What Does Full On Organics Digestion Look Like

Northeast Residuals & Biosolids Conference
November 1-2, 2022

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Image: Credit BBC

Agenda

01 Why Organics Digestion

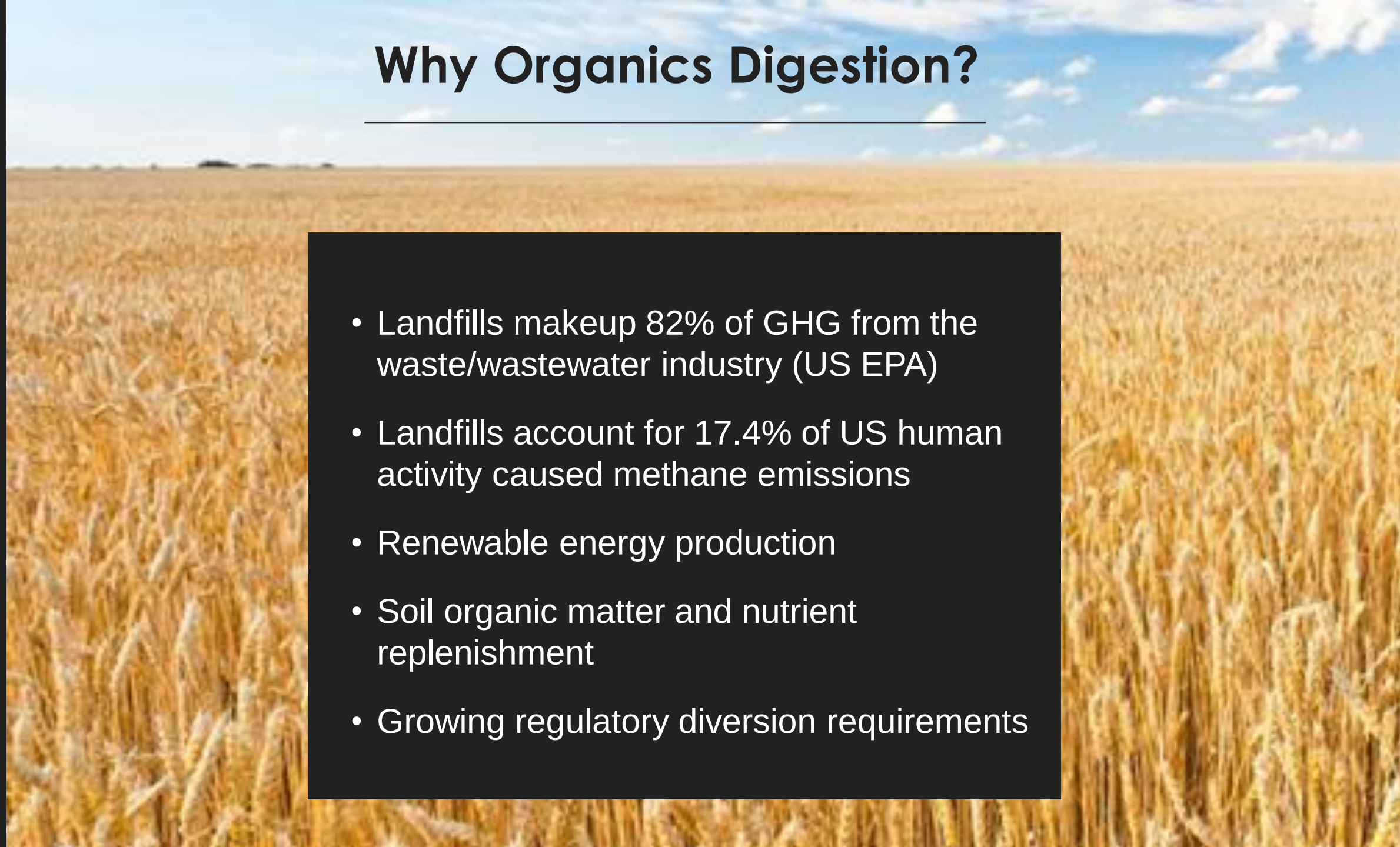
02 Getting Started

03 Critical Decisions/Information

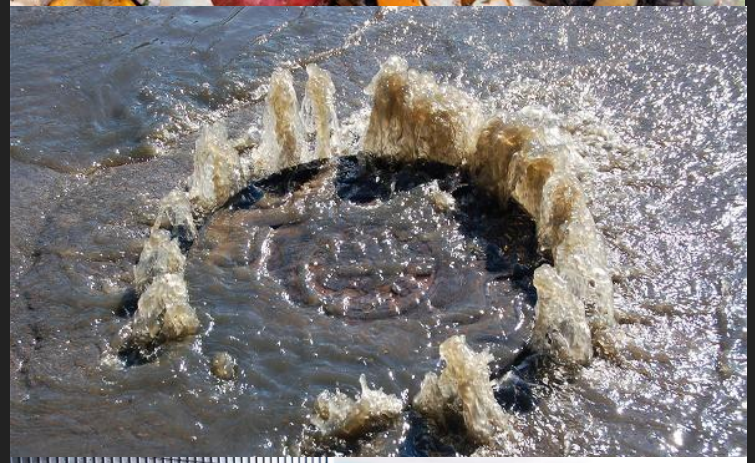
04 Edmonton Case Study

05 Organics Processing Facilities (OPF)

Why Organics Digestion?



- Landfills makeup 82% of GHG from the waste/wastewater industry (US EPA)
- Landfills account for 17.4% of US human activity caused methane emissions
- Renewable energy production
- Soil organic matter and nutrient replenishment
- Growing regulatory diversion requirements



What You Need to Know

Feedstock Type & Source

Food Waste

- Residential – solid, low contamination
- Industrial - process waste liquid or solid, low contamination
- Institutional – solid, moderate contamination

FOG

- Slurry
- Low contamination

Green Waste

What You Need to Know

Feedstock – How are you going to get it

Municipal Collection

- Source Separated – colored bins
- Comingled with MSW
- Curbside pick up
- Transfer stations

Private Haulers

- Reasons to come to you

Industries

- Reliability of quantity and delivery

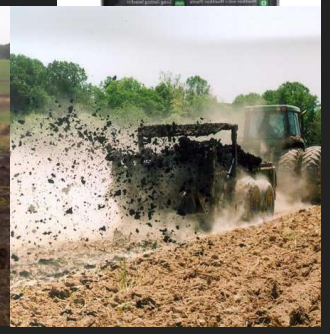
Critical Decisions

Cheetos Lip Balm
Introduced in 2005

There's no point in making something nobody wants

What are going to make?

- What does the marketplace want
- Who wants it
- How often do they want it
- How are you going to get it to them
- What are the regulations for various products
- What are the risks



Critical Decisions

What can you make?

Energy

- CHP
- RNG
- GHG Credits

Digestate

- Liquid
- Solid

Compost – required after dry digestion

Pellets – animal feed

How to Make Your Product

What type of digestion?

Liquid

- Rigorous pre-processing to create a slurry
- Contaminants removed in pre-processing
- Thermophilic – digestate can be used directly
- Mesophilic – may require pasteurization step

Dry - Mesophilic

- Batch or plug flow
- Pre-processing limited shredding, moisture and bulking material added
- Post processing needed to remove contaminants and possible pasteurization

Edmonton Case Study

The Edmonton, AB Story

The City has been dedicated to waste reuse for more than 20 years

95% Waste Diversion Goal

Edmonton Waste Management Center

Existing Organics Facility

Composting Facility –
Shut Down and demolished

IPTF –
Integrated Processing & Transfer Facility – Tipping of MSW, Pre-process MSW to extract organics and RFD for Enerkem Facility

HSAD –
High Solids Anerobic Digestion Facility – Dry digestion of 40,000 tonnes per year organics

Tipping Building –
Previously accepted MSW future receiving of SSO

Curing Site –
Outdoor Gore composting and window composting – curing and yard waste and biosolids composting

Edmonton, AB Story

- Edmonton makes a great case study because it has all the elements of Organics digestion (truly full on)
- MSW Compost Facility shut down 2019 due to structural issues
- To advance diversion goals City instituted SSO curbside collection for single and multi-family residence – ICI is collected privately
- City allows green waste top off of green carts
- Instituted Grasscycling program

https://www.edmonton.ca/programs_services/garbage_waste/grasscycling

Feedstock

Feedstock Type, Source and Delivery Method

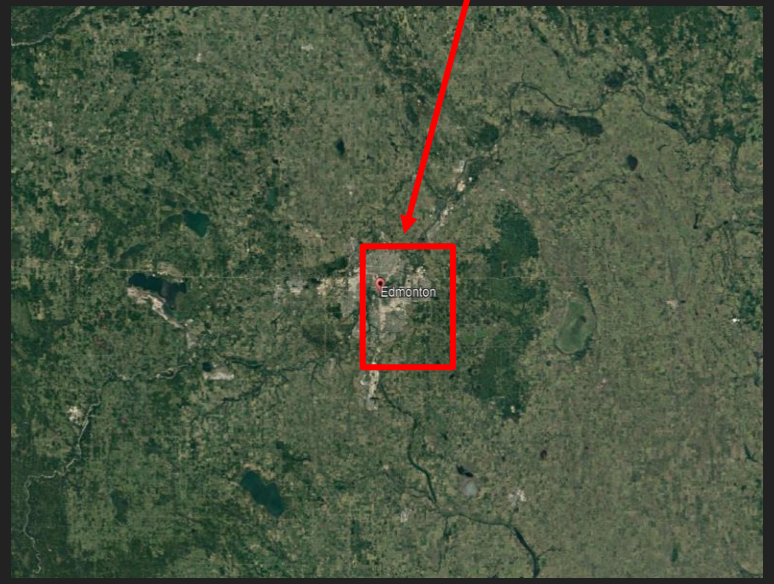
- City had extensive records
- Was performing a pilot for SSO collection and had characteristics of the waste
- Review of multiple waste composition studies from other jurisdictions

Material	2025	2045	
Single Family SSO	70,900	85,800	Mostly curbside collection
Multi Family SSO	24,400	33,500	Mostly curbside collection
Organics from MSW	16,200	22,200	Mostly curbside collection
Yard Waste	33,300	48,600	Combination Transfer Station and seasonal special collection

Feedstock	Summer	Fall	winter
Food waste	15%	25%	89%
Soil or other organics	0%	2%	0%
YW	77%	60%	0%
Paper	3%	7%	7%
Plastic	2%	3%	2%
Other contaminants	3%	3%	2%

Products

Metro Edmonton everything else is agricultural



Energy – top priority

- Already had CHP at HSAD – mostly used on site
- Not much demand for gas on site
- RNG was the target form of the energy

Multiple Products for Agricultural Use

- Liquid digestate
- Solid digestate
- Soil Blends
- Compost

Product Challenges

- No allowed use for organics digestate
- Regulations consider digestate solid waste
- Quality important

Product Delivery

RNG

- Local utility –strict control over gas injection and quality
- Revenue projections based on RNG sales & GHG Credits
- rEN credits to be tracked

Digestate – Existing Land Application Market

- Met with Regulators – They wanted a regulation for Organics digestate – We wrote one
- In the end they felt it should be part of facility permit
- Improved quality over current biosolids digestate for land application

Project Delivery Method

Public Private Partnership (P3)

- Client invites teams of vendors, contractor and operators to provide bid to Design, Build, Operate, Finance, and Maintain (DBOFM) a facility
- Life of contract 20 years
- Performance driven contract
- Product marketing included – limits on storage - penalties
- Rigorous maintenance planning and review process
- Handover – 10-year life after handover
- Independent certifier

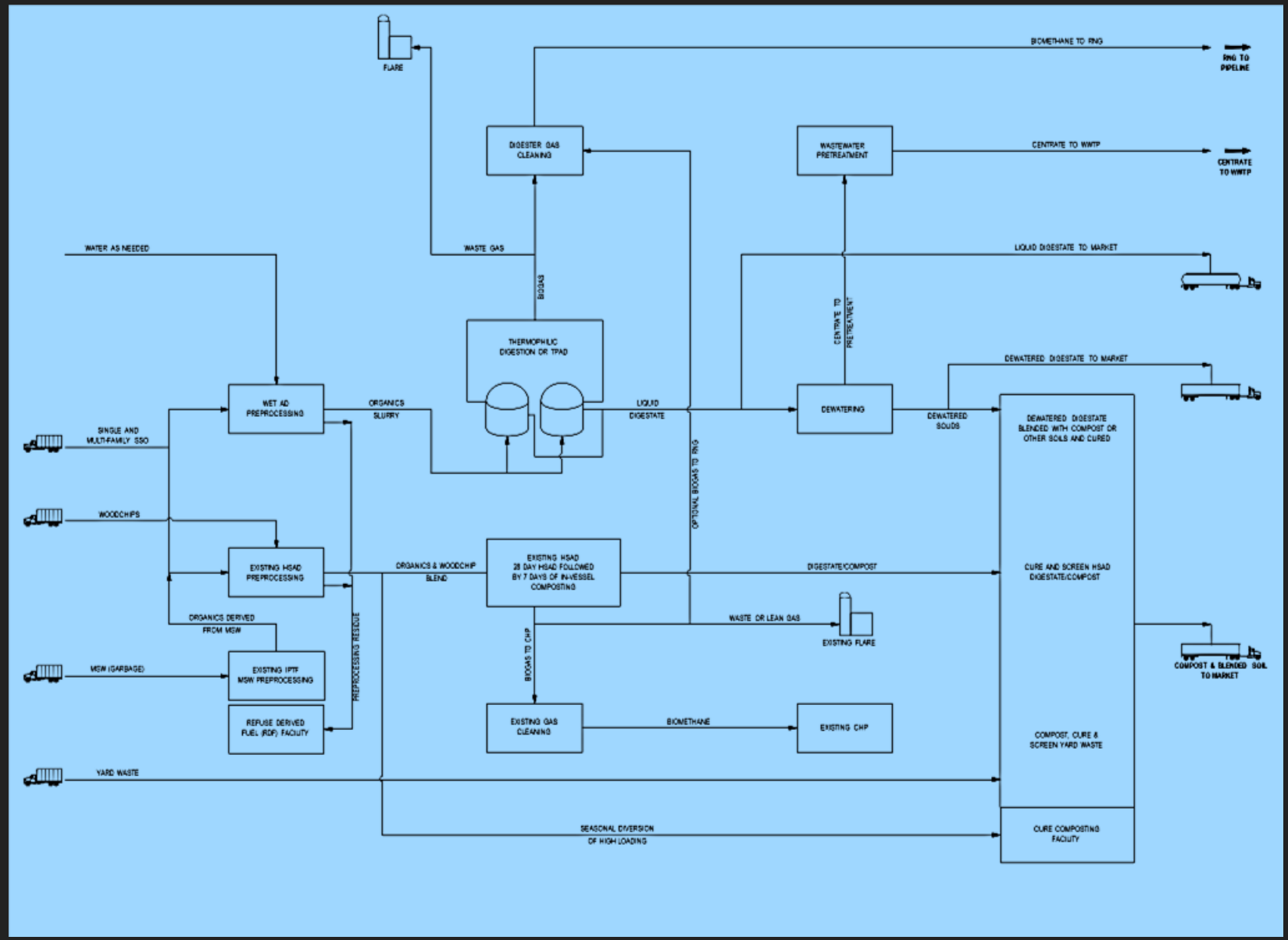
Project Delivery Method

Major Terms

- Performance Driven – Vendor had discretion on Technology
- 20 years with 5 years extension
- Performance driven contract
- The advantage of P3 is the market gets to bring its' innovation and best ideas to the project
- Some risk is shifted from owner to team

Indicative Design Organics Processing Facilities (OPF)

Indicative Design OPF

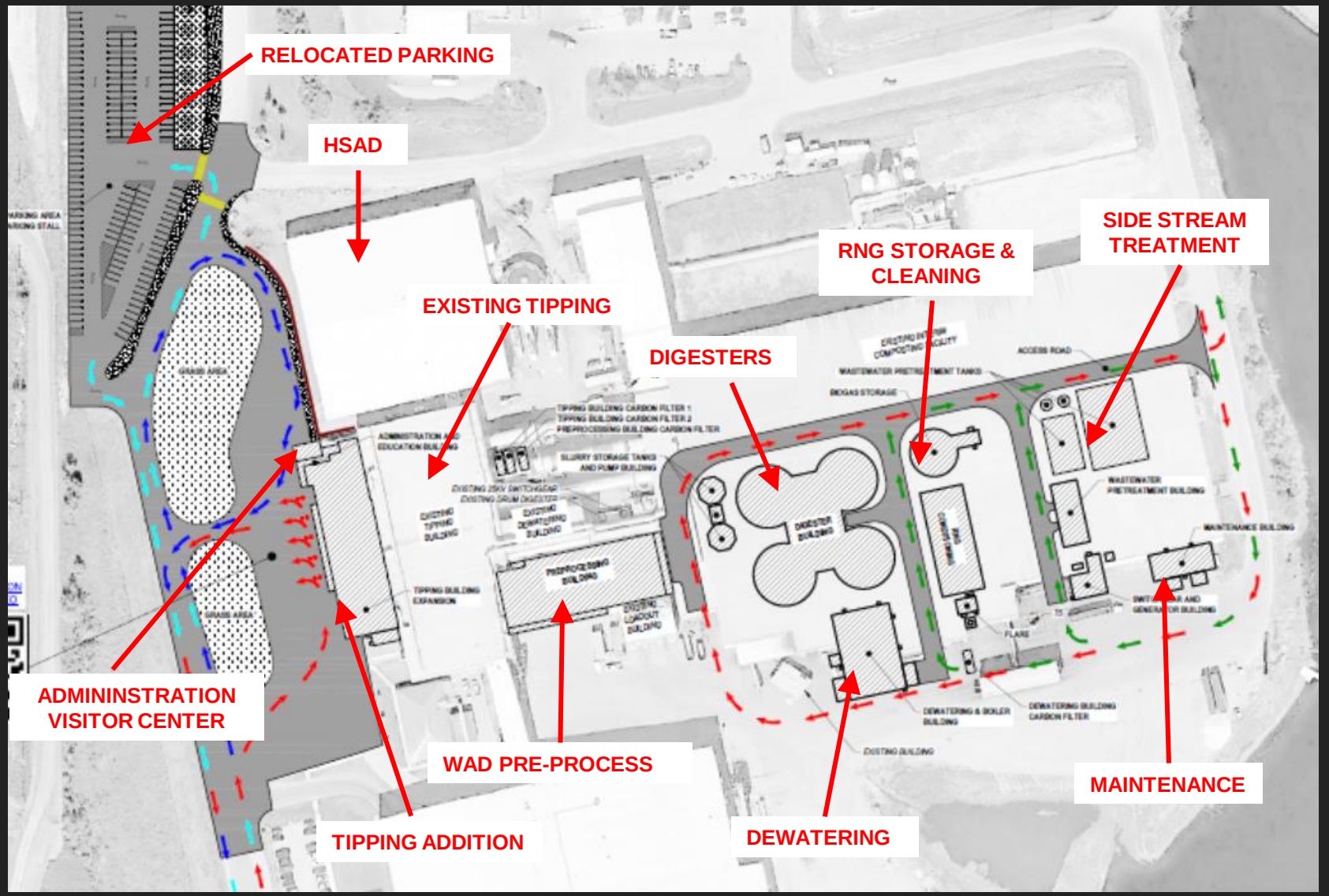


Indicative Design

Facility	2025	2045
New AD	56,500	98,100
HSAD	40,000	40,000
Regional Facility	15,000	15,000
Gore Expansion to handle peaks	15,000	55,000

Anticipated Products	2045
RNG	300,338 GJ/YR
Liquid Digestate	343 ML/YR
Solid Digestate	80,000 MT/YR
Dry Digestion Solids	20,500 MT/YR
Compost/Soil Blends	Market Dependent

Indicative Design



Indicative Design Cost Projection

Item	Value	
Capital	CA$ 211,496,000	US$ 156,507,000
O&M	CA$ 32,000,000	US$ 23,680,000
Revenue (GHG Credits, RNG)	CA$ 14,302,000	US$ 10,584,000
NPV	CA$ 334,236,000	US$ 247,335,000

Not P3 quotes

Based on indicative design

No revenue counted for digestate products

Poor soil conditions significantly increased Capital cost

Due to economic climate in 2020 City decided to ship as much material as possible to 3rd party operations.

Stantec

Questions?

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"A SOCIETY IS DEFINED NOT ONLY BY WHAT IT CREATES, BUT BY WHAT IT REFUSES TO DESTROY"

John Sawhill - Greatest Guide to Green Living

"THERE NO SUCH THING AS 'AWAY'. WHEN WE THROW ANYTHING AWAY IT MUST GO SOMEWHERE "

Annie Leonard – The Story of Stuff Project