IRM Facility Tour Plan

Capital Regional District

Advanced Integrated Resource Management (IRM) Project

August 23, 2017

1. Introduction

On June 28, 2017 the Integrated Resource Management Advisory Committee (IRMAC) recommended to the CRD Environmental Services Committee that five key deliverables be prepared and delivered for the September IRMAC meeting, based on the staff report entitled the *Advanced Integrated Resource Management, Next Steps* and the presentation that was provided regarding the IRM Road Map. These recommendations were approved by the Environmental Services Committee on June 28th, 2017 and subsequently by the CRD Board. One of these five key deliverables is an IRM Facilities Tour Plan.

The following describes the proposed IRM Facilities Tour Plan. Within the IRM RFEOI report, it was identified that consideration should be given to undertaking facility tours of a representative sample of technologies and vendors. Facility tours have the potential to flesh out understanding of a technology, over a shorter timeline and for a lower overall cost compared to undertaking a pilot study. It was recommended that facility tours not be undertaken on an ad-hoc basis, but in a strategic fashion with specific information targets in mind.

This Facilities Tour Plan has been developed considering the outcome of the IRM RFEOI process, experience of the HDR team in arranging and conducting similar tours, feedback from CRD Staff and in consideration of other documents prepared and/or provided in support of the IRM process (e.g. presentation and report for the City of Sidney Advanced Waste Treatment Master Plan).

2. Tour Goals and Objectives

The Goals and Objectives for the Facility tour are as follows:

- Gather additional first-hand information regarding the performance of key technologies and approaches, including: understanding of the success in managing various feedstocks similar to CRD materials; facility design and facility operations.
- Further CRD's understanding of the rationale and primary drivers that facility owners/operators in other jurisdictions considered when selecting their advanced integrated resource management technology or technologies.
- Develop a better understanding of the successes and issues that have been experienced with actual implementation of technologies in other jurisdictions.
- Further CRD's understanding of the procurement and ownership models applied by other jurisdictions and the successes and/or challenges that other municipalities have experienced in their application.
- Develop a better understanding of the range of finished products that can be generated by these technologies and of the market drivers or conditions that have contributed to the success (or issues) associated with facilities similar to those considered by the CRD.

- Observe how these facilities currently interact with the local environment and community, including the measures implemented for emissions control, odour management and other potential effects that can be of local concern.

Overall, the outcome of the Facility tour will result in the gathering of key information that will be used to support development of the Request for Pre-Qualification (RFPQ) for an advanced IRM solution(s) for the CRD. This information will support decision making in the process of developing and finalizing the RFPQ, including refining the focus of the technologies qualification aspects of the RFPQ as well as focusing the approach used to qualify the proponent team that would be responsible for the design/engineering, construction and operation of any IRM facility.

As a result, the Facility Tour is considered as a preceding activity supporting the procurement process. For that reason, the tour and interactions with various parties during the tour will be carefully documented and reported. Arrangements for the tour will be undertaken by designated CRD points of contact. Questionnaires and documentation will be consistent in content and approach, and all discussions during the tour will be observed and recorded as appropriate. The CRD will also seek agreement from the technology provider and/or lead entity that has been identified for the technology interested in advancing an IRM solution to the CRD, to agree that they will comply with the CRD's requirements of Conduct, No-Contact and Anti-lobbying provisions prior to the tour. The Fairness Advisor engaged by the CRD would be provided with the tour documentation for review as part of their engagement in the procurement process.

3. Proposed IRM Facilities Tour Plan

3.1 Identification of a Comprehensive List of Potential Facilities of Interest

The following comprehensive list of facilities of interest is based on the reference facilities as identified by the RFEOI respondents as well as other facilities of which HDR is aware based on other similar tours undertaken by HDR over the past five years as well as information presented in previous reports to the CRD or developed elsewhere regarding the current state of biosolids and waste treatment technologies. This list does not include all facilities located across the world, but a significant cross-section of technologies (thermal, biological, and mechanical) which process a range of feedstock, that could contribute to an IRM solution for the CRD. Of interest are facilities that currently process similar tonnages of similar solid and liquid waste materials as noted in the IRM RFEOI:

1. 35,000 tonnes per year of Class A biosolids;
2. 120,000 to 135,000 tonnes per year of general municipal refuse;
3. 8,000 to 12,500 tonnes per year of controlled waste (including screenings and sludge from existing wastewater plants);
4. 15,000 to 20,000 tonnes per year of source separated household organics (kitchen scraps and compostable paper, not including yard and garden wastes); and,
5. 15,000 to 18,000 tonnes per year of yard and garden wastes.

In addition, the CRD has also maintained the option that the IRM facility could also accept up to 50% of the raw sewage sludge generated in the CRD, ranging up to 55,429 kg-TS/day (Peak 10-day year McLoughlin Residual Solids load).

As noted in the comprehensive list, there are few facilities that currently process all of the potential solid and liquid waste feedstock of interest to the CRD. It is likely that an IRM solution would require co-location or a combination of technologies to address the full spectrum of CRD materials. Consequently, the selection of facilities for the tour will focus on those facilities that demonstrate capability of managing more than one feedstock and/or represent the co-location of multiple processing technologies at a single site.

Table 1A Comprehensive List of Potential Facilities of Interest – North American

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[1]	Feedstock Streams	Ownership / Operational Entity	Location
NORTH AMERICAN FACILITIES						
ARK Power Dynamics	ARK Arkansas	Thermal: ARK Electro-thermo-chemical reaction	3 tpd (1,100 tpy), operating since 2012 as demonstration & testing pilot site	Chicken litter and woody waste	Owned and operated by ARK Power Dynamics	Stamps, Arkansas
Net Zero Waste, Walker Environmental Group	CH Four Seabreeze Farms Digester	Biological: Anaerobic Digestion, digestate processing to recover materials	40,000 tpy , operating since 2014	20,000 tpy food waste and commercial organics, 20,000 tpy of on-farm dairy waste	Owned and Operated by Seabreeze Farms	Delta, BC
Net Zero Waste, Walker Environmental Group	Abbotsford B.C.	Biological: indoor, covered GORE composting	15,000 tpy, operating since 2012	Curbside SSO and Commercial organics	Owned and operated by Net Zero Waste Abbotsford Inc.	Abbotsford, BC
Net Zero Waste, Walker Environmental Group	Sea to Sky Soils Compost Facility	Biological: indoor, covered GORE Composting	5,000 tpy, operating since 2013	Commercial food waste	Owned and operated by Sea to Sky Soils	Pemberton, BC
Net Zero Waste, Walker	Walker Environmental	Biological: outdoor covered Gore Composting	75,000 tpy, operating since 2008	35,000 tpy of SSO and 40,000	Owned and operated by Walker	Thorold, ON

[1] Facility sizes are as reported in published information, tpy indicates tonnes per year, tpd indicates tonnes per day, tph indicates tonnes per hour. Where possible, a conversion of reported values in tpd or tph to tpy are provided in brackets to allow for size comparison, however, this does not represent actual tonnages processed which would vary based on actual operations.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[1]	Feedstock Streams	Ownership / Operational Entity	Location
NORTH AMERICAN FACILITIES						
Environmental Group		Note: NViro Biosolids Stabilization facility is located at same site		tpy of leaf and yard waste	Environmental Group	
Ostara (Note: sub-set of 14 reference facilities)	Durham AWWTP	Biological: Nutrient Recovery from biosolids post-digestion liquor	80 ML/d, operational since 2009	Post-digestion liquor from dewatered biosolids	Clean Water Services	Tigard, OR
Ostara (Note: sub-set of 14 reference facilities)	Rock Creek, AWWTP	Biological: Nutrient Recovery from biosolids post-digestion liquor	150 ML/d, operational since 2012	Post-digestion liquor from dewatered biosolids	Clean Water Services	Hillsboro, OR
Ostara (Note: sub-set of 14 reference facilities)	HM Weir WWTP	Biological: Nutrient Recovery from biosolids post-digestion liquor	80 ML/d, operational since 2013	Post-digestion liquor from dewatered biosolids	City of Saskatoon	Saskatoon, SK
Ostara (Note: sub-set of 14 reference facilities)	Gold Bar/Clover Bar	Biological: Nutrient Recovery from biosolids post-digestion liquor	300 ML/d, operational since 2015	Post-digestion liquor from dewatered biosolids	EPCOR Water Services	Edmonton, AB
ICC Group	ZWE Dry Fermentation Facility	Biological: Dry (High solids, stackable) Anaerobic Digestion	90,000 tpy, operational since 2013	Mixed Solid Waste	Green Waste Recovery/Zanker Road Resource Management Ltd., under 15 year contract with the City of San Jose	San Jose, CA
Engineered Compost Systems (ECS)	LRI/The Compost Factory	Biological: In-vessel composting	Up to 63,500 tpy, operational since 1998	Yard waste, Commercial food waste	Owned and operated by	Puyallup, WA

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[1]	Feedstock Streams	Ownership / Operational Entity	Location
NORTH AMERICAN FACILITIES						
					Waste Connections Inc.	
Engineered Compost Systems (ECS)	Lenz Enterprises	Biological: In-vessel composting	54,000 tpy, operational since 2006	Curbside and commercial food waste, yard waste, slaughter house paunch and manure	Owned and operated by Lenz Enterprises	Stanwood, WA
Engineered Compost Systems (ECS)	Kelowna/Vernon Compost Facility	Biological: In-vessel composting	120,000 tpy	Biosolids and yard waste	Owned by Cities of Kelowna and Vernon, Operated by City of Kelowna	Kelowna, BC
Veolia	Gresham WWTP	Biological: Co-digestion of FOG and Food Waste with biosolids	12,500 gpd FoG and Food waste pretreatment system, full-scale co-digestion in operation since 2015	FOG, pre-consumer food waste	Owned by City of Gresham, operated by Veolia	Gresham, Oregon
Pivotal	Gussing Oberwart Ulm Villach Woodland #1 Goteborg #1	Thermal: FICFB advanced biomass gasification	5 (Woodland) to 200 tpd (Goteborg) (2,000 to 73,000 tpy), Gussing operational since 2002	Woodchips	Privately owned and operated	Various EU locations, Woodland in California USA
Pivotal	Burgeis Cherasco Woodland #2	Thermal: CircleDraft advanced biomass gasification	6 to 11 tpd (2,200 to 4,000 tpy) Cherasco	Woodchips, Cheraso has run trials with 50%	Privately owned and operated	Italy and California USA

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[1]	Feedstock Streams	Ownership / Operational Entity	Location
NORTH AMERICAN FACILITIES						
			operational since 2009	wood chips, 50% manure		
Waste Treatment Technologies (WTT)	Surrey Biofuels Processing Facility	Biological: Dry Anaerobic Digestion	115,000 tpy, scheduled to begin operations in 2017	Organic material	Owned by City of Surrey, Operated under DBOM by Orgaworld	Surrey, BC
Bulk Handling Systems (mechanical treatment)	Newby Island Resource Recovery Park	Mechanical Biological Treatment (recyclables and organics recovery)	1,500 tpd, operating since 2012	Commercial Organics (mixed waste and source separated)	Republic Services	Mipitas, CA
Bulk Handling Systems (mechanical treatment)	IREP Montgomery	Mechanical Biological Treatment (recyclables and organics recovery), some unique pre-processing equipment, Composting of organic fraction	Up to 225,000 tpy, operated from 2014 to early 2017 (currently inactive)	Mixed Solid Waste, Single Stream Recyclables	Infinitus (IREP)	Montgomery, AL
	Vancouver Island University Biosolids Forest Fertilization Project	Application of biosolids on forest sites	NA	Biosolids	VIU	Regional District of Nanaimo, BC
	Sechelt Mine Reclamation Project	Application of biosolids in mine reclamation	Reclamation project inception in 1998	Biosolids (Powell River, Gibsons, District of Sechelt), Pulp and Paper	Lehigh Hansom Materials Ltd.	Sunshine Coast, BC

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[1]	Feedstock Streams	Ownership / Operational Entity	Location
NORTH AMERICAN FACILITIES						
				Residuals, Water Treatment Residuals		
PGH Energy	Covington	Thermal: Updraft Fixed Bed Gasification	10 tpd (3,600 tpy) wood waste, 2 tpd (700 tpy) sewage sludge, in operation since 2013	Wood waste, sewage sludge	Municipally owned, operating contract with PGH	Covington, Tennessee
PGH Energy	Lebanon	Thermal: Updraft Fixed Bed Gasification	64 tpd (23,300 tpy), in operation since December 2016	Scrap wood, tires, sewage sludge	Municipally owned, operating contract with PGH	Lebanon, Tennessee
N-Viro Soil Process, Walker Environmental	Sarnia WPPC	Chemical: Flash lime stabilization	60 wet tpd (21,900 tpy), in operation since 2001	Sewage sludge	Municipally owned and operated	Sarnia, ON
N-Viro Soil Process, Walker Environmental	Walker, Niagara	Chemical: Flash lime stabilization	In operation since 2007	Dewatered Biosolids	Privately owned and operated under P3 agreement with the Region of Niagara	Thorold, ON
Agrinz Technologies	Woolwich Bio-En Facility	Biological: Food waste depackaging, Wet Anaerobic Digestion	70,000 tpy, in operation since 2014	Commercial food waste (could accept undigested sludge)	Privately owned and operated by Bio-En	Elmira, ON

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[1]	Feedstock Streams	Ownership / Operational Entity	Location
NORTH AMERICAN FACILITIES						
Covanta	Durham York Energy Center	Thermal: WTE	125,000 tpy In operation since 2015	Mixed Solid Waste	Owned by the Regions of Durham and York, Operated under contract by Covanta	Durham Region, Ontario
Babcock & Wilcox	Renewable Energy Facility 2	Thermal: WTE (first new WTE built in USA in past 15 years)	907,000 tpy, In operation as of June 2015	Mixed Solid Waste	Owned by municipal Solid Waste Authority of Palm Beach County, operated by private company	Palm Beach, Florida
Sierra Energy	Fort Hunter Liggett Base Demonstration Facility	Thermal: Gasification	20 tpd (7,300 tpy), Currently in Commissioning	Mixed Solid Waste, Biomass	Owned by US Military, operated by Sierra Energy	Fort Hunter Liggett Base, near Davis, CA

Legend	
Biological Facilities	
Mechanical (and Biological) Treatment Facilities	
Thermal Facilities	
Chemical Treatment Facilities	

Table 1B Comprehensive List of Potential Facilities of Interest – Overseas Facilities

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Anaergia	Kaiserslautern	Mechanical Biological Treatment: Mixed Waste Processing to extract organics and recover RDF with unique front end OREX system, high-solids Anaerobic Digestion	100,000 tpy, in operation since 2007	Mixed Solid Waste	Owned and operated by ZAK Municipal Solid Waste Corporation (waste utility)	Kaiserslautern, Germany
Anaergia	Vereco SIA	Mechanical Biological treatment: mixed waste processing to extract organics fraction for anaerobic digestion, recovery of recyclables	50,000 tpy, in operation since 2013	Mixed Solid Waste	Owned and operated by Dzintas Avots	Ventspils, Latvia
Anaergia	Degenham	Mechanical Biological treatment: Pre-treatment, Anaerobic Digestion, Composting of remaining solids	50,000 tpy, in operation since 2014	Food Waste	Owned and operated by TEG Biogas Ltd.	Degenham, England

[2] Facility sizes are as reported in published information, tpy indicates tonnes per year, tpd indicates tonnes per day, tph indicates tonnes per hour. Where possible, a conversion of reported values in tpd or tph to tpy are provided in brackets to allow for size comparison, however, this does not represent actual tonnages processed which would vary based on actual operations.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Veolia	Brussels North WWTP	Thermal: Athos, hydro-thermal oxidation	2 Athos wet air oxidization units, 8m3/h, In operation since 2008	Biosolids	Owned by Brussels – Capital Region, Operating contract 2008 to 2028	Brussels, Belgium
Veolia	MBA Rostock	Mechanical Biological treatment: recovery of recyclables and organic fraction, Dry Anaerobic Digestion	135,000 tpy, in operation since 2008	Mixed Solid Waste	Owned and operated by Veolia	Rostock, Germany
Veolia	Essenheim	Biological: Dry Anaerobic Digestion	48,000 tpy, in operation since 2012	Green Waste (leaf & yard), Organic Waste	Owned by Municipal corporation, Operated by Veolia	Essenheim, Germany
Veolia	UTE TEM	Mechanical Biological Treatment, and Thermal Processing: mechanical treatment to recover recyclables, organic fraction, RDF	190,000 tpy (MBT), AD 35,000 tpy, Composting 41,000 tpy, 160,000 tpy incinerator, in operation since 2009	Mixed Solid Waste, Industrial Waste	Owned by Municipal Corporation, Operated by Veolia	Mataro, Barcelona, Spain
Veolia	Graincourt-les-Havrincourt	Biological: pre-treatment to remove packaging, wet Anaerobic Digestion	50,000 tpy, in operation since 2012	Municipal organics, organics from food and beverage industries	Owned and operated by SEDE Environnement – a subsidiary of Veolia	Graincourt-les-Havrincourt, France

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Veolia	Rostock MBT plant	Mechanical Biological Treatment: mechanical treatment to recover recyclables, organic fraction, SRF. Dry Anaerobic Digestion	195,000 tpy, in operation since 2005	Municipal Solid Waste	Owned by Municipal Corporation, operated by Veolia	Rostock, Germany
Pivotal	Gussing Oberwart Ulm Villach Woodland #1 Goteborg #1	Thermal: FICFB advanced biomass gasification	5 (Woodland) to 200 tpd (Goteborg) (2,000 to 73,000 tpy), Gussing operational since 2002	Woodchips	Privately owned and operated	Various EU locations, Woodland in California USA
Pivotal	Burgeis Cherasco Woodland #2	Thermal: CircleDraft advanced biomass gasification	6 to 11 tpd (2,200 to 4,000 tpy) Cherasco operational since 2009	Woodchips, Cheraso has run trials with 50% wood chips, 50% manure	Privately owned and operated	Italy and California USA
Redwave	MBS Westerwald	Mechanical Biological Treatment: Mixed Waste Processing	100,000 tpy, in operation since 2000	Mixed Solid Waste	Owned and operated by Municipal Corporation (MBS Anlage Westerwald)	Westerwald, Germany
Redwave	ZAB Nuthe Spree	Mechanical Biological Treatment: Mixed Waste Processing, Anaerobic Digestion	135,000 tpy, in operation since 2006	Mixed Solid Waste, Bulky Waste	Owned and operated by Municipal Corporation (ZAB)	Near Berlin, Germany

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Redwave	Ekokem	Mechanical Biological Treatment: Mixed Waste Processing, Anaerobic Digestion	100,000 tpy, in commissioning as of 2017	Mixed Solid Waste	Owned and operated by Ekokem	Ekokem, Finland
Redwave	MBT Lianyungang	Mechanical Biological Treatment: with RDF recovered for Incineration	274,000 tpy, under construction	Mixed Solid Waste		Lianyungang, China
Redwave	Biomass Plant Stausebach	Biological: Anaerobic Digestion	30,000 tpy, in operation since 2014	Source Separated Organics	Operated by EAM Natur GmBH	Stausebach, Germany
Waste Treatment Technologies (WTT)	Alytus	Biological: Dry Anaerobic Digestion	21,000 tpy, in operation since 2015	Municipal Solid Waste	Owned and operated by Municipal Corporation (Alytus Region)	Alytus, Lithuania
Waste Treatment Technologies (WTT)	Cambridgeshire	Mechanical Biological Treatment	170,000 tpy, operational since 2010	Municipal Solid Waste	Donarbon Ltd.	Cambridgeshire, England
Waste Treatment Technologies (WTT)	Kaunas	Mechanical Biological Treatment	220,000 tpy, operational since 2015	Municipal Solid Waste	RTS Infrastructure	Kaunas, Lithuania
Waste Treatment Technologies (WTT)	Leeds	Mechanical Biological Treatment	214,000 tpy, operational since 2016	Municipal Solid Waste	Veolia Environmental Services	Leeds, England

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Waste Treatment Technologies (WTT)	Mondragon	Biological: Composting	33,000 tpy, operational since 2007	Sewage Sludge	NEOS	Mondragon, France
Waste Treatment Technologies (WTT)	Southwark	Mechanical Biological Treatment	87,500 tpy, operational since 2012	Municipal Solid Waste	Veolia Environmental Services	Southwark, London, England
Organic Waste Systems (technology provider for high solids Anaerobic Digester)	SMET, Chagny	Mechanical Biological Treatment: Biodrying of waste, mechanical Treatment to extract organics and recyclables, dry Anaerobic Digestion of organic fraction	81,000 tpy, plant commissioned in Spring 2015	Mixed Solid Waste, Green Waste	Municipal Solid Waste Corporation (waste utility), TIRU SA has 5-year DBOM operating contract for facility	Chagny, France
3WAYSTE	ALTRIOM	Mechanical Biological Treatment: to extract organics and recyclables, some unique front end equipment, composting of organic fraction, generates RDF	120,000 tpy, (currently ramping up tonnages as other contracts expire for municipalities in host jurisdiction), in operation since June 2014	Mixed Solid Waste	Contracted DBOOM by local Municipal Solid Waste Authority	Polignac, France
Veolia Water Solutions and	Passau	Biological: Horizontal Dry Anaerobic Digestion (Kompogas	44,000 tpy, in operation since 2004	Residential kitchen/garden biowaste	Owned and operated by Municipal Solid	Aussernzell, Germany

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Technologies Canada		technology), composting of solid digestate			Waste Corporation (waste utility)	
Miller Waste Systems (North American representative for FITEC technology)	Rothmuhle Biogas Plant	Mechanical Biological Treatment: extract organic fraction using unique FITEC technology, wet Anaerobic Digestion	30,000 tpy for FITEC system and wet AD. Retrofit in operation since 2015.	Municipal Food Waste, Leaf & Yard waste, Pet waste, commercial food waste	Owned and operated by Municipal Solid Waste Corporation (waste utility)	Rothmuhle, Bergrheinfled, Germany
Organic Waste Systems (technology provider for AD portion of system)	Munster	Mechanical Biological Treatment: extract organics and recyclables, high solids Anaerobic Digestion of fine organic fraction, composting of large organic fraction	118,000 tpy, plant operating since 2005	Mixed Solid Waste, Industrial Waste	Owned and operated by Municipal Solid Waste Corporation (waste utility)	Munster, Germany
Orgaworld Canada Ltd. (technology provider for AD portion of system)	SBI-Omrin	Mechanical Biological Treatment: extract organics and recyclables and recover RDF, wet Anaerobic Digestion of organic fraction	230,000 tpy, plant operating since 2002	Mixed Solid Waste, Commercial Waste	Owned and operated by a Municipal Solid Waste Corporation (waste utility)	Oudehaske, Netherlands

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
BPD Industries (facility Engineer was Veolia)	SYDEC, Mont De Marsan Biosolids Composting Facility	Biological: Composting (agitated bay)	50 tpd dewatered biosolids and 50 tpd green waste (36,500 tpy total) operating since 2005	Dewatered Biosolids, Green Waste (Yard Waste)	Owned and operated by a Municipal waste water utility (SYDEC)	Mont De Marsan, France
Kopf (Demonstration Facility)	Balingen Gasification Demonstration	Thermal: Bubbling Fluidized bed Gasification	0.22 dry tph (2,000 tpy) since 2010	Dried biosolids	Municipal Waste water Utility	Balingen, Germany
Kopf (Commercial Installation)	Mannheim	Thermal: Bubbling Fluidized bed Gasification	0.57 dry tph (5,000 tpy), commissioned in 2010	Dried biosolids	Municipal Waste water Utility	Mannheim, Germany
Veolia	Battlefield Energy Recovery Facility	Thermal: WTE (part of integrated facility to manage HHW, Recycling, and Compostables)	90,000 tpy, In operation since May 2015	Residual Mixed Solid Waste, Recyclables, organics	Owned and operated by Veolia, under contract with the local municipal government	Shropshire, UK
AVR	AVR Rotterdam	Thermal: WTE (includes district heating system)	In operation more than five years	Residual Mixed Solid Waste, paper sludge. organics	Owned and operated by AVR, a private company	Rotterdam, Netherlands
Babcock & Wilcox	Copenhill / Amager Bakke	Thermal: WTE (district heating system, water and ash recovery)	70 tph (400,000) tpy, In operation as of 2017	Residual Mixed Solid Waste	Owned by a Municipal Corporation (ARC)	Copenhagen, Denmark
Repotec	GoBiGas, Goteborg Energi facility	Thermal: FICFB Gasification, renewable gas grid injection	100,000 tpy, as of 2013 (Phase 1)	Biomass (low quality pulpwood and	Municipally owned Energy Utility	Gothenburg, Sweden

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
				forestry residues)		
Metso	Kylmajarvi 2	Thermal: Fluidized bed Gasification, cogeneration/district heating	250,000 tpy, In operation since 2012	Pre-processed MSW (Solid Recovered Fuel)	Municipally owned Energy Utility	Lahti, Finland
Ebara	Aomori	Thermal: Fluidized bed Gasification, Ash melting	160,000 tpy, in operation since 2000	MSW, Industrial Waste, sewage sludge	Owned and operated by Ebara, a private company	Aomori, Japan
Thermoselect	Chiba City Recycling Centre	Thermal: High Temperature Gasification, Ash melting	94,000 tpy, in operation since 2000	MSW, facility includes extensive pre-sort/pre-processing of waste prior to gasification	Owned and operated by JFE, a private company	Chiba City, Japan
Thermoselect	Mutsu Industrial Waste Gasification facility	Thermal: High Temperature Gasification, Ash melting	50,000 tpy, in operation since 2003	MSW, facility includes extensive pre-sort/pre-processing of waste prior to gasification	Owned by Sumokita Local Authority	Mutsu, Japan
Alter NRG	Mihama-Mikata Municipal Waste Gasification Facility	Thermal: Plasma Gasification	10,000 tpy, in operation since 2002	MSW	Owned and operated by Hitachi Metals, a private company	Mihama, Japan

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations[2]	Feedstock Streams	Ownership / Operational Entity	Location
OVERSEAS FACILITIES						
Alter NRG	Tees Valley Renewable Energy Facility	Thermal: Plasma arc Gasification	350,000 tpy, Project Cancelled	MSW	Was to be owned and operated by Air Products, a private company	Teesside urban area, UK
Advanced Plasma Power (APP)	Tyseley Gasplasma project	Thermal: Plasma arc Gasification	35,000 tpy, Project in Development	Pre-processed MSW	Owned and operated by APP, a private company	Birmingham, UK

Legend	
Biological Facilities	
Mechanical (and Biological) Treatment Facilities	
Thermal Facilities	
Chemical Treatment Facilities	

3.2 Selection Criteria

In order to determine the preferred facilities to be included in an IRM facility tour, selection criteria have be applied to the long-list of facilities of interest to narrow the field of candidate locations.

The technology/facility specific criteria reflect the type of screening criteria that would be applied in a technology RFPQ, but would not be applied in as stringent a manner given that the facilities tour would be undertaken in advance/in parallel with the early stages of the IRM procurement.

The proposed technology/facility specific selection criteria are as follows:

a) Facility should be owned by a municipality or municipal corporation. While there would be preference that the facility is also operated by a municipality or municipal corporation, it would be reasonable to allow for facilities that are operated under contract between the private sector and the municipal entity. This criteria is proposed as the approach to undertaking technology selection, feedstock identification, service delivery models (e.g. ownership, operations) and procurement processes for a municipally owned facilities are considerably different from the approaches applied by the private sector.

b) Facility should have been in operation for at least one full operating year, at 80% or more availability. While there would be preference for facilities that have been in operation for two or more years, some flexibility may be needed to cover the full range of potential technologies. This criteria is proposed in order that the tour will provide information regarding the operating experience of established facilities. When a facility has been in operation for some time it is possible to see what has worked well and what has had to been modified/adjusted from the original design.

c) Facility must process at least one, but preferably more than one feedstock which is substantially the same as those feedstock materials identified by the CRD, at a scale of at least 25% of the quantity identified by the CRD. 'Substantially the same' means from the same type of source and the same general composition. Ultimately, the tour would include facilities that manage some or all of the feedstock materials identified by the CRD, so that at the conclusion of the tour, management of each type of feedstock was observed at least once.

Preference would be given to touring facilities located within a jurisdiction that is generally similar to the CRD in regards to population and general characteristics.

Application of these criteria would result in a short-list of potential facilities for inclusion on a tour, including both North American facilities and facilities located abroad.

3.3 Application of Selection Criteria and Identification of a Facility Short-list

The selection criteria as identified above have been applied to the facility long-list to screen and shorten the list of potential facilities for tours. The selection criteria have been applied in a yes/no fashion, with any 'no' responses being sufficient to remove the facility from consideration for a tour.

However, should there be a lack of facilities identified which address all types of technologies under consideration and/or all feedstock under consideration by the CRD, there may be sufficient rationale to bring a specific facility onto the tour itinerary, particularly if that facility is located within or along a tour route as selected for the plan.

Alternatively, should too many facilities remain on the short list to be accommodated on a Facility Tour, the list will be further pared down as appropriate to reflect a broad range of technology vendors, technologies and feedstock.

Table 2A Application of Technical Screening Criteria – North American Facilities

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
North American Facilities					
ARK Power Dynamics	ARK Arkansas	Yes	No	No	No
Net Zero Waste, Walker Environmental Group	CH Four Seabreeze Farms Digester	Yes	Yes	No	No
Net Zero Waste, Walker Environmental Group	Abbotsford B.C.	Yes	Yes	No	No
Net Zero Waste, Walker Environmental Group	Sea to Sky Soils Compost Facility	Yes	No	No	No
Net Zero Waste, Walker Environmental Group	Walker Environmental	Yes	Yes	No	No
Ostara (Note: sub-set of 14 reference facilities)	Durham AWWTP	Yes	Yes – but a subset of the biosolids stream	No	No
Ostara (Note: sub-set of 14 reference facilities)	Rock Creek, AWWTP	Yes	Yes – but a subset of the biosolids stream	No	No
Ostara (Note: sub-set of 14 reference facilities)	HM Weir WWTP	Yes	Yes – but a subset of the biosolids stream	Yes	Yes

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
North American Facilities					
Ostara (Note: sub-set of 14 reference facilities)	Gold Bar/Clover Bar	Yes	Yes – but a subset of the biosolids stream	No – but is a public utility	Yes
ICC Group	ZWE Dry Fermentation Facility	Yes	Yes	No – but is under a 15 year municipal contract	Yes
Engineered Compost Systems (ECS)	LRI/The Compost Factory	Yes	Yes	No	No
Engineered Compost Systems (ECS)	Lenz Enterprises	Yes	Yes	No	No
Engineered Compost Systems (ECS)	Kelowna/Vernon Compost Facility	Yes	Yes	Yes	Yes
Veolia	Gresham WWTP	Yes	No	Yes	No
Pivotal	Gussing Oberwart Ulm Villach Woodland #1 Goteborg #1	Yes	No	No	No
Pivotal	Burgeis Cherasco Woodland #2	Yes	No	No	No
Waste Treatment Technologies (WTT)	Surrey Biofuels Processing Facility	No	Yes	Yes	No
Bulk Handling Systems (mechanical treatment)	Newby Island Resource Recovery Park	Yes	Yes	No	No
Bulk Handling Systems	IREP Montgomery	No	Yes	No	No

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
North American Facilities					
(mechanical treatment)					
	Vancouver Island University Biosolids Forest Fertilization Project	NA	Yes	No	No
	Sechelt Mine Reclamation Project	Yes	Yes	No	No
PGH Energy	Covington	Yes	No	Yes	No
PGH Energy	Lebanon	No	Yes	No	No
N-Viro Soil Process, Walker Environmental	Sarnia WPPC	Yes	Yes	Yes	Yes
N-Viro Soil Process, Walker Environmental	Walker, Niagara	Yes	Yes	No	No
Agrinz Technologies	Woolwich Bio-En Facility	Yes	Yes	No	No
Covanta	Durham York Energy Center	Yes	Yes	Yes	Yes
Babcock & Wilcox	Renewable Energy Facility 2	Yes	Yes	Yes	Yes
Sierra Energy	Fort Hunter Liggett Base Demonstration Facility	No	No	No	No

Table 2B Application of Technical Screening Criteria – Overseas Facilities

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
Overseas Facilities					
Anaergia	Kaiserslautern	Yes	Yes	Yes	Yes
Anaergia	Vereco SIA	Yes	Yes	No	No
Anaergia	Degenham	Yes	Yes	No	No
Veolia	Brussels North WWTP	Yes	Yes	Yes	Yes
Veolia	MBA Rostock	Yes	Yes	No	No
Veolia	Essenheim	Yes	Yes	Yes	Yes
Veolia	UTE TEM	Yes	Yes	Yes	Yes
Veolia	Graincourt-les-Havrincourt	Yes	Yes	No	No
Veolia	Rostock MBT plant	Yes	Yes	Yes	Yes
Pivotal	Goteborg (and other EU facilities)	Yes	No	No	No
Pivotal	Burgeis, Cherasco	Yes	No	No	No
Redwave	MBS Westerwald	Yes	Yes	Yes	Yes
Redwave	ZAB Nuthe Spree	Yes	Yes	Yes	Yes
Redwave	Ekokem	No	Yes	No	No
Redwave	MBT Lianyungang	No	Yes	No	No
Redwave	Biomass Plant Stausebach	Yes	Yes	No	No
Waste Treatment Technologies (WTT)	Alytus	Yes	Yes	Yes	Yes
Waste Treatment Technologies (WTT)	Cambridgeshire	Yes	Yes	No	No

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
Overseas Facilities					
Waste Treatment Technologies (WTT)	Kaunas	Yes	Yes	No	No
Waste Treatment Technologies (WTT)	Leeds	Yes	Yes	No	No
Waste Treatment Technologies (WTT)	Mondragon	Yes	Yes	No	No
Waste Treatment Technologies (WTT)	Southwark	Yes	Yes	No	No
Organic Waste Systems (technology provider for high solids Anaerobic Digester)	SMET, Chagny	Yes	Yes	Yes	Yes
3WAYSTE	ALTRIOM	Yes	Yes	Yes	Yes
Veolia Water Solutions and Technologies Canada	Passau	Yes	Yes	Yes	Yes
Miller Waste Systems (North American representative for FITEC technology)	Rothmuhle Biogas Plant	Yes	Yes	Yes	Yes
Organic Waste Systems (technology	Munster	Yes	Yes	Yes	Yes

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
Overseas Facilities					
provider for AD portion of system)					
Orgaworld Canada Ltd. (technology provider for AD portion of system)	SBI-Omrin	Yes	Yes	Yes	Yes
BPD Industries (facility Engineer was Veolia)	SYDEC, Mont De Marsan Biosolids Composting Facility	Yes	Yes	Yes	Yes
Kopf (Demonstration Facility)	Balingen Gasification Demonstration	Yes	No	Yes	No
Kopf (Commercial Installation)	Mannheim	Yes	Yes	Yes	Yes
Veolia	Battlefield Energy Recovery Facility	Yes	Yes	No	No
AVR	AVR Rotterdam	Yes	Yes	No	Yes, recommend inclusion as one of few IRM facility examples
Babcock & Wilcox	Copenhill / Amager Bakke	No	Yes	Yes	No
Repotec	GoBiGas, Goteborg Energi facility	Yes	No	Yes	No
Metso	Kylmajarvi 2	Yes	Yes	Yes	Yes
Ebara	Aomori	Yes	Yes	No	No

Technology Provider	Facility Name / Identifier	In Operation for at least one year, preference for 2 or more years of operation at 80% or more availability	Processes at least one, preferably two feedstock streams similar to CRD materials, at least 25% of potential CRD feedstock quantities	Owned by a Municipality or Municipal Corporation, preference for municipal operations	Recommended for Inclusion on Tour Short List
Overseas Facilities					
Thermoselect	Chiba City Recycling Centre	Yes	Yes	No	No
Thermoselect	Mutsu Industrial Waste Gasification facility	Yes	Yes	Yes	Yes
Alter NRG	Mihama-Mikata Municipal Waste Gasification Facility	Yes	No	No	No
Alter NRG	Tees Valley Renewable Energy Facility	No	Yes	No	No
Advanced Plasma Power (APP)	Tyseley Gasplasma project	No	Yes	No	No

Legend	
Biological Facilities	
Mechanical (and Biological) Treatment Facilities	
Thermal Facilities	
Chemical Treatment Facilities	

Table 3A summarizes the short list of facilities that are recommended to be carried forward for consideration in the Facility Tour itinerary and the technical rationale for inclusion of specific facilities on the facility tour. Table 3B summarizes the short list of facilities that should be considered as possible locations, should the tour itinerary permit and/or should another similar facility be unavailable. Table 3C identifies those facilities that while included on the short-list, are not recommended for inclusion in the tour.

The rationale for refinement of the list is indicated in the 'rationale' column, based on trying to identify a reasonable cross-section of vendors, technologies and feedstocks, as well as basic logistics such as the ability to group facilities in North America and overseas in a logical way to efficiently complete the tour.

Table 3A IRM Facilities Tour Shortlist – Recommended Facilities

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Recommended Facilities							
North American							
Engineered Compost Systems (ECS)	Kelowna/ Vernon Compost Facility	Biological: In-vessel composting	120,000 tpy	Biosolids, Yard Waste	Owned by Cities of Kelowna and Vernon, Operated by City of Kelowna	Kelowna, BC Generally similar to CRD	Include on tour. Is the only facility on the short list for this technology provider and the location is easily accessed.
Covanta	Durham York Energy Center	Thermal: WTE	125,000 tpy In operation since 2015	Mixed Solid Waste	Owned by the Regions of Durham and York, Operated under contract by Covanta	Durham Region, Ontario Generally similar to CRD	Include on tour. Represents one of the newest WTE facilities in North America.
Overseas							
Anaergia	Kaiserslautern	Mechanical Biological Treatment: Mixed Waste Processing to extract organics and recover RDF with unique front end OREX system, high-solids Anaerobic Digestion	100,000 tpy, in operation since 2007	Mixed Solid Waste	Owned and operated by ZAK Municipal Solid Waste Corporation (waste utility)	Kaiserslautern, Germany Generally similar to CRD	Include on tour. Is the only facility on the short list for this technology provider, and the location can easily be accommodated on the European leg of a tour.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Recommended Facilities							
Veolia	UTE TEM	Mechanical Biological Treatment, and Thermal Processing: mechanical treatment to recover recyclables, organic fraction, RDF	190,000 tpy (MBT), AD 35,000 tpy, Composting 41,000 tpy, 160,000 tpy WTE, in operation since 2009	Mixed Solid Waste, Industrial Waste	Owned by Municipal Corporation, Operated by Veolia	Mataro, Barcelona, Spain Larger than CRD, hotter climate	Include on tour. Facility represents a group of integrated technologies including thermal treatment
Redwave	ZAB Nuthe Spree	Mechanical Biological Treatment: Mixed Waste Processing, Anaerobic Digestion	135,000 tpy, in operation since 2006	Mixed Solid Waste, Bulky Waste	Owned and operated by Municipal Corporation (ZAB)	Near Berlin, Germany Generally similar to CRD	Include on tour. Is a reasonably new facility and includes a broader range of technologies.
3WAYSTE	ALTRIOM	Mechanical Biological Treatment: to extract organics and recyclables, some unique front end equipment, composting of organic fraction, generates RDF	120,000 tpy, (currently ramping up tonnages as other contracts expire for municipalities in host jurisdiction), in operation since June 2014	Mixed Solid Waste	Contracted DBOOM by local Municipal Solid Waste Authority	Polignac, France Generally similar to CRD	Include on tour. This is a newer facility and includes some unique components.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Recommended Facilities							
BPD Industries (facility Engineer was Veolia)	SYDEC, Mont De Marsan Biosolids Composting Facility	Biological: Composting (agitated bay)	50 tpd dewatered biosolids and 50 tpd green waste, operating since 2005	Dewatered Biosolids, Green Waste (Yard Waste)	Owned and operated by a Municipal waste water utility (SYDEC)	Mont De Marsan, France Generally similar to CRD	Include on tour. Has been cited as a reference facility for biosolids co-composting in many published articles.
AVR	AVR Rotterdam	Thermal: WTE (includes district heating system)	In operation more than five years	Residual Mixed Solid Waste, paper sludge. organics	Owned and operated by AVR, a private company	Rotterdam, Netherlands	Include on tour. While privately owned, is one of few facilities representing IRM of solid waste and biosolids.

Table 3B IRM Facilities Tour Shortlist – Possible Facilities (consider if Schedule Allows)

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Possible Facilities (Include if Schedule Allows)							
North American							
Babcock & Wilcox	Renewable Energy Facility 2	Thermal: WTE (first new WTE built in USA in past 15 years)	907,000 tpy In operation as of June 2015	Mixed Solid Waste	Owned by municipal Solid Waste Authority of Palm Beach County, operated by private company	Palm Beach, Florida Larger than CRD, hotter climate	Possibly include on tour. Represents one of the newest WTE facilities in North America. However, scale is substantially larger than would be considered by CRD. Would also be outside of the area of travel for the other North American facilities on the tour.
Overseas							
Veolia	Essenheim	Biological: Dry Anaerobic Digestion	48,000 tpy, in operation since 2012	Green Waste (leaf & yard), Organic Waste	Owned by Municipal corporation, Operated by Veolia	Essenheim, Germany Generally similar to CRD	Possibly include on tour, if another dry AD facility is not available.
Veolia	Rostock MBT plant	Mechanical Biological Treatment: mechanical treatment to recover recyclables, organic fraction, SRF. Dry	195,000 tpy, in operation since 2005	Municipal Solid Waste	Owned by Municipal Corporation, operated by Veolia	Rostock, Germany Larger than CRD, generally similar climate	Possibly include on tour, in-lieu of the UTE TEM facility if it is not available for a tour.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Possible Facilities (Include if Schedule Allows)							
		Anaerobic Digestion					
Redwave	MBS Westerwald	Mechanical Biological Treatment: Mixed Waste Processing	100,000 tpy, in operation since 2000	Mixed Solid Waste	Owned and operated by Municipal Corporation (MBS Anlage Westerwald)	Westerwald, Germany Generally similar to CRD	Possibly include on tour, however, ZAB Nuthe Spree would be preferred as is a newer facility and as it includes a broader range of technologies.
Organic Waste Systems (technology provider for high solids Anaerobic Digester)	SMET, Chagny	Mechanical Biological Treatment: Biodrying of waste, mechanical Treatment to extract organics and recyclables, dry Anaerobic Digestion of organic fraction	81,000 tpy, plant commissioned in Spring 2015	Mixed Solid Waste, Green Waste	Municipal Solid Waste Corporation (waste utility), TIRU SA has 5-year DBOM operating contract for facility	Chagny, France Generally similar to CRD	Possibly include on tour, pending the availability of other MBT facilities.
Veolia Water Solutions and Technologies Canada	Passau	Biological: Horizontal Dry Anaerobic Digestion (Kompogas technology), composting of solid digestate	44,000 tpy, in operation since 2004	Residential kitchen/garden biowaste	Owned and operated by Municipal Solid Waste Corporation (waste utility)	Aussernzell, Germany Generally similar to CRD	Possibly include on tour. However, two other Veolia facilities have been included on the short-list.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Possible Facilities (Include if Schedule Allows)							
Miller Waste Systems (North American representative for FITEC technology)	Rothmuhle Biogas Plant	Mechanical Biological Treatment: extract organic fraction using unique FITEC technology, wet Anaerobic Digestion	30,000 tpy for FITEC system and wet AD. Retrofit in operation since 2015.	Municipal Food Waste, Leaf & Yard waste, Pet waste, commercial food waste	Owned and operated by Municipal Solid Waste Corporation (waste utility)	Rothmuhle, Bergrheinfled, Germany Generally similar to CRD	Possibly include on tour. This is a newer facility and has some unique components.
Metso	Kylmajarvi 2	Thermal: Fluidized bed Gasification, cogeneration/district heating	250,000 tpy, In operation since 2012	Pre-processed MSW (Solid Recovered Fuel)	Municipally owned Energy Utility	Lahti, Finland	Possibly include on tour. Logistical issues as facility is distant from other European locations included in the tour.

Table 3C IRM Facilities Tour Shortlist – Not Recommended for Inclusion

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Not Recommended							
Ostara	HM Weir WWTP	Biological: Nutrient Recovery from biosolids post-digestion liquor	80 ML/d, operational since 2013	Post-digestion liquor from dewatered biosolids	City of Saskatoon	Saskatoon, SK Generally similar to CRD	Not recommended for inclusion on tour, as only processes post-digestion liquor from dewatered biosolids
N-Viro Soil Process, Walker Environmental	Sarnia WPPC	Chemical: Flash lime stabilization	60 wet tpd, in operation since 2001	Sewage sludge	Municipally owned and operated	Sarnia, ON Generally similar to CRD	Do not include on tour. Does not co-process any other materials along with sewage sludge.
Veolia	Brussels North WWTP	Thermal: Athos, hydro-thermal oxidation	2 Athos wet air oxidization units, 8m3/h, In operation since 2008	Biosolids	Owned by Brussels – Capital Region, Operating contract 2008 to 2028	Brussels, Belgium Similar climate to CRD, however, higher population	Not recommended for inclusion on tour, as only processes biosolids.

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Not Recommended							
Waste Treatment Technologies (WTT)	Alytus	Biological: Dry Anaerobic Digestion	21,000 tpy, in operation since 2015	Municipal Solid Waste	Owned and operated by Municipal Corporation (Alytus Region)	Alytus, Lithuania Smaller than CRD	Do not include on tour. While this is the only WTT facility on the short-list, the logistics of including this facility on the itinerary are difficult and the technology and feedstock are addressed at other facilities
Organic Waste Systems (technology provider for AD portion of system)	Munster	Mechanical Biological Treatment: extract organics and recyclables, high solids Anaerobic Digestion of fine organic fraction, composting of large organic fraction	118,000 tpy, plant operating since 2005	Mixed Solid Waste, Industrial Waste	Owned and operated by Municipal Solid Waste Corporation (waste utility)	Munster, Germany Generally similar to CRD	Do not include on tour. A number of MBT facilities are included already. This facility is somewhat older and does not include any specific unique components.
Orgaworld Canada Ltd. (technology provider for AD portion of system)	SBI-Omrin	Mechanical Biological Treatment: extract organics, recyclables, recover RDF, wet	230,000 tpy, plant operating since 2002	Mixed Solid Waste, Commercial Waste	Owned and operated by a Municipal Solid Waste Corporation (waste utility)	Oudehaske, Netherlands Larger than CRD	Do not include on tour. A number of MBT facilities are included already. This facility is somewhat older and does not

Technology Provider	Facility Name / Identifier	Processing Technology	Facility Size and Period of Operations	Feedstock Streams	Ownership / Operational Entity	Location	Rationale for Tour Consideration
Not Recommended							
		AD of organic fraction					include any specific unique components.
Kopf (Commercial Installation)	Mannheim	Thermal: Bubbling Fluidized bed Gasification	0.57 dry tph, commissioned in 2010	Dried biosolids	Municipal Waste water Utility	Mannheim, Germany Generally similar to CRD	Do not include on tour. Does not co-process any other materials along with biosolids.
Thermoselect	Mutsu Industrial Waste Gasification facility	Thermal: High Temperature Gasification, Ash melting	50,000 tpy, in operation since 2003	MSW, facility includes extensive pre-sort/pre-processing of waste prior to gasification	Owned by Sumokita Local Authority, operated by JFE	Mutsu, Japan	Do not include on tour. Significant logistical issues as is very distant from other overseas locations included in the tour.

3.4 Tour Logistics and Finalization of the Tour Itinerary

Table 3A above, identifies:

- North American: Two facilities in Canada, one in BC and one in Ontario that are recommended for the tour. Table 3B indicates one other possible facility in Florida that could be included, but it is out of the path of travel across North America. It would take three days to visit all three facilities given the distances and travel times between these locations. Consideration could be given to identifying other facilities on the long-list that could be added to the North American leg that were removed from consideration based on private ownership.

- Overseas (European): Two facilities in Germany, two facilities in France, one each in Spain and the Netherlands that are recommended for the tour. It would take in the order of 6 to 7 days to visit these facilities. It is possible that two of the German facilities could be visited in a single day as they are reasonably proximal. An additional facility in France, five in Germany and one in Finland, are identified as possible facilities that could be included.

Figure 1 presents a map indicating the location of recommended and possible facilities for inclusion in the Overseas Tour, and **Figure 2** presents locations recommended for the North American tour, based on Tables 3A and 3B.

The facilities included cover a broad cross-section of technologies, and include facilities that process biosolids/sewage sludge, organics (food and yard wastes) and mixed waste streams.

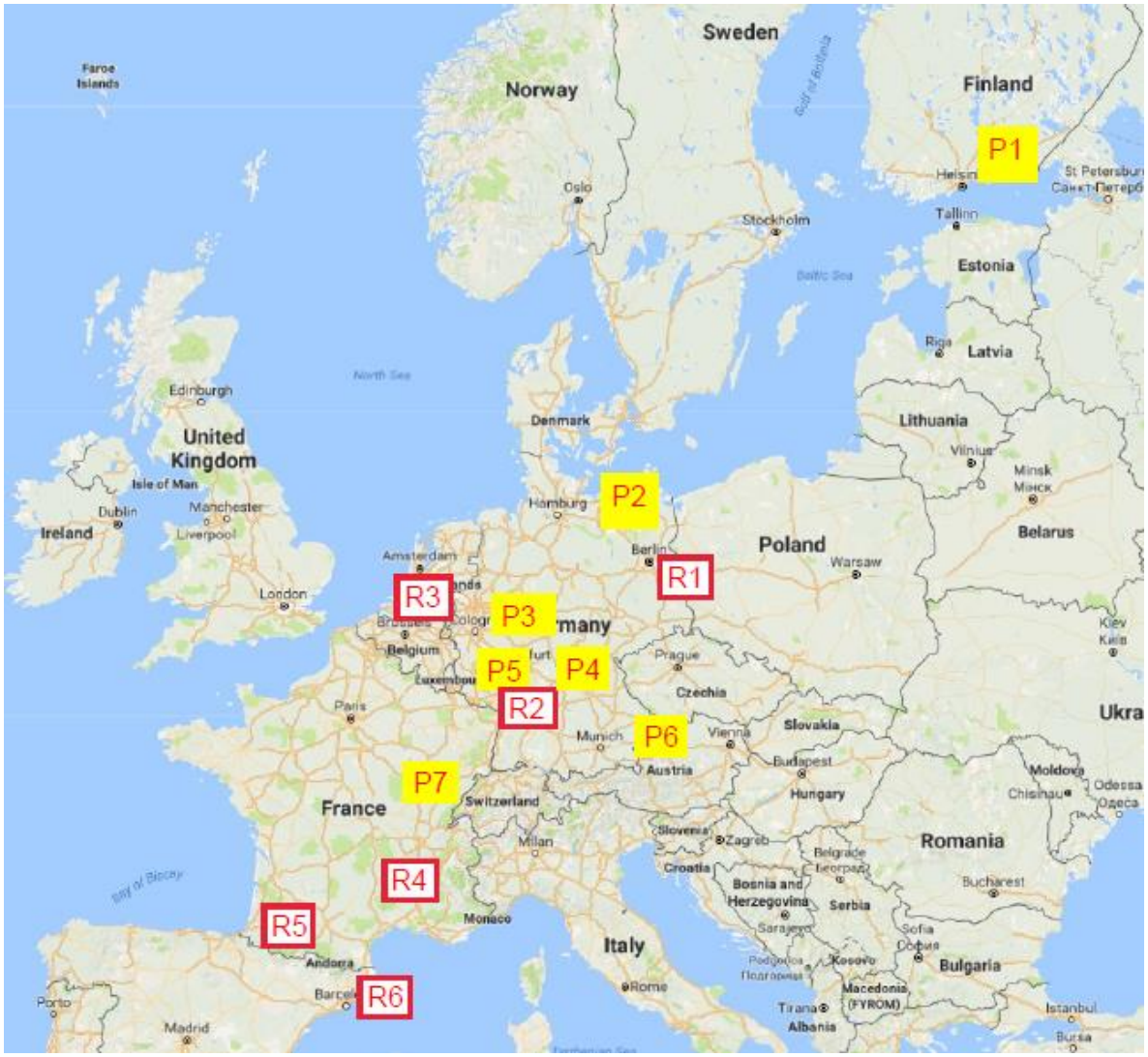
The final tour itinerary would be set by considering the following:

a) Refining the grouping of facilities to allow for efficient travel from one location to another.

b) Confirming the availability of the facility for a tour, consisting of a minimum of 2 hours. The potential availability of a facility for a tour, cannot be ascertained until contact is made with or through the technology provider to the operating entity responsible for the facility.

c) Confirming the availability of English speaking owner/operator representatives to undertake the tour. This cannot be ascertained until contact is made with or through the technology provider to the operating entity responsible for the facility. Often, the technology provider will offer to provide the tour support, as marketing individuals most often have multi-lingual capabilities.

Figure 1 Map of Recommended and Potential Facility Tour Locations – Overseas



Recommended	Possible
R1 Redwave, ZAB Nuthe Spree, Germany	P1 Metso, Kylmarjarvi 2, Lahti Finland
R2 Anaergia, Kaiserslautern, Germany	P2 Veolia Rostock MBT Plant, Germany
R3 AVR Rotterdam	P3 Redwave, MBS Westerwald, Germany
R4 3WAYSTE, Altriom, Polignac, France	P4 Miller, Rothmuhle Biogas Plant, Germany
R5 BPD, SYDEC, Mont de Marsan, France	P5 Veolia, Essenheim, Germany
R6 Veolia, UTE TEM, Mataro, Barcelona	P6 Veolia, Passau, Germany
	P7 OWS, SMET Chagny, France

Figure 2 Map of Recommended and Potential Facility Tour Locations – North America

Recommended	Possible
R1 Kelowna/Vernon Compost Facility	P1 Palm Beach, Renewable Energy Facility 2
R2 Durham York Energy Centre	

In regards to the potential timing of the tour, it is intended that the tours are completed in advance of the CRD finalizing and issuing an IRM RFPQ, so that the outcome can be used to refine the RFPQ approach as well as supporting finalization of the IRM Project Plan. The target timeline would be to undertake the tours as of late October / Early November 2017. This will allow for sufficient time to complete the arrangements for the tours including finalization of the tour itinerary.

In regards to potential attendees, it is important that those involved represent the needs and interest of the CRD, as well as being manageable from the perspective of moving the group from place to place. It is recommended that the size of the group be kept within 10 people or less, and that it include representation from the Integrated Resource Management Advisory Committee, CRD staff and a technical advisor.

In regards to the extent of the tours, generally based on the locations identified only one facility per day may be visited, it is possible that for certain portions of the tour that two facilities could be visited. Reasonable time has to be provided for travel and rest. Also, the trip needs to be accommodated within the tour groups personal and work schedules. Overall, it would be preferred to complete the North American tour on one week, and the overseas tour on the following week.

In regards to form of travel, generally a combination of regional flights and ground transportation would be reasonable. Depending on the concentration of facilities in certain areas, it may be possible to take air or rail transportation to a key node, and rent a small bus and driver from that node to tour surrounding facilities.

Once the general form and nature of the tour is agreed upon and the logistics generally scoped, the fine tuning of the tour itinerary would be determined based on the availability of the facility and representatives of the owner/operator to conduct the tour.

3.5 Communications and Confidentiality

As noted in Section 2, it is recommended that the technology provider and/or lead entity that has been identified for the technology interested in advancing an IRM solution to the CRD, agree that they will comply with the CRD's requirements of Conduct, No-Contact and Anti-lobbying provisions prior to inclusion of facilities representing their technology on the tour.

Implementation of a Conduct, No-Contact and Anti-lobbying requirement, is important as a means of ensuring that the CRD conducts a fair procurement process. The approach used to select the facilities included on the tour, the questions identified by the CRD to be posed to owner/operators on the tour and the approach used to engage in information gathering for the tour would be monitored by the CRD Fairness Advisor.

The following presents a suggested "Conduct, No Contact and Anti-lobbying" requirements for consideration by the CRD, which will be further refined as part of the Tour Plan:

> *Representatives of the technology and/or entities representing the technology or lead entity that has or may express interest in advancing an IRM solution to the CRD should represent and declare that:*
>
> *a) No member, officer or employee of the CRD or the CRD Board has or will have an interest, directly or indirectly, in the performance of any resulting contract for an IRM solution, or in the supply, work or business in connection with said contract, or in any portion of the profits thereof, or in any monies to be derived therefrom;*
> *b) That they would not make any public comment, respond to questions in a public forum, or carry out any activities to publicly promote or advertise their qualifications, interest in or participation in the IRM Project or any RFPQ without the CRD's prior written consent, which consent may be arbitrarily withheld or delayed.*
>
> *Representatives of the technology and/or entities representing the technology or lead entity that has or may express interest in advancing an IRM solution to the CRD, shall be prohibited for contacting anyone other than the designated Contact Person named by the CRD for the purposes of discussing any aspect of the IRM Project whatsoever. Without limiting the generality of the foregoing, contact must not be made with any party outside the designated Contact Person named by the CRD, including any members of the CRD's staff, the CRD Board and committees of the Board, to engage in any form of political or other lobbying with respect to the IRM project, to seek to influence the outcome of the IRM Project or to discuss any aspect of the Project, with the exception only of questions that may be directed to the designated Contact Person, or engagement in any consultation initiated by the designated Contact Person on behalf of the CRD. Any*

consultation initiated by the designated Contact Person, including for example a facility tour, may include other representatives of the CRD and advisors as appropriate.

In the event that any contact and/or lobbying has occurred, as determined by the CRD and in its sole discretion, the CRD may immediately disqualify the representatives of a technology and/or lead entity that has been identified for the technology from participating further in the IRM project including the IRM procurement process, and may reject any prequalification or proposal submission received from a respondent including those representatives without further consideration, and without liability.

3.6 Approach for Information / Data Collection and Reporting

It is proposed that the tour preparation and set up for collecting information to inform the IRM process would include:

1. Preparation of Information Packages for tour attendees, including published information on the facility and technology(ies) represented. This will ensure that the tour group is well informed should improve the quality of observations and questions on the tour.
2. Development of a Tour Questionnaire, to be largely generic in content covering various facility development, technology design and operational questions. This questionnaire would be prepared in advance of the tour, reviewed by the CRD Fairness Commissioner and would be provided in advance of the tour, to the representatives for the facilities to guide the conversation. Generally it would be unreasonable to expect the hosts of the tour to complete the questionnaire in advance, as they are hosting the tour and would derive minimal to no direct benefit thereof. The questionnaire is really intended to show the extent of the CRD's interest in the facility so that those providing the tour are better prepared. The best approach to documenting responses to the questions, is that a representative of the CRD complete the questionnaire based on the tour and discussions.
3. Collection of information provided by the tour hosts. Often materials will be provided by the tour hosts that should be included in the CRD IRM archive. This could include published materials that is on hand at the facility and often copies of presentation materials that those providing the tour may prepare to assist in explaining the facilities operation. In addition, some facilities upon request may provide technical documents including material tests etc.
4. Photographs. Tour hosts should be open to allowing photographs throughout the tour. That is most generally the case. They can also often identify on-line sources of photographs that may be of higher quality for downloading. Generally, one key person of the tour team should be assigned responsibility to take photographs of key aspects of the operations.

The above information would be used to prepare a report regarding the facility tour. Information regarding each facility would be summarized in a format similar to the following table.

SUMMARY XX Facility
General Description:
Ownership:
Location:
Inputs:
Outputs:
Capacity:
Site Size:
Status: Proven. In continuous operation since XXX
Commercial Considerations:
Environmental Implications:
Technology Type:
Process Overview:
Strengths / Successes:
Weaknesses / Issues:
Diversion:
Estimated Costs:
Photos:

In addition, a presentation regarding the outcome of the tour would be prepared for the IRMAC and other use by the CRD.

3.7 Potential Tour Costs

The following table provides an initial estimate of the indicative range of fixed and variable costs that could be incurred for a facility tour, specifically noting the fixed (e.g. tour preparation and documentation) and variable costs (e.g. cost per attendee).

These costs should be considered as generally being in the range of what could be anticipated, but will vary depending on the extent of the tour and the number of facilities included. The cost of flights and transportation can range significantly (as can the cost of accommodation) depending on the locations chosen for the tours. Applicable exchange rates will also affect the variable costs.

Table 4 Summary of Potential CRD IRM Facility Tour Costs (general cost range)

Fixed Costs	
Completing Arrangements for the Tour - Contacting Facilities/hosts, completing itinerary - Arrangements for travel and accommodations - Preparing tour packages and facility questionnaires	$15,000
Preparing Tour Report	$10,000
Preparing and Delivering Tour Presentation to CRD IRMAC	$5,000
Variable Costs	
Cost per Attendee for Tour of North American Facilities - Travel - Accommodation - Meals Assumes: 3 to 4 day tour, 3 flights, four night's accommodation	$3,500 to $4,500
Cost per Attendee for Tour of International Facilities - Travel - Accommodation - Meals Assumes: tour of facilities in Western Europe, international flight, 3 regional flights, ground transportation, 7 day tour and 7 night's accommodation	$7,500 to $8,500

4.0 Conclusion

The itinerary and arrangements for the proposed IRM Facility Tours would be finalized pending the outcome of the IRMAC meeting on September 6, 2017.

The IRM Facility Tours will result in the gathering of key information that will be used to support development of the Request for Pre-Qualification (RFPQ) for an advanced IRM solution(s) for the CRD. This information will support decision making in the process of developing and finalizing the IRM RFPQ, including refining the technologies qualification aspects of the RFPQ as well as focusing the approach used to qualify the proponent team that would be responsible for the design/engineering, construction and operation of any IRM facility.