

# Ulster County ReUse Innovation Center Strategic Plan and Feasibility Study

## *Characterization of the Ulster County Waste Stream and Preliminary Opportunity Assessment*

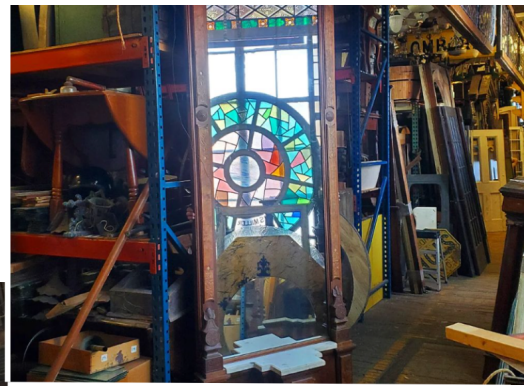
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## Introduction

New York's nation-leading climate law requires concerted efforts to lower greenhouse gas emissions as much as possible, with specific targets for waste reduction identified in the Scoping Plan released in January 2023 to guide policy formulation. Waste management overall is an estimated 12% of New York's carbon footprint<sup>1</sup>, and a strong focus for innovation in Ulster County. A Reuse Innovation Center is under consideration as a key strategy for waste reduction and diversion, driven by the vision of highly motivated legislators and staff who have decades of experience in materials management. Advantages of increased waste diversion include reduction of fuel use and emissions, reduced transportation costs, reintegration of materials into the circular economy and potentially related economic opportunities. To help Reuse Innovation Center stakeholders develop a common understanding of the types, volumes and characteristics of waste generated and processed in Ulster County, a waste characterization study was performed by ReUse Consulting and Sustainable Hudson Valley under contract to the County.

## Approach

The waste characterization has drawn on published reports and field observations conducted from October, 2022 through January, 2023. Data on waste materials flows was reviewed, along with direct field observations and interviews to learn about features of the materials management system in Ulster County that most affect the possibilities for increased diversion and the feasibility of a Reuse Innovation Center as envisioned by the County.

### 1. Primary documents reviewed were:

- Ulster County Resource Recovery Agency Local Solid Waste Management Plan.
- Ulster County Legislature's Zero Waste Implementation Plan working draft (TOC and Drafted Materials - 2022-12-10).
- Ulster County Annual Waste and Recycling Solid Report Planning Unit Update 2019
- NYS Beyond Waste Plan, Appendix H: Waste Materials Composition and Characterization
- Ulster County 2018 Inventory of Communitywide Greenhouse Gas Emissions Appendix D: Solid Waste Sector.
- Annual reports by permitted private waste management facilities.
- 2018-2022 UCRRA Data Summary sheets provided by UCRRA staff.

2. Interviews were conducted with and/or visits made to key county agencies, reuse and recycling organizations, private resellers, and expert stakeholders in and near Ulster County.

3. Key activities have included a visit and tour of UCRRA facility in Kingston, meeting with UCRRA board and staff; dialogues with most members of the Ulster County Legislature's Zero Waste Implementation Plan and the Ulster County Department of the Environment; as well as direct observations for a one-day period of UCRRA tipping floor materials delivery and handling.

4. Dave Bennink conducted one site visit to the New Paltz Transfer Station and four visits to UCRRA's main facility: a tour with the team and UCRRA staff/ board; a Saturday morning observing public visits to UCRRA during a four-hour period; a day on the tipping floor photographing activities, materials and evidence of

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<sup>1</sup> Governor Kathy Hochul State of the State Address, 2022.

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diversion; and a walk-around with UCRRA's Executive Director to assess possibilities for use of the adjacent, undeveloped property.

5. Additional community observation included driving around to observe building stock and the amount of new construction that was visible in the region; a visit to Home Depot to get a sense of building materials prices; and visits to thrift and resale shops to observe their inventory and learn about their capacity.

6. In addition, data visualization intern Ariana Henry (Vassar College Mappers) analyzed DEC annual reports from the seven mid-Hudson counties, including Ulster, and the major transfer stations in the region to create materials flow diagrams out of Ulster County, and around and out of the Mid-Hudson Region. The goal of this analysis was to demonstrate aggregated opportunities for waste diversion through regional collaboration.

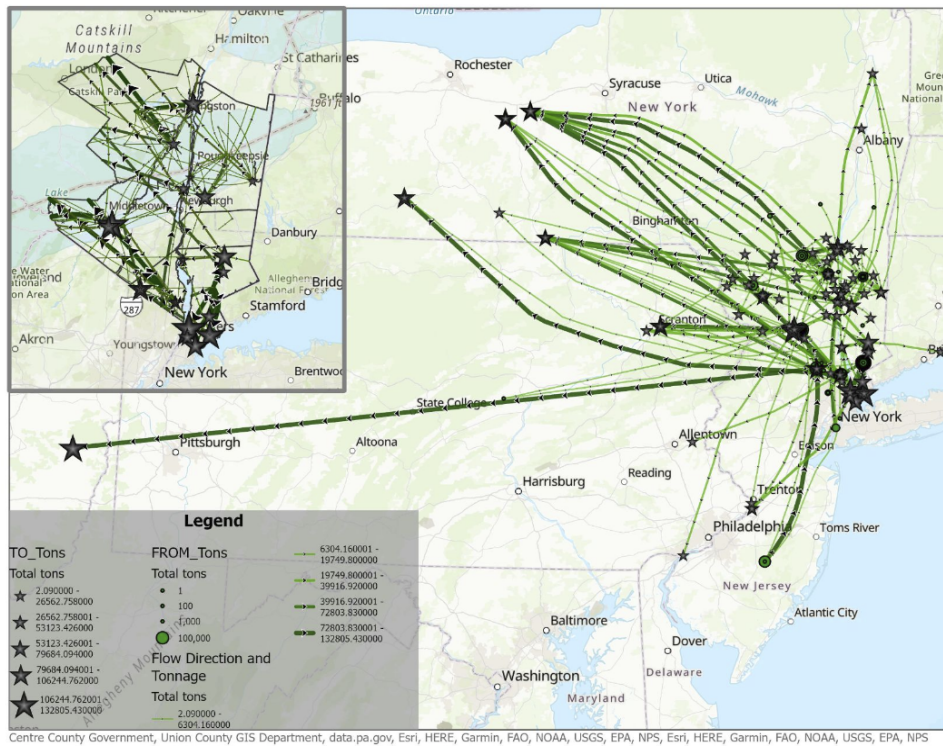
In this document we review the flow and types of materials collected, recycled, landfilled in Ulster County and our observations of the process, highlighting opportunities for diversion into a Reuse Innovation Center.

### Materials management system overview

In Ulster County, like the rest of the Hudson Valley, materials are collected from local sources, centralized at transfer stations, and - for the most part - transported out of the region to the nearest major landfill, Seneca Meadows, in central New York, and to recycling markets worldwide. The chart shows the complexity of these flows based on 2020 data.

A number of recyclables that are generated in the Valley are hauled as far away as India and China. The majority of commodities are handled regionally. Primary destinations in the Hudson Valley are: ReCommunity/Beacon, Westchester County Thruway and the Ulster County Resource Recovery Agency, UCRRRA. Of these three entities, UCRRRA has found the most markets close by, whereas the other two send their recyclables greater distances.

Flow of MSW and C&D Debris between Transfer Stations in NYS



In Ulster County, UCRRRA has two main transfer stations (TS) that it operates and oversees, one in the Town of Ulster and the other in New Paltz. Combined, these are permitted to accept 1,040 tons per day and 5,460 tons per week of MSW and C&D. Statewide, 53% of MSW comes from residential sources and 46% from commercial/ institutional sources.<sup>2</sup>

<sup>2</sup> NYS Beyond Waste Plan, Appendix H: Waste Materials Composition and Characterization

## Summary of the Waste Stream

The waste stream can be defined as anything that has finished its serviceable life, or that is being disposed of. This includes materials that are recycled, those that are diverted into remanufacturing, and the actual waste stream going to disposal or incineration. We examined the waste stream coming from UCRRA and going to the Seneca Meadows landfill in Central New York, and the wider flows of materials that are not regulated and directed to UCRRA.

2018 UCRRA Waste Stream Totals

Material	Total (tons)	Percent of waste stream
MSW	101,780	66.72%
C&D	31,569	20.69%
Biosolids	3,686	2.42%
Single Stream	6,423	4.21%
Old corrugated cardboard	1,553	1.02%
Food Waste	3,537	2.32%
Mixed News	1,051	0.69%
Wood Chips	1,169	0.77%
Commingled	526	0.34%
Brush	459	0.30%
E-Waste	304	0.20%
Glass	496	0.33%
Total	152,553	100%

The total waste stream, as defined by Ulster County, is made up of Municipal Solid Waste (MSW) and Construction and Demolition (C&D) waste handled by UCRRA, recyclables handled by UCRRA, and C&D waste handled by permitted facilities. Beginning in 2018 to identify trends, we see that this equalled 182,046 tons in 2018, inclusive of the estimated 48.3% of C&D being handled by others (see chart below). This volume does not include other recycling and reuse efforts such as permitted facilities recycling other materials, businesses in the circular economy diverting reusable materials, remanufacturing operations, repair businesses and more.

With this said, our first focus is on the waste stream handled by UCRRA. According to the annual reports from UCRRA and the UC waste characterization Zero Waste Implementation Plan TOC V3 2018 report (UCRRA), in 2018 there were 101,780 tons of MSW and 31,569 tons of C&D debris. In addition, there were 19,204 tons of recyclables diverted from the waste stream at UCRRA facilities, for a total of 152,553 tons that were handled by UCRRA facilities in 2018. Recycled material equals about 13% of the total material handled. This avoided 591 trips (based on weight, not volume) to Seneca Meadows, at an average load of 32.5 tons per truck. The 2018 UCRRA Waste Stream Totals chart does not include waste diverted by private businesses and organizations. Without these groups, the waste problem would be worse.

## Estimated amounts of MSW/C&amp;D currently being landfilled annually for Ulster County

UCRRA C&D per year	UCRRA C&D (tons)	total Estimated C&D (tons)*	MSW	Total Estimated MSW + C&D
2018	31569.25	61,062.38	101780.05	162,842.43
2019	35220.48	68,124.72	100805.66	168,930.38
2020	38184	73,856.87	100,564.00	174,420.87

\*inclusive of material handled by other facilities and extrapolating from 51.7% of C&D estimated to be handled by UCRRA based on their survey-based 2019 annual report

In 2018, 76% of the waste sent to Seneca Meadows from UCRRA was MSW, and 24% was separated out as C&D waste. In addition, only 51.7% of the C&D waste stream is handled by UCRRA (2019 data).<sup>3</sup> Waste is also being sent elsewhere. This further suggests that C&D waste is a higher percentage than the reviewed documentation shows, and that other major C & D waste handlers, like LaMela, should be engaged as stakeholders for this planning process. Based on the reports and that percentage, Ulster County generated an estimated 61,062 tons of C&D waste not including the C&D waste remaining in the MSW stream.<sup>4</sup> If UCRRA had handled all of that C&D waste at their facilities, that would have equaled 34% of the waste stream sent to Seneca Meadows, and would have dropped MSW to under 56%.

In 2019, the UCRRA Ulster County Annual Waste and Recycling Solid Report, Planning Unit Update, a survey-based report inclusive of data provided by large waste generators in the county, tracked a total of 247,074 tons of the waste stream for all of Ulster County. 85,312 tons were diverted from the waste stream via reuse and recycling. Of the recycling, 13,297.29 tons of this was cardboard, making it the number one diverted material by weight.

By 2022, UCRRA facilities were handling 152,605 tons of material in the waste stream (please note that this figure, as opposed to the 2019 figure, is exclusive of regulated recyclable materials; it is our understanding that the total amount of material handled by UCRRA has risen each year).<sup>5</sup> If the facilities were open an estimated 2763 hours in 2022, this would be 110,463 pounds of material per hour! The material arrives to be inspected, weighed, dumped, sorted, and pushed to the equipment operator for loading in debris trailers. UCRRA employees are constantly on-task, managing 75,661 arriving loads per year, or a load about every 139 seconds. During our site visit and while working on the tipping floor, no break between loads greater than 4 minutes was observed. Despite the pace of materials entering the facilities, the results of tipping floor diversion for

<sup>3</sup> Source: Ulster County Annual Waste and Recycling Solid Report Planning Unit Update for 2019, which analyzed survey results from large waste generators. It was noted that "due to low response rates from large Retail Centers, Grocery Stores, Hospitals, and County Buildings, the survey results can not accurately reflect the waste total generation or characterization of the waste stream. Particularly for Retail Centers, much of the waste generated is back-hauled through the distribution chain. Because this material does not enter the flow of waste within the County or managed by UCRRA or permitted haulers, and because these facilities did not respond to the survey, these factors should be in consideration when interpreting survey results."

<sup>4</sup> Studies are inconsistent in their breakdown of MSW and C & D, with some including C & D as a component of MSW; therefore, C&D waste is actually a higher portion of the waste stream than is listed and may have been as high as 28%. (Note that the numbers change from year to year.)

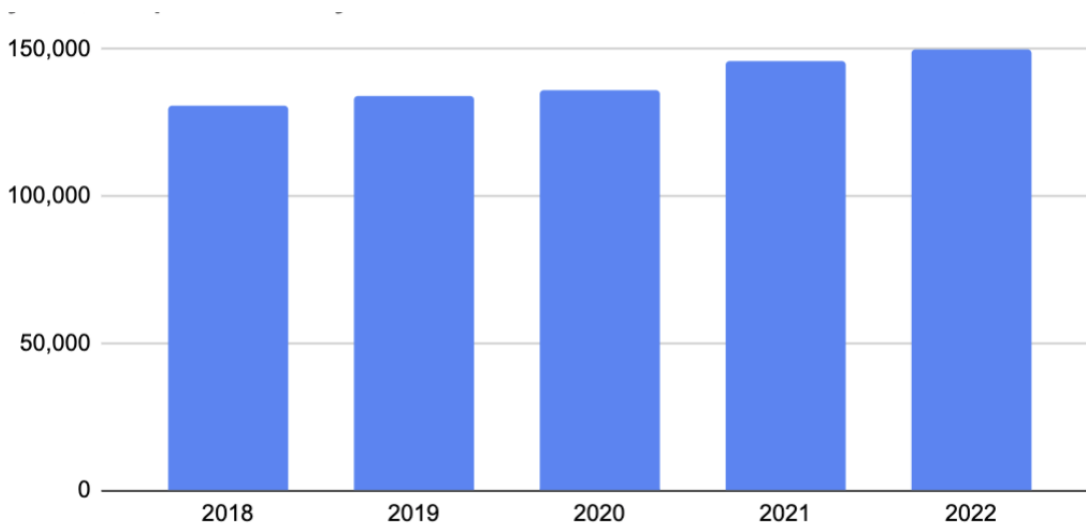
<sup>5</sup> Tim DeGraff, Director of Finance and Administration, UCRRA.

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2022 was an estimated 6,122,000 pounds or 3061 tons. (This was based on the quantities of key items and their estimated average weight; for example, recycled tires are tracked by the unit rather than by weight. We converted all of the materials in the UCRRA Diversion Data 2019-2022 chart below that were listed in units into estimated pounds for consistency with how the measurements are tracked at Seneca Meadows.)

Between 2019 and 2022, the average weight of the loads increased by 2.5%, from 1.97 tons to 2.02 tons. Some of this may be related to temporary use of UCRRA’s Transfer Station by Dutchess County haulers with especially heavy loads. Some other changes, like CD percentages dropping in 2022, likely came from better refining what is in each load. The employees were encouraged to ‘split- loads’, or call the scale house and report loads as a percentage of CD and MSW instead of having to choose just one or the other. Another potential cause of skewing numbers may have been the \$200 million school improvement levy. This may have led to more than the average CD materials entering the system.

The amount hauled to Seneca was 130,580 tons in 2018. That number has now risen to 149,786 tons or a 15% increase. This has happened while the population of Ulster County has increased just 2.54%.<sup>6</sup>



Tons of material sent to Seneca Meadows from UCRRA per year, as provided by UCRRA staff

<sup>6</sup><https://mhvcommunityprofiles.org/demographics/total-population>



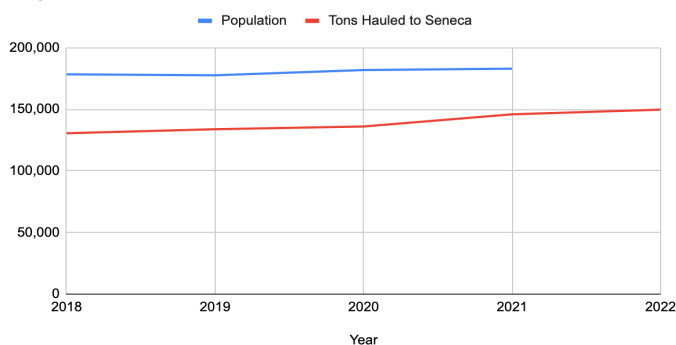
<b>UCRRA Diversion Data 2019-2022</b>							
Note: These were diverted from the tipping floor or scale.							Estimated
<b>Unit type:</b>	<b>Material:</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>Weights</b>	
units	Freon containing appliances	1,830	2,645	2,510	2,999	404,865	
units	Ballasts	244	684	450	1,225	7,350	
units	batteries	78	178	195	382	17,190	
units	fluorescent bulbs	1,103	1,359	1,343	1,858	1,858	
units	fires	3,076	3,673	3,985	3,824	152,960	
units	propane tanks	121	183	113	119	4,165	
tons	yard waste	435	756	879	1,138	2,276,000	
tons	clean wood	31	106	94	271	542,000	
tons	dirt/rubble	-	345	676	454	908,000	
tons	food waste (diverted out of T/S only)	8	4	-	9	18,000	
tons	ewaste	90	115	77	103	206,000	
tons	metal	463	722	553	596	1,192,000	
tons	aluminum	3.76	3.30	1.50	5.23	10,460.00	
tons	copper	1.55	0.96	0.91	0.32	640.00	
tons	occ	78	88	86	189	378,000	
tons	road millings	263	536	-	-	-	
tons	wire	4.39	2.84	2.60	1.14	2,280.00	
tons	textiles	-	8.48	3.11	-	-	
units	tarp off (fee)	2,834	3,079	3,800	4,093		
estimated tipping floor diversion 2022 (lbs)							6,121,768.00
estimated hours open 2022							276300%
estimated tipping floor diversion / hour open (lbs)							2,215.62
estimated tipping floor diversion percentage of total handled							0.02
estimated total materials handled per hour 2022 (lbs)							110,463.26
<b>Materials/loads totals for UCRRA</b>		<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>19 vs '22*</b>	
units	Inbound tickets Ulster	51,284	57,054	57,005	56,055	0	
tons	Tons msw	59,310	67,328	60,035	70,093	0	
tons	Tons cd	27,627	30,137	31,365	25,762	(0)	
tons	Total combined (Ulster/New Paltz)	136,026	138,748	148,288	152,605	0	
units	Inbound tickets New Paltz	17,888	19,968	21,389	19,606	0	
tons	Tons msw	41,152	41,196	45,649	48,976	0	
tons	Tons cd	7,937	9,087	11,239	7,774	(0)	
*increase from 2019							
Special categories		<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>Nat'l Aver</b>	
units	mattresses (not diverted)	not tracked	not tracked	14,377	16520*	10,000	
tons	e-waste-Saturday events	304	251	179	185		
*2022: 13922 through 10.31.22 or 16706 projected for all of 2022 (actual result: 16520)							
<b>Inbound Tickets</b>							
	total inbound tickets	total tons	Tons/ticket				
	2019	69172	136026	1.966489331			
	2022	75661	152605	2.016957217			

<b>Seneca Meadows - Actual totals</b>		<b>Change vs previous year (tons+%)</b>	<b>Population</b>	<b>Difference</b>
2018	130580	na	na	178418
2019	133810	3230	2%	177,573
2020	136033	2223	2%	181,851
2021	145948	9915	7%	182,951
2022	149786	3838	3%	N/A

## Waste and diversion trends

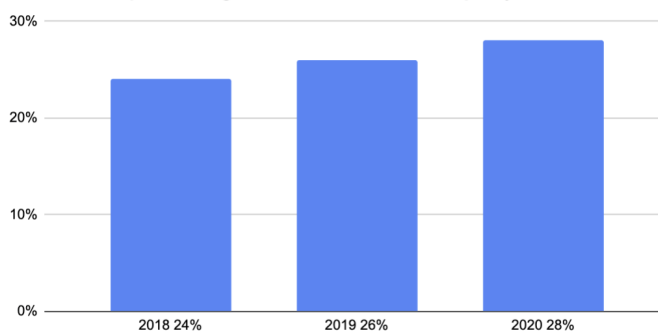
Between 2018 and 2019, the population of Ulster County showed a net decrease, from 178,599 to 177,673.<sup>7</sup> This was the combined result of influx from metropolitan areas and migration out of the region. At the same time, the waste generated in the County rose from 133,349.3 tons to 134,413.2 tons. Thanks to Ulster County’s long-standing commitment to recycling, it is noteworthy that the County’s per capita waste generation was 16.52% lower than the national average in 2018 and 15.35% lower in 2019.<sup>8</sup> But in spite of those recycling efforts, the average citizen in Ulster County sent 1,493 lbs of material to Seneca Meadows in 2018, and 1,514 lbs in 2019. This may be the result of increased remodeling and renovation work being done by new residents, increasing the amount of C&D over that time period.

Population and Tons Hauled to Seneca



Population estimate for 2022 not available

C & D as a percentage of the waste stream per year



## Tipping Floor Observations and Analysis

Tipping floor observations were conducted over a four hour period, from roughly 9:00 a.m. to 1:00 pm on a weekday. The purpose was to analyze what types of materials were in the waste stream and their condition at dumping time. While the observed MSW was contaminated and unlikely to be usable, the waste from haulers, C&D businesses and similar self-haulers contained valuable items.

This was a brief period of observation for the purposes of understanding the overall types of materials and methods of handling them; to understand generally the volume and characteristics of materials that can be diverted for reuse. Findings are compiled in a spreadsheet ([UCRRA Transfer Station Tipping Floor Data.xlsx](#)), including estimated value, highlighted items, weight, and noted key item values. “Key items” are those with particularly high value per item that would best go toward support of a diversion program (e.g., French doors that could be resold, vs. low-value clothing items that would likely be given away to a charitable organization). Data from past studies in other communities was referenced to help determine estimates of the weights of materials viewed during the observation period.

In the four hour observation period, an estimated 5,695 pounds of divertable materials were identified. We estimate we were able to spot about 75% of the divertable materials that were processed, considering that as

<sup>7</sup> Appendix H, NYS Waste Materials Composition and Characterization

<sup>8</sup> EPA

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it's dumped, material is often immediately covered by more material. The reusable items were valued at an estimated \$2,396, with the key items providing more than half that value at \$1,385. Many of the reusable items received a value of \$0.00 and some \$1.00 to avoid overestimating the total value. It is important to note that there are additional costs incurred when handling reusable materials compared to recyclables, and that these costs must be offset by revenue from selling the reusable products. This is taking into account that the UCRRA facilities already divert materials and this would be in addition to their current diversion efforts.

Extrapolating to 9 hours, the daily total would be 12,826.58 pounds of divertable material, and it would be valued at \$5,391 in a day, with key items valued at \$3,116.25. Assuming that this was a relatively typical day, one year could see over 4,000,000 pounds diverted and \$900,000 of materials - if employees dedicated to this task were on the floor while open. \$900,000 is rounded down and counts the value of 'key items' at moderate value.  $4,000,000 \text{ pounds} = 5695 \text{ lbs}/4 \text{ hrs} - 12827 \text{ lbs}/9 \text{ hrs} - 312 \text{ days} \times 12827 = \text{about } 4 \text{ million pounds of debris}$ . This amount costs UCRRA \$150,000 or \$75/ton to get to Seneca Meadows. 4 million is about 1.5% of the total. Two people on the tipping floor at all times, which is more than 2 full-time equivalents, might have diminishing returns, perhaps \$4200 per day and 22,000lbs diverted - (that is potentially 6,864,000 lbs and \$1,310,000 in value). 6,864,000 lbs or 3432 tons would cost the UCRRA \$257,400 to send to Seneca Meadows, and when combined with the current diversion of 6,122,000 lbs, that would be an estimated 13,000,000 lbs or 6500 tons of diversion or 4.27% of the material entering the facilities.

This clearly suggests that there is an opportunity for designating at least one UCRRA worker who is not responsible for directing traffic, to focus solely on diverting materials from the tipping floor for reuse and recycling. Given that the facility is open 54 hours a week most weeks, and that some time after closing would be required, we developed a scenario based on 60 hours per week. One worker on the floor at all times is equal to 1.5 FTE. If that worker could divert an average of 18 pounds per minute, that would add up to 4.86 tons per day or about 1516 tons per year. The facilities are open more than 40 hours per week, and therefore multiple staff members would be required to cover all of the hours, maximizing possible diversion – the equivalent of 3 FTEs.

From a cost savings standpoint, an estimated 22,000 pounds could be saved per day if there were 2 workers on the tipping floor at 6 days/wk x 52 wks/year or 312 days, 3432 tons that could be diverted for reuse and recycling, assuming two dedicated people. If 3,432 tons were diverted, it would save \$257,400 of hauling and disposal fees. Assuming employee annual costs (wages, insurance, taxes and medical) of \$65,000/yr or \$195,000 for 3 FTE, the \$257,400 minus \$195,000 would result in a net savings of \$62,400.

Another tipping floor observation was that delicate objects such as glass/mirrors, that arrived intact, were smashed by dumpers who were in a hurry to get their delivery made and were unaware of any reason not to destroy them. If more than one person were working on diversion, one could be talking to the customers and potentially avoiding this situation. A second person could also be intercepting deliveries as they arrived at the center but before they got to the tipping floor, also increasing the likelihood of preserving valuable divertables. Since many of the deliveries were from repeat or regular visitors, they could be coached in pre-sorting/handling their materials to increase diversion further, whether as recyclables or for reuse. The above projected diversion totals were based on current public behaviors and the conditions of materials once they crashed onto the tipping floor. They are based on a strictly reactionary approach, but these staff members would also represent this pro-active approach that would likely preserve more materials, increase diversion over the amounts listed, and increase the value these materials would sell for.

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The UCRRRA facility does not currently have a place where people can drop off things like bottles and cans, or reusable items, and has just one day a month where one can drop off electronics for free. Offering the opportunity to drop off a wide range of items - high value and otherwise - could create more of a sense of possibility and more reasons for people to come to the facility, knowing that they could save or make money. This is a key strategy in other Reuse Innovation Centers - for example in Wisconsin and in Washington State.

### Diversions opportunities

Components of the waste stream were further analyzed for patterns in diversion, and for their relevance to their potential role in a Reuse Innovation Center. The table below lists common material categories and examples of items found in that category that the RIC would target to divert for reuse and recycling.

#### EXAMPLES OF DIVERTABLE MATERIALS FOUND IN EACH CATEGORY

Appliances/White Goods	Refrigerators, water heaters, ranges
Architectural Details	Trim, porch posts, gutters
Bicycles	Bicycles, tricycles, bike trailers/strollers
Bricks	Bricks, clay blocks, pavers
C&D Debris	plywood, pipe, TJI floor joists
Cabinets	Kitchen cabinets, vanity cabinets, storage cabinets
Carpet/padding/rug	Carpet, rugs, carpet padding
Clean Wood	Lumber, beams, decking
Contaminated wood	Creosoted wood, treated wood
Doors	Interior doors, exterior doors, garage doors
Electronic Waste	Tvs, monitors, computers
<b>Film plastic</b>	Shrink wrap, packaging
<b>Wood Pallets</b>	Wood pallets, plastic pallets, crates
Glass	Window glass, mirrors, light globes
Gypsum board	Sheetrock
Mattresses	Mattresses, box springs, foam mattresses
<b>Books/Bags/Boxes</b>	Books, paper gift bags, banana boxes
<b>Other durables</b>	Furniture, luggage, sporting goods
Miscellaneous items	Shower stalls, staircases, etc
Plastics - durables	Crates, medical devices, buckets
<b>Aluminum (all),non-ferrous</b>	aluminum downspouts, copper pipe
Scrap Metal	Metal gates, metal pipe, metal roofing
<b>Textiles</b>	Clothing, sheets, drapes
Tires	Car tires, truck tires, bicycle tires
Cardboard (OCC)	cardboard boxes, cardboard packaging

## Waste Stream Component Prioritization Matrix

The following chart reflects numerous MSW waste material types that we have compared to each other using a number of environmental and other parameters intended to provide a basis for gauging the priority and the value of diversion via a Reuse Innovation Center. The average score is 60.8. The higher the score, the more 'valuable' the diversion of that item is.

Scoring (5 high, 1 low) -- Multipliers of -1 to +3 for each parameter based on importance (+3 high, -1 low)

The matrix has a multiplier row that is used to magnify differences between the materials. If a parameter is considered more important, the multiplier for that column is higher. Parameters are defined below the chart.

Items that are already regulated should require less effort by the RIC. We set the multiplier at -2 so that it would actually deduct from the final score if it is already a material type that is being diverted due to existing regulations. It is true that possibly all of the listed materials are already being diverted from Seneca Meadows to some degree, but clearly a large amount of materials are being missed by local diversion efforts, and the RIC will supplement existing efforts. Existing reuse operations often start by diverting the 'low-hanging fruit' items that are easier and don't require as much set up time and money, but all options are still on the table.

One thing is clear from our research. Supply and demand are hard to control when it relates to the circular economy. Materials at stores like Home Depot are new and carefully controlled and monitored, whereas the waste stream contains materials from the last 200 years in all shapes and sizes that pass through Ulster County randomly and often suddenly without any notice. It has been important for us to characterize the waste stream, but the RIC will have to be flexible and ready for anything if it is going to divert the maximum amount from the landfill. This is best done by involving existing businesses in the circular economy and starting new businesses that target specific types of waste. This matrix is a fundamental input to how decisions are to be made, but it won't be surprising if material types that scored lower rise to the top of the diversion list due to conditions or a specific business that opens up to handle that material type.

## Waste Stream Component Prioritization Matrix

Waste Stream Component	Type	Mass Reduction Potential	Volume Reduction Potential	Reuse/Repair Potential	Ease of separation/diversion	GHG reduction potential	Community concern	Commodity market value	Longevity	Toxicity	Barrier-free, less complex diversion	Diversion opportunities exist	Additional Diversion Potential	Handled by other regulations**	FINAL SCORE
MULTIPLIER x		1	1	2	2	3	2	3	2	2	2	1	2	-2	
Scrap Metal	C&D	5	3	6	8	15	8	9	8	8	8	5	6	0	98
Clean Wood	C&D	4	4	10	8	9	6	9	8	0	10	3	8	0	79
Doors	C&D	2	2	8	10	9	6	12	8	2	8	4	6	0	77
Appliances/White Goods	C&D	2	2	10	10	12	6	9	4	8	10	3	4	-4	76
Architectural Details	C&D	2	2	10	6	9	8	12	8	2	8	5	4	0	76
Bicycles	MSW	1	1	10	10	9	8	9	6	2	10	5	2	0	73
C&D Debris	C&D	5	4	8	8	9	6	6	4	2	8	4	8	0	72
Cabinets	C&D	2	2	8	8	9	6	12	6	2	8	4	4	0	71
Plastics - durables	MSW	2	3	6	6	9	6	3	8	8	8	5	6	0	70
Tires	MSW	3	2	4	10	12	8	6	8	6	8	5	2	-4	70
Bulky Items/Furniture	MSW	4	3	6	8	9	6	9	6	4	6	3	6	0	70
Cardboard (OCC)	MSW	2	2	4	8	6	6	9	10	2	8	4	8	0	69
Textiles	MSW	3	2	6	6	9	6	6	6	2	6	5	8	0	65
Bricks	C&D	3	2	8	8	6	6	9	8	0	8	4	2	0	64
Carpet/padding/rug	C&D	2	2	6	8	9	2	6	4	8	6	4	6	0	63
Electronic Waste	MSW	1	1	6	8	12	4	6	4	8	8	4	4	-4	62
Wood Pallets	MSW	3	3	10	4	12	6	3	4	2	6	5	4	0	62
Mattresses	MSW	2	3	2	10	9	10	3	6	2	2	2	10	0	61
Other durables	MSW	3	2	6	6	6	6	3	10	0	8	5	6	0	61
Contaminated wood	C&D	2	2	6	6	9	6	3	4	10	6	1	4	-2	57
Gypsum board	C&D	3	3	2	10	9	4	3	4	8	2	3	6	0	57
Aluminum (all),non-ferrous	C&D	3	2	4	6	6	6	3	10	0	8	5	4	0	57
Books/Bags/Boxes	MSW	3	3	6	4	6	6	3	6	0	8	5	4	0	54

**Waste Stream Component Prioritization Matrix continued**

Waste Stream Component	Type	Mass Reduction Potential	Volume Reduction Potential	Reuse/Repair Potential	Ease of separation/diversion	GHG reduction potential	Community concern	Commodity market value	Longevity	Toxicity	Barrier-free, less complex diversion	Diversion opportunities exist	Additional Diversion Potential	Handled by other regulations**	FINAL SCORE
Miscellaneous items	MSW	3	3	6	4	6	6	3	4	0	8	5	6	0	54
Glass	MSW	3	2	4	6	6	4	3	10	0	8	5	4	-2	53
Film plastic	MSW	1	1	2	8	9	6	3	2	8	2	4	6	0	52
<b>Average score</b>														<b>68.56</b>	

\*Mattresses - average of 100 pounds x 16,000 mattresses = 1,600,000 pounds

\*\* Regulated materials are given a negative value because there are already measures in place to prevent these items from reaching the landfill

METHODOLOGY OF RATING SYSTEM: The above matrix is a mixture of objective and subjective assessments of various material types. Available statistics and 30 years of experience were used. This matrix is focused on more of an environmental benefit than an economic one. The parameters, listed below, are meant to show the relative importance of focusing on diverting one material over another based on cumulative score. The parameters focus on several points: environmental impacts, quantities (more items means more impact), and parameters avoiding producing new replacements

**Parameter description**

Mass Reduction Potential	Waste is measured in tons so it is compared as such; trucks have weight limits so more weight equals more trucks and expense and energy required to handle
Volume Reduction Potential	Waste is hauled in finite spaces and stored in landfills with limits; bulky items that are diverted extend the life of landfills and require less long haul trucking
Reuse and Repair Potential	Items that can be reused or repaired for reuse take precedence over items that are simply recycled
Ease of Separation	Waste can require large inputs of energy for handling- items that are easier to sort out are preferred for that reason
GHG Reduction Potential	Materials break down over time and release greenhouse gases. Items that produce GHG are doubly bad because they continue to pollute once in the landfill
Community Concern	A subjective comparison of material types based on the communities view of the wastefulness, perceived volume, and priority to divert from the landfill
Commodity Market Value	Some materials have a value when offered for recycling (like metal) or sold intact within the circular economy (like doors)
Longevity	This is another parameter with multiple aspects - does the item break down once in the landfill; could the material be used long if kept out of the landfill
Toxicity	Is the item itself toxic (like treated wood), or would throwing it away result in manufacturing a toxic replacement
Barrier-free, less complex diversion	Materials that can be more easily diverted without regulation, delay, investment, or expensive infrastructure needs are prioritized





We tried to use the estimates of waste characterization listed above to highlight all of the materials going to Seneca Meadows from UCRRA. The RIC is not going to be able to divert all of those materials, so we have set some focus areas. Table H-1, above, shows the categories we plan to focus on in the right-hand column. These categories or sub-categories represent 40.74% of the MSW waste stream and the RIC will divert as much of that as possible. Table H-5, above, shows a waste characterization estimate for C&D materials found in New York State. There are examples of items that could be diverted from all of those listed categories. One example would be that even though used sheetrock isn't easy to reuse, it can be recycled and new surplus sheets can be reused.

### **Suitability and Considerations Regarding Selected Materials for Handling by an RIC**

**Freon containing appliances (FCA)** - There has been a significant increase in FCA from 2019 to 2022. During that period, the amount diverted has risen from 1830 units to 2999 units or a 64% increase. There was a 12% increase in facility wide collection during that time. This large increase is consistent with the increasing concern about refrigerants in state government as the Climate Law implementation has begun. Some FCA are reusable, but existing Reuse Innovation Centers (RIC) try to factor in the energy efficiency of a particular unit when deciding whether that unit should be reused or recycled. Older units may still work, but if they use much more power, the benefits of reusing that unit are diminished.

**Ballasts** - Ballasts, commonly used in fluorescent lights, were diverted in 2022 at a rate of over 5 times faster than 2019. Current RIC policies restrict the reuse of ballasts due to liability concerns and lack of information on their use/condition.

**Batteries** - Batteries were also diverted in 2022 at a rate 5 times greater than 2019 numbers. There is a well developed system for recycling automobile and marine (or similar) batteries, and turning one in for recycling can result in a cash payment to those dropping them off.

**Fluorescent bulbs** - These were recycled at an even higher rate of 66%, increasing from 1103 in 2019, to 1858 in 2022. The RICs are not licensed to handle hazardous waste and these bulbs represent some level of liability (especially if broken), so the quantity accepted is restricted, but the bulbs are often still usable and often fit existing light fixtures unlike some new bulb types.

**Tires** - Field observations showed that patrons of the facility would often unload a tire and then dump other materials on top of it, presumably to hide it so that they were not charged an extra fee. Despite this and other challenges, UCRRA continues to divert almost 4,000 tires a year from the tipping floor. Some communities have used tire businesses that stock used but still reusable tires for a fraction of the price of new tires. This provides the community an affordable alternative, but tires that are damaged or lacking tread should not be reused.

**Propane tanks** - The numbers show that there isn't much of an increase in propane tank diversion despite the ever growing waste stream. It is likely that the UCRRA employees have made a point of diverting all of the tanks they can find for many years. This item is a serious hazard to staff and the community and there may not be much room for improvement here. This is another item that if it is to be reused, it requires someone trained in the full understanding of the use of the tanks, their condition, and up to date regulations on the topic. The current RICs do not have that trained staff so tanks are not collected for reuse.

**Yard Waste** - Ulster County offers multiple options for residents to recycle or compost yard waste, but events like the 2022 ice storms tend to tax the systems in place due to a sudden increase in the volume of compostable materials. UCRRA saw a huge increase in yard waste in recent years, and accepted 1138 tons of it while watching out for the limits of their State permit to do so.

**Clean Wood** - Clean wood loads highlight the fact that pre-sorted loads lead to much more diversion. Source separated loads, like a truckload of used pallets, can be more easily recycled and therefore are easier to pull out of the waste stream. Clean wood totals have increased almost 9 times the amount of 4 years ago. This is likely a combination of increased emphasis and more source separation. The 271 tons breaks down into two categories: 1. wood that has touched the tipping floor (241 tons in 2022) and 2. wood loads that were diverted to the composting area at the last minute (30 tons)

There seems to be very little wood being diverted compared to what is possible. By our observations, if a truck arrived full of clean wood, it was diverted, but when truckloads came with a mixture of wood and other material, the wood went into the waste pile. Clean wood comes in many forms, but it is by far the greatest single material type that is diverted by existing RICs. Examples include lumber, trim, flooring, plywood, beams, wood furniture, siding, decking and many more.

**Dirt/rubble** - These loads can be some of the heaviest materials dropped at the transfer station. UCRRA in Ulster has allotted some room for dirt/rubble and they saw over 900,000 pounds diverted in 2022. There are likely more affordable options available in the County where these materials are dropped at. Dirt is an example of something that is often readily reused. Dirt and rock being excavated from one site is often transported and used as fill on another site. Some cities or counties have businesses or efforts that match supply and demand for this material.

**Food waste** (from Transfer Station only) - A large amount of food waste is separated in Ulster County, but the occasional load makes it to the transfer stations. These can be from one time food manufacturers that have spoiled food, or similar. There is clearly a large amount of food waste in the waste stream and it is very challenging to separate items like that once it is on the tipping floor. Food waste diversion regulations often catch large producers and those that recycling benefits financially, but small sources like residences still collectively produce large amounts and they are being sent to Seneca Meadows. Ulster County has implemented an ambitious food scrap diversion law which can be expected to increase volume from large producers.

**E-Waste** - The E-waste numbers listed in the table are for electronics that have been diverted directly from the tipping floor. The Saturday free drop off program for E-wastes from Ulster is in addition to this number. This program has averaged over 200 tons a year, but has decreased recently as the definition of what types of electronics are accepted for free has narrowed, thus restricting what residents are allowed to drop for free. The Bellingham RIC (BRIC), takes in working electronics on a limited basis due to lack of space, or directs residents to local electronics recycling programs that are free in that County.

**Metal** - Over 1,000,000 pounds of metal were diverted by UCRRA in 2022. This material is more easily separated than many, and UCRRA has a dumpster outside of the building. Based on tipping floor observations, significantly more metal could be saved for reuse or recycling. The reusable examples may include things like bed frames, iron railings, and hardware, and these are found for sale at local reuse stores in Ulster County.

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**Copper** - The amounts of copper diverted are low, leading us to assume that not much is received, since its resale price is high - for example, compared to steel.

**OCC (Baled corrugated containers)** typically from supermarkets, distribution centers, and retail outlets - The amount of OCC diverted was fairly high, but much more can still be removed from the waste stream. Facility investments like additional space for sorting, and employee investments like hiring additional staff to sort and divert, represent an opportunity to increase diversion. There are some great examples of grocery stores that place their intact and reusable cardboard boxes near the checkout stations. The customers are encouraged to grab these boxes to substitute for using paper or plastic bags. This also is a great resource for people who are planning a move and need an affordable (free) source of boxes to pack their possessions in.

**Road Millings** - These materials are received sporadically when there is road work in the area. The millings can be used on-site to repair roads around the facility in Ulster.

**Wire** - This is from regular electrical wire and similar products. There are some quality concerns over reusing electrical wire that has already been installed.

**Textiles** - UCRRA started diverting textiles and struggled to find markets for the commodity. The harder it was to find markets, the less effort was put into sorting it until that effort was suspended. This can be reversed with systematic market development. Finger Lakes Reuse in Ithaca is a good example of large scale textile reuse and recycling. They handle tens of thousands of items each year, hand sorting them for reuse and resale at their stores, or sending them in bulk to textile recyclers that pay a modest amount for them.

**Mattresses** - mattresses were not tracked until recently, presumably because there was no special fee to record as a tracking mechanism. Current fees collected are modest, so people continue to bring them in. This is the only item listed in the table that was not diverted from the waste stream. Mattresses that arrive at UCRRA facilities are blended in with all other trash and sent to Seneca Meadows. They are often recycled in other communities, and in some cases have been donated and reused or even resold. The pandemic and recent concerns about bed bugs, as well as restrictions put in place by the State, limit the ability to reuse mattresses. Hopefully, the use of mattress protecting covers will make mattress reuse more common.

According to the Mattress Recycling Council, nationwide, over 20 million mattresses are discarded, and at least 56 companies<sup>9</sup> recycle approximately 2 million mattresses yearly for an average of 35,714 mattresses per location per year.<sup>10</sup> Proportionately, the population of Ulster County would be expected to throw away about 10,000 mattresses each year, but the number is higher: 14,377 mattresses were disposed of at UC facilities in 2021, and that number had jumped to 16,520 mattresses in 2022. Why this disparity? It might be that the quality of mattresses is decreasing, and that people are replacing them more frequently. Regardless, this data makes it possible to give serious consideration to what can be done with mattresses as an example of the County's commitment to tackling hard-to-recycle materials.

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<sup>9</sup> As of 2017, there were 56 mattress recycling facilities in North America, an uptick of 30% since 2013 Source: <https://www.liveabout.com/mattress-recycling-business-2877997>.

<sup>10</sup> per the [Mattress Recycling Council](#) website, a total of 930 public and private entities participate in recycling mattresses in programs in CA, CT and RI, plus "nearly all the towns" in RI. All these states have legally created or mandated mattress recycling programs

**Summary**

This review confirms UCRRA's and the County's access to plentiful materials in all the priority categories identified in the scoping of the Reuse Innovation Center initiative. While variable from year to year, these levels have been consistently more than sufficient, providing diversion strategies are identified and productive reuses of the materials are established. RIC programs and activities to address these priority materials and how they may be accomplished are the subject of the next project task.

Ulster County should be proud of its high recycling rates and investment in systems to divert waste. Yet it still ships enormous amounts of materials to the Seneca Meadows landfill, with high costs and environmental impacts. The Ulster County Resource Recovery Agency additionally has considerable opportunities to potentially increase diversion significantly through improvements of its collection and processing systems.

Because private haulers transport at least half of construction and demolition waste, there are additional opportunities in working with them as stakeholders to uncover opportunities for collaboration.

A Reuse Innovation Center can address a significant segment of these opportunities, but by no means all. Before considering investment in this kind of new facility or project, the County and UCRRA should explore what can be done to increase diversion through straightforward system redesigns that can yield near-term results with very limited expenditures (such as designating a space for dropping off reusable materials before crossing the scale). The County should also be exploring related opportunities for waste diversion and remanufacturing through a waste reduction industrial park. The ReUse Innovation Center stands the best chance for success if it is evaluated within the context of this entire range of options.