Jurisdictional Scan

Information documented includes:

General Facility Information		
• Region / Jurisdiction • Use of Thermal Process • Owner / Operator • Facility Name • Location of Facility • Country	• Year Commissioned • Current Status • Input Material Stream(s) • Sources • General Technologies Applied	• Branded Technology • Technology Provider • Products • Facility Design Tonnes • Current Tonnes Managed • Process
Demographic Information		
• Population Served	• Number of Single and Multi-family Dwellings • Population Density	• General Climate Information
Brief Overview, Municipal Waste Program Information		
• MSW Tonnes Generated - Residential • MSW Tonnes Generated - Other (Commercial etc.) • MSW Tonnes Disposed	• Jurisdictions Responsible for service provision • Brief Summary of Current Waste Diversion Programs • Other Processing Infrastructure Used	• Residual Disposal Methodology • Reported Diversion from MWP(wOR) • Per Capita Waste Generation Rate • Reported Pricing
Other		
• Facility Grouping • Rationale for Short-listing for Jurisdictional Review includes: stated MWPwOR Facility Capacity (>100,000 tpy), Age of Facility (< 10 years), Operating Status (Operating), Similarity of Jurisdiction to Toronto (Larger Dense Urban Community, similar climate etc.), Recovery of Organics and/or inclusion of thermal treatment, Similarity of waste management programs including curbside SSO. • Rationale for why or why not jurisdiction utilizes thermal treatment • References for information sourced from the Internet		

City of Toronto Mixed Waste Processing Study

General MWP Facility Information

Region / Jurisdiction	Use of Thermal Process	Owner / Operator	Facility Name	Location of Facility	Country	Year Commissioned	Current Status	Input Material Stream(s) (MSW, other)	Sources (Residential, Industrial, Commercial, Institutional)	General Technologies Applied (mechanical sorting, biological treatment, fuel production, thermal treatment)	Branded Technology (if applicable)	Technology Provider (if applicable)	Products	Facility Design Tonnes (TPY)	Current Tonnes Managed (TPY)	Process
CANADIAN FACILITIES UTILIZING A THERMAL PROCESS																
City of Edmonton, Alberta	Yes - prod'n of RDF for onsite use	City of Edmonton / Contracted operations __________ Enerkem	Edmonton Waste Management Centre ____________ Enerkem Waste to Biofuels and Chemicals Facility	Edmonton, AB	Canada	1999 (MRF), Subsequent facilities from 2000 onwards	The extent of completion of commissioning and progression to full commercial operation has yet to be verified.	MSW	Residential, Commercial	Manual and Mechanical Sorting Hydraulic tampers Rotating screens with bag breaking spikes Biodrying/Composting Mechanical system to produce feedstock for Waste to Biofuels Facility Overland conveyor to carry organics to Edmonton Composting Facility and non-biological waste to adjacent Waste to Biofuels Facility	Enerkem biofuel production system	Enerkem (for biofuel production system)	Recyclables, Organics, Solid Fuel (RDF). RDF is supplied to Enerkem's adjacent 400 TPD waste to biofuels plant.	1500 tpd MSW processing plant (~ 400,000 tpy)	N/A	Non-recyclable solid waste, plastic waste and biomass residues are sorted to create RDF. RDF converted to syngas using gasification. Syngas is converted to methanol and ethanol.
Municipality of the District of Chester, Nova Scotia	Yes - prod'n of RDF for onsite use	Sustane Technologies (DBOOM contract with Municipality of Chester, plant located on municipal site)	Advanced MSW Recycling Facility	Chester, NS	Canada	Commissioning in 2020	Commissioning pilot plant (as of May 2020)	MSW	N/A	Mechanical processing to generate biomass pellets from MSW. Uses low-temperature and low-pressure processes. Includes: shredding of incoming material, steam treatment to separate plastic from remaining waste, screening and separation to remove contaminants. Plastic stream is processed through a pyrolysis system and the products are purchased by 3rd party to generate synthetic diesel. Biomass material (organic) is processed to remove inorganic materials, then dried and pelletized into biomass pellets. 10% of the feedstock is inorganic material that is sent to the landfill	steam treatment system	Sustane Technologies	Synthetic diesel, recyclable material and biomass pellets for use as alternative solid fuel by Industry, synthetic kerosene (for use in steam production on-site), synthetic diesel. Also able to generate clean streams of typical recycled products including ferrous and non-ferrous metals, and PET.	70,000	Approved to convert 50,000 tonnes of municipal garbage annually (from Chester Landfill)	MSW is sorted and shredded and "cooked" with steam using a proprietary digester. Wet and dry separators remove plastic and metals (recovered for recycling). Final biomass product dried and pelletized in an industrial metal pelletizer (kahl belt dryer, pellet mill and cooler used). Plastic stream is cleaned and taken through a pyrolysis system for conversion to synthetic diesel. Overall mass balance: 5-10% inerts, 50% biomass pellets, 20% synthetic oil, 5% metals recovered,15- 20% water.
U.S. FACILITIES UTILIZING A THERMAL PROCESS																
Montgomery, Alabama	Yes - prod'n of RDF for offsite use	City of Montgomery/RePower South (formerly Infinitus facility)	Montgomery Recycling and Recovery Facility (formerly Infinitus Renewable Energy Park)	Montgomery, Alabama	USA	Original facility commissioned in April 2014. Recommissioned in February 2019.	Original facility closed (just over 1 year post-commissioning), purchased in 2018 by the City of Montgomery. Reopened in Feb. 2019.	MSW (Note: this MSW stream is from single stream residential and commercial collection, with no-source separation programs)	Residential, Commercial	Manual sorting, Mechanical sorting (BHS Debris Roll Screen, Nihot Single Drum Separator, BHS Polishing Screen, NRT SpydIR) to recover recyclables and remove large fraction waste stream which was to have been shredded to produce RDF. Organic fraction sent to outdoor windrow composting area (was to have been replaced by an AD facility).	BHS	BHS	Recyclables, Compost (contaminated, no evidence that compost was marketed)	120,000	100,000	Material goes through a reducer, bag breaker, OCC separator, debris roll screen (removes fines), single drum separator (separates heavy mat'l from lighter high value recyclables), polishing screens (separates into 3 streams - mixed paper, containers, fines), screens to remove small contaminants from mixed paper, Optical sorter to detect and eject plastic films from mixed paper, magnets, optical sorter to separate plastics, eddy current, optical sorters for fuel system (removes PVC & metals from low quality paper and non-recyclable plastics to create ReEngineered Feedstock), product baled and wrapped.
Babylon, NY	Yes - prod'n of RDF for offsite use	Omni Recycling	Omni Recycling	Babylon, NY	USA	1993	Operational	MSW	Residential, Commercial	10 ft. diameter by 50 ft. long trommel, several conveyors, magnets, separators and 3 solid waste balers	N/A	N/A	Recyclables. All solid waste residual after processing and recyclables recovery, is baled and loaded onto trailers for long-haul disposal out-of-state.	122,700	N/A	N/A
Miami-Dade County and the cities of Aventura, Cutler Bay, Doral, Miami Gardens, Miami Lakes, Opa-locka, Palmetto Bay, Pinecrest and Sunny Isles Beach, FL	Yes - prod'n of RDF for onsite use	Covanta	Miami-Dade Resource Recovery Facility	Miami, FL	USA	2013	Operational	MSW	Residential, Commercial	Mechanical sorting system (conveyors, drum magnet, eddy current separator, trommels) to recover recyclables. Remainder of waste is directed as RDF to EFW.	N/A	N/A	RDF, ferrous and non-ferrous metals, RTI Biomass Fuel	N/A	1,450,000	Garbage (e.g. MSW) is dumped on tipping floor, conveyed to sorting and shredding. Metals are removed and the remainder shredded to produce RDF. Other garbage (bulky, C&D, landscaper waste) is received, sorted, metals removed and the remainder is shredded to produce a biomass fuel, a portion of which is used to supplement the RDF for the RRF, and the remainder sold to cogeneration facilities in Central FL.
Ames, IA Cambridge, Gilbert, Huxley, Kelley, Maxwell, McCallsburg, Nevada, Roland, Slater, Story City, Zearing, and unincorporated Story County.	Yes - prod'n of RDF for onsite use	City of Ames	Arnold O. Chantland Resource Recovery Facility	Ames, IA	USA	1975 upgraded 2009	Operational	MSW	Residential	Mechanical sorting system (new conveyors, magnet, eddy current separator, an induction sorter, equipment supports and access catwalks)	ISS Machine ECS Machine	Steinert Eriez	RDF (65%) directed to the WTE facility, ferrous metals (5%)	N/A	36,430 tons (rec'd at the plant and processed to create 15,656 tons of RDF) 1,199 tons of metal, 149 tons of glass recovered for recycling.	Ferrous and non-ferrous materials recovered for recycling. Remainder is shredded - burnable portion becomes RDF and non-burnable portion is landfilled.
Perham, MN	Yes - prod'n of RDF for onsite use	Prairie Lakes Municipal Solid Waste Authority	Perham Resource Recovery Facility	Perham, MN	USA	started in 1986, reconstructed in 1998, more expansions 2013/2014.	Operational	MSW	Residential	Mechanical sorting system (trommel, magnets, eddy current separator, apron and belt conveyors, baler, fines clean-up system, and sorting and access platforms)	N/A	N/A	Recyclables, WEEE, RDF for two existing EFW facilities, generates steam for nearby businesses (300 million lbs).	73,000	62,000	Materials sorted at MRF, material tipped, loaded onto conveyors for sorting - conveyors, magnets etc., 6 sort line operators remove OCC, electronics and bulky items. Waste enters a trommel, fines drop through - and pass over a disc screen. Materials go through an eddy current, 2 magnets. Leftover paper and plastic are not recovered and go back to tip floor. Ferrous, AL and OCC are baled. Residual is mixed in the pit and conveyed via grapplers into the incinerator.
Red Wing, MN	Yes - prod'n of RDF for offsite use	City of Red Wing	Mixed Waste Processing & RDF Preparation Facility	Red Wing, MN	USA	1982, upgraded 2017	Operational	MSW	Residential	Mechanical sorting.	N/A	CP Group and SSI Shredding Systems	RDF, Recyclables RDF is shipped to Xcel Energy's Red Wing power station as fuel supply toward 18 MW of electricity production.	30,000 (by 2022)	N/A	Use eddy currents and magnets to recover metals and a stationary shredder to produce RDF.
Palm Beach County, FL	Yes - prod'n of RDF for onsite use	Covanta (under contract with the Palm Beach Solid Waste Authority)	Resource Recovery Facility	Palm Beach County, FL	USA	1987 2014 upgraded	Operational	MSW	Residential	Two WTE facilities: - REF 1 includes a tipping floor, RDF plant, RDF storage and an EFW. RDF plant includes a flail mill to tear open plastic bags, ferrous metals and aluminum are removed, remaining material is processed by a secondary shredder into RDF which is conveyed to storage and then for combustion. - REF 2 is a mass burn facility without the RDF front end, which will recover ferrous and non-ferrous metals from the ash.	Babcock and Wilcox both WTE facilities	Babcock and Wilcox	Recyclables (metals), e-waste, Electricity, RDF	2 Units (REF 1 which includes MSW pre-processing and REF 2 which does not) REF 1: 566,000 REF 2: >1 Million tpy	REF 1: 771,000 (has operated over design capacity) REF 2: >1,000,000	REF1 - material unloaded, unprocessible waste removed (e.g. appliances, tires, metal, propane tanks etc.), material fed into a flail mill to tear open plastic bags, metals removed by eddy current and magnets. Material goes through rotating trommel screen to remove <2" (which are landfilled). Remaining materials are shredded to produce RDF and fed to boilers to produce electricty. REF2 is a mass burn facility - materials fed into a pit and conveyed to incinerator to generate steam.
Newport, MN Hennepin, Ramsey and Washington Counties	Yes - prod'n of RDF for offsite use	Partnership on Waste and Energy (Hennepin County and the Ramsey / Washington Recycling & Energy Board)	Ramsey/Washington Recycling & Energy Center	Newport, MN	USA	1985	Operational with planned organics -waste facility addition	MSW	Residential, Commercial	Mechanical sorting includes: In-feed conveyors, front end loaders, grapple cranes, shredders, hammer mills, magnetic separators, primary and secondary disk screens, primary and secondary air classifiers, eddy current separators, magnets, balers, compactors for the RDF and loading equipment.	N/A	N/A	RDF and metals (~350,000 tons of RDF annually) The RDF produced is converted to energy at the Xcel Red Wing electrical generation plant, the Xcel Wilmarth electrical generation plant, and the GRE Elk River electrical generation plant . Possible organic mulch from the new organic-waste facility	454,000	464,000 (2019)	Material tipped onto floor, conveyed through a series of shredders, magnets, and screens and processed into RDF.
CLOSED Elk River, MN Sherburne County	Yes - prod'n of RDF for onsite use	Great River Energy (owned by 28 electric cooperatives in Minnesota/Wisconsin)	Great River Energy's Elk River Resource Processing Plant	Elk River, MN	USA	1951 with retrofit in 1989.	Now closed and being decommissioned.	MSW	Commercial 60% Residential 40%	In-feed conveyor. Komptech Terminator shredder, cross belt magnet pulls out the ferrous material while the burnable material forms a pile. Bulky material is mixed with the MSW and is processed into RDF. There are two parallel processing lines in the plant. Each line is capable of processing over 50 tons of MSW per hour. The processible MSW goes through a flail mill powered by a 1200 HP motor and has 24 hammers weighing 150 pounds each. Each processing line includes a disc screen, air classifier and eddy current.	Komptech Terminator	N/A	RDF and recyclables	272,000	N/A	N/A
Martin and Faribault Counties	Yes - prod'n of RDF for offsite use	Faribault & Martin County	Prairieland Solid Waste Management Resource Recovery Facility	Truman, MN	USA	1991	Operational	MSW	Residential	Ferrous magnet, shredder	Komptech single-shaft shredder– the Terminator 6000 SD with XXF shredding unit	N/A	RDF and recyclables	<100,000	76,900	Waste is tipped, non-procesibles, recyclable metals and rejects are sort-separated and placed in a trailer for disposal or recycling elsewhere. A portable waste shredder performs size reduction and sorting of bulky and oversized material. Waste is conveyed to a vertical shredder, metals extracted with magnets, through a trommel (>3", 1-3" and <1"). Materials are compacted into trailers and sent to an RDF burn plant or to a landfill for disposal.
La Crosse, Wisconsin Buffalo, Trempealeau and La Crosse Houston and Wabasha county	Yes - prod'n of RDF for offsite use	Xcel Energy (merchant WTE facility)	French Island, Xcel Energy RDF facility and WTE plant	La Crosse, Wisconsin	USA	1978 with retrofit in 1988	Operational	MSW	Residential, Commercial, Industrial, and Institutional wastes	ferrous magnets and eddy current magnets	N/A	N/A	Metals, RDF (co-combusted with wood waste at the WTE facility)	<100,000	72,568 (2018)	Municipal solid waste converted to RDF and mixed with wood (waste wood and railroad ties) as a fuel for onsite fluidized bed boiler.
UNITED KINGDOM FACILITIES UTILIZING A THERMAL PROCESS																
Barnsley/ Doncaster/ Rotherham (BDR) Waste Partnership	Yes - prod'n of SRF for offsite use	Renewi (formerly Shanks)	BDR Waste Treatment Facility Manvers; Bolton Road	Rotherham, South Yorkshire, UK	United Kingdom	2015	Operational	Household Waste from BDR (varies by municipality but includes garbage, food waste and non-recyclable items)	Residential	MBT used to process waste at Bolton site to produce SRF. Organic fraction transferred to AD plant to produce energy and biocompost. SRF hauled to a multi-fuel plan next to the existing coal-fired power station at Ferrybridge where electricity is generated. The Grange Lane TS is used to bulk up waste, and a shredding operation is planned.	N/A	a2a	RDF, Recyclables, Biogas	286,000	150,000 (2017/18)	MBT used to process waste to produce SRF. SRF transported to a multi-fuel plant to generate electricty. Organic materials undergo bio-drying (12-15 days), then sorted and recyclable materials removed. Fines are transferred to an off-site AD facility to generate biogas.
Cambridgeshire	No	AmeyCespa, 28-year contract with Cambridgeshire County Council	Waterbeach	Waterbeach, UK	United Kingdom	2009	Operational	MSW	Residential	Mechanical sorting (sorting equipment, eddy current, trommels); Biological stabilization (bio-drying) of RDF fraction (wide lanes of material, turned by mechanical turning arm)	Rotopala Biodrying system, TITECH technology (TOMRA Sorting Systems) uses x-ray transmission to recover inerts from the back-end of the biodrying process	WTT / Taim Weser	Recyclable metals, RDF	200,000	125,000	MRF manages ~ 86K tpy. AT MBT facility, bags are opened and materials go through a trommel and then sorted using magnets, vibrating plates and air sorting. Residual materials go to the composting hall where materials are turned 24/7. After 6-8 weeks, material is landfilled. Compost facility for LYW (no food waste). Landfill captures LFG - and produce renewable electricity.
Milton Keynes Borough	Yes - prod'n of RDF for onsite use	AmeyCespa, under 15-year contract with Milton Keynes	Milton Keynes Waste Recovery Park (Advanced Thermal Treatment, Mechanical Treatment, Dry AD)	Milton Keynes, UK	United Kingdom	2018 (became operational in March 2018)	Operational	MSW	Primarily residential 'black bag' residual waste, some waste from other sources	Mechanical sorting (140,000 tpy, extracts 32,000 tpy organic waste); processing of biological fraction through dry AD, up to 94,000 tpy of residual to the ATT facility	ATT based on Energos technology	Stadler MT, followed by Celtic dry AD	Recyclable metals, Energy from biogas, Compost-like output, Residual directed to ATT to produce energy	140,000 50% of feedstock from Milton Keynes Council	132,000	Garbage conveyed for sorting and removal of plastic bottles and metals. Food and biodegradable items transferred to AD facility to generate a compost-like material which can be used for site remediation. Remaining materials go to advanced thermal treatment facility where it is converted to syngas which is combusted to generate steam which creates renewable electricity in a turbine.
Wakefield District Council	Yes - prod'n of RDF for offsite use	Renewi (formerly Shanks), developed as part of 25-year PFI contract with Wakefield Council	South Kirkby (230,000 tpy RDF preparation plant, Co-sited with a 36,000 tpy MRF)	Wakefield, UK	United Kingdom	2015	Operational	MSW	Primarily residential	Mechanical sorting equipment: primary shredder, vibrating screen, air drum separator, windshifter, (2) MACH Ballistic Separators, (2) Ferrous magnets, (2) Eddy currents, Film/paper optical sorter, plastic optical sorter, RDF monitoring unit, Machinex II - Ram Baler, Organic Moving Floor	Machinex equipment (as listed)	Machinex	RDF and recyclables (mixed paper, plastic film, mixed plastics, ferrous and non-ferrous), biogas from AD	230,000	120,000 tonnes of mixed municipal waste reported to have been received at South Kirkby in 2017 (WDI 2017)	Dry recyclables sorting plant separates 36,000 tonnes of glass, plastic, metals, paper and cardboard using screens, optical sorting and a glass cleanup system, an air capture system for plastic film, magnets and eddy currents. In the second area, the organic fraction is separated using screens and treated with an autoclave before being sent to AD. Other recyclables removed through air treatment systems, ballistic separators, optical units, magnets, eddy-currents and other sorting equipment.
West Lothian	Yes - prod'n of RDF/SRF for onsite use	Levenseat Renewable Energy Ltd.	Levenseat Waste Management Site (MBT, co-located Advanced Thermal Treatment facility (ATT), co-located containers sorting facility)	Lanark, Scotland	United Kingdom	2017	MRF Operational, Power plant in the last stages of commissioning (April 2020)	Commercial, industrial waste and MSW	Residential, Commercial, Industrial	Mechanical Sorting (42 tph) includes: Trommel Primary Shredder Combi Deck Vibrating Light Separator Double Drum Heavy Light Separator Windshifter Single Drum Heavy Light Separator (2) MACH Ballistic Separators (4) Ferrous Magnets Eddy Current Dust Collector (2) Fiber MACH Hyspec Optical Sorters Plastics MACH Hyspec Optical Sorter (3) Secondary Shredders RDF Monitoring Unit (2) Machinex Single-Ram Balers (one for RDF, one for recyclables) Bale Wrapper (2) Back Scraping Drums (3) MACH Motion Floors; Belt Dryer (using heat generated from the ATT); Wet Scrubbers (APC system for ATT)	Machinex waste processing equipment: (2) MACH Ballistic Separators, (2) Fiber MACH Hyspec Optical Sorters, Plastics MACH Hyspec Optical Sorter, (3) MACH Motion Floors. Andritz belt dryer.	Machinex (mechanical treatment),Outotec (ATT, fluidized bed system)	RDF (Refuse Derived Fuel) and SRF from super-light fraction. The MRF will provide 100,000 tonnes per annum to EfW plant. Recyclables (paper, cardboard, plastics, metals and wood).	MRF - 200,000 tpy. Entire facility has received approval to process 750,000 tpy.	167,753. The facility is currently ramping up to full capacity. The full capacity will be 200tpa as that is the Business Case.	Have two mixed waste recycling processes - one is a MRF to sort and separate recyclables and the other is a mixed waste recovery facility designed to process bulky waste, commercial & industrial and construction & demolition waste. The remaining residual waste from both processes is made into RDF. RDF is used as a feedstock at the Levenseat EFW plant. SRF is produced from the super-light and high calorific non-recyclable waste. Have two composting processes - one for processing segregated and packaged food waste, commingled green & food waste, sludges and liquids utilising drum technology and the other for windrow composting of LYW. Food waste is processed and separated into liquid and solid fractions. The liquid portion is shipped off site to AD facilities and the solid portion is composted on site.

Demographic Information / **Brief Overview, Municipal Waste Program Information**

Region / Jurisdiction	Population Served	Number of SFD	Number of MFD	Population Density	General Climate Information (avg. min & max temperature, precipitation)	MSW Tonnes Generated - Residential	MSW Tonnes Generated - Other (Commercial etc.)	MSW Tonnes Disposed	Jurisdictions Responsible for service provision (collection, diversion, disposal)	Brief Summary of Current Waste Diversion Programs (recycling, source separated food scrap/organics collection, LYW, other)	Other Processing Infrastructure Used (MRF, Composting, AD, EFW etc.)	Residual Disposal Methodology (e.g. Traditional Landfill, Biocell, Bioreactor, etc.)	Reported Diversion from MWP(wOR)	Per Capita Waste Generation Rate (kg/capita) (Household Waste)	Reported Pricing
CANADIAN FACILITIES UTILIZING A THERMAL PROCESS															
City of Edmonton, Alberta	932,550	320,000	N/A	123 / km2	-1 C - 9C	1 million tonnes annually		N/A	City is responsible for: collection of waste, the diversion of waste through recycling and reuse programs, and the recovery of products and energy from residual waste materials.	Household hazardous waste collection since 1995 with the opening of the first Eco Station. In 2015, the City opened its fourth Eco Station. Urban-scale composting since 2000. Electronic waste recycling since 2007. Construction and demolition recycling since 2008. Planned roll-out of curbside SSO collection postponed until 2021 due to Covid-19.	Materials Recovery Facility – opened in 1999 E-Waste Recycling Facility – opened in 2007 Edmonton Composting Facility (Composter) – built in 2000 Integrated Processing and Transfer Facility – opened in 2009 Construction and Demolition Recycling Facility (C&D) – opened in 2012 Research and Development Facilities – The EWMC is also home to research and development facilities: Enerkem Waste-to-Biofuels and Chemical Facility (Biofuels Facility) – scheduled to be fully operational by 2019. *Anaerobic Digestion Facility (ADF) – scheduled to be operational in 2020.* *New Composting Facility planned for 2025.*	Residual waste not processed at their EWMC is hauled to a private landfill located ~ 1 hour away (traditional landfill))	Anticipated to be 90%, 60% recycling and 30% via IPTF and Biofuel plant. Actual (verified) diversion information from IPTF and Biofuel plant is not available.	1072	2014 reporting - Waste-to-biofuels and chemical facility - Capital cost ~$100 million, integrated processing and transfer station - capital cost ~ $40 million, advanced energy research facility - Capital cost ~ $11 million (CAD). In 2020, Enerkem raised $76.3 million in new funding. New AD facility estimated as $42 million CAD (2020). RDF processing costs and tipping fees payable to the third party operating the Biofuels Facility are $127/tonne for conversion to biofuels compared to $111/tonne for landfill (2017), (CAD).
Municipality of the District of Chester, Nova Scotia	10,310	6,161 (2016)		9.2/km^2	-8 to 24 C	10,600		10% of feedstock is landfilled, equivalent to approximately 5,000 tonnes ; District of Chester total tonnes disposed unavailable	Municipality of Chester is responsible for collection, processing and disposal of residential waste.	Operates a four-stream waste management system (garbage, bulky waste, 2-stream recycling, source separated organics) that can be used by residential and IC&I generators. Garbage and recyclables are collected in bags, organics in green carts (plus additional paper bags) once every two weeks. One bulky item can be collected every 2 weeks. HHW is collected at the Kaizer Meadow landfill drop off facility. Kaizer Meadow accepts a range of divertible materials and MSW.	Kaizer Meadow Landfill drop-off facility. Chester uses processing capacity at other MRF and composting facilities in the South Shore for source separated materials.	All residual waste is sent to the Kaizer Meadow Landfill, a traditional landfill	Sustane is indicating that the facility would divert approx. 90% of incoming material from landfill disposal.	N/A	Unavailable. Received funding from Atlantic Canada Opportunities Agency ($358,000) and $2.6 million from Sustainable Development Technology Canada (2017).
U.S. FACILITIES UTILIZING A THERMAL PROCESS															
Montgomery, Alabama	202,000	104,858		482/km^2	avg. daily temp. 8.1 C	185,000		35% directed to fuel, 15-20% recycled, rest is landfilled (incl diapers and glass).	City of Montgomery AL is responsible for collection and disposal services.	No diversion programs are offered at the curb. City sets up 12 locations 2X/month to accept bulky items.	Recovered fuel is marketed to off-site facilities.	RDF is intended to be sold as a coal alternative, shipped to paper mills, cement companies, or other industrial operations that burn coal. Location of residual disposal is unclear, however, the Recovery Facility shares land with the Montgomery Landfill. Landfill is still in operation.	Claims to divert about 15% of material in the waste stream for recycling, and recovers another 35% of the stream for fuel.	998 (2011)	$37 million original cost + $12 million to upgrade in 2018 (USD). ($49 million and $16 million CAD respectively)
Babylon, NY	212,355	N/A	N/A	1563.8 /km2	8C - 23C	N/A	N/A	N/A	Town of Babylon is responsible for collection services, operation of a recycling center, and for contracting for processing and disposal services.	- Town has separate, but Town-wide, residential and commercial waste collection districts - Residential MSW is collected twice per week and commercial MSW is collected once per week - Recyclables are collected in a blue recycling container or a clear plastic bag (containers one week, paper the next) - Town collects the following materials for recycling: Paper: newspaper, corrugated cardboard, magazines, telephone books, and junk mail; Containers: glass and metal containers, #1 and #2 plastics - Drop-off recycling center - Yard waste is collected 12 months of the year, once per week	-The Town owns and operates a center where residents may drop recyclables. -The Town operates an ashfill. -Covanta Energy owns and operates a WTE facility on Town land.	Not applicable - use WTE	Confidential but is reported to exceed 35%	N/A	N/A
Miami-Dade County and the cities of Aventura, Cutler Bay, Doral, Miami Gardens, Miami Lakes, Opa-locka, Palmetto Bay, Pinecrest and Sunny Isles Beach, FL	2,600,000	350,000	N/A	373 /km2	21C - 29C	3,447,000		1,200 tons per day	Split jurisdiction for collection and processing between the County and incorporated municipalities within the County. Private haulers are franchised and must use County facilities. It is anticipated that there will be some variation in what is received at the facility as waste can be brought by County (for Miami), private haulers and residents.	Diversion programs include: - recycling - household hazardous waste	The Miami Dade System includes: a waste-to-energy facility, three landfills (a Subtitle D MSW landfill, a Class III landfill, and an Ash Monofill), three transfer stations, thirteen neighborhood trash and recycling centers, and two home chemical collection centers. Waste-to-Energy recovers and recycles more than 60,000 tons of ferrous metals, over 3000 tons of aluminum and 80,000 tons of soil/aggregate annually. 24,000 tons of specialty wastes are diverted from landfills and thermally destroyed.	County owns and operates 3 landfills - 2 for MSW and 1 for ash. Has contracts for alternate disposal at landfills located in other counties.	46%	1325	$62 Million USD ($83 million CAD) operating expenses for WTE.
Ames, IA Cambridge, Gilbert, Huxley, Kelley, Maxwell, McCallsburg, Nevada, Roland, Slater, Story City, Zearing, and unincorporated Story County.	90,000	N/A	N/A	380.8 /km2	4C - 15C	52,863 (2018)		estimated at ~ 19K (to Boone LF) (2018/19	City of Ames owns and operates the RRF and is responsible for disposal. Residents are responsible for arranging for waste collection services. City offers free drop off for yard waste in the spring and fall, access to an HHW depot. Residents need to contract themselves for recycling collection service. Waste is received from private haulers and residents - as a result, it is expected there would be some variation in waste composition.	City of Ames provides access to drop off some divertible materials (yard waste, HHW).	Resource Recovery Center, HHW drop off facility	Sent to Boone County Landfill, a Subtitle D compliant facility	N/A	N/A	Operations $4.2 Million (2018 USD) ($5.6 Million CAD) with revenue of $634K ($847K CAD) for RDF, $65K ($85K CAD) for sale of metals
Perham, MN	58,345	N/A	N/A	172 /km2	-12C - 21C	N/A	N/A	Bottom Ash is the only material sent to landfill. 2,213 tons in 2019	5 surrounding Counties responsible for collection and delivery to facility. County is responsible for six transfer stations, two C&D landfills, 29 drop-off recycling sites, a MRF, HHW program and P&E.	Recycling, HHW	MRF, public recycling and reuse centre,	Clay County Landfill	N/A	N/A	Reported in 2015, MRF cost $9.6 million ($12.8 m CAD)- $3.8 million ($5.1 m CAD) for equipment design and installation and $5.7 million ($7.6 m CAD) for construction.
Red Wing, MN	16,412	N/A	N/A	74.9 /km2	-8C - 23C	N/A	N/A	N/A	City provides garbage and recycling collection service, residents can also drop off materials at the solid waste campus.	Curbside Recycling. Drop off of various materials (e.g. HHW, LYW, Scrap metal) at the Solid Waste Campus.	Solid Waste Campus (MRF, composting, drop-off depot)	WTE	N/A	N/A	Improvements estimated at $12 million -to-date ($16 m CAD) (2018) 5 RDF building construction contract awards - $3.6 million ($4.8m CAD), 2 equipment agreements - $4 million ($5.4 CAD) (USD)
Palm Beach County, FL	1,400,000	N/A		288/km2	25C-30C	1,360,000	N/A	N/A	Solid Waste Management Authority provides solid waste and recycling collection services, processing and disposal.	Recycling, composting, transfer stations	MRF, public recycling and reuse centre	Ash is delivered to Class I landfill	REF 1 reports 60% diversion of incoming materials from landfill disposal through RDF processing and EFW. REF 2 reported to recover 90% of ferrous and 85% of non-ferrous post burn, estimated at 27K tons of metals annually	970	REF 2 $674 million (2014 USD) ($901 m CAD) ~ $25/ton (2014 USD) ($33 CAD)
Newport, MN Hennepin, Ramsey and Washington Counties	785,000	N/A		1,2590 /km2	3 C- 12C	N/A	N/A	N/A	The City does not provide for collection, depot or processing services. Residents and businesses need to contract for collection. Private businesses provide drop off centers for materials. Washington County and the Partnership on Waste and Energy also allow for access to drop off materials. All trash collected by haulers in Ramsey and Washington counties must be delivered to and processed at the R&E Center and must only deliver "accepted" types of waste.	Private sector, Washington County and the Partnership on Waste and Energy allow for drop off of various materials. Private sector generally provides for: Yard waste and organics collection sites Household hazardous waste collection sites Product reuse center Medicine collection sites Electronics recycling	N/A	N/A	2019 tons - MSW Rec'd = 427,159, RDF = 346,472, Non-ferrous = 1,034, Ferrous = 13,931, Bulky Waste Residue = 40,606., Process Residue = 16,487,	N/A	2019 approved budget is $36 million USD ($48 m CAD). Organic-waste facility addition estimated as $43 million USD.
CLOSED Elk River, MN Sherburne County	101,560	N/A		223.49 /km2	3 C- 12C	64,200	N/A	N/A	Sherburne County oversees management and transportation of all household, industrial and commercial waste in the County. Most of the components of the waste management system (garbage collection, curbside recycling, drop-off, yard waste composting, source separated organics collection) are managed by the private sector except for the City of St. Cloud which provides a municipally run collection system.	Curbside recycling collection, recycling redemptions, drop-off recycling facilities, yard waste composting facilities, source separated organics collection (SSO), Household Hazardous Waste (HHW) mobile and permanent facilities, and problem materials management.	A joint venture between the Elk River Landfill (Waste Management) and the Elk River Municipal Utilities has resulted in a (landfill) gas to electric plant which currently supplies the energy needs for about 1,600 homes in the City of Elk River. The Methane-to-Electricity Facility is a 5,100 square foot, state-of-the-art power plant that contains four 800-kilowatt Caterpillar engine-generators with the ability to generate approximately 20 million kilowatt-hours per year. The Elk River Municipal Utilities manages the product (electricity) while Waste Management controls the operation and maintenance of the facility. **Pope Douglas Waste to Energy Facility.** The Pope Douglas waste to energy facility converts trash to energy by burning it in one of three incinerators and generating steam from the heat. It operates 24 hours a day 365 day a year. 80 % of the trash that enters the facility is RDF produced by the material recycling facility. The material recycling facility and the EFW will close in March 2019 as the facility can no longer sell electricity at a price that will cover its costs. Prices have dropped due to low-cost natural gas and renewable energy.	N/A	Less than 2 percent of incoming waste is landfill disposed. 300,000 tons of metro area waste are diverted as RDF to the EFW annually. The material recycling facility recovers 200 million aluminum cans and 24 million pounds of steel annually.	N/A	N/A
Martin and Faribault Counties	33,634	N/A		524 /km2	3 C- 12C	N/A	N/A	reported at 10% of incoming MSW	Municipality provides collection services and public facilities.	Curbside recycling, drop-off recycling facilities, yard waste composting facilities, source separated organics collection (SSO), HHW	Facility previously had a composting operation but was phased out to make 100% RDF in 2012.	Traditional landfill	90% conversion of MSW to RDF	N/A	N/A
La Crosse, Wisconsin Buffalo, Trempealeau and La Crosse Houston and Wabasha county	336,000	N/A		396 /km2	3 - 13 C	N/A		Every 10 pounds of waste delivered, about 3.5 pounds end up in landfill. Calculated: 27,125 tons per year	County provides waste disposal and landfill related diversion services at the County Landfill including a public recycling drop-off area. Local municipalities in the County provide for collection and curbside diversion services.	N/A	Sanitary landfill, ash monofill, construction and demolition landfill, clean wood waste processing, and yard waste disposal. Landfill gas-to-energy. Municipality sends 73,000 tons/year of MSW to the Xcel facility.	French Island Landfill. Used for residual from RDF, demolition materials or foundry sand. Receives waste from a number of neighbouring municipalities. Collects LFG. 2 streams of waste managed at separate areas - MSW and C&D. Landfill separates shingles for recycling and wood waste for WTE facility, clean concrete and asphalt is accpeted for free and ground for use on local roads and highway projects.	The plant recycles nearly 1000 tons of ferrous and 250 tons of non-ferrous annually.	N/A	N/A
UNITED KINGDOM FACILITIES UTILIZING A THERMAL PROCESS															
Barnsley/ Doncaster/ Rotherham (BDR) Waste Partnership	641,000	350,000		1,900 /km^2	5C - 12C	340,000	N/A	N/A	Barnsley/Doncaster/Rotherham separately responsible for collection. BDR Waste Partnership responsible for processing.	Collection of garden waste year-round, plastic collection curbside along with other recyclables.	MBT plant and AD facility.	N/A	95% diversion from landfill. MBT - 2016 - 12.8% recycled from incoming MSW. 143,000 tpy RDF to EFW (2019, WIDP_infrastructure_list).	525	£750 million for a 25 year contract ($1.3 billion CAD). BDR partnership secured £77 million private financing ($133 million CAD).
Cambridgeshire	648,000	270,000		212 /km2	5C - 13C	330,000 tonnes (2017/18)	N/A	Reported to landfill 200,000 tpy.	Rubbish, recycling and food & garden waste collection through District Council Bin collection services. County Council is a waste disposal authority responsible for recycling centres, treating 'black bag rubbish', treating food and garden waste collected by District Councils, delivering P&E and environmental campaigns.	Asbestos collection and disposal service, household recycling centres	Site also includes a 60,000 tpy MRF to sort South Cambridgeshire recycling	PPC-permitted landfill	50% of waste received goes to landfill (~200,000 tpy).	460 kg collected household waste per person (2017/18)	2008 Cambridgeshire County Council signed a £730 m contract with Amey which included construction (~$1.27 billion CAD)
Milton Keynes Borough	248,800	108,000		3,679 /km2	5C - 13C	124,000 (2017/18)	N/A	96,300	Milton Keynes Council operates weekly waste and recycling collection. The Council contracts for processing and disposal services.	Collection of batteries, blue box collection of glass, bagged collection of single stream recyclables (excluding glass), green bin collection of food and garden waste, household waste recycling centres. Recycling rate of 54% and higher.	Household waste recycling centres (3), Milton Keynes Council Materials Recycling Facility, EnVar Composting facility	Sent to Advanced Thermal Treatment (ATT) to be transformed into energy. Only about 3% is sent to traditional landfill	Reports 95% of input material to MKWRP facility is diverted from landfill. MBT processes ~ 140K tonnes of residual waste and extracts 32K tonnes of organics for AD, EFW gasification plan processes up to 94K residual.	c. 460 kg collected household waste per person (2017/18)	N/A
Wakefield District Council	334,000	132,000		990 /km2	5C - 12C	150,000 (2017/18)	N/A	5% to landfill Calculated: ~6,000	Wakefield Council is responsible for waste and recycling collection, processing and disposal. Council contracts with Renewi for network of household waste recycling centres, transfer stations and bring sites.	Household waste recycling centers, bulky collection, brown recycling bin (single stream recycling), green recycling bin (food waste, food packaging, diapers), garden waste collection	Wakefield Council contracts with Renewi for network of (3) household waste recycling centres, transfer stations and bring sites. Organic fraction is treated with an autoclave prior to AD. Two facilities - Mixed dry recyclables sorting plant which processes 36,000 tpy of recycling and another for MSW which removes metals, plastic film, paper and plastics, and organics so that the final fraction meets the standards for RDF production.	N/A	95% diversion from landfill	N/A	Reported at £100 million ($173 million CAD) for waste plant as part of a 25 year £750 million ($1.3 billion CAD) private finance initiative.
West Lothian	340,000	155,000		719 /km2	0C - 17C	Not applicable - this is a merchant facility with MSW sourced from multiple Scottish Local Authorities	N/A	Not Available as of July 2020 - claims a 98% diversion rate from landfill	Note that this is a merchant facility with MSW sourced from multiple Scottish Local Authorities which are each be responsible for collection and management of waste from within their respective jurisdictions.	Jurisdictions that use this facility also provide other diversion infrastructure including recycling centres, blue bin collection of recyclable paper materials, brown bin collection of food and garden waste, green bin collection of recyclable containers.	Waste disposal and recycling centres (4). MRF processes 42 tph to produce 100K tpy RDF for the power plant and a SRF. A container sorting facility will treat 27k tpy of containers from dual stream collection. Power plant uses gasification - as of April 2020 was undergoing the last stage of the commissioning process. Site is gearing up to shred 42,000 tpy LYW to be used as AD feedstock.	Totals Not Available as of July 2020. The MRF will provide 100,000 tonnes of RDF per annum to EfW plant	98%	N/A - this is a merchant facility with MSW sourced from multiple Scottish Local Authorities	Reported at £111 million ($192 million CAD) to develop facility.

Region / Jurisdiction	Facility Grouping	Comments: Recommendation for Short-listing:	Comments: Rationale for why or why not jurisdiction utilizes thermal treatment.
CANADIAN FACILITIES UTILIZING A THERMAL PROCESS			
City of Edmonton, Alberta	MWPwRR,OR and RDFR plus Alternative Energy	**Comments:** The amount of total waste coming to the EWMC that is diverted from landfills in the past 5 years appears to be trending down. The City's highest reported diversion rate was in 2013 at 49.5 percent and the lowest in 2016 at 35.7 percent. This does not correlate with the reported diversion from the City's MWPwOR system. There has been increased scrutiny on the City's diversion and system performance, and proposed changes to the system including adding an AD processing component. **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, extent of completion of commissioning and progression to full commercial operation has yet to be verified. • Reasonably similar jurisdiction (although no SSO collection) • This is the only jurisdiction in Canada with a complete MWPwOR system including biofuel recovery. The lessons learned by the City related to MWPwOR could be helpful • Facility utilizes a thermal process	Reduce Alberta's GHG emissions, reduce need for food crops as feedstock for ethanol, and help Alberta lead the way in advanced biofuels. Continue to advance the innovation at the Edmonton Waste Management Centre and reduce reliance on external (private) landfills. Reduces GHGs, contributes to the goals of Edmonton's environment plan, helps meet the federal and provincial 5% renewable fuels standard. Expected to create jobs and contribute to local economy.
Municipality of the District of Chester, Nova Scotia	MWPwRDFR plus Alternative Energy	**Recommendation**: Do not include on Short-list **Rationale:** • Size < 100,000 tpy • Facility was being commissioned in 2019 • Performance of facility is unknown • Host jurisdiction is very rural with a small population • Facility utilizes a thermal process	Municipality traditionally used landfill but wanted to explore a thermal process to eventually eliminate landfilling.
U.S. FACILITIES UTILIZING A THERMAL PROCESS			
Montgomery, Alabama	MWPwRR,OR	**Comments:** IREP Facility ceased operation in 2015. Montgomery AL purchased the facility and converted it to a source separated MRF with RDF capabilities. It is in operation as of February 2019 **Recommendation:** do not include on Short-list **Rationale:** • Size > 100,000 tpy • Recent major upgrade with a shift from recycling and organics recovery to recycling and RDF recovery, therefore no longer addresses Toronto intent for organics recovery. • Facility processes mixed MSW. There are no source separation programs (recycling or organics) in effect in Montgomery. • Facility utilizes a thermal process	Facility operates as a dirty MRF. Municipality requires no sorting of waste by residents. Anticipates fuel product can be sold to cement plans, power plants and paper mills as fuel.
Babylon, NY	MWPwRR,OR	**Comments:** Facility can process both MSW and source separated recyclables where recyclables are diverted. Yard waste is composted **Recommendation:** Do not include on Short-list **Rationale:** • Size > 100,000 tpy • Old facility with no major upgrades over the last 10 years, currently operating • Smaller jurisdiction with a waste management system that is very dissimilar from Toronto including key parameters such as frequency of garbage collection, no SSO collection, and the overall diversion system • Facility utilizes a thermal process	Covanta manages 75% of MSW produced by households and businesses. Long term contract with Town of Babylon to 2035. Town provides dual stream recycling and manages residual at WTE facility.
Miami-Dade County and the cities of Aventura, Cutler Bay, Doral, Miami Gardens, Miami Lakes, Opa-locka, Palmetto Bay, Pinecrest and Sunny Isles Beach, FL	MWPwRR, RDFR	**Comments:** Preprocessing of input waste streams to size reduce and recover materials for use as RDF; metals recovered from the EFW ash **Recommendation:** Do not include on Short-list **Rationale:** • Size > 100,000 tpy • Newer facility, currently operating • Design of the preprocessing line at this EFW facility is focused on producing RDF for the EFW, not on recovery of materials for beneficial use. • No source separated organics collection program and organics are not recovered from MWP • Facility utilizes a thermal process	Miami-Dade County goal to reach recycling rate of 30%. Landfill capacity limited in Florida, while WTE counts as diversion in Florida. Statewide recycling goal of 75% by 2020.
Ames, IA Cambridge, Gilbert, Huxley, Kelley, Maxwell, McCallsburg, Nevada, Roland, Slater, Story City, Zearing, and unincorporated Story County.	MWPwRR, RDFR	**Comments:** Preprocessing of input wastes streams to size reduce and recover materials for use as RDF; metals recovered from the EFW ash **Recommendation:** Do not include on Short-list **Rationale:** • Size, operating at < 100,000 tpy • Newer facility, currently operating • Design of the preprocessing line at this EFW facility is focused on producing RDF for the EFW, not on recovery of materials for beneficial use. • No source separated organics collection program and organics are not recovered • Facility utilizes a thermal process	Was first full-scale WTE facility in the US. One of few to use RDF as a fuel for power plant which is permtted to burn up to 30% (by weight) of RDF. Processing challenges do not always permit this.
Perham, MN	MWPwRR, RDFR	**Comments:** Preprocessing of input wastes streams via MRF to recover recyclables, HHW, WEEE; no organics recovery; small facility **Recommendation:** Do not include on Short-list **Rationale:** • Size < 100,000 tpy • Newer facility, currently operating • Design of the facility is for processing waste from a small community that is very different demographically from the City of Toronto. • The Facility's processing capacity would be insufficient for the City's needs • Facility utilizes a thermal process	Landfills were filling up and the area would run out of disposal capacity. Generates steam which can displace fossil fuel use by local industries.
Red Wing, MN	MWPwRR, RDFR	**Comments:** Preprocessing of input wastes streams via MRF to recover metal recyclables; no organics recovery; small facility **Recommendation:** Do not include on Short-list **Rationale:** • Size < 100,000 tpy • Newer facility, currently operating • No source separated organics collection program and organics are not recovered from MWP. • Design of the facility is for processing waste from a small community that is very different demographically from the City of Toronto. The Facility's processing capacity would be insufficient for the City's needs. • No source separated organics collection program and organics are not recovered • Facility utilizes a thermal process	Facility was originally built as a coal-fired generating station in the '40s but converted to burn RDF in 1986. RDF shipped off-site to a facility in Newport for power generation. City is looking to phase out landfills as part of sustainability efforts.
Palm Beach County, FL	MWPwRR, RDFR	**Recommendation:** Do not include on Short-list **Rationale:** • Is licensed to process > 100,000 tpy • REF 1 is older but still operating, REF 1 produces RDF for EFW with no organics recovery and new REF 2 does not have any MSW pre-processing. • Larger urban area generally similar to Toronto, does not provide SSO collection • Facility utilizes a thermal process	Limited landfill capacity. Longer term commitment to sustainability through water conservation, energy recovery, GHG reduction. Current SWA analysis indicates costs of REF2 are about the same as landfilling @ $25/ton and excludes problems and costs of landfilling in the future.
Newport, MN Hennepin, Ramsey and Washington Counties	MWPwRR, RDFR	**Recommendation:** Do not include on Short-list **Rationale:** • Is licensed to process > 100,000 tpy • Old facility, still operating • Does not recover organic fraction (although are planning to do so in the future) • Larger urban area generally similar to Toronto, however does not have SSO collection and private collection/diversion services not expected to provide same diversion service level as Toronto. • Facility utilizes a thermal process	2018/2019 - in negotiations with Enerkem, but Enerkem lost a major funder in early 2019 and it was recommended negotiations be terminated so other technologies can be pursued for RDF. View waste as a resource and want to add value to the local economy and environment. Have a plan to expand through AD development, explore gasification/alternate technologies, diversify markets for RDF through conversion technology. Planning on rolling out a curbside SSO program in 2022 using durable collection bags which will be co-collected with trash and sorted out at the R&E center. They estimate by 2027, about 30,000 tpy of organics will be separated from trash.
CLOSED Elk River, MN Sherburne County	MWPwRR, RDFR	**Recommendation:** Do not include on Short-list **Rationale:** • Is licensed to process > 100,000 tpy • Material recycling facility does not recover organic fraction • County is a smaller urban area dissimilar from Toronto • Facility is closed and being decommissioned	Not Available as of July 2020
Martin and Faribault Counties	MWPwRR, RDFR	**Recommendation:** Do not include on Short-list **Rationale:** • Facility processes < 100,000 tpy • Old facility, still operating • Does not recover organic fraction • Smaller urban area dissimilar from Toronto • Facility utilizes a thermal process	Infrastructure to process RDF was already in place. The Minnesota Pollution Control Agency (MPCA) requires all counties to assess the feasibility of resource recovery when completing solid waste management plans. State law requires that Greater Minnesota counties consider and, where feasible and prudent, implement programs to process mixed municipal solid waste by solid waste composting, incineration or other mixed waste processing techniques.
La Crosse, Wisconsin Buffalo, Trempealeau and La Crosse Houston and Wabasha county	MWPwRR, RDFR	**Recommendation:** Do not include on Short-list **Rationale:** • Facility processes < 100,000 tpy • Old facility, still operating • Smaller less-urban area dissimilar from Toronto, does not have SSO collection • Facility utilizes a thermal process - MWP used to generate RDF for WTE facility • Does not recover organic fraction	In the 80s, landfill was filling and locals wanted more recycling to preserve capacity. State was not willing to mandate recycling. WTE was an alternative that had less consumption of landfill, and provided beneficial energy production. Local municipalities shared energy credits.
UNITED KINGDOM FACILITIES UTILIZING A THERMAL PROCESS			
Barnsley/ Doncaster/ Rotherham (BDR) Waste Partnership	MWPwRR, OR, RDFR	**Comments:** Developed as part of PFI contract with the Barnsley/Doncaster/Rotherham (BDR) waste partnership. It was the first in the UK to combine a Mechanical Biological Treatment (MBT) plant and a dry Anaerobic (AD) plant. Reported that the facility was accepting waste from February 2015, and has been fully operational as of July 2015. **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto), but does not have an SSO collection program • The facility recovers the organic fraction for dry AD processing to recover biogas • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive.
Cambridgeshire	MWPwRR, RDFR	**Comments:** Biodrying - TAIM WESER supplied the new machinery for the biological treatment of the plant with its renowned and reliable system, Rotopala, which consists of a fully automated system to decompose and stabilize the organic fraction of the waste in order to obtain an output product with significantly lowered biodegradable content (BMW diversion) which can be landfilled without any post-treatment by further refining or curing, contributing to reduction as required by the EU- Landfill Directive, or can be used elsewhere as RDF in thermal treatment facilities. The retooling of the facility was required due to a fire in 2013 and mechanical failures of the processing equipment. **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto) which does offer a food waste collection program • The primary reason to include on the short-list even though the facility does not recover any organics for separate processing is that the input waste stream may be more similar to Toronto's and as they use some unique approaches to remove inerts post biological processing • Facility does not utilize a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste disposal in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Originally the local authority was not supportive of EFW and MBT was expected to reduce tonnage and biodegradability. In 2016, the contract was reviewed to identify cost savings and in 2017 Amey announced plans to develop a large scale EFW on same site. To-date proposals for a £200 m EFW (230-250K tpy), have been rejected by County Council and by the Housing Secretary (June 2020). Amey landfill reported to be at capacity in the next 10-15 years. In 2019, Amey was fined for sending too much biodegradable material to landfill (exceeded by 29%). Damage from a storm to the MBT was offered as a reason for the overage. Amey was subject to half a million pounds fine.
Milton Keynes Borough	MWPwRR, OR, plus Alternative Energy	**Comments:** Identified as strategic site to meet needs of Milton Keynes 2026 Waste Development Plan. Co-located with ATT facility. **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto) does collect and divert food waste • Facility recovers the organic fraction from residential residual waste and directs it to dry AD for processing • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Council has a no mass burn policy and has a 70% recycling target by 2024/5.
Wakefield District Council	MWPwRR, RDFR	**Comments:** MHT facility developed as part of PFI contract with Wakefield Council. **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Services larger urban jurisdiction (somewhat comparable to Toronto) which does collect and divert food waste • Facility does not recover the organic fraction from mixed waste which is 'heat treated' (stabilized), but does recover a broad range of other recyclable materials • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. RDF is designed for use at a power station located in West Yorkshire. Part of South Wakefield's waste strategy.
West Lothian	MWPwRR, RDFR	**Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating. • Services larger urban jurisdictions (somewhat comparable to Toronto) some of which do collect and divert food waste • Facility does not recover the organic fraction from mixed waste, but does recover a broad range of other recyclable materials. • Facility produces SRF/RDF. Thermal treatment facility (ATT) is currently undergoing commissioning.	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Power plant located next door to processing facilities. Scotland has a municipal waste landfill ban in 2021. This facility will help local authorities and commercial waste producers to meet the requirements of the ban. Scotland also has a zero waste plan - of which the landfill ban is a part. Thermal Treatment of Waste Guidelines form part of the National Waste Management Plan and set out the approach for permitting thermal treatment facilities.

City of Toronto Mixed Waste Processing Study

General MWP Facility Information

Region / Jurisdiction	Use of Thermal Process	Owner / Operator	Facility Name	Location of Facility	Country	Year Commissioned	Current Status	Input Material Stream(s) (MSW, other)	Sources (Residential, Industrial, Commercial, Institutional)	General Technologies Applied (mechanical sorting, biological treatment, fuel production, thermal treatment)	Branded Technology (if applicable)	Technology Provider (if applicable)	Products	Facility Design Tonnes (TPY)	Current Tonnes Managed (TPY)	Process
Glasgow City Council	Yes - prod'n of RDF for onsite use	Viridor (Glasgow) Ltd	GRRECC (Glasgow Recycling & Renewable Energy Centre)	Polmadie, Glasgow	Scotland, UK	2018/19	Fully operational	MSW	Residential	Mechanical Pre-treatment (shredders, screens, overband, eddy current, NIR) Gasification AD Advanced Conversion Facility (ACF) which heats RDF creating gas to generate power	Mechanical Pre-treatment - Bezner BTA - Hydro mechanical pre-treatment Gasification - Energos (now defunct) AD - Enpure (now defunct)	Interserve acting as Engineering Procurement Construction Contractor. Reportedly dismissed in 2016 and Doosan Babcock hired to finish project.	Recyclables (ferrous non-ferrous and plastics, recyclable paper and card), Biogas, Refuse Derived Fuel (RDF)	200,000	200,000	Waste received, bags split open, magnets remove metals. Materials go through trommels - larger materials go through MRF, smaller materials (food and organic materials) are prepared for AD. Residuals from both stages (as RDF) go to advanced conversion facility (ACF) to produce a syngas.
West Sussex County	Yes - prod'n of RDF for offsite use	Biffa	Brookhurst Wood	West Sussex, UK	United Kingdom	2014	Operational	Black Bag' household waste, commercial waste and mixed waste from 11 household waste recycling sites from West Sussex	Residential, Commercial	Shredding: Mechanical sorting to remove inerts, separate organic stream and recyclable metals; remaining stream directed to RDF; organic stream directed to wet AD.	N/A	Eggersmann	Recyclable metals, RDF (concerns about viability of local markets for RDF), Biogas & Digestate (used for ADC).	310,000	190,000	Materials are shredded and biodegradable waste separated from other recyclable materials. Metals are extracted and the remaining materials (mostly paper and plastic) are used to produce RDF. Organic material goes to AD to produce biogas which is used to generate renewable energy in a CHP and digestate is used as alternative daily cover (ADC) at Brookhurst Wood landfill.
City of Leicester	Yes - prod'n of SRF for offsite use	Biffa, under contract with the City of Leicester	Leicester Recycling Centre	Hoods Close, Leicester, UK	United Kingdom	Pre-2009	Operational	MSW	black bag' household waste	Mechanical Processing (Bag Splitter (2), Trommel (-100 mm and +100 mm, -40 m and 40 - 80 mm), Magnets, Air Sifter, Ball Mill, Eddy Current, Flip Flow Screen, Baler). Organic fraction send to Wanlip AD facility. Large fraction shredded to produce SRF and baled. Fines sent to disposal.	N/A	N/A	Recyclable metals, SRF (light materials extracted by air streams and called FLOC), RDF, Food/garden fraction sent to AD facility	150,000	100,000 tonnes mixed municipal waste reported to have been received at Bursom in 2017 (WDI 2017)	Waste is fed into a bag splitter, fed into a trommel for separation into <100mm and 100mm+. 100mm+ materials have recyclable materials removed using magnets, air sifters, eddy currents etc. <100 mm waste goes into a ball mill to pulverize materials, waste is then fed into another trommel (<40mm, and 40-80mm). <40 mm materials go through magnets and to a flip flow screen to separate out <5 mm (goes to air sifter and either is organic material which goes to AD at Wanlip) or for RDF. RDF is comprised of all residual materials and is used as an alternative to fossil fuels in cement kilns.
Leeds Metropolitan Borough Council	Yes - prod'n of RDF for onsite use	Veolia	Recycling and Energy Recovery Facility	Leeds, UK	United Kingdom	2016	Operational	MSW	Residential	Shredders Ballistic separators magnets eddy current separators NIR optical sorters baler facility air treatment	N/A	Waste Treatment Technologies	Recyclables (PET & HDPE, mixed plastics, ferrous, non-ferrous), RDF	214,000	180,000 tonnes of mixed municipal waste reported to have been received at Leeds Recycling and Energy Recovery Facility in 2017 (WDI 2017)	In the Mechanical Pre-Treatment (MPT) process garbage is shredded and then sorted to extract recyclable material. Plastics, paper/ cardboard, ferrous and non-ferrous metals are extracted using different types of automated technology. Residuals are made into RDF for combustion.
East London Waste Authority (ELWA)	Yes - prod'n of RDF/SRF for offsite use	Renewi (formerly Shanks)	Frog Island	Rainham, UK	United Kingdom	Pre-2009	Operational	Household Waste and Recyclable Materials (Primarily from Barking & Dagenham and Havering)	Primarily Residential	Shredding, Biodrying, Mechanical Sorting of dried material	Ecodeco biodrying technology	a2a	RDF, SRF, Recyclables. Outputs shipped to European Markets.	180,000	106,668 (2018/19)	Waste is received at the MBT plants and shredded. The biodegradable component is placed under temperature controlled conditions to dry and stabilize the waste and to produce a compost-like output. Metals and glass are then removed at a MRF. The residual material is used for RDF or SRF depending on the composition and size of materials which is shipped to an EFW plant in Europe (Netherlands).
	Yes - prod'n of RDF/SRF for offsite use		Jenkins Lane	Barking, UK				Household Waste and Recyclable Materials (Primary from Newham and Redbridge).						180,000	152, 523 (2018/19)	
Southwark	Yes - prod'n of RDF for offsite use	Veolia, 25-year contract with Southwark Council	Old Kent Road	Southwark, UK	United Kingdom	2012	Operational	Recycling (directed to MRF facility), MSW to MBT, Public waste accepted at public Reuse and Recycling Centre	Residential	Shredding: Mechanical sorting to remove recyclable metals and fibre; Bio-drying of remaining RDF fraction using aerobic composting tunnels	N/A	WTT	Recyclable metals and fibre, RDF (sent to Veolia SELCHP facility)	87,500	166,000 tonnes of untreated mixed municipal waste received at the site in 2017.	Source separated materials processed at MRF. Garbage is shredded and goes through a shredder and separated into <80mm and >80mm. Metals and glass removed from the larger fraction through mechanical treatment. Smaller fraction needs to be dried before it can be mechanically sorted. For the biological process, materials are loaded into tunnels, the materials are biodried and SRF is produced from the mechanically sorted dried materials.
Wrexham County Borough	Yes - prod'n of RDF for offsite use	FCC (formerly WRG), PFI Contract with Wrexham County Borough Council	Wrexham MBT facility (adjacent to Wrexham Eco Recycling Park)	Wrexham, UK	United Kingdom	2015 (MBT)	Operational	MSW	Largely Residential, small quantities of construction and industrial waste	Mechanical sorting (shredder, screening, ballistic separator, ferrous and non-ferrous separator, NIR devices); Biological stabilization (bio-drying) of RDF fraction in 5 aerobic tunnels	N/A	Eggersmann	Recyclables (plastic, paper, cardboard, wood, textiles); RDF, marketed to Ferrybridge Multifuel Energy Ltd for use at EfW facility developed in West Yorkshire	120,000 (although Eggersman reports throughput of MBT as 50,000, 33,500 tpy HHD waste and 16,500 tpy commercial)	36,000	MSW is sorted through a mechanical process to recover recyclables. The remainder goes to the biological treatment process where waste is transferred to bio-drying tunnels. Aerobic composting is used to remove excess moisture and prepare waste for conversion to SRF. Through a refinement process, aggregates are removed for further recycling and SRF is produced to a designated specification according to the end-user.
Essex County Council, Southend on Sea Council	Yes - prod'n of RDF for offsite use	Urbaser	Essex MBT plant, Courtauld Road	Essex, UK	United Kingdom	Commission period from 2014 to 2017	Current contractual disputes regarding issues that occurred during the commissioning phase. Plant still in testing phase, 3 years past-due to be up-and-running. It is unclear if fully operational yet (2020).	MSW	Residential residual waste, commercial waste, street sweepings, non-recyclable waste from household recycling centres	Mechanical sorting; biological stabilization (bio-drying) using 3 fully automated windrow composting lines (turned by stack turning machines supplied by ROTOPALA)	N/A	Bianna / Taim Weser	Recyclables, stabilized material that can be landfilled or used as RDF	375,000 (or 417,000 pending the report cited)	274,000	Waste goes through manual sorting station, then through trommels, ballistic separators and other mechanical separation. Remaining waste goes to biological processing (composting) and refining to generate stabilized organic material for landfill or SRF and aggregates.
Falkirk Council	Yes - prod'n of RDF for offsite use	Avondale Environmental	Falkirk Mechanical Biological Treatment (MBT)	Falkirk, UK	United Kingdom	Pre-2009	Facility ceased operations in 2013. Reports stated that facility would re-open 2018/2019 with contracts in place with 3 to 4 Scottish Local Authorities, however, no new reports indicate that the facility has re-opened.	N/A	N/A	N/A	ArrowBio process: water-based mechanical-biological treatment for solid waste, which includes AD stages	Stadler	Original intent to recover recyclables, biogas and RDF. Facility not operational.	200,000	0	N/A
Newcastle upon Tyne	Yes - prod'n of RDF for offsite use	Suez (formerly SITA)	Byker MBT	Newcastle upon Tyne, UK	United Kingdom	Pre-2009	Operational	MSW	Residential 'black bag' residual waste	Mechanical separation (shredding, trommel screens, air classifier, magnetic separation, secondary shredder); RDF fraction recovered and marketed (pelletizer for RDF)	N/A	N/A	Recyclable metals, RDF	120,000	120,000 tonnes mixed municipal waste reported to have been received at Byker in 2017 (WDI 2017)	Recyclable materials (primarily metals) extracted, remaining waste made into RDF and goes to EFW plant in Teesside, or shipped to Sweden to CHP plant, non-processible waste landfilled.
Derbyshire County Council and Derby City Council	Yes - prod'n of RDF for onsite use	Renewi (formerly Shanks)	Waste Treatment Facility	Sinfin Lane, Derby	UK	2018	June 2019 protests occurred calling for the permanent closure of the facility due to odours and environmental pollutants. Facility struggled to meet certified performance tests. Facility has been closed.	MSW	Residential	Mechanical Pre-treatment - Okay Engineering (shredders, screens, overband, eddy current, NIR) MBT - Entsorga (biodrying) Energos - Gasification	Mechanical Pre-treatment - Okay Engineering(shredders, screens, overband, eddy current , NIR. MBT - Entsorga Energos - gasification	Interserve was acting as Engineering Procurement Construction Contractor but contract was terminated in 2019.	Recyclables (ferrous, non-ferrous and plastics), RDF	190,000	150,000	N/A
EUROPEAN FACILITIES UTILIZING A THERMAL PROCESS																
Barcelona AMB (Area Metropolitana de Barcelona)	Yes - prod'n of RDF for onsite use	TERSA & Urbaser	Sant Adria de Besòs, Barcelona (Ecoparc II)	Carretera Planta Incineradora Sant Adrià de Besòs	Spain	2006	Operational	MSW	Residential	Mechanical treatment to recover recyclables (trommels, ballistic separators, magnetic separators, plastic film separators, auto sorters and induction separators), biological treatment of organic fraction via wet AD (2 digesters). Remaining refuse is used at RDF at the on-site WtE plant.	N/A	Urbaser	Recyclables, Biogas, Power	260,000	246,375	Organic waste from source separated collection and residual waste both undergo pretreatment, though in separate lines: one for organic waste from source separated collection and two for residual waste. The plant also has a transfer line if needed. Incoming residual waste material undergoes pretreatment with trommels and ballistic separators, magnets, etc and may go through rotatry biostabilizers to disintegrate paper and cardboard to facilitate composting. One of the goals of Ecoparc de Barcelona is to use organic matter from selective collection for the production of biogas through the methanization process.Some organic material separated during pretreatment goes to pulpers, and is anaerobically digested. Digestate and some other material from pretreatment is composted.
Barcelona AMB (Area Metropolitana de Barcelona)	Yes - prod'n of RDF/SRF for off-site use	Ferrovial Servicios	Ecopark 4, Hostalets de Pierola	Barcelona	Spain	2010	Operational	MSW and Organic (selective collection)	This installation receives municipal waste from several municipalities in the metropolitan area of Barcelona and the south-east of the Anoia region.	Mechanical sorting to separate remainder fraction and organic fraction. Remainder fraction feeds into three pre-treatment streams for recovery of recyclables and RDF. Organics fraction is composted/bio-dried to produce SRF. Organics from selective collection are processed via AD. Equipment includes: 3 Waste feeders, 1 Organic feeder, 1 Vegetable Fraction feeder Screening Drum Hand Picking Bag opener (4) Ballistic separators (10) OS_NIR Magnets	Stadler (mechanical Treatment) Sorain Cecchini (Biological treatment) AirClean (Air Treatment) TOMRA AUTOSORT optical separators	TOMRA for the Mechanical Treatment	RDF production from 2D fraction, recyclables (metals, plastic, paper, board, glass)	360,000 (285,000 MSW) (some reports indicate 75K biowaste and 300K MSW)	286,000 MSW (2018)	Incoming material undergoes pretreatment with trommels and ballistic separators, magnets, etc and may go through rotatry biostabilizers to disintegrate paper and cardboard to facilitate composting. Some organic material separated during pretreatment goes to pulpers, and is anaerobically digested. Digestate and some other material from pretreatment is composted.
Montpellier Mediterranee Metropole	Yes - prod'n of RDF/SRF for offsite use	Suez	Montpellier, France	Ametyst	France	2008	latest date of research material states Operational in 2015	Organic fraction of MSW, biowaste	Primarily residential	4 x PF1300-2 concrete/steel digesters to process organic fraction from MSW, dewatering system, aerobic composting plant for digestate (tunnels, covered windrows), odour management system	Pre-composting BRS® system AD - HZI/ Kompogas Maturation in ECOSILO® tunnels	Waste sorting and preparation in a pre-composting BRS® system AD - HZI/ Kompogas, Maturation in ECOSILO® tunnels	Biogas, Composted digestate, Recyclable metals	>100,000	128,056 (2018) MSW	Incoming waste materials go through trommels - non-organic fraction - >350 mm and 80-350 mm are incinerated. After prefermentation step, 20-80mm non-organic materials go through screening to remove recyclables (metals) and become SRF for cement plants. Organics are sent to AD and the digestate is then aerobically composted. Biogas used to generate heat and electricity.

Demographic Information

Region / Jurisdiction	Population Served	Number of SFD	Number of MFD	Population Density	General Climate Information (avg. min & max temperature, precipitation)
Glasgow City Council	596,000 (2020)	292,619		3,400 pple/km2	avg annual temp 8.5 C / rainfall 1,171 mm in a year
West Sussex County	836,000	332,000 HHDs, over 80% SFD		428 /km2	5C - 13C
City of Leicester	330,000	123,000		4,494 /km2	6C - 12C
Leeds Metropolitan Borough Council	475,000	346,000		4,4066 /km2	5C - 12C
East London Waste Authority (ELWA) – Frog Island	487,000	approx. 400,000 HHDs		2300 to 5800/km²	4C - 8C
East London Waste Authority (ELWA) – Jenkins Lane	678,000	approx. 225,000 HHDs		5400 to 9600 //km2	5C - 13C
Southwark	313,000	120,400		10,890 /km2	5C - 13C
Wrexham County Borough	135,000	60,000		269 /km2	6C - 12C
Essex County Council, Southend on Sea Council	1.443 million	581,000		423.8 /km2	5C - 13C
Falkirk Council	158,000	71,000	N/A	532/km2	8.4C and 938 mm
Newcastle upon Tyne	295,000	129,000		2,600 /km2	6C - 12C
Derbyshire County Council and Derby City Council	Derbyshire - 802,700 Derby 12,515	347,200 (Derbyshire) 104,123 (Derby)		3,082/km2 (derby)	N/A
Barcelona AMB (Area Metropolitana de Barcelona) – Ecoparc II	portion of 3.2 million (600,000)	700,000	Multi-households represent 2.9% of the total number of homes in the city. the city has a total of 727,356 homes.	15,926 /km2 (Barcelona), 1,250 /km2 over metropolitan area	16.4C and 606 mm
Barcelona AMB (Area Metropolitana de Barcelona) – Ecopark 4	12% of 3.2 million	700,000	Multi-households represent 2.9% of the total number of homes in the city. the city has a total of 727,356 homes.	15,926 /km2 (Barcelona), 1,250 /km2 over metropolitan area (have also seen 5.073/km2)	15C - 21C
Montpellier Mediterranee Metropole	275,000 (also saw 430,000)	N/A	N/A	4,800 /km2	8C - 18C

Brief Overview, Municipal Waste Program Information

Region / Jurisdiction	MSW Tonnes Generated - Residential	MSW Tonnes Generated - Other (Commercial etc.)	MSW Tonnes Disposed	Jurisdictions Responsible for service provision (collection, diversion, disposal)	Brief Summary of Current Waste Diversion Programs (recycling, source separated food scrap/organics collection, LYW, other)	Other Processing Infrastructure Used (MRF, Composting, AD, EFW etc.)	Residual Disposal Methodology (e.g. Traditional Landfill, Biocell, Bioreactor, etc.)	Reported Diversion from MWP(wOR)	Per Capita Waste Generation Rate (kg/capita) (Household Waste)	Reported Pricing	Facility Grouping	Comments: Recommendation for Short-listing:	Comments: Rationale for why or why not jurisdiction utilizes thermal treatment.
Glasgow City Council	224,525 (2017)	N/A	Glasgow households landfilled 150,943 tonnes (2017); Facility residual disposal unavailable	Glasgow City Council	Curbside collection of: Mixed dry recycling (papers, cardboard, plastic bottles, food & drinks cans) Glass (bottles and jars) - collection is by under contract by a private sector waste management company. Garden waste collection (fortnightly) Food waste collection (weekly) Residual (fortnightly) Household Waste Recycling Centres x four Recycling Points - over 650 across the city for the collection of mixed dry recyclables as well as textiles. Bulky waste collection - for ad hoc collection of items from households	MRF - for mixed dry recyclables Landfill - residual waste Anaerobic digestion - food waste 4 x household waste recycling centres Composting - green waste (yard waste) Advanced Conversion Facility	N/A	reported to divert 90% of residual waste away from landfill	N/A	Reported costs range from £154 to £254 million ($267 - $440 million CAD), with the upper limit reached due to technical issues.	MWPw RR, OR RDFR plus Alternative Energy	**Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Services a larger urban area (generally similar to Toronto), that provides SSO collection. • Facility recovers the organic fraction of MSW for separate AD processing • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Scotland has a municipal waste landfill ban in 2021. This facility will help local authorities and commercial waste producers to meet the requirements of the ban. Scotland also has a zero waste plan - of which the landfill ban is a part. Thermal Treatment of Waste Guidelines form part of the National Waste Management Plan and set out the approach for permitting thermal treatment facilities.
West Sussex County	447,000 (2015)	706,000 tonnes IC&I waste, 1,060,000 tonnes of C&D waste (2015)	Not Available as of July 2020. In 2016, it was reported that RDF was being landfilled due to the inability of the municipality (not the operator) to find an outlet. In 2017, West Sussex secured a long term deal to supply RDF to a major European buyer - RDF will be shipped to EFW plants in Holland and Germany	Rubbish and recycling collection through District and borough Councils. West Sussex Council is the Waste Disposal Authority responsible for processing and disposal.	11 household waste recycling sites accept bulky household waste and garden refuse, provision of subsidized compost bins, promotion of waste reduction & reuse initiatives, Materials Recycling Management Facility (MRF).	11 Household Waste Recycling Sites, MRF	Traditional landfill - Brookhurst Wood, Biffa's landfill site.	Designed to divert over 75% of incoming material stream from landfill.	535	25 year contract @ £1 Billion ($1.74 billion CAD). West Sussex is spending another £7.7 million ($13.4 million CAD) to expand the MBT plan to allow for more waste to be processed on-site.	MWPwRR, OR, RDFR plus Alternative Energy	**Comments:** Mechanical treatment with organics recovery through wet AD. German MBT and AD specialists Haase and Eggersmann are understood to have provided the technology for the plant, while German-based engineering firm M&W was handed the EPC contract for the project. The biodegradable fraction of waste that is mechanically sorted is treated using AD, producing a biogas that is used to generate renewable energy. The mechanical sorting plant also produces RDF with the Council finding a market for the fuel – either sending it to a third party recovery outlet in Europe or to a domestic thermal treatment facility. Understood to be operational, albeit functioning well under capacity due to technology issues. **Recommendation**: Short-list **Rationale**: • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • More rural jurisdiction that does not have an SSO collection program • Organic fraction of MSW is recovered and directed to AD • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. The original intent was that an EFW facility would be developed close to the facility and use the heat generated to heat luxury homes to be built nearby. The project never got off the ground. West Sussex had to find another outlet for the RDF and faced less favourable conditions for RDF with competition from other European countries, reduced demand for material and higher incinerator tip fees. The UK's future trading relationship with the EU could impact exports of RDF to Europe.
City of Leicester	174,000	N/A	Claims 70% diversion from landfill.	City is responsible for: collection of waste, recyclables, bulky item collection, garden waste service and operation of 2 recycling centres.	City provides for single stream recycling collection, provides for trial collection of electrical waste and battery recycling, bulky item collection, garden waste collection through subscription, recycling centres and provides reduction & reuse P&E.	2 residential recycling centres, one trade waste facility.	N/A	landfill diversion rate of more than 80%	526	2002 - £30 million for facility ($52 million CAD) as part of a £300 ($520 million CAD) 25 year contract to manage collection, recycling and disposal of Leicester's waste.	MWPwRR, OR, RDFR plus Alternative Energy	**Comments:** Mechanical waste treatment plant at Hoods Close, Leicester based on ball-mill technology is used to process the "black-bag" household waste collected within the City of Leicester. The waste is subject to initial size reduction via a slow speed shredder, which also opens the bags so that the waste then becomes accessible to subsequent stages in the process, and increases the density of the waste prior to input into the ball-mill. The ball-mill rotates at a speed of about 30 to 40 revolutions per minute and steel balls inside shreds and tears the waste to homogenize the material. The prepared waste is then screened through a 13mm trommel screen to extract food and other small particles of organic waste (which are sent to Wanlip AD facility), metals are removed, and the majority of the remaining material is shredded to produce a solid recovered fuel. The remaining material comprising grit, soil, glass etc. is sent to landfill. The plant has a capacity of 150,000 tonnes per annum and achieves a landfill diversion rate of more than 80%. **Recommendation**: do not include on Short-list **Rationale**: • Size > 100,000 tpy • Older infrastructure but currently operating • Larger urban jurisdiction (somewhat comparable to Toronto) which does not have an SSO collection program, however organic fraction of MSW is recovered and directed to AD • This is an older facility and there are more recently developed facilities that recover similar materials, and also run by the same operator • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6 the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Leicester was Britain's first "environment city" in 1990 and has continued with sustainablity goals.
Leeds Metropolitan Borough Council	315,000 (2017/18)	20,000 tonnes local authority collected commercial waste (2017/18)	N/A	Leeds MBC is responsible for waste and recycling collection, processing and disposal. Council provides network of 8 household waste recycling centres and contracts with Veolia for the treatment and disposal of residual MSW.	8 household waste recycling centres, bulky waste collection, green bin (mixed dry recyclables), brown bin (garden waste), and separate food waste bin. There is also a network of smaller recycling sites found in supermarket and pub car parks (for paper, glass, cans, plastic bottles and textiles).	8 household waste recycling centres and dry recyclables are processed separately by another contractor (HW Martin / Associated Waste Management). 2020 - facility has started delivering low carbon heat to homes Adjacent to RERF is the Veolia Paper Pulp Facility which will further process and clean the paper and card removed from household waste. Steam from the turbine will be used to dry out the fibre material to produce Veolia's Pro-Fibre product which can be used to make new products.	Leeds Energy Recovery Plant Incinerator	10% of residual waste recovered for recycling with the remainder turned into RDF and treated at the adjacent energy recovery facility. Claims 99% of non-recyclable waste is converted to green energy.	399 kg collected household waste per person (2017/18)	2016 Reported contract value of £555 million ($963 million CAD) to build and run facility for 25 years. Operating reported at £200 million ($347 million CAD), less than what Leeds would've paid in Landfill taxes. Facility cost £140 million ($243 million CAD) to build.	MWPwRR, RDFR	**Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Services larger urban jurisdiction (somewhat comparable to Toronto) which does collect and divert food waste • Facility does not recover the organic fraction from mixed waste, but does recover a broad range of other recyclable materials • Unique process to provide paper feedstock to an adjacent facility for processing into a paper fibre product	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled In 2005/6. The UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Facility supports Leeds goal of becoming a Zero Waste City. Leeds recently (2020) granted funding to extend a recently completed heat network into the city centre to deliver low carbon heat from the RERF to 5 council bldgs and will allow expansion in the future.
East London Waste Authority (ELWA) – Frog Island	205,000	N/A	Contractual target is 67% diversion from landfill, but Renewi reports is currently 99% and expects to maintain this rate in the future.	Barking & Dagenham and Havering Boroughs are responsible for collection services. ELWA is responsible for transport, disposal and processing services.	19% Recycling Rate (Barking and Dagenham), 32% Havering	Reuse and Recycling Centre	Not Available as of July 2020. Have some contingency landfill.	45% contracted landfill diversion target. 2019/2020-reported at 99% diversion. Contractual diversion from landfill rate is 67%. Contractual recycling target is 33% of household recycling. 2018/19 rate is 27%.	410-440	25 year PFI contract. Compensation based on a rate per tonne for all material rec'd from 4 councils, rate per tonne dependent on rate of recycling and diversion from landfill, and a contribution towards the maintenance of major assets owned by the contract (life cycle). Overall capital cost reported as £100 million (2007) ($173 million CAD) for facilities.	MWPwRR, RDFR	**Comments:** Developed as part of contract with ELWA. Treatment technology involves biodrying and it is understood that outputs are currently predominantly shipped to European markets. **Recommendation**: Short-list **Rationale**: • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto), that does not have an SSO collection program • The facility does not recover any organics for separate processing, • Facility utilizes a thermal process - applies composting/bio drying technology to produce RDF.	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. 2019/2020 - Renewi has contracts with EFW facilities in the Netherlands which process the majority of RDF. Some material may be sent to Scandanavia as well. On January 1, 2020, an RDF import tax was implemented in the Netherlands which may cause contracts to be reviewed. Similar taxes may be introduced in Sweden (used to have an incineration tax from 2006-2010). They could be as high as €32/tonne ($50/tonne CAD) Renewi is responsible for all processing and disposal costs associated with waste generated. Renewi bears all the risk and reward of a material price change in market rates for the disposal of materials. Renewi reports they have been for a number of years, and are still in a loss making position on the ELWA PFI contract.
East London Waste Authority (ELWA) – Jenkins Lane	240,000	N/A		Newham and Redbridge Boroughs are responsible for collection services. ELWA is responsible for transport, disposal and processing services.	15% Recycling Rate (Newham), 28% Redbridge	Reuse and Recycling Centre			350-360			**Comments:** Developed as part of contract with ELWA. Treatment technology involves biodrying and it is understood that outputs are currently predominantly shipped to European markets. **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Older infrastructure >10 years, currently operating. • Larger urban jurisdictions (somewhat comparable to Toronto), that do not have SSO collection programs • The facility does not recover any organics for separate processing, • Facility utilizes a thermal process - applies composting/bio drying technology to produce RDF.	
Southwark	120,000	150,000	N/A	Rubbish and recycling collection through the Southwark Borough Council. Council has contracted for processing and disposal capacity at the Old Kent Road IWM facility. Veolia provides food and garden waste collection service, WEEE banks, mobile recycling centre and bulky waste collection.	Borough provides recycling collection service. Old Kent Road MRF processes all residential recyclables collected in the borough. Also has a public recycling and reuse centre.	MRF, public recycling and reuse centre	Solid Recovered Fuel for incineration is sent to the South East London Combined Heat and Power Plant (SELCHP)	When developed, it was envisaged that the facility would help to reduce the waste sent by the borough to landfill by 85% from 2008 to 2013. The 87ktpa MBT facility was to recover 10% of residual waste for recycling with the remainder turned into a SRF and treated off-site for use in energy generation.	385	2008 - £660 million 25 year PFI contract ($1.15 billion CAD) to undertake all waste and recycling collection, treatment and disposal.	MWPwRR, RDFR	**Comments:** The technology uses a combination of mechanical and biological processes to sort the waste. The mechanical element includes an automatic segregation system to separate recyclable materials such as metals and fibre from the mixed waste. The biological element removes moisture from the waste, and helps produce a homogenous consistent fuel. **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto), but does not have an SSO collection program • The facility does not recover any organics for separate processing • Facility utilizes a thermal process - applies composting/bio drying technology to produce RDF. • RDF used as a fuel to provide low carbon heat	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Low carbon heat provided to about 3,000 hhlds through SELCHP as part of council initiatives against fuel poverty.
Wrexham County Borough	38,250	N/A	N/A	Wrexham County provides for collection of materials, and arrangements for processing and disposal.	Wrexham County provides recycling collection (3 stream), communal recycling, household recycling centres, green garden and food waste bin collection, textile collection (clothing) and bulky waste collection. Wrexham reported a 68% recycling rate, one of the higher recycling rates by a waste authority.	MRF, communal recycling centres (3), RDF marketed to EfW, Wrexham Recycling park for the treatment of mixed green waste and food waste.	Residue transformed into fuel for multifuel power generation facilities. Runcorn Energy from Waste will use RDF from MBT. Unclear where residues from combustion are disposed.	Not reported, but non-recyclable outputs are currently understood to be diverted to energy recovery (Ferrybridge).	134	2008 - £40 million ($69 million CAD) for 25 year contract to develop the recycling park. Long term fuel supply with Ferrybridge Multifuel Energy and FCC environment - £300 million, 500,000 tpy facility is being built by the joint venture.	MWPwRR, RDFR	**Comments**: Biodrying tunnels with preparation of the remaining fraction to a fuel for cogeneration plants, cement plants, lime plants, etc. **Recommendation**: Short-list **Rationale:** • Size < 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto), which does have an SSO collection program (mixed green waste and food waste) • The facility does not recover any organics for separate processing • Facility utilizes a thermal process - applies composting/bio drying technology to produce RDF.	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Wrexham Council to meet the original Welsh Government recycling target of 40%. MBT facility intended to help meet Welsh Government's zero waste targets and changes in the market for the treatment of residual waste.
Essex County Council, Southend on Sea Council	732,000 (primarily household waste)		In 2019, County Council directed 200,000 tpy to be landfilled due to economics of sending RDF to EU and part-closure of receiving facility. Landfilling is the most cost-effective measure.	Essex County Council is the solid waste authority responsible for contracting for disposal and processing (including composting). Has had difficulty contracting markets for RDF. Local Councils are responsible for collection services (waste, recycling, green bin garden and food waste).	Local recycling schemes are offered across the County. County provides waste reduction and reuse P&E.	County Council provides 23 recycling centres for household waste across the county. Has contracted windrow composting capacity at 10 sites in Essex.	Bellhouse Landfill in Colchester	Not reported, but contracts are in place for the management of RDF from the facility - combination of domestic and export options to Europe.	507	Contract reported to be worth £800 million for 25 year contract ($1.39 billion CAD)(2012)	MWPwRR, RDFR	**Comments:** Developed to service the residual waste treatment contract with Essex CC and Southend-on-Sea BC. Bianna Recycling supplied 3 No. pretreatment lines and 1 No. refinement line. TAIM WESER supplied 3 fully automated trapezoidal windrow composting lines for pre-treated MSW by stack turning machines (ROTOPALA), with a process capacity of 375,000 ton/year. The organic matter at the MBT plant is decomposed and stabilized to obtain an output product that can be landfilled according to the EU- Landfill Directive or can be used elsewhere as RDF in thermal treatment facilities. **Recommendation:** do not include on Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure commissioned within the last 10 years, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto) does have some food waste collection program • The facility does not recover any organics for separate processing • Facility utilizes a thermal process - applies composting/bio drying technology to produce RDF • Facility has experienced operational issues • Have examples of similar facilities	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Council has disputed performance of facility and in June 2020, a high court judged ruled in favour of Essex county council, and that the issues were due to the original design and build of the plant.
Falkirk Council	90,000 (local authority collected waste)	N/A	N/A	Falkirk Council provides household recycling and waste services, rubbish and litter management and commercial waste and recycling services.	2 recycling centres, absorbent hygiene products collection service, food waste collection, recycling collection, textile collection, garden waste collection, bulky waste collection.	Falkirk Council Recycling Centre and Composting Facility	N/A	Not currently operational	570	N/A	MWPwRR, RDFR & Alternative Energy	**Comment:** As of April 2016, it is understood that the facility has undergone a facelift, processing residual waste to produce RDF. The facility was procuring new contracts up to its design capacity with operations due to commence 2018/19, however, no reports are available that state any expectation of reopening. **Recommendation**: do not include on Short-list **Rationale:** • Size > 100,000 tpy • Not operational • Merchant facility in smaller urban jurisdiction. • The MRF has been/may have been upgraded and with contracts in place with 3 to 4 Scottish Local Authorities, however, reopening date is still unknown • Facility utilizes a thermal process	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. 2019/2020 - Renewi has contracts with EFW facilities in the Netherlands which process the majority of RDF. Some material may be sent to Scandanavia as well. On January 1, 2020, an RDF import tax was implemented in the Netherlands which may cause contracts to be reviewed. Similar taxes may be introduced in Sweden (used to have an incineration tax from 2006-2010). They could be as high as €32/tonne ($50/tonne CAD). Renewi is responsible for all processing and disposal costs associated with waste generated. Renewi bears all the risk and reward of a material price change in market rates for the disposal of materials. Renewi reports they have been for a number of years, and are still in a loss making position on the ELWA PFI contract.
Newcastle upon Tyne	142,000	N/A	40,000 (estimated)	Newcastle City Council contracts for recycling collection and processing. The Council also provides waste collection services.	Single stream recycling collection (glass containers separated), battery collection, Garden waste collection, household waste and recycling centres, fee for service bulky waste collection, reduction and reuse P&E.	3 household waste and recycling centres, Sandhills garden waste recycling centre. Some food waste streams sent for composting in Ellington.	N/A	40% of material processed is recovered and diverted from landfill	676	N/A	MWPwRR, RDFR	**Comments:** The first substantial MBT plant in the north of England. When initially developed, the facility received black sack waste, shredded it, passed it through a trommel and magnetic separation with the organic content separated from residual waste. Dry recyclables are separately collected and sorted by Suez for the city council. The organic component of the waste was sent to a Suez composting site at Ellington in Northumberland for further treatment and milling to produce a grey compost which is to be used on non-food crop or non-grazing land. RDF is now sent to Suez thermal treatment facilities in the north east. **Recommendation**: do not include on Short-list **Rationale:** • Size > 100,000 tpy • Older infrastructure, currently operating • Larger urban jurisdiction (somewhat comparable to Toronto) but does not have a food waste collection program • The primary reason not to include on the short-list is that the facility no longer recovers organics for separate processing • Facility utilizes a thermal process • Appear to be operational issues	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Increasing infill and development is putting pressure on facility due to complaints about noise and odour.
Derbyshire County Council and Derby City Council	N/A	N/A	Expected to send 10,000 tonnes to landfill	Derbyshire County Council and Derby City Council.	N/A	N/A	N/A	N/A	N/A	Original contract reported to be a shared £50 million ($87 million CAD) 25 year contract with RRS.	MWPwRR, RDFR	**Comments:** Contractual issues have hampered the operation of this plant. Facility is now closed. **Recommendation**: do not include on Short-list **Rationale:** • Size > 100,000 tpy • Services a larger urban area, which does not offer SSO collection service. Facility does not recover the organic fraction for separate processing •-Facility closed while Renewi finds a new plan to move project forward.	The EU implemented a Landfill Directive in 2001 that regulates waste management of landfills in the EU and sets targets for reductions of biodegradable waste that can be landfilled. In 2005/6, the UK government introduced a Landfill Allowance Trading Scheme which set annual limits on the tonnages of waste sent to landfill (this was subsequently abolished in 2011). MBT was identified as a technology by the UK Department for Environment, Food and Rural Affairs that could increase recycling, reduce biodegradability, stabilize residual waste, generate biogas and prepare RDF. A landfill tax was implemented in 1996 to assist the UK in meeting its targets and make other technologies more financially attractive. Contract between Resource Recovery Solutions (RRS is a 50:50 partnership between Renewi and Interserve) and council was terminated in 2019 as gasification facility could not be commissioned. Renewi is running recycling centres and waste transfer stations under a new two-year contract. Renewi will determine what is needed for facility to become operational.
EUROPEAN FACILITIES UTILIZING A THERMAL PROCESS													
Barcelona AMB (Area Metropolitana de Barcelona) – Ecoparc II	1,416,763	N/A	N/A	several municipalities in the metropolitan area of Barcelona and the south-east of the Anoia region.	Public Containers (4 or 5) for the collection of source separated recycling - Paper & Card, Organics, Glass, Packaging, and Residual. Also door to door collection service. Green points for collection of Tires, Electrical materials, Paints and varnishes, Household appliances/ white goods , and oils	AMB (Area Metropolitana f Barcelona) has 2 composting plants and 4 ECOPARCS (MBT plants) to treat the unsorted MSW and the biowaste produced. Combining ECOPARCS(MBT) + Incinerator reduces rejected materials to landfilling to less than 10%. Other facilities include: Viladecans sorting plant and Transfer plant; Sant Adria de Besos MBT; el Part de Llobregat MBT; Torrelles de Llobregat composting; Sant Cugat del Valles composting; Montcada I Reixac biowaste treatment and sorting plant; Hostalets de Pierola Landfill.	Any residuals are sent to EfW that is integrated with the MBT	N/A	777 1.21kg/person/day/capita	in 2015, the annual budget for waste treatment in the AMB was €155 million ($244 million CAD)	MWPwOR, RDFR plus Alternative Energy	**Recommendation**: Short-list **Rationale**: • Size > 100,000 tpy • Commissioned within the past 10 years, currently operating • Services larger urban jurisdiction which does have separate collection of food waste • Facility recovers organics fraction for anaerobic digestion • Facility utilizes a thermal process	The National Waste Law introduced in 1998, introduced separate collection of MSW in all municipalities over 5,000 inhabitants and banned disposal of recyclable materials. Some regions in Spain have introduced economic incentives to promote waste prevention and separate collection, including a landfill and incineration tax on MSW. In 2020, taxes were €47.1/tonne for landfill and €23.6/tonne for incineration ($74 and $37 CAD respectively). The AMB, government of Catalonia and 36 metropolitan municipalities recently signed an agreement to achieve zero waste and increase diversion. The PREMET25 has the ultimate objective of achieving compliance with European Union targets: recycling rates of 55% and 60% by 2025 and 2030. This agreement would see the phasing out of the Ecoparks where recovery is only about 12% of mixed recyclables and progressively reconverted into more specialized treatment plans, with a greater focus on organics management. A reduction in incineration is also envisaged.
Barcelona AMB (Area Metropolitana de Barcelona) – Ecopark 4	1,416,763	N/A	N/A	several municipalities in the metropolitan area of Barcelona and the south-east of the Anoia region.	Public Containers (4 or 5) for the collection of source separated recycling - Paper & Card, Organics, Glass, Packaging, and Residual. Also door to door collection service. Green points for collection of Tires, Electrical materials, Paints and varnishes, Household appliances/ white goods , and oils	AMB (Area Metropolitana f Barcelona) has 2 composting plants and 4 ECOPARCS (MBT plants) to treat the unsorted MSW and the biowaste produced. Combining ECOPARCS(MBT) + Incinerator reduces rejected materials to landfilling to less than 10%. Other facilities include: Viladecans sorting plant and Transfer plant; Sant Adria de Besos MBT; el Part de Llobregat MBT; Torrelles de Llobregat composting; Sant Cugat del Valles composting; Montcada I Reixac biowaste treatment and sorting plant; Hostalets de Pierola Landfill.	N/A although landfill capacity is available in the Region	64% of incoming materials are diverted from disposal. Of 160K MSW and 85K SSO per annum, get 24.5 Ktpy recovered materials, 5.2 Ktpy biogas, 5.6 Ktpy compost, 25.8 Ktpy biostabilized material, 40 Ktpy RDF (of which some goes to incinerator). Overall 76K tpy gets incinerated. Residual is composed of 9.250 K sand and fines, 3.38 K decanted and sands, 4.880 K bulky, and 3.5 K fly ash for a total of 21.010 Ktpy (9%).	777 1.21kg/person/day/capita	N/A	MWPwRR, OR, RDFR	**Comments:** The plant has two differentiated streams: a first stream for sorting the remainder fraction, and another for the organic fraction. The remainder fraction feeds into three pre-treatment streams of 30 tons per hour each, 90 tons per hour in total, plus one stream of 20 tons per hour for the organic fraction of municipal solid waste (OFMSW). Ecopark 4 processes around 300,000 tons a year, 100,000 tons per stream. **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Commissioned within the past 10 years, currently operating • Services larger urban jurisdiction which does have some separate collection of food waste • Facility recovers organics fraction for aerobic composting/bio-drying to produce SRF • Facility utilizes a thermal process	The National Waste Law introduced in 1998, introduced separate collection of MSW in all municipalities over 5,000 inhabitants and banned disposal of recyclable materials. Some regions in Spain have introduced economic incentives to promote waste prevention and separate collection, including a landfill and incineration tax on MSW. In 2020, taxes were €47.1/tonne for landfill and €23.6/tonne for incineration ($74 and $37 CAD respectively). The AMB, government of Catalonia and 36 metropolitan municipalities recently signed an agreement to achieve zero waste and increase diversion. The PREMET25 has the ultimate objective of achieving compliance with European Union targets: recycling rates of 55% and 60% by 2025 and 2030. This agreement would see the phasing out of the Ecoparks where recovery is only about 12% of mixed recyclables and progressively reconverted into more specialized treatment plans, with a greater focus on organics management. A reduction in incineration is also envisaged.
Montpellier Mediterranee Metropole	170,000 MSW and 33,000 kitchen waste	N/A	N/A	N/A	In 2016, the City introduced a pilot test of underground collection of organic waste, intended to increase capture for materials to the AD plant.	N/A	N/A	N/A	114 kg/cap of organic waste	2003 reported to cost €57 million ($89.8 million CAD). Overruns pushed cost to €90 million ($141 million CAD)	MWPwOR, RR plus Alternative Energy	**Comments:** Largest AD plant in Europe, being integral part of an MBT High impurity content in organic fraction sorted from MSW. **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Commissioned 10 years ago, currently operating • Services larger urban jurisdiction which does not separately collect and divert food waste • Facility utilizes a thermal process • Facility processes the recovered organic fraction from mixed waste and biosolids and is a good test case to look at facility performance after 10 years of operating with a difficult feedstock	MBT facilities were previously promoted and subsidized by the Environment and Energy Management Agency (ADEME) until the "law of energy transition" in 2015. The law has the following objectives - Reduce GHG emission by 40% by 2030, cut final energy consumption by 30% by 2030, reduce fossil fuel consumption by 30% by 2030, increase the share of renewable energies in final energy consumption to 32% by 2030, halve the amount of landfilled waste by 2025, waste recovery targets (55% by 2020 and 65% by 2025 for all non-hazardous non-inert waste). There are multi-year energy plans that set industry and region specific objectives. It also extends separate collection to all organic waste before 2025. To promote separate collection, MBT is no longer considered relevant and will not receive any more public funding. Incineration is to be reduced by a quarter by 2020 and halved by 2025. France has the following landfill taxes (2020) - €152/t ($239 CAD) in non-authorized landfills, €25/t ($39 CAD) in authorized landfills with 75% energy recovery from captured biogas, €35/t ($56.7 CAD) in authorized bio-reactor cells with biogas recovery, €42/t ($66 CAD) in other authorized landfills.

City of Toronto Mixed Waste Processing Study

General MWP Facility Information																	Demographic Information					Brief Overview, Municipal Waste Program Information												
Region / Jurisdiction	**Use of Thermal Process**	**Owner / Operator**	**Facility Name**	**Location of Facility**	**Country**	**Year Commissioned**	**Current Status**	**Input Material Stream(s) (MSW, other)**	**Sources (Residential, Industrial, Commercial, Institutional)**	**General Technologies Applied (mechanical sorting, biological treatment, fuel production, thermal treatment)**	**Branded Technology (if applicable)**	**Technology Provider (if applicable)**	**Products**	**Facility Design Tonnes (TPY)**	**Current Tonnes Managed (TPY)**	**Process**	**Population Served**	**Number of SFD**	**Number of MFD**	**Population Density**	**General Climate Information (avg. min & max temperature, precipitation)**	**MSW Tonnes Generated - Residential**	**MSW Tonnes Generated - Other (Commercial etc.)**	**MSW Tonnes Disposed**	**Jurisdictions Responsible for service provision (collection, diversion, disposal)**	**Brief Summary of Current Waste Diversion Programs (recycling, source separated food scrap/organics collection, LYW, other)**	**Other Processing Infrastructure Used (MRF, Composting, AD, EFW etc.)**	**Residual Disposal Methodology (e.g. Traditional Landfill, Biocell, Bioreactor, etc.)**	**Reported Diversion from MWP(wOR)**	**Per Capita Waste Generation Rate (kg/capita) (Household Waste)**	**Reported Pricing**	**Facility Grouping**	**Comments: Recommendation for Short-listing:**	**Comments: Rationale for why or why not jurisdiction utilizes thermal treatment.**
Hansestadt Rostock. Mecklenburg-West Pomerania	Yes - prod'n of RDF for off-site use	Veolia	Rostock, Germany - EVG	Rostock	Germany	2007	Operational	MSW	Residential	Mechanical sorting, Kompogas dry AD plant, stabilized product combusted as an RDF	N/A	HZI/ Kompogas	Recyclables, Biogas, RDF	195,000	150K tpy MSW with 40,000 tpy processed at AD	At the facility metal, glass and stone is first of all filtered out of the waste. The remaining waste is then crushed, and further separated into inorganic and organic components. The inorganic waste is used as a fuel in a nearby waste incineration plant to recover thermal energy, and produce electricity and heat. Since 2010, the organic components have been fermented in order to produce crude biogas. Some of this is used to generate electricity and heat, which is used to power the plant. The surplus is further processed into biomethane. All in all the facility produces twice the amount of energy needed to operate it.	208,000	N/A	N/A	1,100 /km2	5C - 12C	100,000	N/A	N/A	The collection and removal of waste from private households, such as domestic waste, bulky waste, electrical and electronic waste, and organic waste, is the responsibility of the waste management company Stadtentsorgung Rostock GmbH	The collection and removal of waste from private households, such as domestic waste, bulky waste, electrical and electronic waste, and organic waste, is the responsibility of the waste management company Stadtentsorgung Rostock GmbH. Almost all the municipal waste generated in Rostock undergoes processes to recover and recycle materials, or recover energy. On behalf of the Hanseatic City of Rostock, the city's own waste management company operates four recycling yards. Domestic waste is processed at Rostock's mechanical biological treatment (MBT) facility. Veolia has developed a flake-based recycling method for PET that converts 1 m PET bottles into flakes.	20MW capacity cogeneration plant EfW (Vattenfall)	Any residuals are sent to the incineration plant	35% of MSW is converted to RDF.	N/A	Estimated capital cost of €20 million for the MBT facility ($31 million CAD)	MWPwRR, OR, RDFR plus Alternative Energy	**Comments:** First MSW Kompogas dry AD plant in Germany, increasing throughput capacity of existing MBT plant. In-vessel composting system for digestate, with stabilized product combusted in nearby incineration plant (mixed-waste compost not allowed for agricultural land use in Germany/Europe). **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Commissioned just over 10 years ago, currently operating • Services a smaller urban area which has separate collection of food waste • Facility recovers organics fraction for dry AD • Facility utilizes a thermal process	The first MBTs started in the 70s followed by bioreactor landfills in the 80s and early 90s. Bioreactors were not considered a sustainable solutions. In the 90s new legal requirements included restrictions on landfil inputs (i.e. biodegradability to avoid biological conversion in landfill). By using MBT and WTE, generation of landfill gas is minimal (i.e. the design of the ban would have prevented the landfill of materials which had not been first incinerated). There is also a landfill ban on separately collected waste materials and unsorted municipal waste - which could be recovered. The EU directive also provided requirements for landfills. It is estimated that Germany has landfill capacity for two more decades. Stabilized organic product from mixed waste processing cannot be marketed for unrestricted use, and is commonly sent for thermal treatment.
Federal State: North Rhine-Westphalia District: Rhein-Kreis Neuss	Yes - prod'n of RDF for offsite use	N/A	Mechanical-biological waste treatment plant Neuss	Neuss, North Rhine-Westphalia,	Germany	2001	Operational	MSW	N/A	Mechanical sorting: Pre shredder, trommel screen, magnet, eddy current separator, NIR sorters, Post shredder, roll packer, pelletizer, conveyor belts	N/A	Sutco (for mechanical sorting)	Recyclables, RDF	206,000	N/A	Appears to be a traditional MBT plant with production of RDF after bio-drying process.	155,000	N/A	N/A	1,546 /km2	6C - 14C	N/A	N/A	N/A	Likely AWISTA as they provide the collection service for Dusseldorf which borders the Neuss area geographically	As a subsidiary of Düsseldorf's public utilities company, AWISTA (Gesellschaft für Abfallwirtschaft und Stadtreinigung mbH) has received a long-term assignment by the North Rhine-Westphalien state capital city government for the execution and performance of the required waste management services. Germany reported to the Commission that zero tonnes of BMW were landfilled in 2006, 2007, 2008 and 2009. This is as a result of the German ban on non-pretreated MSW.*(source 2013)*	In neighbouring Dusseldorf there is a 450,000tpa capacity EfW with CHP (MSW, Bulky, Street Cleaning waste, Industrial waste) Biomass heating-and power-station Düsseldorf-Garath	N/A	N/A	N/A	N/A	MWPwRR, RDFR	**Recommendation**: Do not include on Short-list **Rationale:** • Size > 100,000 tpy • Commissioned well over 10 years ago, currently operating. • Services a smaller urban area • Facility does not recover the organic fraction for separate processing • Facility utilizes a thermal process • Facility produces RDF but have examples of similar facilities	The first MBTs started in the 70s followed by bioreactor landfills in the 80s and early 90s. Bioreactor landfills were not considered a sustainable solution. In the 90s, new legal requirements included restrictions on landfill inputs (i.e. restrictions on biodegradability to avoid biological conversion in landfill). By using MBT and WTE, generation of landfill gas is minimal (i.e. the design of the ban prevented the landfill of materials which had not been first incinerated). There is also a landfill ban on separately collected waste materials and unsorted municipal waste - which could be recovered. The EU Directive has also provided restrictions on landfill disposal. It is estimated that Germany has landfill capacity for two more decades.
Toledo, Castilla-La Mancha	Yes - prod'n of SRF for onsite use	Ferrovial Services	Toledo Ecopark, El Aceituno	Toledo	Spain	2012	Operational	MSW	Residential	Mechanical sorting (2 processing lines), recovery of recyclables, 3rd sorting line to produce SRF from light fraction. Organic fraction composted in wide-bed aerobic process (odour control using acid gas scrubbers and biofilters). Residual material disposed in on-site landfill.	TITECH NIR	Urbaser	Recyclables, SRF, Compost	250,000	N/A	Separation of materials occurs in a treatment plant with two production lines, each at 35 tons/hr. Organics are composted in another facility. There is a waste-derived fuel generation plant to manufacture SRF. Bioliquids plant transforms SRF (shredded paper, cardboard, wood, plastic waste) into a bio-liquid (similar to diesel C) using flash pyrolysis. Three kilograms of SRF can produce a litre of crude biofuel. The remaining material is buried in a controlled landfill located at the facilities.	650,000	N/A	N/A	359 /km2	10C - 20C	N/A	N/A	N/A	N/A	N/A	Biostabilization and composting facility.	Controlled landfill with leachate treatment plant located at the facility which also manages waste from another Cespa-operated treatment plant in Talavera de la Reina.	Reported 90%	N/A	Reported to be €45 million ($71 million CAD)	MWPwRR, OR, RDFR & Alternative Energy	**Comments:** The Toledo Ecopark waste treatment plant uses state-of-the-art technologies, including automation of the selection and sorting process by means of two lines, each of which has the capacity to handle 35 tonnes of waste per hour, plus an additional line for producing SRF (Solid Recovered Fuel) from light materials contained in the waste stream which cannot be reused as byproducts. The composting system in operation is a dynamic one, taking place in a closed warehouse and in two stages: fermentation and maturing, with intermediate and final curing systems. **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Commissioned within the past 10 years, currently operating • Services larger urban jurisdiction which does not have separate collection of food waste • Facility recovers organics fraction for aerobic composting • Facility utilizes a thermal process • Facility creates a bio-diesel from SRF	The National Waste Law introduced in 1998, introduced separate collection of MSW in all municipalities over 5,000 inhabitants and banned disposal of recyclable materials. Some regions in Spain have introduced economic incentives to promote waste prevention and separate collection, including a landfill and incineration tax on MSW. It does not appear that Toledo has a landfill tax or ban. Spain still has to comply with the EU Landfill Directive and these types of facilities will assist with meeting these goals.
Promnik near Kielce	Yes - prod'n of RDF for off-site use	Przedsiebiorstwo Gospodarki Odpadami (PGO Kielce)	Waste management centre Kielce	Promnik near Kielce	Poland	2016/17	Operational	MSW	Mixed municipal waste (i.e. household and commercial waste sources)	Mechanical sorting (automated sorting) including: Bag splitter sieve drums ferrous metal separators none-ferrous metal separators optical sorters (12) on-line RDF Fraction analysis strip ballistic separators flip flop screen low speed rotating crusher vibrating chute compressor station process control and visualization system automatic channel presses automatic ballast loading stations RDF fraction crusher Biological system equipment includes: automatic compost turner input loading system unloading system for stabilized waste sludge transfer system	N/A	Sutco	Recyclables, RDF, Compost	100,000 (sorting plant), 25,000 (composting plant)	51,600 tonnes total MSW from Kielce, but facility is understood to process material from other municipalities as well.	Mechanical sorting for garbage and separately collected recycling waste. Biological fraction processed with dry fermentation. Biogas used in cogeneration plant. RDF made from residual, burned at industrial furnaces, including cement plants.	196,000	84,000	N/A	1,795 /km2	2C -12C	c.31,800 tonnes (2017)	c.19,800 tonnes (2017)	N/A	Waste collections in Kielce are understood to be contracted to Eneris.	Collection of general waste, food waste, bulky waste, dry packaging and glass.	Integrated sorting, composting and baling facility.	Residual will go to adjacent landfill.	Of the total MSW received, 60% is recycled, 25% is composted and 11% is used to produce RDF (~4% attributed to moisture and process losses).	N/A	Reported to cost €79 million ($124 million CAD) (2014). Also saw pricing of 248 million poland zloty ($88.9 million CAD) - of which 66% subsidized by the Cohesion Fund, 7.90 by PGO-Kielce funds, and 25.7% preferential loan of the National Fund for Environmental Protection and Water Management.	MWPwRR, OR, RDFR	**Recommendation:** Short-list **Rationale:** • Size ~ 100,000 tpy • Commissioned within the past 10 years, currently operating • Services a smaller urban area within a larger region which does not have separate collection of food waste • Facility recovers organics fraction for aerobic composting • Facility utilizes a thermal process (recovers RDF)	As a member of the EU, Poland needs to make progress towards its commitments as part of the EU Landfill Directive. In 1995, Poland was still landfilling more than 80%, and could postpone the targets by four years. This pushed the target of 35% by 2020. Poland has implemented a landfill tax and rates are charged according the risk category of waste being landfilled. While Poland has introduced a number of waste management directives, it does not appear likely that targets will be met. As of 2011, only 1% of waste in Poland was incinerated. In an effort to divert more waste from landfill, EFW plants are to be developed in each of Poland's biggest cities. The EU is anticipated to cover 80% of the costs, with the remaining costs covered by central, regional and local governments. In 2020, funding in the order of €63 million ($99 CAD) for a WTE plant in Gdansk and €40 million ($63 CAD) for a WTE plant in Olsztyn was announced, but not without controversy. Poland is receiving over €10 billion ($15.75 billion CAD) in support for projects related to environmental protection and resource efficiency from EU cohesion policy during the 2014-2020 budget period.
Radom	Yes - prod'n of RDF for off-site use	AK NOVA	Waste management centre Radom	Radom	Poland	2008 upgrade due 2019	Operational	MSW	Residential and ICI	Mechanical sorting (automated sorting) including: bag opener, sieve drums, ferrous and non-ferrous metal separators, optical sorters, on-line RDF fraction analysis, ballistic separators, RDF fraction crusher. Composting of organic fraction (automated loading and turning system).	Biofix for composting	Sutco	Recyclables, RDF, Compost	210,000 tpy (sorting), 42,000 tpy (composting)	N/A	Mechanical sorting of "wet" fraction - 0-20mm to landfill, 20-100 mm organics composted for land application, >100 mm made into RDF.	700,000	Not reported at a local level, but records on Eurostat show that the occupancy rates in Poland in 2017 were 2.6 people/household.		2,000 /km2	2C -12C	c.240,000 tonnes of waste generated by the inhabitants of the city of Radom and neighbouring municipalities.	N/A	N/A	Waste management services in Radom are understood to be undertaken by 'PPUH Radkom' - an arms length company set up by the municipality.	Collection of general waste, wet waste (i.e. food, fruit and vegetable remains), dry waste (i.e. paper, card, cartons, plastic bottles and metals), and glass packaging. Separate collections for difficult to handle materials such as bulky waste and plans to roll out designated collection points for smaller electrical appliances and batteries.	Separate areas for composting of separately collected green waste and mixed waste. Collection of LFG for CHP. MRF for dry waste processing.	Traditional landfill	N/A	N/A	54 million PLN ($19 million CAD) for expansion of facility in 2017. Original cost cited as €17.6 million ($27.7 million CAD)	MWPwRR, OR, RDFR	**Recommendation:** Include on Short-list **Rationale:** • Size > 100,000 tpy • Commissioned 10 years ago, currently operating • Services a smaller urban area which has separate collection of food waste • Facility recovers organics fraction for aerobic composting • Facility utilizes a thermal process (recovers RDF)	As a member of the EU, Poland needs to make progress towards its commitments as part of the EU Landfill Directive. In 1995, Poland was still landfilling more than 80%, and could postpone the targets by four years. This pushed the target of 35% by 2020. Poland has implemented a landfill tax and rates are charged according the risk category of waste being landfilled. While Poland has introduced a number of waste management directives, it does not appear likely that targets will be met. As of 2011, only 1% of waste in Poland was incinerated. In an effort to divert more waste from landfill, EFW plants are to be developed in each of Poland's biggest cities. The EU is anticipated to cover 80% of the costs, with the remaining costs covered by central, regional and local governments. In 2020, funding in the order of €63 million ($99 CAD) for a WTE plant in Gdansk and €40 million ($63 CAD) for a WTE plant in Olsztyn was announced, but not without controversy. Poland received over €10 billion ($15.75 billion CAD) in support for projects related to environmental protection and resource efficiency from EU cohesion policy during the 2014-2020 budget period.
Bekes County	Yes - prod'n of RDF for off-site use	DAREH Bázis Nonprofit Zrt. – it is privately run, government funded	DAREH-Ép, Békéscsaba, Hungary	Békéscsaba, Hungary	Hungary	2015	Operational	MSW	Residential - MSW, Source separated MSW, Green Waste	Mechanical sorting to recover recyclables, and fine fraction including organics and RDF. Optical sorting used to 'clean' contaminants from RDF and organic streams. Organic fraction is biologically stabilized.	TOMRA optical sorters	TOMRA for the Mechanical Treatment (optical sorters)	Recyclables (metals, paper, plastic), RDF	120,000	data not published	The plant operates in the following way: At the beginning of the sorting line there are two parallel lines, each with bag opener, drum screen, magnets, optical sorter for polymers/ beverage cartons and eddy current system for aluminium. One of the lines has an additional shredder for bulky items for the screen oversize fraction (> 320 mm). The first step in the waste treatment line is feeding the bag opener. After the bags have been opened, the two waste streams go to the trommel (drum screen). The screen splits up the input material into three grain sizes: <80 mm; 80-320 mm; >320 mm. The main stream, which is the most relevant for the sorting of recyclables, is 80-320 mm. The fraction <80 mm, which has a very high organic content, after removing the inerts with X-ray sensor based sorter machine is biologically stabilised during several treatment steps; while the >320 mm fraction is stored and shredded regularly. After the polymers and aluminium have been separated from the 80-320 mm fraction, the two remaining streams converge. The 3D (heavy and rolling) and 2D (light and flat) separation of the sorted polymer and beverage cartons fraction then takes place and from these two streams PET, PP, PE, PE-film and beverage cartons are sorted out. The mixed paper is sorted from the remaining stream after the polymer and aluminium separation. After this, the rest of the fraction goes to the RDF sorter, which produces a high quality alternative fuel. Then the residue of the fraction goes to the adjacent landfill. The <20 mm fraction of the inert material is landfilled and all sorted recyclables e.g. polymers and paper go through a quality control process where any remaining impurities are removed. The sorted recyclables, such as PET, PE, PE-film, PP, beverage cartons, mixed paper, ferrous and nonferrous metals, are sold to recycling companies for further processing and have been used, for example, to re-granulate sorted plastic.	Portion of 4.2 million population in Region	150,000		104 /km2	5C - 15C	N/A	N/A	Not Available as of July 2020, <20 mm fraction of inert material is landfilled	Bekes County authority	Permitted total is 466,000 tpy (for all facilities operated in the region). This includes source separated, mixed recyclables, Green waste, and residual.	MRF, Household Waste Recycling Centres, Composting facilities.	N/A	N/A	N/A	Reported at €15 million ($23.6 million CAD)	MWPwRR, RDFR	**Comments:** System is designed to serve 86 settlements, comprising around 150,000 households. Complex MSW process that recovers a range of recyclables, RDF and biologically stabilizes the organic fraction prior to disposal. **Recommendation**: Short-list **Rationale:** • Size > 100,000 tpy • Commissioned within the past 10 years, currently operating. • Services small urban areas which do not have separate collection of food waste • Facility recovers organics fraction for aerobic biological stabilization • Facility utilizes a thermal process (recovers RDF)	The plant is designed to help Hungary meet recycling targets set by the EU, which require its members to recycle 50% of household and similar waste by 2020. In order to meet this directive, new waste management infrastructure is required. Hungary has had a landfill tax since 2013. Hungary started to build MBT plants after 2000 to reduce waste to landfill, and to send the outputs for co-incineration. It appears, historically, there has been a shortage in demand for RDF. The first incinerator was built in Budapest in the late 70s and modernized from 2003-2005. This incinerator with energy recovery has been managing around half the waste generated in Budapest.
ASIAN FACILITIES UTILIZING A THERMAL PROCESS																																		
Phitsanulok	Yes, RDF used off-site	Municipal Authorities of Phitsanulok/ Unknown Private Company	Mechanical - Biological Waste Treatment Plant	Phitsanulok, Thailand	Thailand	2000	operational	MSW	Residential	Aerobic composting of MSW. Following composting the material is processed using trommels, disc-screens, wind shifter, mgnetic separator, solid separting spinner to generate RDF and other materials.	FABER-AMBRA	FABER-AMBRA	Solid Recovered Fuel (SRF), and Refuse Derived Fuel (RDF), Recyclable metals	28,000	N/A	Composts mixed waste for 9 months where volume decreases by 50%. Composted material is processed with: 4% recovered as MBT Cover, 17% recovered as RDF, 11% sent for land reclamation, 20% sent to Landfill. RDF is screened by trommel, disc-screen, wind shifter, mgnetic separator, solid separating spinner. RDF is baled and sent to cement factories	90,000 registered, 50,000 to 100,000 non-registered	24,000 hhlds	N/A	4,929 pple/km2	30 C, distinct rainy seasons	76 tonnes/ day; 40% organic, 40% recyclables, 20% other	N/A	64% reduction of 76 tons/day	City responsible for education, enforcement. Operates municipal landfill.	Polluter pay principle, promotes reuse, household and community composting, and recyclable waste separation for sale.	Pyrolysis (in conceptual stage)	Landfill, Pyrolysis	N/A	N/A	Reported values appear out by a large order of magnitude (equivalent to less than $1 million CAD)	MWPwRR and RDFR	**Recommendation:** Do not Include on Short-list **Rationale:** • Size <100,000 tpy • Older infrastructure > 10 years • Climate and population very dissimilar • No separate organics collection	Thailand has established the National 3R Strategy and the National Master Plan for Waste Management (2016-2021).
Lianyungang	Yes, RDF used off-site	Lianyungang Chenxing Environmental Protection Industry Co. Ltd/	Lianyungang MBT Plant	Lianyungang, Province Jiangsu	China	2018	operational	MSW and commercial waste	Residential & Commercial	Biological drying in drying tunnels, heavy/light separation process; shredder; gantry crane; screening; air stream sorting; overbelt magnets; eddy current separators;	REDWAVE Sensors	REDWAVE - Austrian-German Technology	RDF, Recyclable metals	273,750	750 tons per day ~ 270,000 tons annually	The MSW is pre-shredded and an overbelt magnet removes ferrous materials. This is then fed into an intermediate bunker where a gantry crane conveys the waste into one of 18 biodrying drying units (for 8 day processing period). The water is discharged from the drying units in the form of water vapour. The dried material is then sent through a mechanical refinement process where heavy and light materials are separated. This includes screening, airstream sorting, shredding, overbelt magnets, eddy current separators and REDWAVE sensor sorting systems. The light fraction is used to create SRF. The heavy components are landfilled.	4,393,914	N/A	N/A	610/km2	-4 to 30 C	Has a higher content of organics than in Europe	N/A	Heavy components	No recycling infrastructure noted in Lianyungang. Private companies offer some recycling collection options.	Sorting waste is relatively new in China as of 2019: Shanghai divides household waste into four categories: wet (SSO), dry (MSW), hazardous, recyclables	Incineration	Landfill, Incineration	N/A	N/A	N/A	MWPwRR, RDFR	**Recommendation:** Do not Include on Short-list **Rationale:** • Size > 100,000 tpy • New infrastructure < 10 years • Climate and population very dissimilar • No separate organics collection • Material undergoes biodrying to prepare for RDF production for incineration on-site • No organics recovery	China has adopted policy targets of achieving 35% recycling rate for household waste by 2020.
Singapore	Yes, RDF used off-site	National Environemental Agency (NPA)/ Jinjiang Group and Eastern Green Power jointly established JE Synergy Pte Ltd/China Jinjiang Environment Holding Company Limited	Singapore Mechanical Biological Waste Treatment	Western Singapore	Malaysia	N/A	Construction	MSW	Residential	N/A	N/A	N/A	RDF, Recyclables	500 tonnes per day ~ 180,000	N/A	MSW is processed to remove recyclables, with the remaining materials sent for biological processing (bio-drying) to generate an RDF for incineration.	N/A	N/A	N/A	N/A	24 to 32 C	4,500 tonnes per day	N/A	N/A	Singapore offers collection, diversion and disposal	Recycling collection at centralized neighbourhood blue bins. Offer mobile recycling days. Offers textile and e-waste bins across the island.	N/A	N/A	7% diversion of MSW	N/A	$49 million US Cdn exchange rate @ 1US:1.34CAD ~$65 million CDN	MWPwRR, RDFR	**Recommendation:** Do not Include on Short-list **Rationale:** • Size > 100,000 tpy • Facility is not yet constructed • Climate and population very dissimilar • No separate organics collection • Material undergoes biodrying to prepare for RDF production for incineration • No organics recovery	To maximize recycling and resource recovery from municipal solid waste and prolong the lifespan of the city-state's only landfill. Singapore has a target of 70 per cent recycling rate by 2030. This is aligned to the Sustainable Singapore Blueprint plan of moving Singapore towards becoming a Zero Waste Nation with the aim of reducing the environmental impact of landfilling residual waste.
CANADIAN FACILITIES NOT UTILIZING A THERMAL PROCESS																																		
Region of York, Ontario	No	GFL	Canada Fibers High Diversion Material Recovery Facility	Vaughan, ON	Canada	2009	Facility is being re-configured, not in active full-time operation	MSW	N/A	Mechanical Sorting process that includes trommel	N/A (system is being reconfigured, no information is available currently on changes in equipment)	Original system designed by Dongara	Recyclable materials and Fuel Products, possible small fraction recovery for organics processing	Reported as 100,000 tpy	Minimal, have run small scale municipal test streams in recent years	N/A	Not applicable. Facility is owned and operated by the private sector. No significant long-term contracts with any municipal jurisdictions are known at this time.					N/A									N/A	MWPwRR,OR	**Recommendation**: do not include on Short-list **Rationale:** • Not in full-time operation. • This facility does offer an option for test runs for MWPwOR, pending the ability of the City to negotiate a suitable arrangement with Canada Fibres • Facility does not utilize a thermal process	Thermal treatment is not recognized as diversion in Ontario.
Regional Municipality of Halifax, Nova Scotia	No	Mirror NS (under contract with the HRM)	Otter Lake Landfill Front End Processing and Waste Stabilization Facility (FEP/WSF)	Otter Lake Landfill, HRM, NS	Canada	1999	Operational	MSW	Residential, Commercial (Note at tip fees of $152/tonne, commercial haulers are diverting waste to lower cost landfill facilities)	Mechanical sorting: large fraction (bulky) to landfill, recyclables removed from the medium fraction of non-organic waste which is then shredded and landfilled, small fraction (organic fraction) sent to WSF for biological stabilization through aerobic composting. recycling recovers white goods/scrap metal, glass bottles, paper fibre.	N/A	N/A	RDF (sent to landfill), white goods/scrap metal, bottles, paper fibres	N/A	140,500 (2011)	Waste is received at the FEP, white goods and scrap metal removed manually for recycling. Other large items also removed and sent to landfill. Waste passes through bag breakers and screened. <500 mm goes to adjoining Waste Stabilization Facility (WSF) building. 50mm - 150mm are shredded and sent to WSF. >150 mm goes over conveyors for final hand removal of any material not acceptable to landfill. Material is aerobically composted in the WSF, once stabilized, material is sent to landfill.	403,000	187,338 (2016)		$73.4/km^2$	-8 to 24 C	320,000 tpy (from residential and commercial sectors) (2012)		Of 140,500 incoming tonnes, 135,600 is landfilled (2011)	HRM is responsible for collection, processing and disposal services offered to the residential sector. IC&I generators are required to divert materials, and have no reasonable options but to use HRM processing infrastructure (HRM by-law No.S-600 provides HRM with legal control of the import and export of waste generated within the municipality).	HRM provides source separated organics (biweekly food and yard waste collection, weekly in the summer in urban/suburban areas), recycling collection (weekly in the City, biweekly in outlying areas) and bi-weekly garbage collection to all residential households. Residents also have access to a special waste depot for management of MHSW, and mobile community MHSW events. HRM offers P&E services with a focus on assisting MFD and IC&I diversion, licenses and monitors diversion of C&D materials, provides audits and education sessions. Residential diversion rate from landfill was 52% (2014). C&D diversion infrastructure is provided in the City by the private sector.	HRM contracts (DBO) for organics processing (owns one composting facility in Halifax, the other in Dartmouth) and recycling processing (owns existing MRF in Halifax). MHSW depot is sited at the MRF property.	Otter Lake - main disposal facility - this is a traditional landfill with LFG capture.	Diversion from landfill through moisture loss and recovery of 1,500 tonnes of recyclables. Less than 3% diverted from disposal. HRM has looked at pilot applications of their RDF in alternative fuel applications.	396 (2013)	N/A	MWPwRR and biostabilization	**Comments:** The role of the Otter Lake Landfill FEP and WSF is to pre-process residual MSW in order to stabilize the material prior to landfilling. Recent studies have questioned the value of the FEP/WSF operation and associated costs, given that the facility recover minimal material for diversion. However, this facility is an integrated component of the HRM disposal infrastructure fulfilling commitments to the community. **Recommendation:** do not include on Short-list **Rationale:** • Size > 100,000 tpy • Facility was commissioned well over 10 years ago, currently operating • Reasonably similar jurisdiction in regards to the urban core of Halifax with comparable source separated diversion programs • However the FEP/WSF is intended to stabilize material destined for landfill, not to recover organic material for diversion • Facility does not utilize a thermal process	Establishment of the Otter Lake Landfill FEP and WSF was intended to reduce volume of waste to extend life of landfill. Development of the WSF was a condition of public acceptance for the previous expansion of the Otter Lake Landfill.
U.S. FACILITIES NOT UTILIZING A THERMAL PROCESS																																		
Sunnyvale, Mountain View, Palo Alto, CA	No	City of Sunnyvale / Bay Counties Waste Services	SMaRT Station	Sunnyvale, CA	USA	1994; upgraded 2008	Operational	MSW, recyclables, LFW, SSO, C&D	Residential, Commercial	Two 40 TPH processing lines each with 12 ft diameter by 60 ft. long trommels, several disc screens, magnets and eddy current separators as well as sorting lines and batch baling lines with walking floor conveyor.	N/A	CP Group	Recyclables, Compost, recovered C&D materials (lumber, concrete etc.)	~330,000	224,000	Trash undergoes a manual sort, goes through a trommel, sorting by size and type with magnets, eddy currents and manual sorting. Residual goes to landfill -Kirby Canyon 650tpd. Yard trim is chipped and composted. Separately collected food waste is co-digested at the Sunnyvale WPCP.	295,478	63,000	49,000	2,384 / km2	10.5C - 17.8C	354,000		~ 156,800 tpy sent to landfill	Municipalities of Sunnyvale, Mountain View, Palo Alto are responsible for collection and processing.	C&D MSW LYW Source separated recycling FoodCycle (food scraps collection)	MWP System MRF Wood and Yard Trimmings Composting	Refuse is compacted and sent to Kirby Canyon Recycling and Disposal Facility (landfill located at on-site) in Morgan Hill - Operated by WM. This landfill is a traditional landfill with no landfill gas program available	44%	1198	unavailable	MWPwRR,OR	**Comments:** Facility anticipated to be renovated to accept more waste, including retrofitting dual stream to accept single stream, in next 3-4 years. **Recommendation**: Short-list **Rationale**: • Size > 100,000 tpy • New infrastructure commissioned just over 10 years ago, currently operating • Smaller jurisdiction with warmer weather. • This facility is one of the few NA facilities that has integrated systems for MSW, recycling, composting, LYW and C&D processing • Facility does not utilize a thermal process	Local landfills at capacity (Palo Alto), municipalities have Zero Waste goals, communities must meet CA legislation including AB 341 (75% recycling goal by 2020), AB 1826 (mandatory commercial composting), AB 32 (reduction of GHG emissions) and SB 1383 (targets for statewide organic disposal reductions).
Newby Island, CA	No	Republic Services Inc.	Newby Island Resource Recovery Park	San Jose, CA	USA	2017	Operational	MSW, recyclables	Residential, Commercial (wet and dry trash, organics, recyclables)	Four processing lines (dry commercial, wet commercial, residential single steam and commercial single steam). Organic fraction is recovered for processing (dry AD followed by aerobic curing).	Mechanical sorting includes: NIHOT Single-Drum Separators BHS Polishing Screen BHS Metering Bins BHS Bag Breaker BHA OCC Separator PRI-MAX Primary Reducers BHS Debris Roll Screens BHS News sorters NRT Multisort IR NRT Spydirs	BHS	Recyclables, Compost and Fuel Products (biogas, heat and power)	381,000 (permitted to accept up to 4,000 tpd)	363,000	Dry materials undergo a series of mechanical and manual sorting steps. Wet materials are sorted and shipped to Zero Waste Energy (partner facility) which also receives feedstock from ICI, and SSO delivered directly to facility. Materials are anaerobically digested and biogas is used as fuel in on-site CHP modules.	1,035,000	301,000		2,251.87 / km2	10C - 22.5C	1,025,000		N/A	City has franchised residential and commercial cart collection services, and contracts for processing and disposal.	City of San Jose provides the following (largely through contracted services): - recyclables processing (single-stream and extracted recyclables from garbage processing) - organics diversion(yard trimmings and organics extracted from garbage processing sent to a composting facility) - Neighborhood Cleanup (NCU) events - curbside junk pickup (mattresses, appliances) - City Council Neighborhood Beautification Days (City reports that 70% of materials collected from NCU, curbside junk pickup and neighborhood beautification days is diverted.)	Four material recovery facilities (MRF) utilized for the City's residential and commercial material are located in north San Jose (GreenWaste Recovery, California Waste Solutions, Newby Island Resource Recovery Park, and Zero Waste Energy Development). Most of the compostable organics from these waste streams, such as food waste, yard waste, and compostable paper, are processed by the Z-Best facility located in southern Santa Clara County. Currently, 12 certified construction and demolition (C&D) waste facilities are located in San Jose, and recycle at least 75 percent of C&D debris. There are currently five landfills serving San Jose with projected capacity to continue operating through 2022.	Residual is transported to Republic's Newby island Landfill, a traditional landfill with LFG recovery.	80% for commercial materials and 95% for residential materials	990 (est based on statewide data)	$55 million (2012 USD) ($73.5 million CAD)	MWPwRR,OR	**Comments:** New facility with recent technology **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • Newer facility, currently operating • Design of the facility is for processing both commercial and residential waste with the organics fraction recovered for secondary processing, intended to achieve high diversion from landfill • Facility does not utilize a thermal process	Communities must meet CA legislation including AB 341 (75% recycling goal by 2020), AB 1826 (mandatory commercial composting), AB 32 (reduction of GHG emissions) and SB 1383 (targets for statewide organic disposal reductions).
Alameda County, CA	No	Waste Management	Davis Street Resource Recovery Complex & Transfer Station	San Leandro, CA	USA	Most recent facility commissioned is the organic material recovery facility in 2018	Operational	MSW	Residential	Dry Waste / C&D MRF includes a mechanical sorting system. Organic Material Recycling Facility is configured to separate the organic fraction and other recyclables from MSW (via conveyors, sorting and access platforms, trommel screens), and to direct the organic fraction to composting and/or AD.	N/A	N/A	Dry Waste / C&D MRF: Clean lumber, metal, concrete, cardboard, paper OMRF: recyclables, compost, biogas	178,000 (Dry Waste / Construction & Demolition MRF) 200,000 + (OMRF)	N/A	Has a SS MRF and an organics mgmt station. Organics managed through a series of conveyors, screens and manual sorting. Food and mixed organics are conveyed to a separate building for mixing with LYW. AD used in first step and methane gas is collectd and blended with LFG at Oyster Bay LFG facility. Digestate aerobically composted.	1,663,000	545,000		710/km2	11C-22C	N/A	N/A	N/A	Not applicable. The facility is a private sector owned and operated facility. The Sanitary district ensures that residential and commercial customers are provided with services at reasonable rates.	Not applicable, the facility is a private sector owned and operated facility. Oakland has robust recycling programs, with mandatory recycling and source separation of organics for MF and ICI.	Material Recovery Facility includes: Appliance/electronics/mattress/tire drop off and recycling. Dry waste and C&D MRF - first high diversion C&D facility which recovers clean lumber, metal, concrete, cardboard, paper etc. Organics transfer, collecting yard waste and food scraps which is transferred for composting at the WM Covered Aerobic Static Pile facility in Marin County. Organics Material Recycling Facility - processes mixed waste to recover recyclables and the organics fraction for further processing. Public Drop-off - for residential access to the above diversion options. ReUse Drop-off - collecting various materials for donation to charity. Landscape Center - for pick up of material (mulch, compost etc.).	Altamont Landfill in Livermore, CA - Traditional Landfill	N/A	N/A	OMRF + adjacent composting facility - >$ 120 million USD (2017) ($160 million CAD)	MWPwRR, OR	**Comments:** New facility (OMRF commissioned in 2018) with recent technology. Part of an integrated resource recovery complex. **Recommendation:** Short-list **Rationale:** • Size > 100,000 tpy • Newer facility, currently operating. • Design of the OMRF facility is for processing MSW with the organics fraction recovered for secondary processing, intended to achieve high diversion from landfill. • Large urban jurisdiction (significant difference in climate) • Facility does not utilize a thermal process	Communities must meet CA legislation including AB 341 (75% recycling goal by 2020), AB 1826 (mandatory commercial composting), AB 32 (reduction of GHG emissions) and SB 1383 (targets for statewide organic disposal reductions).
Anaheim, CA	No	Republic Services Inc.	Republic Services Inc. (Republic Recycling Complex or Taormina Regional MRF)	Anaheim, CA	USA	2015	Operational	MSW, recyclables	Residential, Commercial	Rotary trommels to open bags of MSW. Automated and manual sorting of MSW for further processing.	BHS	BHS	Recyclables	236,000	118,000	Have SS residential and commerical lines and two mixed waste lines. Use trommels, separators, debris roll screens, polishing screens, optical sorters, eddy currents and magnets. Use a Mega Thor Turbo Separator to process 20 tons of SSO per hour. Processed material is taken to a composting facility about 20 miles away - managed through aerated static pile.	352,497	102,300		2,555.2 /km2	13C - 24C	349,000		N/A	City of Anaheim contracts with Republic Services for services including a three-stream collection program, processing and disposal.	Three-stream cart collection program (95-gallon containers): a black container for trash, a green container for recyclable items and a brown container for yard waste. Also offers bulky item collection, and an HHW program. Minimal offerings for waste reduction and reuse.	HHW collection centers, Recycling Centers	N/A	N/A	990 (est based on statewide data)	N/A	MWPwRR	**Comments:** New facility with recent technology **Recommendation:** Do not include on Short-list **Rationale:** • Size > 100,000 tpy • Newer facility, currently operating • Design of the facility is for processing both commercial and residential waste, and a residential waste stream that does not benefit from food waste diversion or advanced reduction/reuse programs - resulting in concerns over waste profile. • The facility does not include organics recovery • Facility does not utilize a thermal process	Communities must meet CA legislation including AB 341 (75% recycling goal by 2020), AB 1826 (mandatory commercial composting), AB 32 (reduction of GHG emissions) and SB 1383 (targets for statewide organic disposal reductions).
ZBEST, California	No	Zanker Recycling	ZBEST Post Consumer Organics Composting	Gilroy, CA	USA	1997	Operational	MSW	Residential, Commercial, Post-consumer organics	Mechanical sorting to remove inorganic materials, shredding, aerobic composting using compost bag technology. Post-compost curing and screening.	Facility looking to change from bag-based composting to aerated static pile system.		Recyclables (paper, wood, plastics, cardboard, mixed paper), compost	~142,000	1,300 - 1,500 tpd	Facility receives post consumer organics, processed to remove non-compostable items, shredded and transported to a composting area where they are ejected into a 350ft long bag that houses all the compostable materials. Facility also manages yard trimmings and aerobically composted in windrows.	NA (merchant facility)	N/A	N/A	377.96/km2	15C- 23C	N/A	N/A	N/A	N/A	Within the ZBest facility all materials are processed in an enclosed 20,000 square foot building to remove non-compostable items. Recyclables are recovered, organics are directed to composting and residues are disposed.	N/A	Not Available as of July 2020	N/A	N/A	N/A	MWPwRR, OR	**Recommendation:** Do not include on Short-list **Rationale:** • Size > 100,000 tpy • Older facility > 10 years, currently operating • Facility is designed to process post-consumer organics, not organics recovered from MSW processing • Facility does not utilize a thermal process	Communities must meet CA legislation including AB 341 (75% recycling goal by 2020), AB 1826 (mandatory commercial composting), AB 32 (reduction of GHG emissions) and SB 1383 (targets for statewide organic disposal reductions).
Placer County, CA	No	Western Placer Waste Management Authority	Placer County Materials Recovery Facility (MRF)	Roseville, CA	USA	1995 upgraded 2015	Operational	MSW	Residential and commercial	Mechanical sorting system (conveyors, magnets, shakers, fines clean-up system, and sorting and access platforms)	Machinex	Machinex	Recyclables (metals (ferrous), plastics, glass, paper)	2,425 tons per day, (MRF is permitted for 2,025 tpd, C&D, wood, green waste @ 400 tpd)	in one quarter 81K through MRF, 58K MSW, 11K green waste, 10K C&D, some wood waste Overall recovery was 40% by the quarter. 25% for MRF, 53% for C&D.	City has a one-bin program. Materials are separated out through a somewhat traditional MRF setup, organic material composted on site and residuals disposed of at onsite landfill.	164,793	N/A	N/A	68/km2	4C-23C	98,000	N/A	Permitted to accept 1,900 tpd. Receives MRF residue, (fines for ADC, or burial)	City collects the waste that is delivered to the Western Placer Waste Management Authority for processing at MRF facility and disposal.	Recycling, HHW, transfer stations, composting operations	Composting, Depots	Western Regional Sanitary Landfill - LFG recovery	N/A	N/A	N/A	MWPwRR	**Comments:** Preprocessing of input wastes streams via MRF to recover recyclables; no organics recovery; small facility **Recommendation:** Do not include on Short-list **Rationale**: • Size < 100,000 tpy • Newer facility, currently operating • Design of the facility is for processing waste from a small community that is very different demographically from the City of Toronto. The Facility's processing capacity would be insufficient for the City's needs; modifications would be required to recover organics • Facility does not utilize a thermal process	Communities must meet CA legislation including AB 341 (75% recycling goal by 2020), AB 1826 (mandatory commercial composting), AB 32 (reduction of GHG emissions) and SB 1383 (targets for statewide organic disposal reductions).

City of Toronto Mixed Waste Processing Study

General MWP Facility Information

Region / Jurisdiction	Use of Thermal Process	Owner / Operator	Facility Name	Location of Facility	Country	Year Commissioned	Current Status	Input Material Stream(s) (MSW, other)	Sources (Residential, Industrial, Commercial, Institutional)	General Technologies Applied (mechanical sorting, biological treatment, fuel production, thermal treatment)	Branded Technology (if applicable)	Technology Provider (if applicable)	Products	Facility Design Tonnes (TPY)	Current Tonnes Managed (TPY)
UNITED KINGDOM FACILITIES NOT UTILIZING A THERMAL PROCESS															
NONE															
EUROPEAN FACILITIES NOT UTILIZING A THERMAL PROCESS															
Valencia, Management Area I, Zonal Plan Zone III and VIII, Spain	No	Entidad Metropolitana de Tratamiento de Residuos "EMTRE" (waste processing company)	Los Hornillos, Waste Treatment Plant and Los Hornillos Composting Plant	Quart de Poblet, Valencia	Spain	2009	Operational	MSW	Residential and medical waste	Mechanical sorting (5 lines, 4 for residential material, 1 for medical waste), organic fraction send to composting (aerobic tunnels), residues to landfill.	N/A	WTT & TAIM WESER (mechanical sort)	Recyclables (paper, cardboard, ferrous and non-ferrous metal, brick, PET, LDPE, HDPE), compost	400,000	N/A
Riga	No	SIA Getlini EKO	Getlini Landfill	Riga	Latvia	1970s landfill. Sorting plant operational since 2015.	Operational	MSW	Residential & ICI	mechanical sorting, biogas production from LFG.	N/A	N/A	Biogas, recyclables, possibly some RDF (unclear)		~300,000
AUSTRALIAN FACILITIES NOT UTILIZING A THERMAL PROCESS															
Wanneroo	No	WA-based superannuation fund Westscheme and SembSITA Australia Pty Ltd./ SUEZ Environnement (formerly SITA)	BioVision 2020 - SUEZ Neerabup BioVision Advanced Resource Recovery Technology Facility	Neerabup, City of Wanneroo, Western Australia	Australia	2017	Operational	MSW	Residential	Bioreactors (Drum composter that is a rotating steel cylinder); trommel; magnets. 2 accelerated composters, 2 primary trommels, 2 ballistic separators, 2 Vibrating screens and 2 pulverisers. The primary compost stays approximately 28 days in the composting floor, where 2 turners agitate the product every 3 days.	Advanced Resource Recovery Technology (ARRT)	Conporec (a Canadian company) supplied composting technology	Recyclables, High quality mixed source compost	100,000	N/A
Tarago	No	Veolia	Woodlawn	Tarago, New South Wales	Australia	2017	Operational	MSW	Residential and Commercial and C&D	Four large rotating bio-drums to commence degradation and prepare materials for separation; bioreactor	Aerokap control process with BioKap (Veolia)	Veolia group	Recyclables, Compost for on-site mine rehabilitation/reclamation.	244,000	144,000
Kemps Creek	No	SUEZ Environnement (formerly SITA)	Kemps Creek SAWT ARRT Facility	Kemps Creek, New South Wales	Australia	2008-2009	Operational	MSW, Biosolids, Contaminated waste, Mixed putrescibles, Non putrescibles	Residential and Commercial	One line is dedicated to processing MSW and small amounts of commercial & industrial waste by separating organic material from the waste using trommels (large rotating cylindrical sieves), then recovering ferrous and non-ferrous metals (mainly aluminium) using overbelt magnets and eddy current separators.Organic materials transferred to digester (24-72 hours), screened to remove plastic bags and metals and then piled into aerated windrows in a covered building. Compost screened after curing, residual sent to landfill.	Advanced Resource Recovery Technology (ARRT)	SUEZ	High quality mixed source compost, Recyclable metals	134,000 - investigating expansion to 220,000 tpy	134,000
MIDDLE-EASTERN FACILITIES NOT UTILIZING A THERMAL PROCESS															
Dubai	No	Imdaad/ FARZ	Farz MRF	Dubai UAE	UAE	2020	Commissioning	MSW	Residential and some IC&I	2 sorting lines - one for household waste, one for ICI waste. Use bag opener, trommel, magnetic separator, ballistic separator, optical separator, smart recovery technologies	N/A	N/A	Recyclable metals, paper and plastics	1,200 tonnes per day ~432,000	N/A
Al Ain	No	Emirates Environmental Technology Co./ DP Cleantech	MRF and Compost Plant in Al Ain	Al Ain	UAE	2006	Operational	MSW	Residential	Mechanical and manual sorting. Composting appears to be open windrow.	N/A	Compost facility managed by Enrich (an irish company)	Compost (marketed under "cultiva"), Recyclables	N/A	1,200 tons daily
Abu Dhabi	No	Tadweer	Abu Dhabi Waste Management Center (Tadweer)	Abu Dhabi	UAE	2008, compost plant built in 2006	operational	MSW	Residential	MSW is processed using manual and automated methods. Plastics are directed to secondary processing where plastics are chopped, shredded, washed and pelletized. Plant material is received and processed separately.	N/A	N/A	Recyclables (metals, plastics), compost	600,000 tons	2,000 tons daily

Demographic Information / **Brief Overview, Municipal Waste Program Information**

Region / Jurisdiction	Process	Population Served	Number of SFD	Number of MFD	Population Density	General Climate Information (avg. min & max temperature, precipitation)	MSW Tonnes Generated - Residential	MSW Tonnes Generated - Other (Commercial etc.)	MSW Tonnes Disposed	Jurisdictions Responsible for service provision (collection, diversion, disposal)	Brief Summary of Current Waste Diversion Programs (recycling, source separated food scrap/organics collection, LYW, other)
UNITED KINGDOM FACILITIES NOT UTILIZING A THERMAL PROCESS											
NONE											
EUROPEAN FACILITIES NOT UTILIZING A THERMAL PROCESS											
Valencia, Management Area I, Zonal Plan Zone III and VIII, Spain	Facility has 4 lines for residential materials - two for the treatment of "all one" fractions, one for separately collected organics and one for "all one" and the rest. "All one" fractions are sorted mechanically and separated into <70 mm which goes to the organic line, 70-190 mm goes to ballistic separators for separation into three more fractions, >190 mm undergoes manual sorting. SSO plus organic matter from MSW goes to 25 composting tunnels.	750,000 (a portion of these residents) (have also seen 1 - 1.2 million)	366,000 (a portion of these households)		5,600 /km2	13C - 21C	N/A	N/A	N/A	N/A	There are a number of ecoparks where residents and businesses may drop-off packing, HHW, bulky waste, rubble, C&D, batteries etc. MSW, organics are not accepted.
Riga	After sorting recyclable materials are sent for further processing. Biodegradable materials are stored with separately collected bio-waste at the landfill in engineered cells, anaerobic process in the cells accelerates biogas production. Biogas is used in an on-site power plant to produce electricity, delivered to the power network and used on-site for heat for offices, hot water, WWTP, and a greenhouse.	Riga - 632K, urban area - 939K, Metro 1.07 million.	N/A	N/A	metro density - 146.7/km/2	-5 C to 17C	N/A	N/A	N/A	Unclear as to how waste is collected. Riga is divided into 4 zones with one company able to serve up to 3, but competition council is involved in this decision.	Recycling depots for some plastics, OCC, paper, glass and batteries. No collection of SSO
AUSTRALIAN FACILITIES NOT UTILIZING A THERMAL PROCESS											
Wanneroo	MSW is shipped 31 km from Perth. The initial MSW material enters a drum composter where it decomposes for 3 days. The material is then ejected from the drum composter and refined using a trommel. This allows the fine composted organics to fall through. A windsifter is then used to remove light contaminants, some of which can be recycled. Materials moved to an indoor/covered composting hall and further matured with forced aeration. Compost is used for resale; some recyclables extracted, ferrous materials extracted, oversized contaminants are removed for disposal. Remaining fine materials are crushed.	500,000 residents	N/A		N/A	8 to 31	N/A	N/A	Tonnes disposed not available. Reported 20% reduction in total amount of waste sent to landfill each year	Curbside responsibilities: City of Wanneroo, City of Stirling, City of Perth, City of Joondalup, Town of Cambridge, City of Vincent, Town of Victoria Park Transfer station/ Reuse Centre responsibilities: Mindarie Regional Council	Curbside collection (single day bulk and tree/shrub) collection; recycling packaging/other; garbage curb collection; drop-off transfer stations; drop-off clean green waste facility, no curbside SSO collection.
Tarago	All waste is transferred by rail from Sydney to Tarago (250 km) and arrives at the tipping floor of the facility. The waste is then combined with air and water in a large rotating drum. Any inorganic and metal materials are separated for recovery and recycling (where possible). The organics are further refined and matured into compost. Compost used for reclamation. Residual sent to bioreactor landfill.	5.23 million	N/A		430 persons per km2	11 to 26 C	65,000 tonnes per year	4,400 TPY (City bldgs and city construction only); 55,000 TPY from C&D; 700,000 TPY from Commercial	750,000 tonnes per year (20% of Sydney's putrescible waste)	City's responsibility to provide curbside pickup	Offer garbage, mixed recycling, organics (optional) curbside collection; large item pick up at curbside (book); e-waste pickup at curbside (book);
Kemps Creek	This facility operates with two different waste streams: food and garden organics and MSW. One processing line is dedicated to processing MSW. This separates organic material from the waste using trommels. Then the materials are passed through overbelt magnets and eddy current separators to remove any metals.Organic materials transferred to digester (24-72 hours), screened to remove plastic bags and metals and then piled into aerated windrows in a covered building. The putrescible fraction of MSW is composted and cured separately from source separated food and garden organics. The compost is screened after curing, residual sent to landfill.	N/A	N/A		N/A	6 to 31 C	31,000 tpa from Penrith City Council; 32,000 tpa from Campbelltown, Camden, Wollondilly, Wingecarribee Councils; 46,000 tpa from Liverpool and Penrith Council contracts; 11,000 tpa from City of Sydney	N/A	55% of incoming material diverted to landfill	Each council offers bin curbside collection systems, transfer stations (aka waste and recycling centres)	Offer green waste pickup (requires booking), curbside garbage and recycling, e-waste drop off. Penrith provides 3 stream curbside collection of Organics (including food and LYW), recycling and garbage.
MIDDLE-EASTERN FACILITIES NOT UTILIZING A THERMAL PROCESS											
Dubai	Once MSW is received in the unloading area, it is sent through 2 shredders that feed into the trommels. There are 2 large trommel screens that divide the input into two different fractions based on size. Valuable fractions between 80-300mm in size are passed on to the next stage of magnetic separation on four different-sized belts. Fractions smaller than 80mm are removed from the process. The four large suspended magnets separate ferrous from non-ferrous. Ferrous waste is pulled by magnets and sent to vibratory feeders, non-ferrous is passed through to separation using eddy currents to ensure there are no ferrous components missed. The waste conveyed by vibro feeders is passed on through optical separators that use near-infrared spectroscopy technology to take out plastic materials. Ballistic Separators are then used to separate waste into 2D fractions and 3D fractions.These are then sent to a baler using the pit conveyor. These baled materials are then loaded onto trucks and shipped out to buyers.Organic waste and inert is diverted and is directly sent to landfill.	3.3 million	2640	N/A	762.6/km2	15 to 41 C, hot dry climate	2.8 million tonnes of waste (2013)	N/A	300,000 tonnes annually	Dubai Municipality is responsible for collection at recycling stations.	Dubai Municipality is responsible for recycling stations. No collection at curb is available unless pay privatized companies to collect
Al Ain	MSW is fed through 2 large machines that break the material down. It is then fed through large drum screens where it is divided into three streams based on size. The smallest particles are assumed to be organic, where it is brought to the composting plant via conveyor belt. A magnet removes any ferrous materials. The remaining waste is carried through manual sorting via a conveyor belt where recycled material is pulled. Over 300 trained supervisors and pickers are used. These recycled materials fall down a chute into piles that are then baled.	N/A	N/A	N/A	N/A	12 to 44 F, hot dry climate	N/A	N/A	30% of processes MSW is disposed as Residue	Al Ain	Curbside recycling, garbage, and organics
Abu Dhabi	Mixed MSW are segregated into several recyclable items using a mixture of manual and automated methods. Green waste (i.e. plant matter, not food waste), received, shredded, composted in open windrows.	N/A	3704	N/A	N/A	12 to 44 F, hot dry climate	N/A	N/A	N/A	Waste management in the Emirate of Abu Dhabi has been a government service provided by municipalities in Abu Dhabi, Al Ain and Al Dhafra region.	N/A

Region / Jurisdiction	Other Processing Infrastructure Used (MRF, Composting, AD, EFW etc.)	Residual Disposal Methodology (e.g. Traditional Landfill, Biocell, Bioreactor, etc.)	Reported Diversion from MWP(wOR)	Per Capita Waste Generation Rate (kg/capita) (Household Waste)	Reported Pricing	Facility Grouping	Comments: Recommendation for Short-listing:	Comments: Rationale for why or why not jurisdiction utilizes thermal treatment.
UNITED KINGDOM FACILITIES NOT UTILIZING A THERMAL PROCESS								
NONE								
EUROPEAN FACILITIES NOT UTILIZING A THERMAL PROCESS								
Valencia, Management Area I, Zonal Plan Zone III and VIII, Spain	400,000 tpy waste processing and composting plant called 'Facility 1'	N/A	N/A	N/A	€2.2 million (2016) and €1.6 million (2016) ($3.5 million CAD and $2.5 million CAD respectively). It should be noted that it is unclear what these numbers are based on and in 2020, these numbers were reported as part of a fraud investigation.	MWPwRR, OR	**Comments:** The treatment plant is located in the municipality of Quart de Poblet (Valencia) and is designed to service integrated townships in Management Area 1 Zonal Plan of Zone III and VIII . It has a treatment capacity of 400,000 t / year and recovers the following products: paper and cardboard, ferrous , aluminum , brick , PET, LDPE , HDPE and compost. The plant consists of a process warehouse , with 5 lines of treatment , where the by-products are recovered , the organic fraction is sent to composting and residuals are separated for landfill disposal. Tunnels are used for composting organic matter which is then matured and refined for the production of fermented compost. **Recommendation**: Short-list **Rationale**: • Size > 100,000 tpy • Commissioned within the past 10 years, currently operating • Services larger urban jurisdiction which does not separately collect and divert food waste • Facility recovers organics fraction for aerobic composting. • Facility uses bio-drying process to produce stabilized MSW • Facility does not utilize a thermal process	The National Waste Law introduced in 1998, introduced separate collection of MSW in all municipalities over 5,000 inhabitants and banned disposal of recyclable materials. There is no national landfill ban. Some regions in Spain have introduced economic incentives to promote waste prevention and separate collection, including a landfill and incineration tax on MSW. In Valencia the landfill tax was €7.5/tonne ($11.8 CAD) for non-hazardous waste (2017).
Riga	Landfill. Recyclables sent off-site for processing.	Biocell / Bioreactor landfill	N/A	436 kg/hhld (2017)	€10.2 million Cdn exchange rate @ 1Euro:1.56CAD ~ $16 million CAD	MWPwRR, RDFR	**Recommendation**: do not include on Short-list **Rationale:** • Size > 100,000 tpy • Some infrastructure commissioned within the past 10 years, currently operating. • Some recovery of organic and recycling of metals, construction materials and plastics from raw feedstock. • Reports suggest some RDF potentially disposed of via local cement kiln. • Energy recovery at site from landfill gas engines generating electricity and heat for greenhouses growing food for resale • Facility does not utilize a thermal process	Latvia is subject to the EU Landfill Directive, but has not yet met its targets. Developing WTE is being considered as a way to meet targets and reduce dependence on fossil fuels. The government is considering development of a WTE facility with a treatment capacity of 11,000 tpy of RDF. Landfilling has been the primary disposal method for many years. In 2015, 62% of MSW was landfilled and 29% recycled/recovered. The Getlini landfill may assist Latvia in meeting its targets if the amount diverted is eligible to be counted as diverted.
AUSTRALIAN FACILITIES NOT UTILIZING A THERMAL PROCESS								
Wanneroo	MRF, traditional landfill, Wangara Greens Recycling Facility	Traditional landfill	Recovers approximately 70% of material	2.2 tonnes per capita	$80 million AUD Cdn exchange rate @ 1AUD:0.95CAD ~$76 million CDN	MWPwOR RR	MWP processed in a rotating drum to breakdown the waste. Crude compost sorted and screened to remove large or inorganic particles, including metals. Remaining material composted. Technology may work well in hot climates but unlikely to work as well in a colder climate. **Recommendation:** Do not include on Short-list **Rationale:** • Size ~ 100,000 tpy • New infrastructure commissioned within last 10 years, currently operating • Technology used does not result in high quality organics product • Climate very dissimilar - affects feedstock and how effectively technology operates • No separate curbside SSO program	MWP only extracts organics to be anaerobically composted plus a minimal amount of recyclables. All other items are sent to landfill. Australia has set a target of 80% resource recovery rate from all waste streams. Target to increase use of recycled content by governments and industry signficantly. In addition, Australia looks to halve the amount of organic waste sent to landfill by 2030.
Tarago	N/A	Bioreactor; Landfill	N/A	2.2 tonnes per capita	$100 million AUD Cdn exchange rate @ 1AUD:0.95CAD ~$96 million CDN	MWPwOR RR	Compost is used for reclamation. No curbside SSO program. Use an MBT facility and bioreactor landfill to manage ~ 20% of Sydney's waste. Technology may work well in hot climates but unlikely to work as well in a colder climate. **Recommendation:** Do not include on Short-list **Rationale:** • Size ~ 100,000 tpy • New infrastructure commissioned within last 10 years, currently operating • Technology used does not result in high quality organics product • Climate very dissimilar - affects feedstock and how effectively technology operates • Curbside SSO program is optional	Help councils of Sydney meet their targets to divert 70% of waste away from landfill by 2021. Australia has set a target of 80% resource recovery rate from all waste streams. Target to increase use of recycled content by governments and industry signficantly. In addition, Australia looks to halve the amount of organic waste sent to landfill by 2030.
Kemps Creek	Currently investigating recovery of plastics, with possibilities for reuse including processing into pelletised plastics or processed engineered fuels.	Engineered landfill with landfill gas recovery	N/A	2.2 tonnes per capita	$49 million AUD Cdn exchange rate @ 1AUD:0.95CAD ~$47 million CDN	MWPwOR RR	Expansion of facility considered to process up to 220,000 tpy and to recover plastics with either pelletizing or creating RDF. Organics processing technologies may work well in hot climates but unlikely to work as well in a colder climate. **Recommendation:** Do not include on Short-list **Rationale:** • Size ~ 100,000 tpy • New infrastructure commissioned within last 10 years, currently operating • Technology used does not result in high quality organics product • Climate very dissimilar - affects feedstock and how effectively technology operates • Separate curbside SSO program in one municipal jurisdiction supplying MSW	Australia has set a target of 80% resource recovery rate from all waste streams. Target to increase use of recycled content by governments and industry signficantly. In addition, Australia looks to halve the amount of organic waste sent to landfill by 2030.
MIDDLE-EASTERN FACILITIES NOT UTILIZING A THERMAL PROCESS								
Dubai	Plastic processing plant -One crushing & washing Line and one pelletizing extruder to treat HDPE and PP with a capacity of 25 tons/day -One crushing & washing Line and one pelletizing extruder to treat LDPE with a capacity of 25 tons per day -One crushing & washing Line to treat PET flakes with a capacity of 25 tons per day	Landfill	13% diversion from the garbage stream	2.5 kg/person	80 million AED Cdn exchange rate @ 1 AED: 0.36 CAD ~ $29 million CDN	MWPwRR	**Recommendation:** Do not Include on Short-list **Rationale:** • Size > 100,000 tpy • Facility is recently commissioned • Climate and population very dissimilar • No separate organics collection • Is essentially just a MRF • No organics recovery	Dubai's Vision 2021 objective is to recycle and reuse 75% of waste currently going to landfills. Dubai's vision is similar to UAE's national agenda which is to reduce the landfill by 75% by 2021.
Al Ain	N/A	Landfill	15% recycling rate	N/A	N/A	MWPwOR, RR	Comment: 2 large WTE plants proposed to be constructed. 600K tpy facility to be located in Al Ain. **Recommendation:** Do not Include on Short-list **Rationale:** • Size > 100,000 tpy • Facility has been operating for > 10 years • Climate and population very dissimilar • No separate organics collection • Organics processing by open windrow	UAE's national agenda is to reduce the landfill by 75% by 2021.
Abu Dhabi	N/A	N/A	20% recycling rate due to high contamination from Dubai	N/A	N/A	MWPwOR, RR	Comment: Mention of future plans for projects concerning RDF, bio-gas and WTE. **Recommendation:** Do not Include on Short-list **Rationale:** • Size > 100,000 tpy • Facility has been operating for > 10 years • Climate and population very dissimilar • No separate organics collection • Green waste materials (e.g. yard waste) processing by open windrow	UAE's national agenda is to reduce the landfill by 75% by 2021.

Facility Name	Current Status	Sources (Residential, Industrial, Commercial, Institutional)	General Technologies Applied (mechanical sorting, biological treatment, fuel production, thermal treatment)	Branded Technology (if applicable)	Products	Facility Design Tonnes (TPY)	Current Tonnes Managed (TPY)	Process	Population Served	Number of MFD	Population Density	MSW Tonnes Generated - Residential	MSW Tonnes Generated - Other (Commercial etc.)	MSW Tonnes Disposed	Jurisdictions Responsible for service provision (collection, diversion, disposal)	Brief Summary of Current Waste Diversion Programs (recycling, source separated food scrap/organics collection, LYW, other)	Other Processing Infrastructure Used (MRF, Composting, AD, EFW etc.)	Residual Disposal Methodology (e.g. Traditional Landfill, Biocell, Bioreactor, etc.)	Reported Diversion from MWP(woR)	Per Capita Waste Generation Rate (kg/capita) (Household Waste)	Reported Pricing	Comments: Rationale for why or why not jurisdiction utilizes thermal treatment.	General References
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