-off, and curbside recycling collections. Does not include cost resident pays for subscription trash collection services to private haulers.

RRS also collected metrics on service costs. Isabella County's household cost per year fall within the range and compare to the other communities. While the County's costs are comparable 45 percent of households receive bi-weekly service and a lower percent of households have carts. Findings show service offerings are not as robust as communities benchmarked even though costs are comparable. Both the City of Lansing and Emmet County's costs are slightly lower but are not inclusive of trash or yard waste collection and processing. This study did not perform the level of analysis for specific contract components but rather gleaned high-level service offerings for comparison.

Table 13. Benchmark Contract Structure Comparison

	RRRASOC	SOCRRA	WASHTENAW COUNTY	CITY OF LANSING	EMMET COUNTY
Service Provider Contracts with Community	Yes	No	79% includes Municipal provided service and preferred hauler	Municipal provided service	60% eligible for curbside recycling collection
Consortium Contracts	No	Yes	No	No	No
Service Provider Contracts directly with Customer	No	No	Yes	No	No
HHW Collection Type	Event	Permanent Site	Event & Permanent Site	Permanent Site	Event

Notes:

Consortium contracts as used in this context refer to a group of communities agreeing to contract together to increase negotiating power to reduce costs when contracting for solid waste, recycling, and yard waste collection services.

Contract structure varies among the benchmark communities. Each of the high diversion communities have their own contract structure that supports a comprehensive management system. They each have components of best management practices that integrate and work for their system.

Key Benchmark Takeaways

- The top 3 performing communities demonstrate integrated collection systems. Lansing operates a pay-as-you-throw (PAYT), Emmet County made significant investment to build collection for rural population base, and SOCRRA has an advanced collection contract system.
- Strong recycling programs are possible in rural, suburban, and urban settings. For rural areas, a combination of some curbside and convenient recycling drop-off access can be highly successful.
- Diversion rates are higher in communities with automatic recycling (again, integrated collection systems), meaning residents do not have to take additional steps to set up recycling in addition to trash services. This finding is in line with The Recycling Partnership's report and findings Resource Recycling drew from a 2016 Sustainable Packaging Coalition (SPC) study showing that automatic recycling programs have greater participation rates (Source: <https://resource-recycling.com/recycling/2017/03/10/is-access-everything/>)

Table 14. Typical Participation Rates in Different Systems

TYPICAL PARTICIPATION RATES IN DIFFERENT SYSTEMS	
RECYCLING ACCESS	PARTICIPATION
Automatic	60-80%
Opt-in	38%
Subscription	30%
Drop-off	9-15%
None	0%

- Carts are recommended as a best practice for programs because they offer residents more recycling capacity. Greater recycling capacity means residents don't throw recyclables in the trash once their recycle bin is full. Some communities opt to conduct bi-weekly recycling collection, in which case the extra capacity carts offer is a must for successful diversion.
- Communities with pay-as-you-throw programs tend to have higher diversion rates. The City of Lansing is highlighted here as a successful PAYT City with strong diversion rates among CART customers.
- While it is challenging to find a commonality between cost per household because services vary between communities, in general costs are less per household when services are organized and contracted within the municipality or authority.



Collection

Every household and business in a community needs easy access to recycling through curbside collection, commercial collection, and/or drop-off site locations. Recycling should be just as convenient as waste disposal. RRS staff collected data on haulers operating in Isabella County to analyze the current access to collection and evaluated the current collection compared to best practices for similar communities.



Strengths

- Private Sector Activities: The private sector is leading the way in Isabella County by providing recycling collection services. Three haulers operating in the County offer curbside recycling service to their customers. Although recycling is challenging for several reasons, the private sector has found some solutions to make recycling collection work, and without the private sector activities there would be no recycling in the County.
- County-wide services: Convenient curbside access to recycling is widespread. The common suite of materials accepted for curbside recycling by haulers in the County include: Newspaper, Cardboard, Office and Mixed Paper, Paperboard, Plastic #1 through #7, Glass, Aluminum, Steel and Tin. Trash, recycling, and yard waste collection is available for a reasonable cost in all portions of the County, including rural areas.
- Cost of service: The average cost of trash and recycling service in the County is \$10.85/household/month. Trash, recycling, and yard waste are bundled costs in the contracts.

Challenges

- Multi-Family services: Curbside recycling service is widely available in the County, a best practice, yet multi-family and possibly commercial generators are lacking an opportunity. There is only one free drop-off located in the County, in the City of Mt. Pleasant. Additionally, there are a few scrap metal dealers scattered around the County providing limited item drop-off. These businesses are part of the recycling infrastructure and are expected to be part of the solution moving forward however, they are limited in the services and options they can provide for diversion.
- Curbside service type: Based on LUG hauling contracts 19 percent of the households are using carts automated curbside recycling in 65 or 95-gallon carts. Cart service is only available from one service provider. With most of the households using 18-gallon bins for recycling, residents have less capacity to collect recyclables and getting those recyclables out to the curb is not as convenient as wheeled cart collection. Additionally, curbside bin collection is not as efficient as fully automated wheeled cart collection. Investment to roll out carts in LUGs using bins would greatly impact the recovery of recyclables.

- Leverage improved or expanded services: Some LUGs with like services are paying more than other LUGs with like services. Municipalities and program managers can consider a variety of approaches to leverage improved or expanded services, and in some cases to reduce costs. These tools range from cooperative contracting to formation of authorities, interlocal agreements, or other forms of “bundling” or concentrating service sectors (such as business districts).

Education and Outreach

Recycling systems must be continually evaluated and adapted as material composition and technologies change. Simple, easy to understand information needs to be put in front of residents and employees across Isabella County communities through up-to-date websites, cart tags, social media, mail outs and public meeting forums to improve MRF infeed and end market uptake. This will increase supply of good quality material, decrease MRF labor and residual landfill costs, and avoid materials taking the long way to landfill.

Education is powerful, but citizens are not the only ones that need educated. Isabella County will need to continue to educate front line staff (haulers and those answering phones) and elected officials to ensure informed decisions and achievement of recycling targets.

Table 15. Education and Outreach Evaluation

UPTAKE	CATEGORY	FINDINGS
●	Website with educational materials	Isabella County website is actively updated and provides recycling information.
●	Keep America Beautiful (or similar) programs utilized	Keep America Beautiful of postings were encouraging, educating, and beautifying community and unrelated to recycling education.
●	The Recycling Partnership available resources used	Industry stakeholders have available resources for municipal use. Partnership resources are utilized.
○	Using Recycle Coach, ReCollect or similar app resource to interface with residents	RRS is not aware of any communities using app resources to interface with residents. Rewards for Recycling is used in at least one LUG which is a community-based recycling incentive program. Incentivizing is a best practice, but this is not an app to teach how to recycle or remind of your recycle day.
●	K-12 Programs	Isabella County provides school age educational material on the website and actively engages in-school outreach (includes pre-K and college).
○	Commercial Generators	There are no public campaigns or activities targeted toward commercial generators.
●	Governmental Leadership	Isabella County communicates with LUG leaders regarding program information: flyer distribution for special events (Recycle Day), social media postings, direct calls to provide certain information, some directly reach out to Isabella County for information, and all are invited to planning commission meetings.
●	Social Marketing	Isabella County should enhance its uses of social media: Facebook and Twitter for two-way engagement.
●	Regular Communications	Isabella County conducts presentations and distributes information Communication with residents about Recycle Days, promotion of the events, and diversion.

Strengths

- **Website and Social Media:** Isabella County maintains an up-to-date website with information on where and how to recycle in the County and special event information. The website has an extensive list of resources and is used to promote private and public-sector activities. With a curbside participation rate of 53 percent targeted outreach could increase participation.
- **Outreach:** Isabella County provides education to K-12, government leadership, and residents through a variety of marketing channels. Public education is important to encourage recycling, identify end of life management options, provide clear information as to what can be recycled, etc. There is opportunity to utilize community based social marketing. Community based social marketing uses a variety of tools to achieve behavior change, such as removing barriers, providing incentives and prompts to encourage people to change their behavior, getting people to commit to new behavior, and normalizing the new behavior (McKenzie-Mohr, 1999). For example, offering weekly collection reminder emails or texts so residents do not forget to set their recycling cart at the curb with their trash cart. Once a few residents set out recycling carts at the curb, their neighbors notice and also want to participate in the service. Slowly, weekly recycling becomes a behavior norm for the majority of the neighborhood.
- **Recycling Racoons Squad:** EGLE created recycling racoon squad to serve as its education ambassadors across the state. Education resources available to communities include posters, social post JPEGs, videos and more. The Know It Before You Throw It campaign is also being launched across Michigan.

Challenges

- **Limited Budget and Staff:** Isabella is hampered by available staff time and budget. The County is large, both in terms of geography and population, and there is less than one FTE to do all education and outreach planning, deployment, and monitoring in the County.
- **Private Haulers and Facilities:** The private sector is leading recycling efforts in the County. However, there is little coordination in outreach efforts within the sector or between the private sector and the government. Thus, the messaging is up to County.
- **Commercial Outreach:** Commercial sector generates as much as 40-60 percent of the total waste in the County. There is little interaction with the commercial sector regarding recycling, contracting, best practices, or assistance for reducing waste. Lack of meaningful activities targeting this sector is a gap.



ORGANIZATIONAL MANAGEMENT APPROACHES

Private Sector Model

Description: In some counties there is little involvement by the public sector in solid waste management services. Citizens and businesses make their own independent arrangements for trash collection and pay their own bills. Haulers make their own decisions about what services to provide and whether to stay in business or sell-out.

Strengths: In an era of limited government capability and lack of trust in government, such approaches have become increasingly popular. No tax dollars are used. Scarce municipal financial and management resources are directed to other critical areas. The market driven efficiency of individual companies provides for good profit and service oriented business decisions providing for effective management of the system. Buyers go through the service purchasing process just like they would for a plumber, heating contractor or lawn care company.

Weaknesses: Access to service can be an issue for more rural areas that don't justify at the curb trash collection on economics alone. Many people opt for no service to avoid fees and end up dealing with trash on-site (burning/burying) and/or illegally (direct dumping or dumpster use at businesses, multi-family complexes, recreational areas, and rest stops). Typically recycling services are not provided. When recycling services are provided they are only provided to customers willing to pay a relatively high fee. Competition often drives the marketplace in one of two directions. Either there are a lot of competitors with many trucks driving down each street, making stops only at their own customer's homes or businesses, typically at a high cost of service. Or there are few competitors (a much more common and emerging trend) and fees for service are high due to lack of rate competition and the level and comprehensiveness of recycling services is limited.

Financing Implications: Private firms use banks and other sources of funds for all required capital. This may limit total available capital at times but also is typically a much more efficient way to access capital quickly than many public sector approaches. Operating costs including debt retirement are covered through user fees paid by generators.

Ordinance/Licensing Model

Description: A local ordinance specifies some basic levels of service expected from service providers. Information on fees may have to be published regularly. Recycling services may be required. Certain parts of the community may need to be picked up on certain days. Documentation of truck licensing and maintenance may need to be provided. These are typical ways that some structure is built into what services are provided. The ordinance may also place requirements on generators. For example, households may be required to contract for service. Multi-family complexes may have to screen their dumpsters and provide for recycling services.

Strengths: Allows some definition of basic services that would be available to citizens and businesses in the county while still relying on private sector resources for funding equipment and providing services. Citizens and businesses still make their own arrangements.

Weaknesses: Still have the problem of high cost of service either due to too much competition or too little. Arrangements for processing or recyclables can also be difficult to set up. Lack of control over quality of recycling service may prevent its more widespread adoption. Lack of data on program performance can limit ability to measure success.

Financing Implications: Still accesses all the private sector capital and operating fund capabilities but provides a means for the public sector agency to raise funds for program costs through licensing fees, or to distribute funds that are collected through other means (tax base, surcharge, bonds, agency funds, assessments or generator fees) to licensed haulers that provide enhanced services.

Contracted Services Model

Description: Municipalities, counties, or even larger developments/subdivisions bundle groups of customers together, develop specifications for service, identify a funding mechanism and then take proposals/quotes from private sector service providers to deliver the specified services. Some contracting approaches still leave the billing of customers up to the service providers while others do their own billing and pay the hauler independently. Contracting may be used for all solid waste management services in an area, only for residential, or only for a specific service type (such as curbside recycling or bulky item pickup).

Strengths: Allows high degree of control over what services are provided. Bundling of customers together allows service provider to provide lower cost, more efficient operations, documented in many cases to result in greater than 30 percent reductions in cost to households for residential service. Recycling programs can be easily specified, changed, delivered efficiently, and funded at necessary levels. The buyer of services can specify where solid waste, recyclables or compostables should go, or, at a minimum, secure guarantees that such material is being managed according to local or state laws and regulations -- limiting liability. Competition can be encouraged through the bidding process, providing a necessary critical mass of customers to justify an entrant into the area.

Weaknesses: Competition can be reduced as well when long term contracts are signed, and one company wins all the work or purchases all the contracted service providers. In the long run this can reduce options for different service providers. Generators (households and businesses) may no longer have a choice in who provides service. The buyer of service typically has to find a way to secure funds to pay the cost of the contract -- although some leave this process to the contractor. The purchasing process is complicated and demands financial and management resources from the buyer to carry out. Long term contracts often experience rate creep upwards which can be avoided by opening the contracting to new bidders.

Financing Implications: Can still access all the private sector capital and operating fund capabilities but also provides a means to augment this with joint public/private funding mechanisms (surcharges at landfill or transfer station) and public sector funding mechanisms (surcharge, bonds, agency funds, assessments, or generator fees) and to direct those funds in ways that enhance service provision.

Franchise Model

Description: In this approach, an exclusive right to provide services is granted, typically for one or more types of services (solid waste, recycling, yard waste collection), and for one or more sectors (residential, commercial, etc.). The public agency (either municipality or county) specifies service requirements and takes quotes for the service so that rates are established through a competitive process. The contract is typically long term, often 5, 10 or even 20 years in length. The franchise requirements can dictate where material will be taken or require that certain facilities be constructed.

Strengths: The public sector has significant control over service specifications often resulting in high quality and convenient recycling services. Bundling of customers together, providing an exclusive business opportunity, and using the competitive process often results in a lot of service at affordable rates. The long-term contract length provides

enough time for the vendor to invest in good equipment and facilities, and look at the long term needs of the municipality and its citizen's.

Weaknesses: Eliminates competition, except when franchises are first bid out. Difficult to get out of if franchisee is not providing good service. No choice for generators. Can result in rate creep upwards over long term unless oversight board is disciplined about cost control.

Financing Implications: Fully accesses potential of private sector in raising capital and operating funds, especially with long term franchise arrangement. Enhances ability to leverage public/private funding mechanisms (surcharges at landfill or transfer station) and to optimize use of public sector funding mechanisms (tax base, surcharge, bonds, agency funds, assessments, or generator fees) and to direct those funds to enhance service capability.

Flow Control Model

Description: This approach can be a hybrid of many of the others, but includes features to direct waste to specific facilities, often providing the public sector with a tool to allow funding and development of landfills, waste to energy facilities or transfer stations. There are two types of flow control, legislated and economic. Legislated flow control in New York authorizes local governments to decide what materials can be subject to flow control. Flow control, or waste designation, can often be used as a leveraging tool to motivate voluntary delivery to designated facilities when negotiating contracts. In order to adopt a flow control ordinance, a county or group of counties must undergo a series of public hearings and state or regional approval. They must attempt to achieve flow control by voluntary delivery before an ordinance can be implemented.

Strengths: Flow control models have allowed public sector waste management facilities to be built, often when the marketplace doesn't provide the kind of economics that a typical private company would want to get the business. This has, in some cases, enhanced services and lowered costs to citizens allowing recycling capabilities to increase, for example. Competition amongst haulers can improve under these flow control approaches since no hauler can use ownership of a landfill or transfer station to cut out other haulers.

Weaknesses: Legislated flow control is in a difficult legal position when interstate commerce is impacted with recent court decisions favoring systems that have public ownership of facilities and not favoring systems that use privately owned and operating facilities. A backup system of commercial contracts are sometimes used where haulers continue to use a flow control facility under a negotiated standard long term commercial contract. Economic flow control offers an alternative approach but is initially challenging to set up and can often alter the market signals that reinforce good recycling programs by artificially lowering tip fees. Operation of facilities that benefit from flow control can also suffer, since market forces do not drive cost control or customer-oriented service.

Financing Implications: These approaches are designed to fully access the ability of the public sector to raise tax free capital funds for system development. Private sector capability in raising capital and operating funds is still a factor especially for development of collection system. This approach also has augmented the ability to use public/private funding mechanisms (surcharges at the facility) although the challenges to legislated flow control have often attacked this feature of these facilities. Economic flow control tools rely on public sector funding mechanisms (tax base, surcharge, bonds, agency funds, assessments, or generator fees) to succeed in bringing flow to the facility.

Public Service Model

Description: This approach uses a municipal department of solid waste or public works that purchases all the necessary equipment, employs needed labor, and provides the service as part of the municipal government. Fees for the service often come out of the tax base or through user fees bundled with a water or utility bill.

Strengths: The public sector program managers have a high degree of control over service specification, allowing any desired service to be arranged including recycling, special bulky material pickup, etc.. Service can be provided to every household, regardless of their willingness to contract with a private hauler for such services. A cleaner community is often the result. Workers can often provide assistance in other public works operations like pothole repair, snow removal or fall leaf collection.

Weaknesses: Customers have no choice. As a result, services may become inefficient or be poorly designed. Budgets may become inflated over time, not reflecting modern private sector (or well managed public sector program) efficiencies.

Financing Implications: Little use of private funding and financing capabilities is possible in this approach while extensive use is made of public sector capital and operating fund mechanisms. This approach relies exclusively on public sector funding mechanisms (tax base, surcharge, bonds, agency funds, assessments, or generator fees) to cover operating costs and debt retirement. Surcharges at disposal sites are often not attractive with this approach since it increases the size of the municipal budget requirement.

Public Private Partnerships

The business community and Isabella County will need to work closely together to find success. These partnerships can be found through funding opportunities with private companies, shared owner/operator agreements for MRFs and composting facilities, marketing and educational campaigns, and everything in between. Many retailers and packaging companies are realizing that local governments are responsible for the end of life for their products and thus to the sustainability of their product and are partnering to ensure products are recyclable. For example, Strategic Materials partnered with Moore County, NC to build a glass bunker at the transfer station and Dow and Keep America Beautiful provided a grant to the City of Boise to improve their recycling program for hard to recycle plastics. Therefore, the benefits of public/private partnerships are becoming more apparent and accessible.

Table 16. Public Private Partnerships Evaluation

Uptake	Category	Findings
●	State Grant Funding Awarded	State grant funding has recently become available for materials management education and infrastructure. Isabella County has applied and received tire grants.
○	Partner with Municipalities/ Counties for Grants	Isabella County has not collaborated with others for grant applications.
○	Leverage Private Sector Partnerships	No strong partnerships or collaboration.
○	Cooperative Public/Private Planning	No standing committees or stakeholder groups to foster improved relationships with hauler and government.
○	Outside Group (The Recycling Partnership, Closed Loop) Financing	No funding received.

Strengths

- **State Grants:** With the passage of the Renew Environmental Fund by the legislature in the fall of 2018, the State of Michigan now has an annual allocation of \$15M that is intended to provide support for the development of programming and infrastructure to increase recycling. Currently, EGLE is offering several grant opportunities for communities including 1) Enhancing residential curbside and drop-off recycling programs and 2) Community Pollution Prevention (P2) Grants. State grant funding will be an asset for the County in the future. Recycling market development projects and infrastructure are future areas that will see support from state grants.

Challenges

- **No Standing Committee/Stakeholder Group:** The County does not have a regular committee or standing meeting with the haulers in the County. In successful systems, County and private sector work hand-in-hand to promote initiatives and infrastructure that can help all parties reach their goals.
- **Leveraging Partnerships:** There is tremendous opportunity for Public-Private Partnership (P3). P3 opportunities exist for co-investment, business development incentives, work force development, industrial recruitment, recycling industry collaborative projects, public affairs, and many other initiatives related to recycling. One available resource is The Recycling Partnership's Residential Curbside Recycling Cart Grant for communities to convert from bin or bag based curbside programs to carts or to implement new cart-based programs.

COOPERATIVE STRUCTURES

Michigan law provides several mechanisms for local units of government to work jointly to handle solid waste management responsibilities.

- **Public/Private Agreements:** Act 345, Public Acts of Michigan, 1978, expressly authorizes counties, municipalities, and local authorities to enter a wide variety of contracts including the authority to enter various types of joint ventures or other cooperative working relationships with private sector entities.
- **Inter-local Agreements:** Act 35, Public Acts of Michigan, 1951, authorizes any municipal corporation to "join with any other municipal corporation, or with any number or combination thereof by contract, or otherwise as may be permitted by law, for the ownership, operation or performance, jointly, or by any 1 or more on behalf of all, of any property, facility or service which each would have the power to own, operate or perform separately". Act 7, public Acts of Michigan, 1967 (Ex Sess), as amended, also supports the use of inter-local agreements allowing local units to exercise their powers jointly.
- **Solid Waste Authorities:** Act 179, Public Acts of Michigan, 1947, as amended and Act 233, Public Acts of Michigan, 1955, as amended authorize the creation of authorities to manage waste. Only Act 233 allows a County to be a joining member of an authority.
- **Board of Public Works:** Act 185, Public Acts of Michigan, 1957 authorizes a county to establish a board of public works which is empowered to acquire a refuse system to service the county. The county enters contracts with participating municipalities to allow for the acquisition, construction, operation, expansion of a refuse system. The contract can require full faith and credit from municipalities. Allows funding from various sources including tax levies, service charges, and special assessments. The County can finance with bonds of any type.

By choosing to participate in any or all the above intergovernmental structures, a local unit of government may elect to assign or delegate some of these powers of regulation to another municipal entity, acting jointly to exercise powers to regulate that it holds individually. The specific structure of any of these organizational approaches must be carefully worked out with legal counsel to secure full powers of the enabling legislation that is cited. Failure to do so may unnecessarily limit the capabilities of the system from a legal and financial perspective.

Following are further details of how these organizational tools work.

PUBLIC/PRIVATE AGREEMENTS

Act 345, Public Acts of Michigan, 1978, expressly authorizes counties, municipalities, and local authorities to enter a wide variety of contracts. Inherent in this broad contractual empowerment is the authority to enter various types of joint ventures or other cooperative working relationships with private sector entities. Thus, Act 345 provides the best vehicle for the County to enter contractual arrangements with local private entities to cooperatively finance and/or operate a recycling facility. There are no significant barriers to proceeding with such an arrangement provided specific actions are taken by the public sector that includes:

- Establishing a public sector organizational structure that can access the appropriate enabling legislation allowing sole-source negotiating with a private party for selected services.
- Putting in place a system at the local unit level that provides for the collection of recyclables, compostables and/or solid waste and the delivery of targeted materials to a designated processing facility or facilities to be identified by the public sector. Approaches include municipally operated services, contracted services, franchised services, or licensing of service providers.

- Strong enough public sector involvement in the project to prevent an unregulated monopoly from developing. This at a minimum must include retaining control over: 1) the guarantees of material to be delivered to facilities; 2) the guarantees of availability of the facility to all haulers authorized to operate in the area, and 3) other conditions under which a facility must operate (e.g., rates charged to users and quality of management of facility). Involvement in ownership and financing of a facility could also be important to showing strong public sector involvement in the project.

Fundamentally, these public sector actions are required to avoid anti-trust challenges to the proposed arrangement.

There are no significant constraints on how the selected businesses would organize themselves - assuming that the agreement between the public and private sector takes the form of a service contract. The businesses could set up a for-profit, nonprofit, or cooperative business structure. As well, the legal structure can be a closely held stock or non-stock business organization and does not require that membership be held open for other businesses interested in participating in operating the facility. Finally, the public sector can, and in fact should, participate aggressively in development of both the public and private sides of the proposed arrangement - the most effective means of insuring that all necessary organizational tasks are completed to standards of quality and timeliness acceptable to the public agencies.

Local businesses seeking to cooperate to negotiate with the public agencies for operation and financing of the facility need to investigate and decide upon a structure, whether profit or nonprofit. A primary issue to these local businesses will be to overcome any concerns of antitrust collusion. From the public sector perspective, the participating units of government will want to ensure that, assuming antitrust concerns can be resolved; it has control of the pricing and supervision of the services to be rendered by this association.

If the private group seeks to make a capital contribution towards the project, the public agency could establish either a joint venture with the private group or a condominium arrangement of the facility, whereby each party has title to specified portions of the facility.

In the joint venture arrangement both the public and private entities are joint owners in the project. The joint venture would not be a formal creation of a new corporation or partnership and instead would be a contractual arrangement between the public and private parties. In this arrangement all parties own a piece of the entire project and the joint venture contract clearly spells out separation of risks and liabilities.

The condominium approach takes select portions of the project (the building, the baler, etc.) and assigns ownership and capitalization responsibilities to either the public or private party for each portion. Interests that are not easily divided are assigned to the common interest of both parties and an escrow account is established, much like a condominium arrangement for housing.

If the private party will not make a capital contribution, the public agencies would negotiate a management contract with the private group for operation of the facility. In either case, the terms of the contract will provide for systematic pricing and regulatory controls.

A non-profit or industry cooperative approach could also be used in which selected businesses in the region, would set up a business organization that would contract with the public agencies for the exclusive right to provide the services and facilities that are needed. A non-profit - non stock corporation (membership with directorship) would allow public agencies to participate. In a cooperative legal structure, shares are issued so counties couldn't participate. But private entities could certainly form.

Table 17. Public/Private Agreements

STRENGTHS	WEAKNESSES
Public sector control: consistent level of services and funding of services	Setting up the necessary public sector agency
Leverages private sector capabilities to provide service	Maintaining an aggressive public agency posture during negotiations to bind the private party to reasonable costs
Additional private sector capital if needed	Complex decisions can take more time

Financing Implications: This approach can typically use nearly all the types of funding systems (private and public) available for solid waste and recycling system management as described in Section 10 and Appendix D.

INTER-LOCAL AGREEMENTS

Both Act 35, Public Acts of Michigan, 1951, as well as the Urban Cooperation Act 7, Public Acts of collaborate to exercise their powers jointly and to use joint service agreements to do so. This makes possible a wide range of potential arrangements to own, operate, administer, and fund a solid waste and recycling system. Essentially any of the powers held by an individual local unit can be performed jointly instead of separately, using inter-local agreements, ordinances, and rules/regulations.

In an approach that parallels the public/private agreement, a public agency could perform the same roles as the private agency, under an inter-local agreement with one or more other local units. In a similar way, two or more public agencies may jointly organize through inter-local agreements to set up contracts, franchises or licensing arrangements that provide for recycling services.

In another variation, local units could use intergovernmental contracts to designate the county, a board of public works or an authority as their agent to act on their behalf in promulgating a county-wide solid waste and recycling ordinance, licensing solid waste haulers, developing recycling facilities, collecting fees, sending out notices on billings, and so on. Local units would make a contractual covenant to adopt rates and charges if needed and to not adopt any of their own ordinances that would conflict with their intergovernmental agreement.

If some type of hauler licensing is part of the inter-local agreement the terms of the licensing system become key issues in setting up a smooth-running collection system that crosses over multiple jurisdictions. The specific structure of the licensing must be worked out with legal counsel to assure a workable system. Decisions must be made on what specific legal instrument is most appropriate, should the ordinances be adopted at the local level or at the county level, how will local units assign hauler licensing to the County, what agency will be assigned licensing responsibility, how will specifications be outlined in licensing, and what will be the format and frequency of data reporting required of haulers, just to name a few.

Inter-local agreements for jointly operated systems require a consistent approach to enforcement to protect the solid waste related businesses that comply with the provisions of the licensing system. Decisions need to be made on who will do the enforcement, what penalties will be used, and how will illegal dumping be policed.

If facilities are to be developed as part of the inter-local agreement it will be critical that local units provide for a long-term commitment. To gain that agreement it typically will mean that all parties have a clear understanding of what is expected. Facility and/or vendor procurement may need to begin before the organizational structure is in place so that key decisions are made prior to local units signing on. Participants will need to know what the specific

bid process will be, whether there is a rationale for working only with existing players, as well as some selected details relating to the bid document e.g. material sales split, flexibility etc.

Table 18. Inter-Local Agreements

STRENGTHS	WEAKNESSES
Public sector control: consistent level of services and funding of services	No provision for a joint powers decision making body.
Allows system to assign other roles (operation, administrative, enforcement, etc.) to whatever public agency is most capable of handling those responsibilities.	Local units of governments must be more actively engaged in the project.
Can blend with any of the other organizational tools to access desirable features.	Structure must clearly detail all responsibilities and liabilities and assign roles to the various participants.
Structure is essential component of system.	Contracts, assignments, responsibilities can become very complex. Changes in system that requires contract amendments will face significant administrative challenge. Potential for institutional loss as local units of governments decision makers turn over.

Financing Implications: Many of the types of public sector revenue generating systems available to local units can be used in this approach, as long as local unit authorization is received. This approach lacks easy access to some types of public sector bond financing as a joint entity and instead would rely on one of its participating municipalities for capitalization.

AUTHORITIES

Two statutes authorize the creation of authorities to manage waste. They are Act 179 of 1947, as amended and Act 233 of 1955, as amended. Only Act 233 allows the County to be a joining member of an authority. The specific structure of the authority must be carefully worked out with legal counsel to secure full powers of the enabling legislation.

At least two units of government are required to create an authority as provided for by statute. For the purposes of creating the required articles of incorporation, every participating unit of government will need to approve and sign the final documents. A key issue to discuss is which units will participate and how many and which ones are needed at a minimum for a "go" decision to forming the authority.

The makeup of the Board of Directors is a critical element in forming an authority. It is important that all members feel they have a representative voice in authority actions. Key issues include how many Board members should be provided for, who should appoint board members, how long should board members serve, what types of individuals should be appointed, and how should board representation be determined.

Non-voting or advisory input is also an important element in an authority's structure. Often the members appointed to an authority Board or other decision-making body do not have all the expertise they would like or not all areas of information are represented. A decision must be made as to whether any system of advisory input should be provided for in the governing body of the Authority.

Transition issues can be a major challenge in setting up an authority. Existing programs that are currently in place may need to be addressed in some capacity as part of the authority's responsibilities if any new programs are likely to negatively impact those programs. Decisions must be made on whether responsibility for any preliminary expenses, existing assets/liabilities, on-going contracts, or related items should be assumed by the authority at the time of creation.

Table 19. Authorities

STRENGTHS	WEAKNESSES
Allocation of power and responsibility in a formal decision making structure.	Sometimes political distancing (Authority more independent from local units of governments) can make decision making more difficult.
Bylaws clearly detail administrative procedures to be followed.	Representation on board can be a significant issue in overall control and accountability.
Can blend with any of the other organizational tools to access desirable features.	Board member decision makers may lack experience and expertise.
Can insulate system decision making from the often more political and sometimes less predictable legislative process of each local unit of government.	
Creates its own institutional memory, overall mission and organizational momentum which help long-term stability.	
Legal structure is flexible and streamlined – often through membership and adoption of the authority's articles of incorporation and bylaws.	
Capable of handling one or more counties service areas.	

Financing Implications: Authorities provide access to bond financing capabilities independent of those capabilities held by its member local units. These member local units can also use their own public sector funding mechanisms to fulfill their financial obligations to the authority. An authority also has the ability to access private sector finance and funding methods through public/private agreements.

FUNDING OPTIONS

Many communities throughout Michigan choose to negotiate a community contract with a service provider to collect and dispose of a community's waste. The following illustrates several approaches to fund collection and processing services through a combination of the following funding options. Table 20 presents a funding overview summary matrix.

1. Advance Disposal Capacity Fee

The Advanced Disposal capacity fee that is collected by the County and usually negotiated as a host community fee for licensed disposal facilities.

2. Volume Based Fee Structures (commonly referred to as pay-as-you-throw)

Generators pay in proportion to the amount of waste they set out for collection. Volume based rate systems typically require that residents purchase special bags or stickers, or they offer generators a range of service subscription levels. When generators pay for the waste they produce, they have an incentive to reduce it.

3. Special Assessments through Public Act 185 and Public Act 188

Municipalities, or the Authority through the Isabella County Board at the request of a municipality, could establish special assessments, to fund local solid waste and recycling programs. The special assessment must be linked to a benefit to the property owner and would be collected through the property tax bill.

4. Hauler Licensing

With its existing authority under the state Public Health Code, the County may adopt policies or ordinances to regulate haulers and establish associated fees for public health purposes; or, with the participation of individual local units of government, the County may create a licensing program and establish fees for haulers operating within the County.

5. Countywide Ordinances

Under the County's existing authority, the County can adopt policies or ordinances in furtherance of Plan goals, such as to establish fees for landfill surcharges and County provided services, or with the participation/cooperation of individual local units of government for other solid waste and recycling related programs.

6. Public Act 138 (limited to residential households)

A county, through an inter-local agreement with municipalities, may impose a surcharge on households within the county of not more than \$2.00 per month or \$25 per year per household for waste reduction programs and for the collection of consumer source separated materials for recycling, composting, or household hazardous waste.

7. Matching contributions of funds from municipalities through the pooling of resources from municipalities may be an option to fund regional programs.

8. Public/private partnerships can provide long-term, sustainable funding mechanisms.

Table 20. Funding Systems Overview Matrix

FUNDING SYSTEM/DESCRIPTION	MICHIGAN COUNTY USAGE	USE CASES
Hauler License Resource Recovery Fee: Licensed haulers can be charged a "Resource Recovery Charge" for each household and commercial account and be required to pass through that charge as a line item to their customers. The charge would be set as part of the annual budgeting process to cover all costs for Resource Recovery Programs. Each hauler's share is then based on their percentage of the market.	Used in Eaton County for over 10 years (\$9.60 household/yr. and \$40/commercial account per year). No other known users of this approach in the state.	Best Used For: <ul style="list-style-type: none">• Recycling Program Expenses (drop-offs, curbside)• Special Material Programs (HHW, e-Scrap, Batteries, etc.) Also Works For: <ul style="list-style-type: none">• Admin Expenses (e.g., staff, planning)• Outreach/Education/Promotion
ACT 185 County Public Works Assessment: This funding mechanism is used in water, sewer, refuse/recycling and related environmental projects by counties that have an organized an Act 185 Department of Public Works. Specific procedures must be followed to develop a project including an engineer's cost estimate and required public hearings and county/local approvals. This allows collection of a flat fee assessment for the project over a set period. (Public Act 185, 1957, MCL 123.732).	Act 185 assessments are used in many counties across the state for a variety of projects	Best Used For: <ul style="list-style-type: none">• Recycling Program Expenses (MRFs, drop-offs, cleanups, curbside)• Special Material Programs (HHW, e-Scrap, Batteries, etc.) Also Works for: <ul style="list-style-type: none">• Admin Expenses (e.g., staff, planning)• Outreach/Education/Promotion• Can be used for trash system costs as well
ACT 69 and 138 Resource Recovery Fees: With Act 69, through County and local unit resolutions, voters in each jurisdiction are asked to approve this resource recovery charge (up to \$50) per household/business per year that can then be collected (if voters approve in that local unit) by the County as part of winter taxes. This is similar to a PA 138 fee that is limited to households only with a maximum of \$25/year, but just requires approval by the elected officials of the local unit. (Act 69, 2005, Act 138, 1989, Urban Cooperation Act 7 of 1967, MCL 124.508a)	Leelanau County is the first to use the Act 69 fee. They previously used the Act 138 fee and have an active landfill surcharge. Act 138 is also used by Benzie County, Allegan County and Clinton County – all to fund local drop-off programs, HHW, etc. No other users in the state.	Best Used For: <ul style="list-style-type: none">• Recycling Program Expenses (drop-offs, curbside)• Special Material Programs (HHW, e-Scrap, Batteries, etc.) Also Works For: <ul style="list-style-type: none">• Admin Expenses (e.g., staff, planning)• Outreach/Education/Promotion• Cannot be used for trash disposal costs

FUNDING SYSTEM/DESCRIPTION	MICHIGAN COUNTY USAGE	USE CASES
<p>Landfill Surcharge: A Resource Recovery Fee can be imposed by ordinance/licensing mechanism (e.g., Grand Traverse County levies \$0.12 per cubic yard on solid waste collected by the landfill operator), by contract (e.g., Clinton County) or as part of the budget of publicly owned facilities (like Wexford and Emmet). Applies to all incoming tons (residential and commercial) and varies with incoming waste volumes.</p>	<p>This is the most common approach used by Michigan Counties (Emmet, Wexford, Saginaw, Grand Traverse, Leelanau, Sanilac, Clinton, Genesee, Ottawa, Berrien, Macomb, Wayne, Washtenaw, Monroe, Kent, and more)</p>	<p>Best Used For:</p> <ul style="list-style-type: none"> • Admin Expenses (e.g., staff, planning) • Outreach/Education/Promotion <p>Can Work For:</p> <ul style="list-style-type: none"> • Special Material Programs (HHW, e-Scrap, Batteries, etc.) <p>Least Suited for:</p> <ul style="list-style-type: none"> • Recycling Program Expenses (drop-offs, curbside) due to higher program costs but may offset some costs
<p>Voter Approved County-wide Millage: The majority of voters in the County can approve a millage to fund resource recovery programs, either for capital or operating costs. Majority approval of voters would implement this funding mechanism county-wide. Almost always has a sunset clause (e.g., 5 years) to require re-evaluation and re-voting by citizens.</p>	<p>Emmet County used a temporary millage for the capital costs of its original recycling program start-up. Charlevoix County (drop-offs and HHW). Chippewa County (drop-offs/MRF operated by disabled worker non-profit); Tuscola County (drop-offs, HHW and MRF operated</p>	<p>Best Used For:</p> <ul style="list-style-type: none"> • Recycling Program Expenses (drop-offs, curbside) • Special Material Programs (HHW, e-Scrap, Batteries, etc.) • One Time Capital Costs (e.g., Building) <p>Also Works For:</p> <ul style="list-style-type: none"> • Admin Expenses (e.g., staff, planning) • Outreach/Education/Promotion

FUNDING SYSTEMS

USE OF SPECIAL ASSESSMENTS TO FUND SOLID WASTE/RECYCLING

A special assessment is a charge against real property (i.e., immovable property such as land and structures - not personal property) for an improvement or service that confers a benefit to those living within the special assessment district. Special assessments are used by municipalities to fund projects or services that would otherwise not be possible, such as road repairs, water and sewer mains, street lighting, police and fire protection, and garbage and recycling services. Special assessments can be used in conjunction with general fund revenues, service fees, user charges, grants, or other sources of funding.

HOW DOES A SPECIAL ASSESSMENT DIFFER FROM A TAX OR FEE?

Special assessments are often confused with property taxes since most municipalities find it easiest to include special assessments on the property tax bill. Unlike taxes, special assessments are not levied on personal property, are not subject to constitutional/statutory limitations like the Headlee Amendment, do not require a vote of the electors, and are not tax deductible under the State Homestead Tax Credit or on Federal Income Tax. Unlike a tax, a special assessment must convey a specified benefit. In addition, special assessments can be included in the tax effort used to qualify for shared state revenues. Special assessments differ from user fees in that they are imposed in advance of a project or service. This is a general statement only and should not take the place of consultation with a municipal law specialist.¹

The amount levied in a special assessment is determined by the authorized government unit. Typical methods of assessment are based on front footage, total land area or value, per parcel, per dwelling, degree of accessibility/distance from project, or a combination of several methods or weighted factors. Often, the public may also benefit from a special assessment project or service. In these cases, a government unit may decide to cover part of the cost through general funds, service fees, grants, or other funding sources.

The amount levied does not have to be uniform or applied to all parcels in the government unit – it is based on a determination of how much each parcel benefits from the project/service. This does not mean that strict dollar equality must be used, but the assessment needs to be reasonably proportionate to the benefit (L. Thomsen, Michigan Township News, Oct. 2005). Property that is tax exempt, such as churches, schools, and public service properties, may not be exempt under special assessment statutes.

Careful consideration of apportionment should be done before holding any public hearings, especially if there are large differences in the amounts levied on parcels. Initial over-estimation of assessments is recommended, as it is easier to reduce estimates than to increase them.

Assessments that cover recurring expenses are often imposed one year at a time. This is generally done for services such as recycling, police, and fire protection, weed control, and street lighting. This requires a new assessment roll to be reviewed by the government unit at a public hearing each year.

PUBLIC ACT 69

The State of Michigan requires every Michigan county to develop and implement a solid waste management plan. The purpose of solid waste management plans includes protecting public health, assuring adequate disposal capacity for all waste generated within the county, and establishing goals for waste prevention and recycling.

Providing county residents with a cost-effective, standardized recycling program that is accessible county-wide is the goal of the PA69 of 2005 Program. When most communities are participating, recycling can be accessible throughout

Isabella County and open to all residents regardless of the city, village, or township that they reside in. The costs can be shared equally across the program. This will allow for more consistent recycling program services and education.

Public Act 69 (PA69) allows Michigan Counties, townships, and municipalities to voluntarily enter into an inter-local agreement to fund local residential recycling drop-off programs. If a Township chooses to participate, the County will work with the Township to design, set up and implement a recycling drop-off location within that community.

PA69 offers each township board the option of placing a fee on the tax bills of residential improved parcels in order to fund their community's recycling program. PA 69 limits the fees to no more than \$25.00 per improved parcel per year. The revenues collected for this program are held with the County Treasurer and used solely for recycling program administration, collection and processing of recyclables, site monitoring and public education.

The benefits to communities participating in PA 69 include:

- Minimal program administration and improved use of Township staff: under PA69, recycling collection service is negotiated and contracted by the County, providing the opportunity for townships to reduce expenditures in staff time to oversee and manage a township-run recycling program.
- Site Monitoring: Local site monitors are hired to inspect and maintain PA69 recycling sites on a weekly basis to maximize space, minimize contamination, and keep the site clean.
- Recycling education and information is essential to the success of recycling programs by providing consistent, accurate information and guidelines to reduce contamination and increase recovery.
- PA69 provides communities and its residents with access to a County-contracted recycling coordinator and centralized information on all available recycling and special waste handling.
- Recycling volume and financial reports provided quarterly.
- Recycling guidelines flyer and toll-free recycling hotline for communities and residents.
- Recycling and waste reduction presentations to groups and organizations.
- Residential recycling surveys.
- Educational display booth at events.
- Volunteer opportunities for residents at volunteermatch.org.
- Detailed recycling information available through County information programs.
- Coordinated recycling services and economies of scale: Currently Cities, Townships and Villages are independently negotiating recycling services and pricing for the exact same service varies among local communities. If more Townships participate in the PA69 Recycling Program, the County will have more negotiating power for contracted collection services and increase the shared benefit of cost savings.

PUBLIC ACT (PA) 185 AND 342

PA 185 of 1957 (MCL 123.731, et seq.) and PA 342 of 1939 (MCL 46.171, et seq.) authorize a county to issue bonds for public water and sewer, refuse/recycling and related environmental projects by counties that have a Department of Public Works organized through Act 185. Projects are developed following required procedures, development of an engineer's estimate, and confirmation of necessary county and local approvals prior to establishing the assessment roll for the project. An Act 185 contract is not subject to a right of referendum. Deciding whether to request a county to issue bonds under Act 185 or Act 342 for a project can depend on whether the municipality wants to avoid a referendum petition (Act 185) or be subject to a right of referendum (Act 342).

This Act authorizes the establishing of a department and board of public works in counties; to prescribe the powers and duties of any municipality subject to the provisions of this act; to authorize the incurring of contract obligations and the issuance and payment of bonds or notes; to provide for a pledge by a municipality of its full faith and credit

and the levy of taxes without limitation as to rate or amount to the extent necessary; to validate obligations issued; and to prescribe a procedure for special assessments and condemnations.

Contract bonds are a good way to finance capital improvements if a municipality or an established authority is limited by the 3 percent annual limit on special assessment bonds. A municipality can also combine different revenue sources—such as special assessments, rates, and charges—to repay bonds. Bonds issued by a county are particularly attractive to a municipality because they can generally be sold at lower interest rates than a similar municipal issue, thereby benefiting municipal residents and property owners. Assessment bonds are issued by a county board.

OTHER APPROACHES

Following is a list of statutes commonly used to fund garbage and recycling collection and facilities. This list should not be considered exhaustive – there may be other statutes that are a better fit for a project or community.

- ***Act 138 of 1989 (Urban Cooperation Act of 1967) – County***

1989 PA 138, as amended, allows the County Board of Commissioners, by resolution, to impose a surcharge not to exceed \$25.00 per year, per household, for waste reduction programs and for the collection of consumer source separated materials, as defined in Part 115 of 1994 PA 451, household hazardous wastes, tires, batteries, and yard clippings; PA 138, as amended, requires the County to defer the imposition and collection of a surcharge in a local unit of government within the County until the County has entered into an interlocal agreement relating to the collection and disposition of the surcharge with the local units of government.

- ***Act 342 of 1939 (County Public Improvement Act of 1939) – County***

Authorizes a county board of commissioners to establish garbage or rubbish collection and disposal facilities; or services within or between cities, villages, townships, charter townships, or any combination of government units within or outside of the county. Actions issued under Act 342 can be subject to a right of referendum.

- ***Act 233 of 1955 (Municipal Sewage and Water Supply Systems) – County, City, Village, Township***

Authorizes an incorporation of municipal authorities to acquire, operate, and improve solid waste management systems, form contracts between such authorities and public corporations, and raise funds through bonds or assessments.

- ***Act 76 of 1965 (Joint Water Supply and Waste Disposal Systems) – All Local Units***

Authorizes units of government to construct waste disposal systems or contract for use of such facilities through agreements with governmental units, entities, or agencies of another state.

Along with the authorizing statute, special assessments for public projects must also adhere to these statutory requirements:

- PA 162 of 1962 – Notice of assessment prior to each hearing.
- PA 267 of 1976 – Notice and meeting requirements of the Open Meetings Act must be observed throughout.
- PA 64 of 1988 – Notification of right to protest and appeal.
- PA 65 of 1988 – Property owners must first protest a special assessment at a public hearing held to confirm the assessment roll before appealing to the Michigan Tax Tribunal.

RECOMMENDATION

The following is a suggested near-term phased Road Map to increase diversion in preparation to upgrading the existing MRF to meet the 7 or 10 TPH design basis. The County must work with jurisdictions in the county to increase the quantity of material collected through best practices curbside collection with cart based single stream programs. The County must also work to secure partnership or agreements with jurisdiction in adjacent counties to secure commitments for additional tonnage. RRS recommends a phased approach towards implementation. The development of the system in phases allows for funding to be implemented in stages and further evaluation and adjustment be conducted during each phase.

Table 21 Road Map Matrix

AREA	PHASE 1	PHASE 2	PHASE 3
COLLECTION	<ul style="list-style-type: none"> Identify Local Units of Governments (LUG) recycling contract expiration dates Develop contracting plan that results in synchronization of contracts for LUGs outside Isabella County within 3 years. Seek contract extension for communities with MRF processing contracts that expire in 2023. 	<ul style="list-style-type: none"> Sync up contract schedules for initial regional municipalities for collaboration on contracting for communities whose contracts expire in 2024 and 2025 Apply for grants to purchase curbside carts that coincides with new service contracts 	<ul style="list-style-type: none"> LUG recycling contract collaboration Implement Cart based recycling in LUGs with new contracts Evaluate coordinated contracting with MRF for all tons from collaborating LUGs
PROCESSING	<ul style="list-style-type: none"> Develop specific design for MRF Upgrade Initiate a dialogue with adjacent Counties related to the feasibility of providing additional material and developing the Isabell facility as a regional MRF 	<ul style="list-style-type: none"> Identify MRF partners for single stream processing in regional counties Evaluate coordinated contracting for all tons from collaborating LUGs 	<ul style="list-style-type: none"> Upgrade and construct the current facility based on the commitments from regional LUGs and increased recovery within the County
END MARKETS	<ul style="list-style-type: none"> Identify local markets for recyclable commodities, especially for non-curbside recyclable materials 	<ul style="list-style-type: none"> Coordinate with local end markets to provide local manufacturing inputs 	<ul style="list-style-type: none"> Work to supply material to local markets
EDUCATION & OUTREACH	<ul style="list-style-type: none"> Identify measurable goals to launch an outreach campaign Create a library of marketing collateral Improve online presence 	<ul style="list-style-type: none"> Countywide recycling education campaign Campaigns on target audiences/materials 	<ul style="list-style-type: none"> Incorporate social marketing tools such as prompts, effective messages, etc. Survey residents to gauge awareness Monitor participation and material quality (contamination)

APPENDICES

APPENDIX A: ESTIMATED VALUE OF CURRENT LANDFILLED RECYCLABLES FROM EIGHT COUNTRY REGION

POTENTIAL RECYCLED COMMODITY	TONS	PERCENT OF TOTAL	5 YEAR AVERAGE \$/TON	5 YEAR VALUE	APRIL 2020 VALUE
Mixed Paper	18,023	11.0%	35.67	\$642,846	-\$45,056
Sorted Residential Papers and News (SRPN)	11,422	7.0%	52.52	\$599,828	\$199,884
Corrugated containers (OCC)	17,363	10.6%	90.61	\$1,573,368	\$1,432,469
Aseptic cartons	429	0.3%	71.59	\$30,708	\$9,651
Glass 3 mix	4,035	2.5%	-20.66	-\$83,346	-\$90,788
Aluminum cans (sorted, baled)	2,748	1.7%	1258.18	\$3,457,793	\$1,099,303
Aluminum (foil and other)	397	0.2%	62.91	\$24,984	\$7,943
Steel cans (sorted, densified)	13,614	8.3%	254.11	\$3,459,523	\$850,887
PET (baled, picked up)	2,081	1.3%	666.33	\$1,386,668	\$416,210
Natural high-density polyethylene (HDPE) (bailed, picked up)	238	0.1%	351.48	\$83,752	\$169,185
Colored HDPE (bailed, picked up)	1,469	0.9%	-2.81	-\$4,134	\$124,903
Commingled (#3-7, baled, picked up)	953	0.6%	-\$2.54	-\$2,421	-\$28,595
Low-density polyethylene (LDPE) (includes some bags, film)	14,575	8.9%	-\$2.81	-\$41,002	\$619,450
Durable and rigid containers (HDPE rigid (baled) and LDPE)	5,266	3.2%	-\$2.81	-\$14,814	\$223,812
Total of Potential Recyclables	92,615	56.7%		\$11,113,754	\$4,989,257
POTENTIAL OTHER MATERIAL	70,637	43.3%		\$945,020	\$704,439
TOTAL	163,251	100.0%		\$12,058,774	\$5,693,697
Avoided Landfill Disposal	163,251		\$15.00	\$ 2,448,768	
Disposed Tons	305,836				

Note: This table is representative of selected materials that are recoverable with infrastructure. This is a demonstration to show there is value in the landfill materials. What is feasible depends on infrastructure developed. Slight differences in values throughout this report are due to rounding. In this demonstration, plastics are separated by more grades because of the distinction in 5-year average commodity values. For example, HDPE is separated into natural colored (clear) commodity and colored commodity because of the difference in commodity prices depending on coloring (natural HDPE current average price \$35.50 cents per pound picked up compared to colored HDPE current average price \$4.25 cents per pound picked up¹⁵). Since natural HDPE is worth significantly more than colored HDPE, MRFs may separate natural HDPE from colored HDPE. The plastics list above outlines common plastic commodity bales MRFs may create for sale. Communities may not collect all these materials and MRFs may not process and market all these materials, which is dependent on local programs requirements and end market availability.

¹⁵ Commodity pricing source: SecondaryMaterialsPricing.com

APPENDIX B: BASELINE ESTIMATES OF CURRENT RECOVERY IN ISABELLA COUNTY

Municipality/Hauler	Scenario 1 Status Quo	Scenario 2 - Growth with SS Cart achieving state avg	Growth Factor
County	1,035	1,552	1.5
Deerfield Township	72	108	1.5
Lake Isabella, Village	30	46	1.5
Lincoln Township	24	36	1.5
Rolland Township	16	24	1.5
SagChip Tribe	2	3	1.5
Shepherd, Village	20	29	1.5
Union Township	112	168	1.5
County Total	1,311	1,966	
Mt. Pleasant	413	826	2.0
CMU	263	263	1.0
Tribe/Casino	254	254	1.0
Allied/Republic	380	380	1.0
Waste Management	1,487	1,487	1.0
TOTAL Baseline	4,108	5,176	

APPENDIX C: SCENARIOS

	Municipality/Hauler	Scenario 1 Status Quo	Scenario 2 - Growth with SS Cart achieving state avg
Baseline	TOTAL County Baseline	4,300	5,300
	Clare and Midland	3,400	3,400
Low	County Base plus Clare / Midland	7,700	8,700
	Regional Material @ 25%	6,300	6,300
Medium	County Base plus Regional Total	10,600	11,600
	County plus Other Regional Material @ 25% including Commercial	12,500	12,500
High	County Base plus Regional plus 25% Commercial	16,800	17,800

APPENDIX D: MRF Thruput

	Tons Per Year	Tons Per Day	Tons Per Hour
Current	4,100	16	3.0
Low Recovery - County Growth to Statewide Avg.	5,300	20	3.0
Medium Recovery - Regional Material @ 25%	8,700	34	5.0
High Recovery County plus Regional plus Commercial	17,800	69	10.0

APPENDIX E: 7 TPH MRF COST PROFORMA

Capital Costs	-		Interest Rate	5%	Total
	Cost	Life	Recovery	Annual Cost	
Building	\$5,070,000	20	(\$406,830)	\$406,830	
Processing Lines	\$6,249,500	10	(\$809,339)	\$809,339	
System Infrastructure	\$0	20	\$0	\$0	
		10	\$0	\$0	
		10	\$0	\$0	
		10	\$0	\$0	
		10	\$0	\$0	
Subtotal	\$11,319,500				
Performance Bond 0.0% of total	\$0	10	\$0	\$0	
Equipment Contingency 5.0% of total	\$253,500	10	(\$32,829)	\$32,829	
Equipment Engineering/Inspection 5.0% of total	\$253,500	10	(\$32,829)	\$32,829	
TOTAL CAPITAL	\$11,826,500			Total Annual Capital Cost	\$1,281,828
Facilities and O&M Costs					
		Units	Unit Cost	Cost	
Presort Sorting	3	4.0 FTE	\$54,080	\$216,320	-
Fiber Sorting	3	6.0 FTE	\$54,080	\$324,480	-
Container Sorting	3	1.0 FTE	\$54,080	\$54,080	-
Equipment Operation/Maintenance	1	2.0 FTE	\$63,030	\$126,060	-
Maintenance	1	1.0 FTE	\$54,080	\$54,080	-
Scale and Clerical	1	1.0 FTE	\$55,702	\$55,702	-
Supervisor/Manager	2	2.0 FTE	\$89,232	\$178,464	-
Workman's Comp & Overhead		10%	\$792,867	\$79,287	-
Insurance		13,104	\$1	\$13,104	
General and Administrative		4%	\$1,881,525	\$75,261	
Energy		13,104	\$1	\$11,663	
Baler Wire		9,911	\$2	\$19,823	-
Capital Replacement		1	\$125,000	\$125,000	-
Equipment Maintenance		13,104	\$1	\$13,104	-
Building Maintenance		10,000	\$1	\$10,000	-
Residue Disposal and hauling		1,310	\$24	\$31,043	-
Building utilities		10,000	\$2	\$15,000	-
				Total Annual Labor, O&M Cost	\$1,402,471
				Total Annual Costs =	\$2,684,299
				Market Revenue =	\$471,744
				Other Revenue =	\$0
				Net Market Revenue =	\$471,744
				Net Cost (Cost-Revenue) =	\$2,212,555
Annual Tonnage	Residual Rate	Residual Rate	Gross Cost/Ton	Avg Net Sale Price/Ton with Residue Disposal	Net Cost/Ton
13,104	10.00%	10.00%	\$204.85	\$36.00	\$168.85

APPENDIX F: 10 TPH MRF COST PROFORMA

<u>Capital Costs</u>	-		Interest Rate	5%	TOTAL
	Cost	Life	<u>Recovery</u>	<u>Annual Cost</u>	
Building	\$5,070,000	20	(\$406,830)	\$406,830	
Processing Lines	\$13,569,500	10	(\$1,757,312)	\$1,757,312	
System Infrastructure	\$0	20	\$0	\$0	
		10	\$0	\$0	
		10	\$0	\$0	
		10	\$0	\$0	
		10	\$0	\$0	
Subtotal	\$18,639,500				
Performance Bond 0.0% of total	\$0	10	\$0	\$0	
Equipment Contingency 5.0% of total	\$253,500	10	(\$32,829)	\$32,829	
Equipment Engineering/Inspection 5.0% of total	\$253,500	10	(\$32,829)	\$32,829	
TOTAL CAPITAL	\$19,146,500			Total Capital Cost =	\$2,229,801
<u>Facilities and O&M Costs</u>					
		Units	Unit Cost	Cost	
Presort Sorting	3	3.0 FTE	\$54,080	\$162,240	-
Fiber Sorting	1	1.0 FTE	\$54,080	\$54,080	-
Container Sorting	1	1.0 FTE	\$54,080	\$54,080	-
Equipment Operation/Maintenance	1	1.0 FTE	\$63,030	\$126,060	-
Maintenance	1	1.0 FTE	\$54,080	\$54,080	-
Scale and Clerical	1	1.0 FTE	\$55,702	\$55,702	-
Supervisor/Manager	2	2.0 FTE	\$89,232	\$178,464	-
Workman's Comp & Overhead		10%	\$522,467	\$52,247	-
Insurance		18,720	\$1	\$18,720	
General and Administrative		4%	\$2,152,512	\$86,100	
Energy		18,720	\$1	\$16,661	
Baler Wire		14,159	\$2	\$28,318	-
Capital Replacement		1	\$125,000	\$125,000	-
Equipment Maintenance		18,720	\$1	\$18,720	-
Building Maintenance		10,000	\$1	\$10,000	-
Residue Disposal and hauling		1,872	\$24	\$44,348	-
Building utilities		10,000	\$2	\$15,000	-
			Total Annual Labor, O&M Cost=	\$1,099,821	
			Total Annual Costs =	\$3,329,622	
			Market Revenue =	\$673,920	
			Other Revenue=	\$0	
			Net Market Revenue =	\$673,920	
			Net Cost (Cost-Revenue) =	\$2,655,702	
Annual Tonnage	Residual Rate	Gross Cost/Ton	Avg Net Sale Price/Ton with Residue Disposal	Net Cost/Ton with Revenue	
18,720	10.00%	\$177.86	\$36.00	\$141.86	