



Edmonton Waste Management
Centre of Excellence

City of Edmonton Biosolids Management Plan Development A Multi-Basket Approach

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Outline

- EWMCE
- Biosolids generation in Edmonton
- Current applications
- Proposed applications

EWMCE

NON-PROFIT CORPORATION – Established 2003

PARTNERS





RESEARCH



TECHNOLOGY DEMONSTRATION &
DEVELOPMENT



ADVISORY SERVICES



EDUCATION AND TRAINING

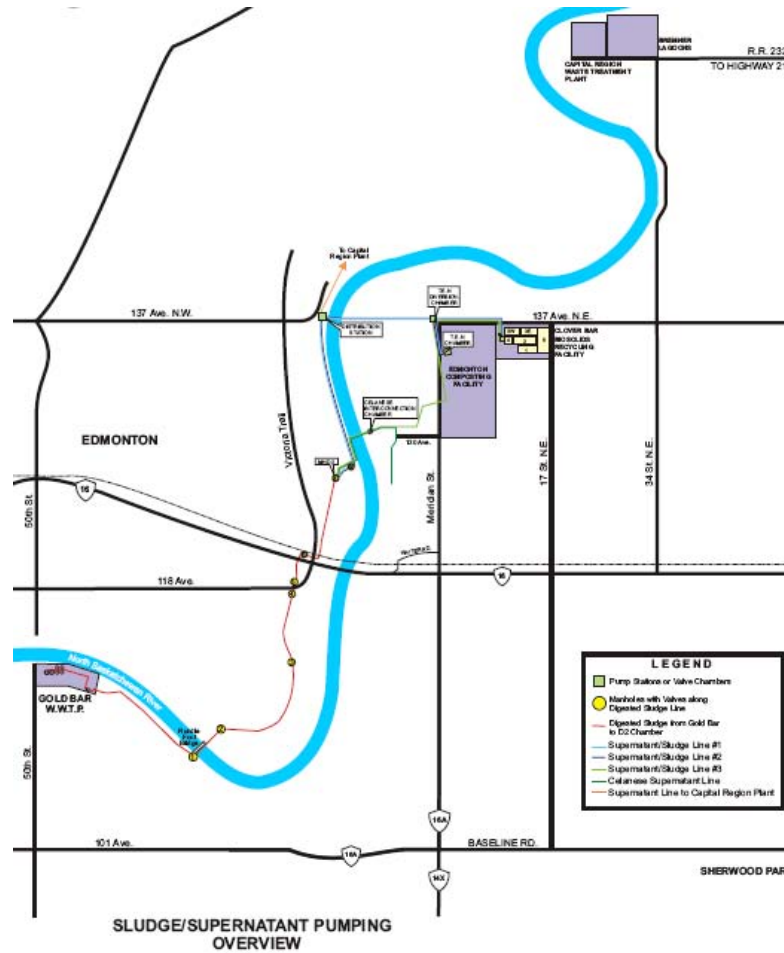
Website:

www.ewmce.com

Biosolids production

- Gold Bar and ACR WWTPs
 - 1 100 000 people
 - 400 000 ML/d wastewater
 - 27 000 dt/year biosolids

Key Units in the Region



Biosolids Generation - Management



Phased Growth at Gold Bar



Gold Bar WWTP

- Pre-treatment
- Primary treatment
- Activated sludge
- Anaerobic digestion
- Biological nutrient removal
- Ultra-violet disinfection
- Membrane filtration
- Odour control
- Energy recovery
- Process automation
- Enhanced Primary Treatment
- Struvite Crystallization



Gold Bar WWTP

Key Milestones - Current Practices

- 1956
 - Gold Bar Opens
 - Onsite Lagoons
- 1972
 - Clover Bar Lagoons
- 1978
 - Sludge to Farmland Program initiated
- 1993
 - Inventory Determined 93,000 dt. in CBBRF
- 1994
 - Biosolids Management Plan
 - Nutri-Gold Program launched
- 2000
 - Co-composter opens
- 2003
 - Align Nutri-Gold with Compost Marketing
- 2008
 - Inventory 190,000 dt.

Clover Bar WMC



Current Biosolids Applications

- Nutri-Gold – Hauling distance increasing
- Composting
 - In-vessel with MSW
 - Outdoor with wood chips (Gore)

Nutri-Gold Application



In-vessel Co-composting

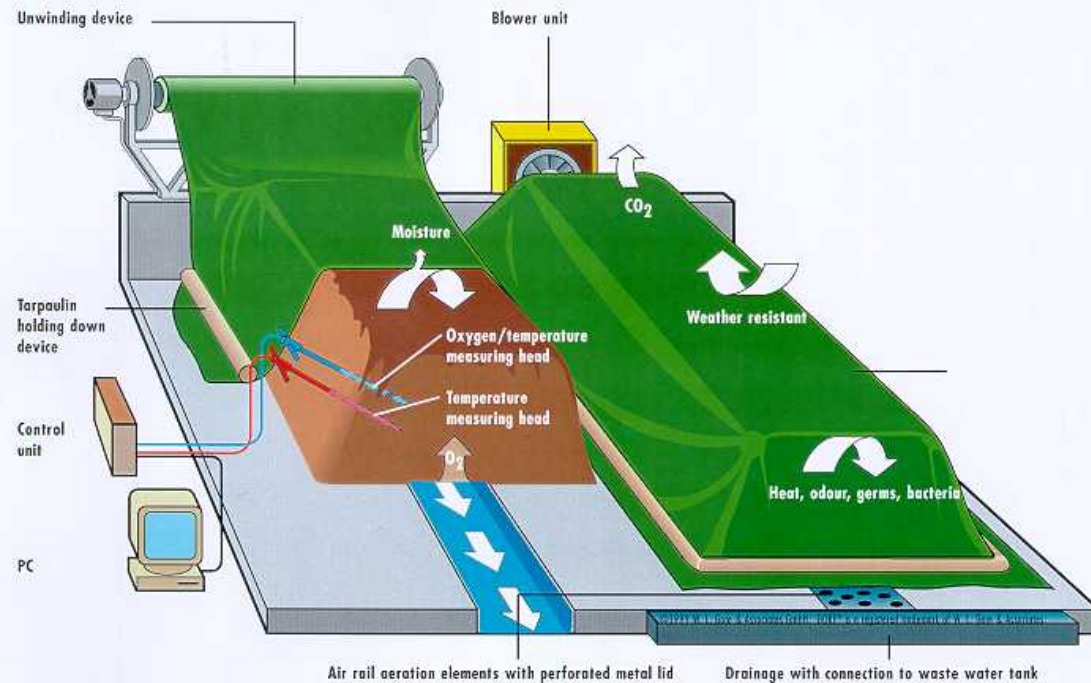


In-vessel Composting



Outdoor Composting

Waste treatment under GORE® Laminate Covering – Model of the compost heap

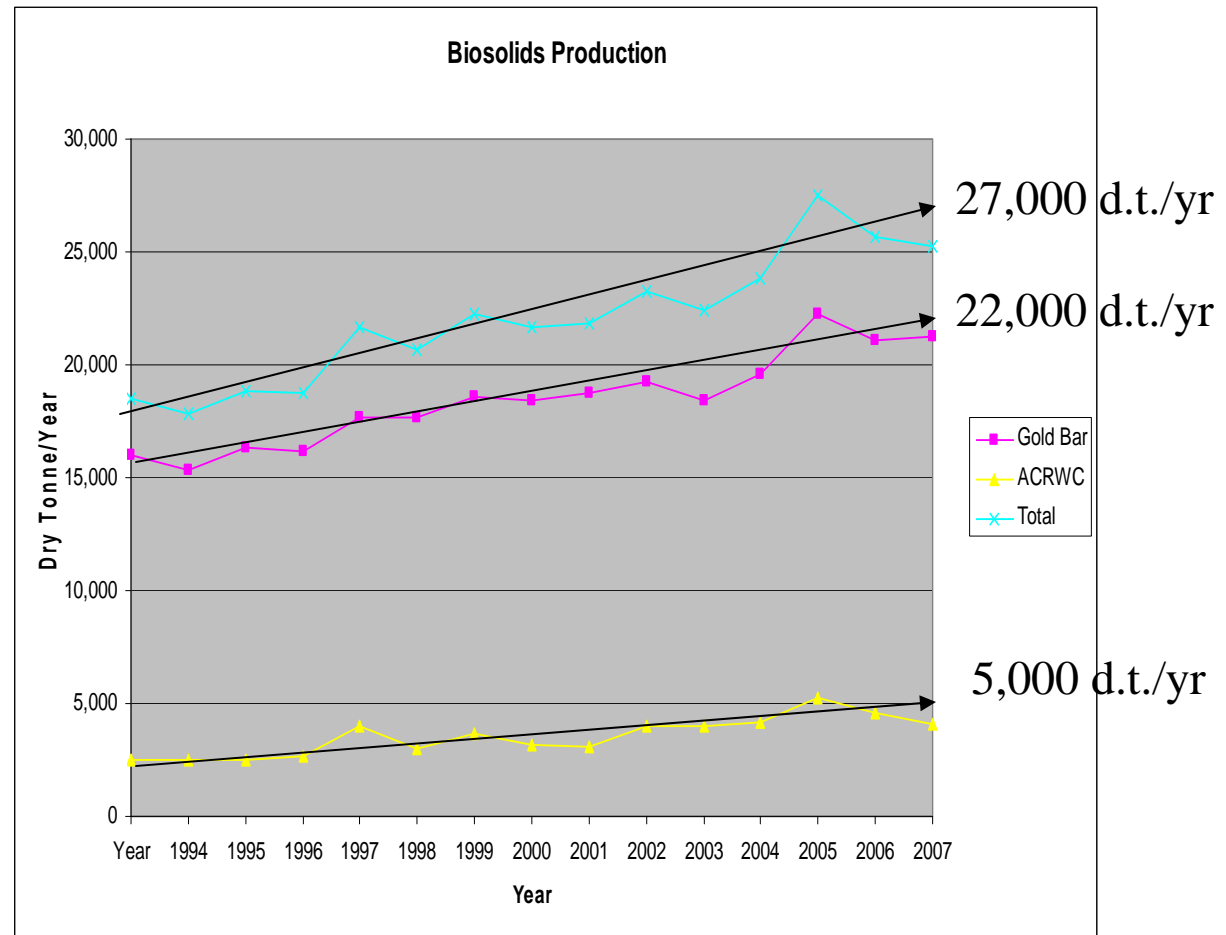


Biosolids Transfers at the Clover Bar Biosolids Recycling Facility

Red = Estimate

Year	Stabilized Sludge to CBBRF			Transfers Out			Annual Storage	Accumulated Storage	
	Gold Bar	CRSTP	Total	Nutri-Gold	Composter	Total			
1994	16000	2500	18,500	13,925	0	13,925	4,575	4,575	
1995	16000	2500	18,500	2,038	0	2,038	16,462	21,037	
1996	16,292	2500	18,792	15,015	0	15,015	3,777	24,814	
1997	16,129	2,634	18,763	15,063	0	15,063	3,700	28,514	
1998	17,647	4,012	21,659	16,896	0	16,896	4,763	33,277	
1999	17,660	3,010	20,671	19,390	0	19,390	1,281	34,558	
2000	18,587	3,653	22,240	14,065	5,515	19,580	2,660	37,218	
2001	18,441	3,189	21,630	6,212	13,832	20,044	1,587	38,804	
2002	18,739	3,083	21,822	6,067	11,029	17,096	4,726	43,530	
2003	19,256	3,969	23,225	5,857	14,856	20,713	2,512	46,042	
2004	18,426	3,997	22,423	5,125	14,379	19,504	2,919	48,961	
2005	19,608	4,185	23,793	0	11,317	11,317	12,476	61,438	
2006	22,225	5,245	27,470	4,517	3,675	8,192	19,278	80,716	
2007	21,092	4,613	25,705	10,720	8,598	19,318	6,387	87,103	
Average			22,673	Average			16,970		

Biosolids Production Analysis Gold Bar and ACRWC 1993 - 2007



Land Application Processes Supplemental to Composting - Sylvis

- Biomass/Biofuel production
- Marginal Land Conversion
- Landfill Closure
- Mine Reclamation
- Composting
- Forestry
- Agriculture
- Oil and gas reclamation
- Soil Product Development
- Parkland Development

Biosolids Management Plan Values

Land Application

- Environmental
 - Ease of regulatory compliance
 - Protection of human health
 - Carbon sequestration potential
 - Greenhouse gas offset potential
- Social
 - Likely stakeholder acceptance
 - Social benefit
- Economic:
 - Capital costs
 - Operating and maintenance costs
 - Potential funding opportunities
 - Potential to generate revenue
 - Potential for cost-sharing
- Technical
 - Proven technology
 - Innovative technology
 - Green technology
 - Compatibility with current and future biosolids quality
 - Integration with CoE programs
- Market Potential
 - Regionally available markets or sites
 - Promotes biosolids management diversification
 - Long-term stability/reliability

Non - Land Application Processes Supplemental to Composting – Associated Engineering

- Vacuum Plate and Frame Press (Dry Vac)
- Cement Kiln Fuel (coal substitute)
- Dried Biosolids to Gasification
- Fluidized Bed Combustion
- Mechtronix/Valoris
- Indirect Drying (Komline-Sanderson)
- Dried Biosolids to Aggregate Production
- Multiple Hearth Furnaces
- Direct Drying
- Slurry Carb

Biosolids Management Plan Values Non-Land Application

- Screening Criteria:
 - Maturity
 - Technical Capability
 - Impacts on CoE Programs
 - Safety
- Value Criteria:
 - Meet or exceed Regulatory Compliance Requirements
 - Helps to minimize environmental impacts
 - Sustainability (long term, technical, regulatory)
 - Flexibility (flexibility/versatility in operation)
 - Helps to build markets for biosolids and biogas
 - Helps to reduce the consumption of resources
 - Ease of integration with existing system
 - Example of innovative technology
 - Example of green technology
 - Likelihood of public acceptance
 - Cost

Biosolids Management Plan Results

- Balanced Portfolio
 - Multi-basket approach:
 - 5,000 tonne/year baskets
 - Both Low tech to high tech options
 - Composting – base process
 - Incorporate Process Improvements/Optimization

Land-based demo projects for Phase 2

Operational research and demo projects

- Mine and marginal land conversion
- Sourcing sites
 - Two mine sites (coal and aggregate)
 - Two marginal land sites
 - One biomass research on fertile land
- Cooperation with regulators
- Project design

Potential Project Partners

- Lehigh Hanson (aggregates mine)
- Capital Power – Genesee (coal mine)
- ACRWC
- ALPAC
- Private land owners
- Partnership with NRCan-Forestry Serv.

Lehigh Hanson

- Aggregate mining, cement production
- Potential sites
 - Strathcona Pit
 - Villeneuve Pit
 - Cadomin Pit
- Thin, poorly developed soils characteristic of mine sites
- Reclamation to agriculture and woody biomass as a fuel source

Capital Power – Genesee Mine

- Coal mining / energy production
- EPCOR 30% ownership stake
- Approximately 7,000 ha
- Mine 5.2 – 5.4 million tpy coal
- 38 ha received reclamation certificates
- 350 ha awaiting reclamation (topsoil and subsoil)
- Interest in biosolids use in:
 - Subsoil / topsoil enhancement
 - Stockpiled soil rejuvenation



ACRWC

- Member of “Edmonton Regional Biosolids Partnership”
- WWTP serves outlying communities and NE Edmonton
- Biosolids transferred to Clover Bar lagoons
- Own approximately 60 ha of low productivity land adjacent to WWTP
- Site offered as in-kind contribution
- Visible demonstration

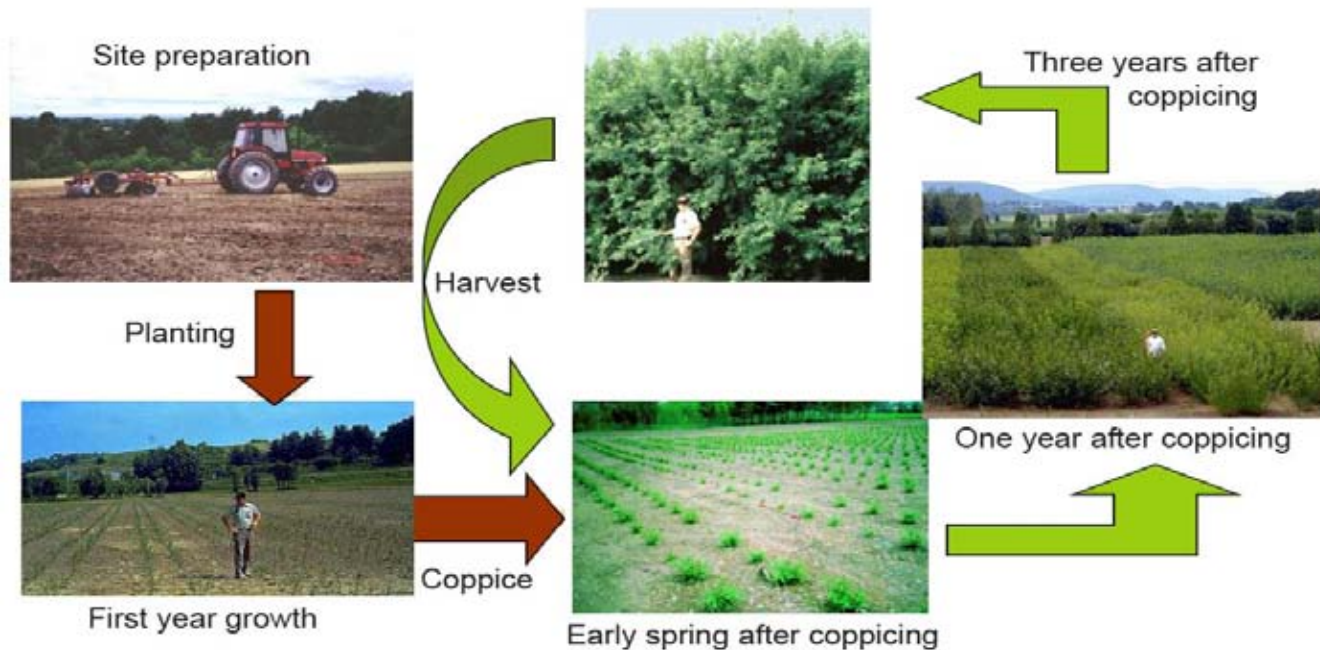


ALPAC

- Pulp mill approx. two hours north of Edmonton
- Produces 650,000 tonnes of pulp annually
- Poplar Farm Program
 - Initiated in 2002
 - Fibre from plantations to supplement forest fibre
 - Goal of 1,200 ha per year / 25,000 ha total
 - 20 year leases to landowners
- Areas determined for 2010, including 25 ha in Lamont County



NRCan – Short Rotation Willow Biomass



Willow Biomass

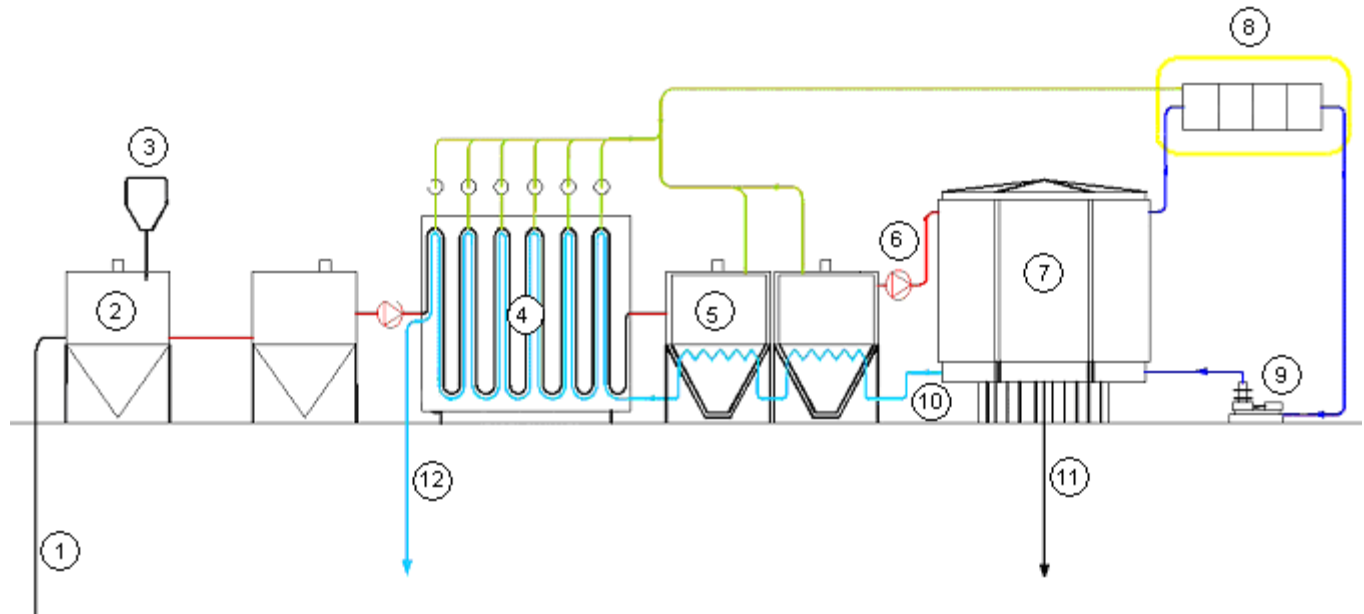


Non-Land Based Applications

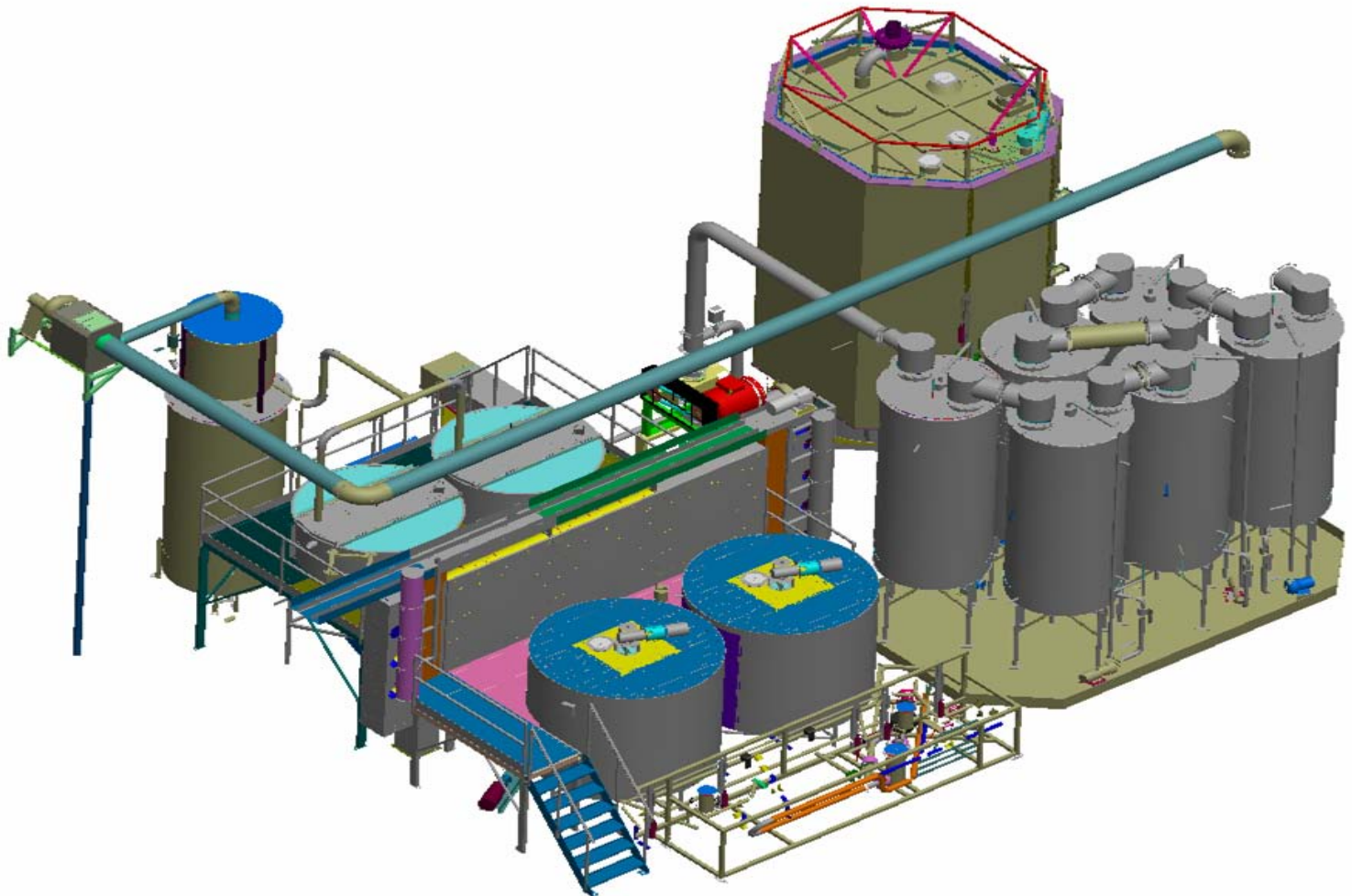
- Process Enhancements
- Biosolids drying
 - DryVac
 - Mechtronix/Valoris
- Co-digestion – WERF
- Gasification – Enerkem
- Struvite cristalization – Ostara

- STDC – Projects partner

Mechtronix/Valoris Biosolids Drying



Mehtonix/Valoris



Process Enhancements

- Pre-digestion thickening
- Post-digestion thickening
 - Mechanical
 - Gold Bar
 - Clover Bar
 - Gravity
- Digestion improvements
 - FOG
 - Sonification
 - Micro-Sludge



Questions?