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**Report to the Joint Standing Committee on the Environment and
Natural Resources**

130th Legislature, First Session

Maine Solid Waste Generation And Disposal Capacity Report for Calendar Years 2018 & 2019

January 2021

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I. Introduction

This report is submitted to the Joint Standing Committee on Environment and Natural Resources pursuant to 38 M.R.S. § 2124-A which requires the Department to submit a biennial report to the Legislature setting forth information on the statewide generation of solid waste, statewide recycling rates, and available disposal capacity for solid waste. It provides an overview of Maine's solid waste generation, diversion, recycling, and disposal activities for 2018 and 2019, and an evaluation of Maine's progress toward the municipal solid waste (MSW) reduction and recycling goals established at 38 M.R.S. § 2132(1-B), and Maine's statewide recycling goal at 38 M.R.S. § 2132(1). The report also includes a projection of the solid waste disposal needs of Maine for the next 10 years and discussions regarding waste disposal beyond that timeframe.

II. Solid Waste Management in Maine – 2018 & 2019 Highlights

In 2018, a total of 1,706,798 tons of municipal solid waste (MSW) and construction and demolition debris (CDD) was generated in Maine and managed through licensed solid waste facilities, and a total of 1,827,009 tons was generated and managed in 2019. Overall disposal (by landfilling and incineration) of MSW increased from 721,646 tons in 2017 to 823,281 tons in 2018 and increased to 844,096 tons in 2019. This resulted in an increase in the per capita disposal amount from 0.54 tons per person in 2017 to 0.62 tons per person in 2018 (0.615 tons per capita) and 0.63 tons per person in 2019 (0.628 tons per capita). During this time period Maine's population increased by 0.4% while waste generation increased about 2.5%. In 2017, Maine's recycling rate (excluding CDD) was 38.09%. Maine's MSW recycling rate (excluding CDD) was 35.10% in 2018, and 37.81% in 2019 (calculated using the best available data).

Based on the currently licensed and operating disposal facilities and management systems, the disposal capacity for Maine generated MSW and its residue streams remains adequate into the near-term future. Up to and beyond 10 years, overall landfill capacity will decrease somewhat as several municipal landfills reach capacity and close.

Maine is not currently meeting its MSW reduction and recycling goals. Overall, solid waste disposal has increased in Maine over the reporting period and recycling has decreased slightly, although 2019's recycling rate was higher than in 2018, as described in more detail later in this report. The value of many recycling materials on the commodities market have declined in recent years, to the point where recycling is often more expensive than disposal by landfilling or incineration.

III. Generation and Management of Solid Waste in 2018 & 2019

A. Overview of the Management of Maine's Solid Waste

Solid waste in Maine is generated by residential, commercial, institutional and industrial entities, and is categorized depending on its characteristics and how it is generated. These categories include municipal solid waste (MSW), construction and demolition debris (CDD), wood waste, special waste, and universal waste; various types of waste exist within these categories. This report primarily addresses those wastes that are typically generated by households and businesses, as the generation, recycling rates, and disposal of these waste are the focus of 38 M.R.S. § 2124-A.

38 M.R.S. § 1305 assigns responsibility for the management of municipal solid waste to each municipality: “Each municipality shall provide solid waste disposal services for domestic and commercial solid waste generated within the municipality.” MSW is managed through combinations of municipal and commercial waste handling services, facilities, and systems as each municipality chooses how to meet that responsibility. Once collected, solid waste may be temporarily stored, transported, recycled, processed, composted, anaerobically digested, beneficially used in place of virgin materials and as fuel, combusted at waste-to-energy facilities, or landfilled. Maine’s *Solid Waste Management Rules* (06-096 C.M.R. chs. 400 – 419) set risk-based standards for the handling of solid waste with the ultimate purpose of protecting public health and the environment.

38 M.R.S. § 2101, Maine’s *Solid Waste Management Hierarchy*, sets an integrated approach to solid waste management as State policy. This “hierarchy” establishes waste reduction as the preferred approach and highest priority, followed by reuse, recycling, composting, volume reduction through waste-to-energy incineration, and landfilling as the management option of last resort. In January of 2019 the Department released the updated “Maine Materials Management Plan,” which outlines strategies for the State to incorporate this hierarchy in the State’s management of waste. Separately examining the management of MSW, CDD and some typical special wastes generated by Maine households and businesses can help Maine’s policymakers identify opportunities to effect positive changes to divert materials from disposal and move the management of various components of the solid waste stream up the hierarchy.

B. Overview of Rate Calculations

The total amount of MSW generated in the State has been calculated through analysis of the amounts of waste at their final points of disposition – waste disposed in landfills, incinerated at waste-to-energy facilities, processed and sent for recycling, beneficially used, and reused, where such data is available. Data was acquired from the annual reports of licensed facilities and of recycling brokers for this 2018 and 2019 report period. Data on the recycling of electronics, vehicle batteries, consumer batteries, mercury-added lamps and textiles was obtained through a combination of voluntary and mandatory reporting by the specialized businesses that manage these consumer products, including reports required by Maine’s product stewardship laws, data from hazardous

waste manifests, and voluntary reporting by major collectors of these items. Data on backyard, school based, and small, on-farm composting operations is generally not collected, so cannot be included in the calculation of Maine's MSW recycling rate.

C. Generation of Municipal Solid Waste in Maine

Tables 1 and 2 present a summary of the amounts and disposition of MSW generated in Maine in 2018 and 2019, and an overview of recycling rates. CDD generation and disposition is presented in Section D, and wood waste generation and disposition is presented in Section F.

This biennial report includes commercial recycling tonnage that was previously excluded, including commercial cardboard recycling rates. The inclusion of commercial tonnage serves to increase Maine's overall recycling rate. If only residential recycling totals were included, the estimated statewide average recycling rate for 2018 and 2019 would drop to 30%. Including commercial recycling numbers as well as residential provides a more complete analysis of the overall recycling rate during the reporting period.

Table 1 - Maine MSW Management - Calendar Years 2018 & 2019

Maine MSW disposition	2018 tons	2019 tons	Total tons
Maine MSW landfilled in state	371,682	403,644	775,326
Maine MSW disposed via waste-to-energy	434,652	420,687	855,339
Maine MSW disposed out-of-state	16,947	19,764	36,711
Subtotal Maine MSW (exclusive of CDD) disposed	823,281	844,096	1,667,376
Paper, cardboard, plastics, metals, glass, textiles, white goods, and stewardship program materials recycled	258,955	263,443	522,397
Other MSW recycled (ferrous and non-ferrous scrap metal, and vehicle batteries)	134,127	180,840	314,967
Reported MSW composted and anaerobically digested (AD) ¹	52,217	68,912	121,130
Subtotal Maine MSW recycled & composted	445,299	513,195	958,494
Total Maine MSW generated (exclusive of CDD)	1,268,579	1,357,290	2,625,870
Maine's MSW Recycling Rate (exclusive of CDD)	35.10%	37.81%	36.46% (average)

¹ Not including backyard, school based, and exempt/small, on-farm composting operations. Compost facilities that accept less than 5 cubic yards of food scraps monthly and on-farm compost facilities that accept less than 60 cubic yards of food scraps monthly are exempt from Department licensing and annual reporting requirements.

D. Management of Construction and Demolition Debris

CDD waste is considered a subset of MSW and is generally handled as a separate waste stream which is usually transported, processed, and may be disposed separately from MSW. Two commercial processing facilities in Maine sort CDD waste to remove recyclable components prior to disposal, use the residues in a landfill for alternative daily cover or temporary road construction, recycle the waste into new wood products, or beneficially use the waste as fuel. CDD is disposed at Maine landfills and waste-to-energy facilities, and several municipalities operate their own CDD landfills. Table 2 outlines Maine's CDD disposal rates and the disposition of CDD generated in Maine for 2018 and 2019.

Table 2 - Maine CDD Management - Calendar Years 2018 & 2019

Maine-generated CDD disposition	2018 tons	2019 tons	Total tons
Mixed CDD disposed in state	412,783	440,336	853,120
Mixed CDD disposed out of-state	1,495	1,423	2,918
Processed CDD sent to a landfill for daily cover, shaping, and grading*	14,603	16,335	30,939
Processed CDD recycled into new wood products	394	3,966	4,360
Processed CDD beneficially used as fuel	8,943	7,658	16,601
Subtotal Maine CDD recycled & beneficially used as fuel	9,337	11,624	20,961
Total CDD generated in Maine	438,218	469,719	907,937
Maine's CDD recycling rate (all non-landfill uses)	2.13%	2.47%	2.30% (average)

* includes only Maine-generated portion of CDD processing wastes from processing facilities located in Maine

E. Management of Special Waste

Special waste, as defined by 38 M.R.S. § 1303-C(34) means “any solid waste generated by sources other than domestic and typical commercial establishments that exists in such an unusual quantity or in such a chemical or physical state, or any combination thereof, that may disrupt or impair effective waste management or threaten the public health, human safety or the environment and requires special handling, transportation and disposal procedures.” Special waste includes, but is not limited to: ash, industrial and industrial process waste, wastewater treatment plant (WWTP) sludge, debris and residuals (including contaminated soil) from nonhazardous chemical spills, petroleum spills and cleanup of those spills, and asbestos and asbestos containing waste. Special waste may be composted, beneficially used, land applied, incinerated, anaerobically digested, and/or landfilled. Several industrial facilities in Maine (e.g. paper mills)

operate “generator owned” landfills for the special waste generated at their facilities. Special wastes, as they are defined as being generated by sources other than domestic and typical commercial establishments, are not included in the waste generation calculations for Maine in this report. However, special wastes disposed in landfills, used as landfill alternative daily cover, or in other landfill-related applications take up disposal capacity and affect the amount of available disposal capacity in Maine.

F. Management of Wood Waste

Wood waste in Maine is another category of solid waste that is frequently generated by households and normal commercial sources and handled at facilities that accept MSW and/or CDD. Wood waste includes brush; stumps; lumber; bark; wood chips; shavings; slabs; edgings; slash; sawdust; wood from production rejects; wood pallets that are not pressure treated or visibly contaminated, and from which fasteners have been removed; that are not mixed with other solid or liquid waste. In 2018 and 2019, a total of 29,587 tons of wood waste was accepted by licensed solid waste facilities in Maine. This included approximately 15,392 tons sent to landfills and 1,340 tons sent to waste-to-energy facilities in 2018 and 12,840 tons sent to landfills and 15 tons sent to waste-to-energy facilities in 2019. However, this report did not attempt to evaluate the amount of wood waste that is processed and marketed for mulch, other landscaping uses, and erosion control material. Data on wood waste that is managed other than at licensed facilities is not tracked and it is likely that the data reported to the Department represents only a small portion of the overall wood waste generated in Maine during the report period.

IV. Progress toward Maine’s Waste Reduction and Recycling Goals

A. Maine’s Municipal Solid Waste Disposal Reduction Goal

In 2017, Maine’s statutory goal for waste reduction was amended to focus on the readily measurable amount of MSW sent for disposal. 38 M.R.S. § 2132(1-B) states:

State waste disposal reduction goal. *It is the goal of the State to reduce the statewide per capita disposal rate of municipal solid waste tonnage to 0.55 tons disposed per capita by January 1, 2019 and to further reduce the statewide per capita disposal rate by an additional 5% every 5 years thereafter. The baseline for calculating this reduction is the 2014 solid waste generation and disposal capacity data gathered by the department.*

In 2014, Maine generated and disposed (at landfills and waste-to-energy facilities) 757,049 tons of MSW, exclusive of CDD. This established the baseline per capita disposal rate at 0.5697 tons per person (Maine’s estimated 2014 population was 1,328,903). In 2017, this goal was not only met but exceeded with an estimated 0.54

tons (1,080 pounds) of waste disposed per capita in Maine. However, disposal increased during this 2018-2019 reporting period with a per capita disposal rate of 0.615 tons (1,230 pounds) in 2018 and 0.628 tons (1,256 pounds) in 2019, as shown in Table 3 below.

Table 3 - Maine MSW Per Capita Disposal - Calendar Years 2018 & 2019

Maine MSW Disposal vs. Goal	2018	2019
Tons MSW Disposed	823,281	844,096
Statewide Population ²	1,338,404	1,344,212
Per Capita MSW Disposal in Tons	0.62	0.63

B. Maine's Municipal Solid Waste Recycling Rate

38 M.R.S. § 2132(1) sets Maine's statewide goal for the recycling of municipal solid waste:

***State recycling goal.** It is the goal of the State to recycle or compost, by January 1, 2021, 50% of the municipal solid waste tonnage generated each year within the State.*

Unfortunately, waste diversion in the past few years has not kept pace, with the result that Maine is further from meeting this goal than reported in 2019, when Maine's statewide recycling rate was estimated to be 38.09%. As noted earlier in the report, Maine's recycling rates for both 2018 and 2019 are lower than the 2017 rate. The recycling rates during this time period were 35.1% in 2018 and 37.81% in 2019. During this reporting period, the average tipping fee for disposal was lower than that for recyclables, resulting in disruptions in Maine's recycling programs.

C. Reporting Requirements for Waste Facilities

In addition to enacting a new mandatory broker recycling reporting requirement, the Maine Legislature made changes to 38 M.R.S. § 2133(7) concerning municipal recycling progress (P.L. 2019 c. 291). This report, previously submitted on an annual basis, is now required to be submitted biennially. The progress reports include data on what options are available to residents and businesses within each municipality for managing solid waste, including recyclables, organics, and CDD. The report is intended to help municipalities and the State assess progress toward achieving an MSW recycling rate of 50%. Municipalities are not required to meet the statewide goal of 50% but are required

² U.S. Census Bureau, American Community Survey Demographic and Housing Estimates, 2018: ACS 1-Year Estimates Data Profiles, <https://data.census.gov/cedsci/table?g=0400000US23&tid=ACSDP1Y2018.DP05>, 2019: ACS 1-Year Estimates Data Profiles, <https://data.census.gov/cedsci/table?g=0400000US23&tid=ACSDP1Y2019.DP05>.

to demonstrate “reasonable progress” in achieving that goal, as determined by the Department. Waste management decisions are the responsibility of the municipality and decisions and actions at the local level significantly impact the overall statewide MSW recycling rate.

In 2018, 487 municipalities were sent letters notifying them of the reporting requirement and providing instructions on how and when to report. Out of the 487, only 104 municipalities submitted their recycling progress reports to the Department. This gap in reporting compliance led to a lack of information that could otherwise enable the Department to better identify materials management opportunities and needs. The next municipal reports are due to the Department April 30, 2021 and will help inform discussions about future recycling infrastructure needs.

D. Waste Diversion and Recycling

In 2018 and 2019, an estimated 2,625,870 tons of MSW was generated in Maine. Of that waste, approximately 1,667,376 tons of MSW was sent for disposal, usually at waste-to-energy facilities or landfills. An estimated 958,494 tons of material was diverted from disposal through recycling, composting, and anaerobic digestion, and through Maine’s product stewardship programs and metal recycling through scrap dealers.

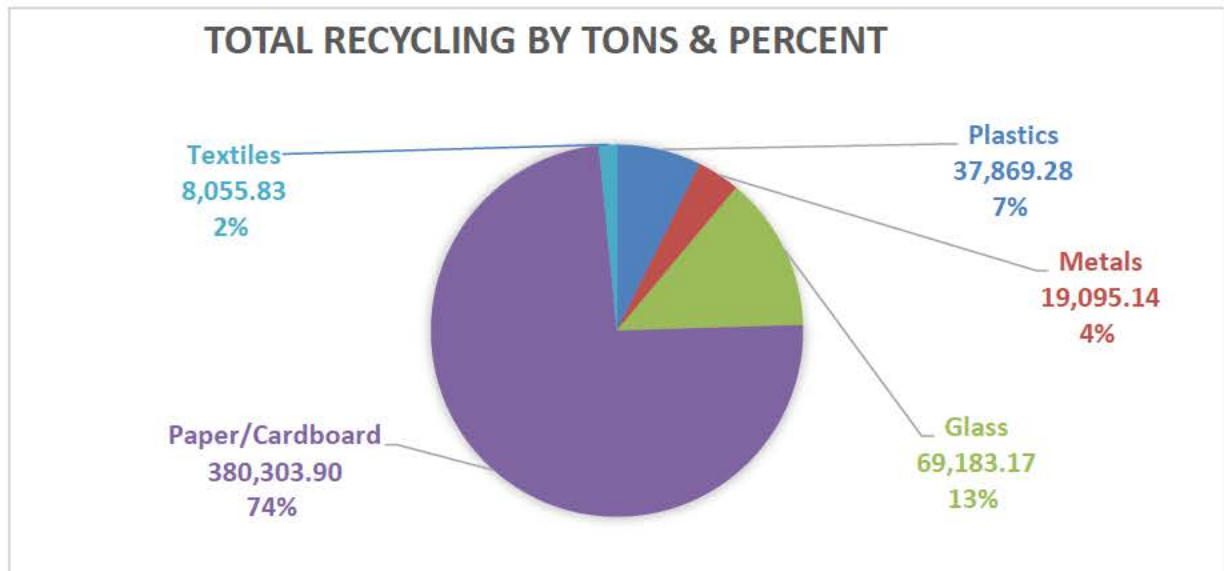


Figure 1. Recycling by tons, material, and percent in 2018 & 2019 (combined).

Figure 1 shows the composition in tons and percent of the recyclables that were reported as managed through municipal and commercial recycling in 2018 and 2019. Figure 2

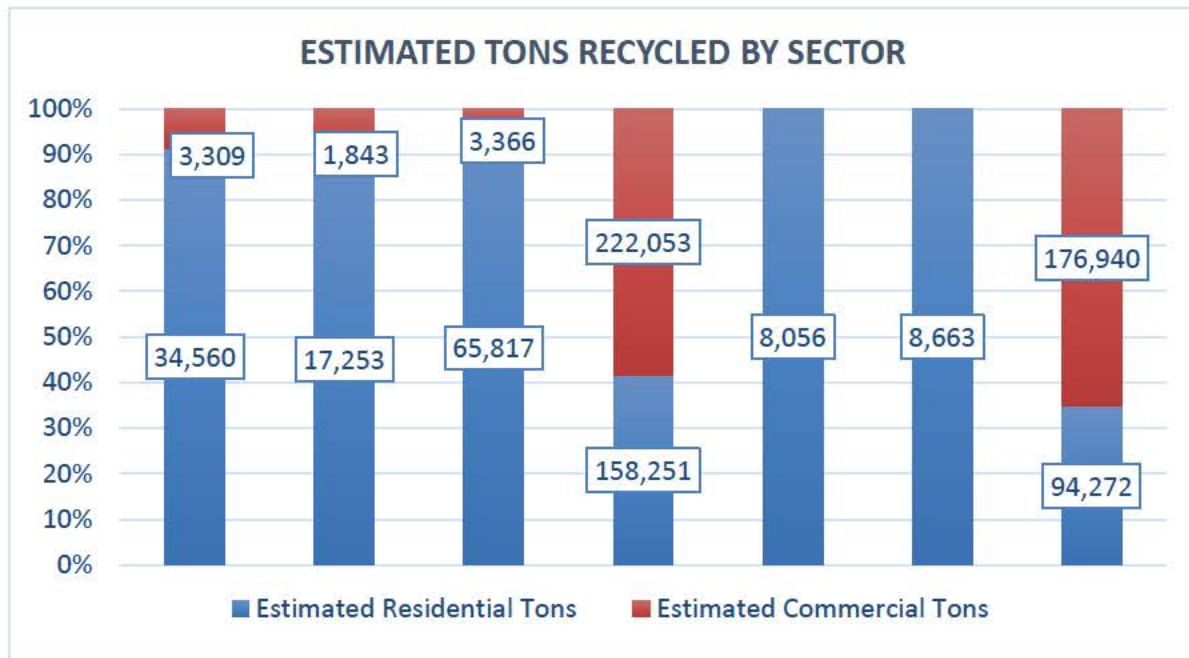


Figure 2. Estimated tons of recycling generated by residential and commercial sectors in 2018 & 2019 (combined).

shows the estimated amounts of each material managed through municipal recycling, composting, and anaerobic digestion programs versus commercial efforts. Figures 1 and 2 include data on management of traditional recyclables, such as those collected curbside. Figure 2 also includes data for food scraps and leaf and yard waste, but neither includes data on scrap metal or vehicle battery recycling.

An estimated 314,967 tons of scrap metal and vehicle batteries were also recovered through Maine's scrap metal dealers, for approximately 837,491 tons in total of recyclable scrap (excluding organics) diverted from disposal in 2018 and 2019. An estimated 522,524 tons of recyclables (excluding organics) were diverted from disposal through recycling programs including the container redemption program as well as municipal and commercial recycling collection. In addition to the recycling tonnage handled through municipal and commercial recycling programs, an estimated 7,890 tons of materials were diverted through Maine's product stewardship programs. This waste was comprised of approximately 7,291 tons of electronic waste, 27 tons of rechargeable batteries, 127 tons of mercury lamps, 227 tons of architectural paint, and 217 tons of paint containers. Around 7,500 mercury thermostats were also managed through Maine's product stewardship programs, including an estimated 30 pounds of mercury.

Including all organics management at licensed facilities, 271,212 tons of organics were diverted from disposal and composted or sent for anaerobic digestion in 2018 and 2019. Of this tonnage, approximately 121,130 tons were food scraps, leaf and yard waste, and other source separated organics from the typical municipal solid waste stream (wastes disposed by households, institutions, and businesses) and count toward Maine's statewide

diversion goal. The remaining 150,082 tons included processing waste from commercial operations, wood ash used as an amendment in the composting process, WWTP sludge, FOG (fats, oils, and grease), from commercial operations, and aircraft de-icer³ handled through anaerobic digestion. This tonnage is not included in Maine's MSW generation or recovery figures; however, it is included in Figure 3 for an accurate depiction of all activity at facilities licensed to process organics in Maine.

The Maine Legislature established the *Maine Solid Waste Diversion Grant Program* at 38 M.R.S. § 2201-B (P.L. 2015 c. 461) to “assist in the development, implementation or improvement of programs, projects, initiatives or activities designed to increase the diversion of solid waste from disposal in the State”. In 2018 and 2019, the Department awarded grants totaling approximately \$300,000, to both public and private entities, funding 19 different proposals for composting, organics recovery and recycling projects.

Figure 3 shows the composition of the materials that were diverted from disposal for composting or anaerobic digestion. While waste audits would be needed to confirm how much food is in the residential and commercial waste, the low quantity of food scraps suggests there is room to improve Maine's food scrap collection efforts to increase organics diversion.

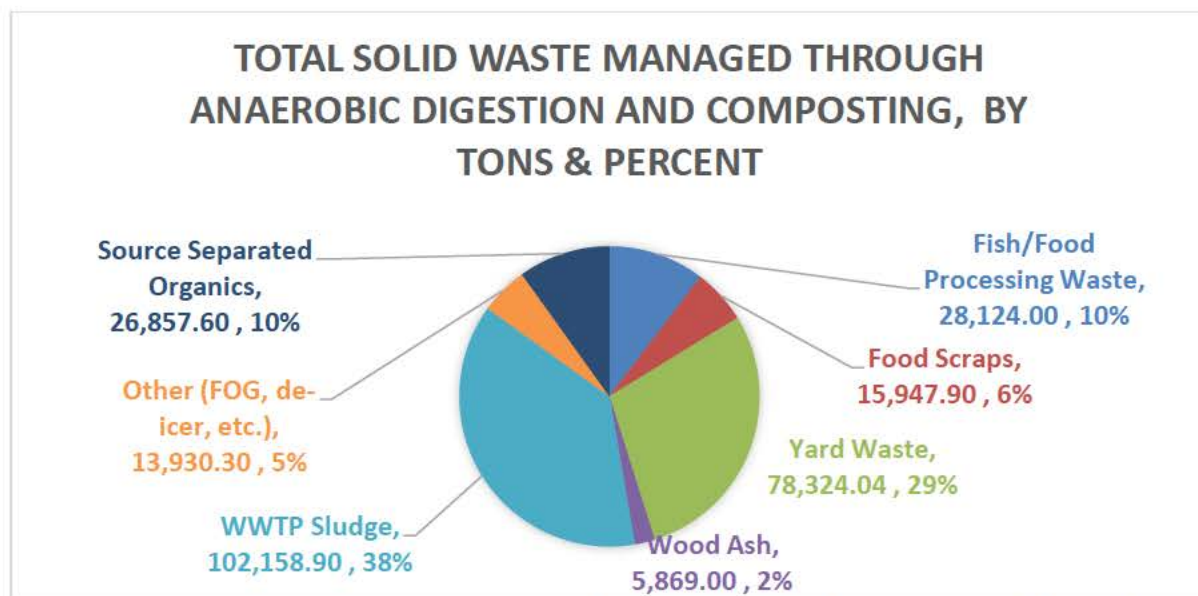


Figure 3. Organics diversion, and other solid wastes managed in Maine, in 2018 and 2019

A significant issue that has recently come to the forefront and will likely influence organics management in the future is the presence of perfluorooctanoic acid or PFOA, and perfluorooctane sulfonate or PFOS, chemicals often referred to collectively as per- and polyfluoroalkyl substances (PFAS), in wastewater treatment plant sludge. Used in

³ For more information about anaerobic digestion of aircraft deicing fluid, see: http://emerald.ts.odu.edu/Apps/FAAUDCA_nsf/University%20of%20Colorado%203%20tie2.pdf?OpenFileResource

household products, industrial settings, and firefighting foam since the early 1950s, these chemicals are persistent and bioaccumulative in the environment⁴. The Department adopted rigorous testing standards for PFAS in sludge licensed for land-based application and composting in March of 2019.⁵ In response, sludge used in land-based application and composting operations has decreased while landfilling of sludge has increased.

Maine's MSW recycling rate (including composting and anaerobic digestion) average for 2018 and 2019 was estimated to be 36.46%. Table 4 shows a breakdown of total waste diversion including CDD and the estimated overall recycling rate for MSW and CDD per year for 2018 and 2019. This table includes the small amount of MSW and CDD generated in Maine and disposed out of state in New Hampshire and New Brunswick.

Table 4 - Maine CDD & MSW Management - Calendar Years 2018 & 2019

Waste Type and Disposition	2018 tons	2019 tons	Total Tons
Total MSW & CDD reported as generated in Maine	1,706,798	1,821,230	3,533,807
Total MSW & CDD disposed* (includes materials used in landfill for cover, shaping, and grading)	1,252,162	1,296,411	2,554,352
Total MSW, CDD, and organics recycled and composted (including wood waste used as fuel chips)	454,636	524,819	979,455
Maine's Combined MSW, CDD & Organics Recycling Rate	26.64%	28.73%	27.68% (average)

* includes only Maine-generated portion of CDD processing wastes from processing facilities located in Maine

The MSW recycling rate is calculated by dividing the total amount of MSW recycled by the total amount of reported in-state generated MSW. The term "municipal solid waste" is defined in 06-096 C.M.R. ch. 400 as "... solid waste emanating from household and normal commercial sources. Municipal solid waste includes front-end process residue from the processing of MSW." Maine has historically included CDD as a subset of MSW since it fits the criteria included in the definition of MSW. However, other states and the U.S. Environmental Protection Agency (US EPA) exclude CDD from their calculations of MSW recycling rates. To address this, the Department has calculated the recycling rate for MSW as defined by the US EPA (Table 1) as well as a recycling and diversion rate for CDD alone (Table 2), and a separate recycling rate that includes both MSW and CDD, shown in Table 4. This approach allows Maine to perform a like comparison with other states' MSW recycling rates, while also enabling Maine to

⁴ Maine DEP Per- and Polyfluoroalkyl Substances (PFAS) Updates:

<https://www.maine.gov/dep/spills/topics/pfas/index.html>.

⁵ DEP Announces Testing of All Sludge Materials Before Land Application.

<https://www.maine.gov/dep/news/news.html?id=1186570>.

evaluate where additional efforts are needed to improve diversion of the array of materials handled by municipalities in Maine.

V. Solid Waste Disposal Capacity

In 2018 and 2019, Maine's active solid waste disposal facilities included three waste-to-energy facilities and approximately forty landfills of varying sizes and types. Of these landfills, nine are licensed to accept municipal solid waste or MSW bypass. Of these nine, seven are municipally owned, one is owned by the State but operated by a commercial waste handling company, and one is commercially owned and operated. Nineteen of the forty are municipally owned smaller landfills (generally less than 6 acres in size) that accept wood waste and CDD; one is a small secure landfill that accepts waste from an industry in the municipality, and some non-local wastes such as WWTP sludge. The remainder of the forty are generator-owned landfills that are associated with a specific manufacturing facility and are licensed to take waste from that facility.

Since the wastes disposed at these generator-owned landfills are specific to those facilities and are not placed into the general waste stream, they are not included in this report for calculating Maine waste generated, disposed, and for determining recycling rates. There is one waste processing facility in Maine that accepts MSW, but it was not fully operational in 2018 and 2019.

A. Current and Projected Capacity

1) Waste-to-Energy Facilities – Current and Projected Capacity

Three waste-to-energy facilities operate in Maine and accept both in state and out of state waste. The total amount of waste accepted by these facilities in 2018 and 2019 can be found in Table 5. Waste-to-energy facilities in Maine accounted for the disposal of 434,651.76 tons in 2018 and 420,687.32 tons in 2019, approximately 29% of all Maine-generated MSW and CDD waste during those two years.

Table 5 – Tons of Waste Incinerated in W-T-E Facilities – Calendar Years 2018 & 2019

Facility	Maine tons		MA tons		NH tons		Total tons	
	2018	2019	2018	2019	2018	2019	2018	2019
ecomaine	170,327	178,746	0	0	2,555	5,466	172,882	184,212
Mid Maine Waste Action Corporation (MMWAC)	81,221	81,852	0	0	146	154	81,367	82,007
Penobscot Energy Recovery Corporation (PERC)	183,104	160,089	49,576	28,304	480	595	233,160	188,988
Total	434,652	420,687	49,576	28,304	3,181	6,215	487,409	455,207

All three waste-to-energy facilities are currently meeting their air quality emission standards and are being operated and maintained in accordance with applicable State laws, rules and Department licenses. Current future capacity of these facilities is expected to remain stable, as currently licensed and constructed. Table 6 presents available licensed disposal capacity for these facilities.

Table 6 - Available Licensed MSW Disposal Capacity at Maine's Waste-to-Energy Facilities - as of December 31, 2020

Waste-to-Energy Facilities	Annual capacity (tons/year)	2020 (tons/year)	2025 (tons/year)	2030 (tons/year)	2035 (tons/year)
MMWAC – Auburn	70,000	70,000	70,000	70,000	70,000
ecomaine – Portland	170,000	170,000	170,000	170,000	170,000
PERC – Orrington*	310,000	210,000	210,000	210,000	210,000
Total Waste-to-Energy Facility capacity in tons	550,000	450,000	450,000	450,000	450,000

*The PERC annual capacity of 310,000 is the engineered capacity of its two boilers operating full time. In 2018, PERC changed its boilers' operating time, resulting in an operational reduction in waste incineration capacity to 210,000 tons annually. PERC can revert to handling up to 310,000 tons/year without modifications to any equipment.

2) Landfills – Current and Projected Capacity

The nine landfills that accept MSW or MSW bypass are detailed in Table 7 below, with each landfill's reported amount of waste accepted and capacity data, as generated by review of each landfill's annual reports for 2018 and 2019.

Table 7 - Current Maine Landfill Capacity

Landfill	Amount of waste disposed	Capacity used in year	Total capacity remaining in licensed area	Estimated life of licensed area
Hatch Hill – 2018	46,450 tons	71,600 cubic yards	575,000 cubic yards	8 years
Hatch Hill – 2019	47,675 tons	77,700 cubic yards	497,500 cubic yards	6.2 years
Bath – 2018	8,585 tons	not reported	356,000 cubic yards	14 years*
Bath – 2019	7,578 tons	22,800 cubic yards	336,600 cubic yards	14 years*
Brunswick – 2018	24,580 tons	54,000 cubic yards	96,300 cubic yards	Closing 2021
Brunswick – 2019	20,800 tons	52,800 cubic yards	43,500 cubic yards	Closing 2021
Presque Isle – 2018	11,320 tons	18,410 cubic yards	179,108 cubic yards	28-30 years (Phases II, III and IV)
Presque Isle – 2019	23,604 tons	22, 107 cubic yards	150,943 cubic yards	28-30 years (Phases II, III and IV)
Tri-Community-2018	41,087 tons	38,989 cubic yards	1,476,285 cubic yards	estimated 35 years
Tri-Community-2019	29,139 tons	30,502 cubic yards	1,445,435 cubic yards	estimated 34 years
Lewiston Municipal - 2018	19,419 tons	15,286 cubic yards	479,324 cubic yards	estimated 29 years
Lewiston Municipal – 2019	17,419 tons	12,124 cubic yards	467,200 cubic yards	29 years
Crossroads Landfill – 2018	474,962 tons	531,246 cubic yards	2,088,307 cubic yards	3 years*
Crossroads Landfill** – 2019	545,603 tons	545,461 cubic yards	1,559,886 cubic yards	3years*
Juniper Ridge - 2018	735,943 tons	840,364 cubic yards	10,180,666 cubic yards	6-12 years*
Juniper Ridge - 2019	818,457 tons	1,606,868 cubic yards	8,987,930 cubic yards	6-12 years*
ecomaine – 2018	45,122 tons	21,790 cubic yards	943,160 cubic yards	43 years
ecomaine – 2019	46,044 tons	25,794 cubic yards	916,366 cubic yards	35+ years

*estimated life based on review of the facility licenses.

**reported life is based on licensed capacity; however, Crossroads has a pending application for an expansion that, if approved, would add up to 15-17 years of additional capacity.

The Juniper Ridge Landfill (JRL) is licensed to accept MSW when it is bypassed from one of the three Maine waste-to-energy facilities and the MSW waste processing facility in Hampden. It can also accept front-end processing waste generated by a waste-to-energy facility. The Lewiston landfill, although licensed to accept MSW, accepted almost entirely ash from the MMWAC waste-to-energy facility in 2018 and 2019, and the ecomaine landfill accepted mostly ash from the ecomaine waste-to-energy facility.

Landfills that accept waste requiring daily cover are frequently licensed to use specific alternative daily covers (ADC). In 2019, Crossroads used the following wastes as ADC: processed utility poles, crushed glass, CDD and wood chips and fines, ashes, contaminated soil, some WWTP sludge, auto shredder fluff and some other special wastes. JRL is also licensed to use several wastes as ADC: ashes, CDD processing residues and fines, and some contaminated soils. During 2018 and 2019, JRL used CDD fines and processing residues as ADC.

As mentioned earlier, several small (generally less than six acres in size) municipal landfills also operate in Maine. These landfills are limited to accepting CDD, wood waste and small amounts of ash material; one is a small secure landfill for WWTP sludge disposal. The total amount of waste disposed at these landfills was 5,787 tons in 2018 and 8,290 tons in 2019. As many of these smaller landfills do not have scales, this tonnage is an estimate.

Several industrial facilities operate their own landfills. Waste accepted at these generator-owned landfills are specific to the industry they serve, and do not accept waste from outside their own facility, other than small amounts of waste from local municipalities or industries accepted on a non-profit basis. Waste at these facilities is segregated from the overall waste stream in Maine, is usually considered a type of special waste, and is not included in waste generation and capacity calculations.

Approximately 65,043 tons of solid waste was sent to two out of state landfills in New Hampshire and New Brunswick during this reporting period due to logistical reasons, as the municipalities border the State/Province.

Table 7 above also presents an estimate of each of the landfill's lifespan, as calculated by the landfill operator or, if not provided, by the Department using current disposal rates and known capacity. MSW is a commodity and generators and haulers will seek to find the most cost-effective disposal facility for their material; also, landfills alter their disposal amounts to take into account market conditions for various wastes and ability to use waste as cover material. Therefore, estimates of capacity or life beyond 5 – 10 years may not be accurate, as waste stream amounts can vary significantly from year to year as generators and haulers seek more cost-effective facilities and landfills change their operations.

3) Municipal Solid Waste Processing Facility

One MSW processing facility exists in Maine – the Municipal Review Committee, Inc./Fiberight, LLC/Coastal Resources of Maine, LLC waste processing facility (CRM). In 2017, Fiberight LLC and the Municipal Review Committee, Inc. (an organization of 115 municipalities developed for the purpose of handling those communities waste needs) received a license from the Department to develop a new solid waste processing facility designed to accept and manage 650 tons of MSW per day. Until April 2018, MSW from the 115 MRC municipalities was disposed at the Penobscot Energy Recovery (PERC) waste-to-energy facility in Orrington, Maine. When construction of the CRM facility was not completed by April 2018, MRC redirected the MSW from its communities to the privately-owned Crossroads landfill in Norridgewock. MRC had negotiated an exclusive contract with Crossroads for the disposal of “bridge capacity” waste during construction, start-up and initial operation of the CRM facility. Through a waste swap agreement that addressed logistical waste handling issues, waste from the MRC communities was also diverted to JRL. Currently 65% of the waste from the MRC communities is being diverted to PERC. During this time period, some of the municipalities that contracted to deliver their MSW to CRM began altering their recycling methods to utilize CRM’s sorting process, reducing or eliminating their own sorting of recyclable material. Since their recycling content was not sorted, it has been landfilled or incinerated with their MSW; some recyclable wastes delivered to PERC were pulled out before incineration. Due to several technical and financial issues, the CRM facility has yet to operate in a consistent manner and has not operated since May of 2020. Discussions concerning potential sale of the facility have been ongoing.

Once the CRM facility is fully operational for a complete calendar year, it should be possible to assess whether the amount of bypass and processing residue resulting from its operations will significantly alter the amounts of solid waste destined for landfilling.

B. Factors Affecting Future Disposal Capacity

1) Closure and Consolidation of Landfills in 2018, 2019, and Near Future

During 2018 and 2019, there were no closures of landfills in Maine. However, the Brunswick landfill is approaching capacity and is expected to close in 2021. Although not expected to greatly impact the solid waste landscape in Maine, a few small CDD landfills will close within the next 5 years. The closure of these landfills will have a minimal impact on future disposal capacity due to the limited amount of waste they are currently receiving.

In 2019, Presque Isle and the Tri-Community group of municipalities merged their landfill operations and created Aroostook Waste Systems (AWS) to manage both facilities. The Presque Isle landfill is expected to continue to accept waste until its

Phase II licensed area is filled (estimated to be in approximately 6 years), at which time long term intermediate cover will be placed over the landfill, and all waste will be taken to the Tri-Community landfill (TCL) for disposal until that landfill has reached its constructed capacity, which at current fill rates is expected to be approximately 34 years. At that time TCL will permanently close and waste disposal will shift back to the Presque Isle Landfill to begin filling in its Phases III and IV licensed landfill area. Phases III and IV are estimated to provide capacity for 21 to 28 years.

2) Long Term Landfill Capacity

Maine's anticipated long-term solid waste disposal facilities for MSW include three waste-to-energy facilities, five municipally owned landfills that routinely accept MSW, one state owned landfill, and one privately owned commercial landfill. Using the generation and capacity numbers provided by the facilities, the amount of MSW generated in Maine that was disposed either in a landfill or waste-to-energy facility during 2018 and 2019 is estimated at 1,663,657 tons in total, or at an annual average rate for those years of approximately 831,000 tons. Of this estimate, approximately 288,000 tons per year, or 29% was disposed through waste-to-energy. Waste-to-energy capacity is available for the long term if those facilities are maintained and remain operable. Assuming that these rates were to remain constant, the remaining approximately 543,000 tons of MSW generated per year would require landfill disposal; this does not include consideration of the MSW waste processing facility in Hampden that is currently not operating or landfill capacity for the additional 450,000 tons of CDD and wood waste generated in Maine.

There is a significant amount of available landfill capacity at the state-owned Juniper Ridge landfill and the commercially owned Crossroads landfill. Neither landfill provided an estimated time frame for reaching capacity in their annual report. However, using the information provided in the annual reports, the Department calculated an estimated time frame of operation at approximately 3 years for current licensed capacity at Crossroads, and between 5 and 10 years at JRL. An expansion application is currently under Department review for the Crossroads landfill, and if approved the expansion would add approximately 7 million cubic yards of waste for a projected 15 to 17 years of disposal capacity. Landfill needs for MSW waste generated in Maine could be met through the capacity at these two landfills, not considering the CDD waste stream currently being disposed in the small, municipally owned landfills. However, JRL is currently licensed to accept MSW when it is bypassed from one of the three Maine waste-to-energy facilities or the MSW waste processing facility in Hampden. When considering the available capacity of the larger municipally owned landfill facilities: Augusta's Hatch Hill, Bath's landfill, AWS-Presque Isle, AWS-Tri-Community, and the landfills operated by ecomaine and Lewiston which are currently taking waste-to-energy facility ash, it is apparent that available landfill disposal capacity for the next 10 years is sufficient for current levels of Maine generated MSW. Each of these landfills has a life estimate for disposal capacity of at least 10 years with the exception of Augusta's Hatch Hill, which is

approximately 6 years. If the CRM facility becomes fully operational, this will result in additional capacity.

In the mid-1990s the Carpenter Ridge landfill, located in T2 R8, was licensed by the State. This landfill has not been completely designed or developed; it is held by the State for future development of disposal capacity if needed. It would provide an estimated two million cubic yards of capacity for special wastes.

After 10 years, some of the municipally owned and controlled landfills will start to reach capacity if no additional capacity is licensed through expansion or vertical increase, particularly for the southern and central portions of the State. However, if recycling rates are increased, this capacity will be extended as the volume of waste needing disposal will decrease. The Aroostook county area appears to have capacity available well beyond 10 years in both the AWS-Presque Isle and AWS-Tri-Community landfills.

VI. Disposal Fees and Supracompetitive Prices

A. Disposal Fees

Current municipal solid waste tipping fees vary by facility, but they generally range from \$40 to \$100 per ton at Maine's waste-to-energy facilities and landfills, with an estimated average tip fee of \$76.72. As some fees and contract terms are considered confidential between the facility and their customers, a general range and average are provided to the Department, and thus in this report rather than specific facility fees. Tipping fees for CDD also vary by facility, but range from \$33 to \$95, with an average per ton of approximately \$59.

The State's Operating Services Agreement with Casella Waste Systems Inc. for the state-owned Juniper Ridge Landfill sets a maximum tipping fee for each waste type. This cap does not include fees established in legislation on wastes being disposed in the landfill.

Municipalities must weigh the cost of recycling against comparatively low tipping fees and ample capacity for disposal. The fact that some municipalities have saved money by cutting recycling programs has led to a situation where Maine is unlikely to meet recycling or per capita disposal reduction goals without solid investments to improve the State's recycling system, including end markets. The average per-ton cost of recycling is generally higher than disposal under current market conditions, sometimes significantly so. Per-ton average tipping fees for single-stream recycling (also known as "zero-sort" or "mixed" recycling) ranged from approximately \$113 to \$144 during 2018 and 2019, with an overall average of approximately \$128, about 67% higher than the average disposal tipping fee for residential MSW. A key factor is that the increase in recycling costs was rapid and municipalities had not budgeted for significant change to occur. While costs vary for a number of reasons, for many municipalities in Maine the average per-ton tipping fee increase between 2017 and 2018 for single-stream recycling was around

626%, while 2019 prices averaged 28% higher than in 2018 and 829% higher than in 2017.

B. Supracompetitive Pricing

Supracompetitive, when applied to pricing, means prices that are higher than they would be in a healthy competitive market; usually resulting from overconcentration, collusion, or some form of monopolistic practice. 38 M.R.S § 2124-A requires the Department to determine whether changes in available landfill capacity have generated, or have the potential to generate, supracompetitive prices and if so, to provide recommendations for legislative or regulatory changes as necessary.

Currently, available and potential disposal capacity at all the operating municipal, commercial and state-owned landfills within Maine does not appear to have or be at risk of having generated supracompetitive disposal fees. Instead, with an average disposal tipping fee of around \$76.72 per ton and average tipping fees for recyclables around \$128 per ton, the cost of disposal seems to be too low to provide incentive for recycling.

C. Recycling Pricing

The financial burden to provide recycling services rests primarily on municipalities whose budgets are already strained. Some municipalities have ceased recycling as the cost to recycle grew in recent years. Over the past decade, global policy changes have had a serious impact on recycling markets across the world, and Maine's recycling programs are no exception. The first major policy change that occurred was China's "Green Fence" in 2013, which limited the recyclable materials acceptable for import into China and set requirements for inspecting bales of recyclables for contamination (non-recyclable, undesired, or inappropriate material mixed in with a bale of a particular recyclable commodity, such as plastic film in a bale of paper). China has historically been the largest importer of recyclable scrap commodities but has focused on implementing policies often collectively referred to as "National Sword" since the Green Fence policy of 2013 in a continued effort to improve their domestic recycling, clean up their environment, and limit imports of contaminated recyclables into the country. In particular, China's ban on imports of mixed plastics and mixed paper in 2017 meant that recyclers had to look elsewhere for export markets as domestic capacity to process these materials is limited in the United States. As a result, countries that were targeted for export of recyclables began to put their own recyclable scrap bans in place to limit the amount of unwanted or contaminated scrap material entering their borders.

Looking forward, another significant policy change that takes effect in January of 2021 will continue to impact global recycling markets into the foreseeable future. The 187 countries that are party to the Basel Convention (the United States is not a party) have approved amendments to set strict and rigorous standards on shipping of plastic waste, including the classification of certain common scrap plastics as hazardous material. A separate agreement among Organization for Economic Cooperation and Development (OECD) member countries may allow trade of certain plastic scrap to continue between

willing OCED members, but it is unclear specifically how export and import of plastic scrap to and from the United States will be impacted in the long-term.

It is likely that challenging market conditions will continue to disrupt recycling programs in Maine in the foreseeable future. More broadly, prices favor virgin materials over recycled content, particularly when it comes to plastics. Despite the lack of domestic recycling infrastructure for plastics, falling prices for oil and natural gas have compelled massive investments in plastics, amounting to “over \$200 billion...invested into 333 new chemical and plastics projects, as of the end of 2019.”⁶ This is driven in part by consumer demand for clean energy and concerted efforts at the local and state levels to move away from fossil fuels, leaving plastics production as an important outlet for fossil fuel market development. Initiatives to improve infrastructure and processing would allow for increased capture and recycling of materials like glass, which lack strong regional markets.

VII. Solid Waste Industry Consolidation in 2018 & 2019

38 M.R.S. § 2124-A requires that the biennial Waste Generation and Disposal Capacity Report include “...an analysis of consolidation of ownership in the disposal, collection, recycling and hauling of solid waste”. The Department has performed a review of the solid waste industry in Maine based on available information and found that there were no significant changes in facilities and services operating in Maine in 2018 and 2019 that may impact future pricing.

The two largest landfills (not considering generator-owned landfills) in Maine which provide the greatest amount of waste disposal capacity are either privately operated (Waste Management Disposal Services of Maine, Inc., a subsidiary of Waste Management, Inc., owns the Crossroads Landfill) or State owned but privately operated (NEWSME, a subsidiary of Casella Waste Systems Inc., operates JRL). Casella Waste Systems and Waste Management are both vertically integrated nationwide waste management services company providing collection, transportation, recycling and disposal services to the communities of Maine. The remaining landfills are all owned and operated by municipalities, groups of municipalities, or regional associations. Two municipal landfill operations merged during this time period, the Presque Isle Municipal Landfill and Tri-Community Landfill in Fort Fairfield, and formed Aroostook Waste Solutions to manage both facilities. Two of the waste-to-energy facilities are owned and operated by a quasi-municipal organization consisting of multiple municipalities, each with partial ownership of the facility. Non-member municipalities may also use these facilities but will pay higher fees than member municipalities. The Municipal Review Committee, a nonprofit organization consisting of 115 Maine municipalities that originally contracted for MSW disposal with (and held ownership interests in) PERC, dissolved its relationship with PERC in 2018 and is one of the licensees for the MSW processing facility located in Hampden.

⁶ Cho, R. (2020, February 20). More plastic is on the way: What it means for climate change. *Columbia University Earth Institute*. Retrieved from <https://blogs.ei.columbia.edu/2020/02/20/plastic-production-climate-change/>.

The presence of the landfills that serve the entire state (Crossroads and JRL) and the other waste services in the State do provide a measure of competition for waste disposal ancillary services, in addition to the presence of the municipally owned and operated facilities. When setting disposal tipping fees, these municipalities consider the cost of operation of the facility, immediate operational needs and long-term maintenance after closure. These municipal facilities provide an additional level of competition for waste disposal. Collection, hauling, and recycling is also conducted in Maine with a mix of municipal and private entities, as each municipality chooses how it will provide its waste management services to the community.

Overall, fees for solid waste disposal appear competitive. At this time, solid waste disposal rates and fees are lower than the current rates for most types of recycling.

Appendix A - Definitions and Acronyms

The following definitions are provided to assist the reader in reviewing this document:

Beneficial Use – *to use or reuse a solid waste or waste derived product as a raw material substitute in manufacturing, as construction material or construction fill, as fuel, or in agronomic utilization.*

Construction/Demolition Debris (CDD) – *solid waste resulting from construction, remodeling, repair, and demolition of structures. It includes but is not limited to: building materials, discarded furniture, asphalt, wall board, pipes, and metal conduits. It excludes: partially filled containers of glues, tars, solvents, resins, paints, or caulking compounds; friable asbestos; and other special wastes.*

Disposal - *the discharge, deposit, dumping, spilling, leaking, placing or incineration of any solid waste into or on any land, air or water so that the solid waste or any constituent thereof may enter the environment or be emitted into the air, or discharged into any waters, including ground waters. This term does not include beneficial use activities approved or exempted under the Solid Waste Management Rules.*

Handle - *to store, transfer, collect, separate, salvage, process, recycle, reduce, recover, incinerate, dispose of, treat, or beneficially use.*

Land clearing debris - *solid wastes resulting from the clearing of land and consisting solely of brush, stumps, soil material, and rocks.*

Municipal Solid Waste (MSW) – *solid waste emanating from household and normal commercial sources. Municipal solid waste includes front end process residue from the processing of municipal solid waste.*

Recycling - *the collection, separation, recovery and sale or reuse of materials that would otherwise be disposed of or processed as waste, and the creation and recovery of reusable materials to create new products; the incineration or use of recovered materials as a fuel for the generation of electricity is not recycling.*

Solid waste - *useless, unwanted or discarded solid material with insufficient liquid content to be free flowing, including but not limited to rubbish, garbage, refuse-derived fuel, scrap materials, junk, refuse, inert fill material, and landscape refuse, but does not include hazardous waste, biomedical waste, septic tank sludge, or agricultural wastes.*

Special Waste – *wastes that are generated by other than domestic and typical commercial establishments that exist in such an unusual quantity or in such a chemical or physical state that require special handling, transportation and disposal procedures.*