

ZOO SHARE BIOGAS A FITEC ANAEROBIC DIGESTION SYSTEM



Fitec Environmental Technologies

- Fitec designs, builds and operates Anaerobic Digestion Systems across North America
- Fitec currently provides operations support for 5 biogas plants totaling approx. 4MW of electrical output and over 100,000 tonnes/yr of organics processed.
- Fitec currently has 5 projects under various stages of design, construction and installation:
 - A BioSqueeze high solids contaminant separation system for commercial and municipal organic wastes
 - Zoo Share anaerobic digester-material handling, high TS pasteurizing and Fitec Self-Cleaning digester system
 - Escarpment Renewables-new receiving, material handling, high solids pasteurizing and in-fermenter plastics removal systems as well as control systems
 - Bromont, QC- Design and supply of a 45,000 tonne/yr AD system including Fitec receiving, pasteurizing and Fitec Self Cleaning digester system
 - Project feasibility for a 20,000 tonne/yr biogas system with RNG sales

About Zoo Share Biogas

- ZooShare Biogas Co-operative is a non-profit renewable energy cooperative, the Executive Director is Daniel Bida
- The biogas plant is 51% owned by the co-operative and its members and community bondholders
- 49% owned by EnerFORGE (formerly Oshawa Power), a local electrical distribution company
- Stonecrest Engineering is the site and civil firm on the project
- Fitec Environmental Technologies is the biogas system designer, process equipment supplier and technical supervisor to the project

Zoo Share Biogas by the numbers

- Zoo Share Biogas will be able to receive up to 17,000 tonnes of pre-treated or clean organic wastes
- Consists of one 2000m³ concrete digester with a concrete roof
- Has two receiving tanks, approx. 130m³ each
- One JMS 312 Jenbacher (633 kW) CHP
- 500 kW FIT contract
- 36m diameter digestate storage tank with double membrane gas holder
- Fitec is the process designer, process equipment supplier and technical advisor to the project
- Key Fitec equipment supplied:
 - Receiving tank agitation with Streisal agitators
 - High solids pasteurizing system including Fitec KV20 pumps and double tube heat exchangers
 - Fitec KV20 pumps also used for continuous digester feeding
 - Self Cleaning Digester system including in-vessel floor sweeper for continuous grit removal and in vessel skimmer for continuous plastics removal

UNDERSTANDING FEEDSTOCK IS KEY

Need to match the right solutions to the waste stream

Physical Composition



Municipal SSO TS: 25-35%;
Contaminants up to 35% of the TS



Kitchens, restaurants & supermarkets TS:
20-30%; Contaminants up to 25% of the TS



Packaged & expired food wastes TS 20-35%;
Contaminants up to 35% of the TS



ORGANIC WASTE ANALYSIS

Biochemical Composition

Typical contaminants in food waste: glass, wood, sand, plates, cutlery, plastic bags, bones, egg shells, cardboard, cans etc.

All contaminants can ultimately be separated based on density differences into two categories: Light and heavy fractions.



Pre-treated slurry containing residual contaminants.

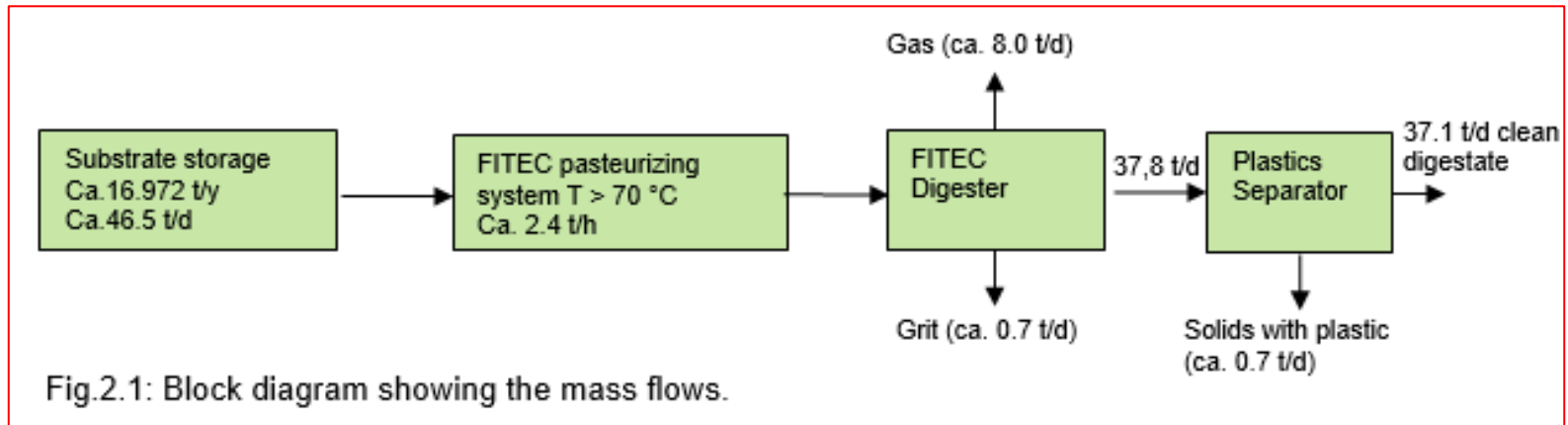
Organic waste type	Mass	TS delivered	oTS	oTSv	Protein	Fat	Biogas Yield	Methane content
	tonne/Cd	%	%TS	%oTS	%	%	Nm ³ /t	%
Supermarket waste-clean	10	21.0	94	95	10.0	6.0	134	53.9
Source separated organics	9	21.0	85	93	16.0	6.0	124	55.1
Food waste from restaurants	13	21.0	90	95	28.0	15.0	136	60.2
Supermarket waste-packaged goods	9	21.0	90	95	20.0	15.0	139	58.6
Solid Zoo Manure	5.5	45.0	78	73	16.0	0.0	87	53.0
Total Input	46.5	23.84					128.03	56.7

BIOTIP AD SIMULATION SOFTWARE

Determines the key AD process engineering parameters

			Operational Safe Limits
Digester Volume	1,963	m ³	
Organic load	4.3	kgoTS/m ³ /d	< 4.0
TS Digester	5.5	%	< 10 %
NH ₄	4.6	g/l	< 5.8
Average TS Input	23.8	%	< 25 %
Biogas	6,420	Nm ³ /d	
Methane	56.7	%	
Energy output	613	KW	

MASS BALANCE WITH THE FITEC SYSTEM



Eventually what goes in must come out

Heavy Fraction-Sedimentation



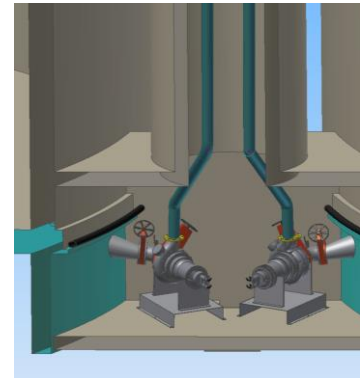
Even with pre-treatment residual contaminants remain & cause damage to equipment, accumulate in the digester and reduce digestate quality.

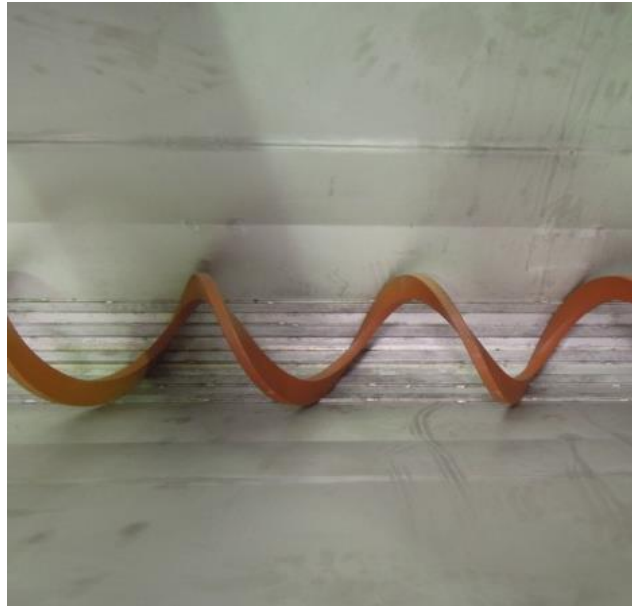
Light Fraction-Floating Layer



Self Cleaning Digester: Grit Removal Step 1

- Installations have been operating continuously for > 15 years.
- Makes half a turn every 2 hours and takes 20 sec to pump the grit as the scraper passes the sump.
- Utilizes a 0.55 kW motor and large reduction gearbox
- No scheduled maintenance
- Torque forces managed by concrete roof and mechanical supports.
- Sump in floor where grit is collected and pumped up to gravity separator.
- Agitator is specially designed to eliminate plastics wrapping around blades and shaft. Also large blades and slower speeds improves energy efficiency.
- Polypropylene liner in the gas zone.





Digester Grit Removal Step 2

Fine contaminant removal means the cleaning of all sinking material from the digester floor to avoid mechanical problems and shut down.

The floor cleaning system removes the final 2-3% of residual contaminants such as stones, sand, glass, egg shells.



In-Vessel plastics removal system

The system is designed to operate in a gas tight environment and skims the digester surface to remove the floating contaminants.

The skimmer operates in the top 20-30 cm of the digester.

The skimmer system typically operates 6-12 hrs per day depending on the level of plastics contamination.

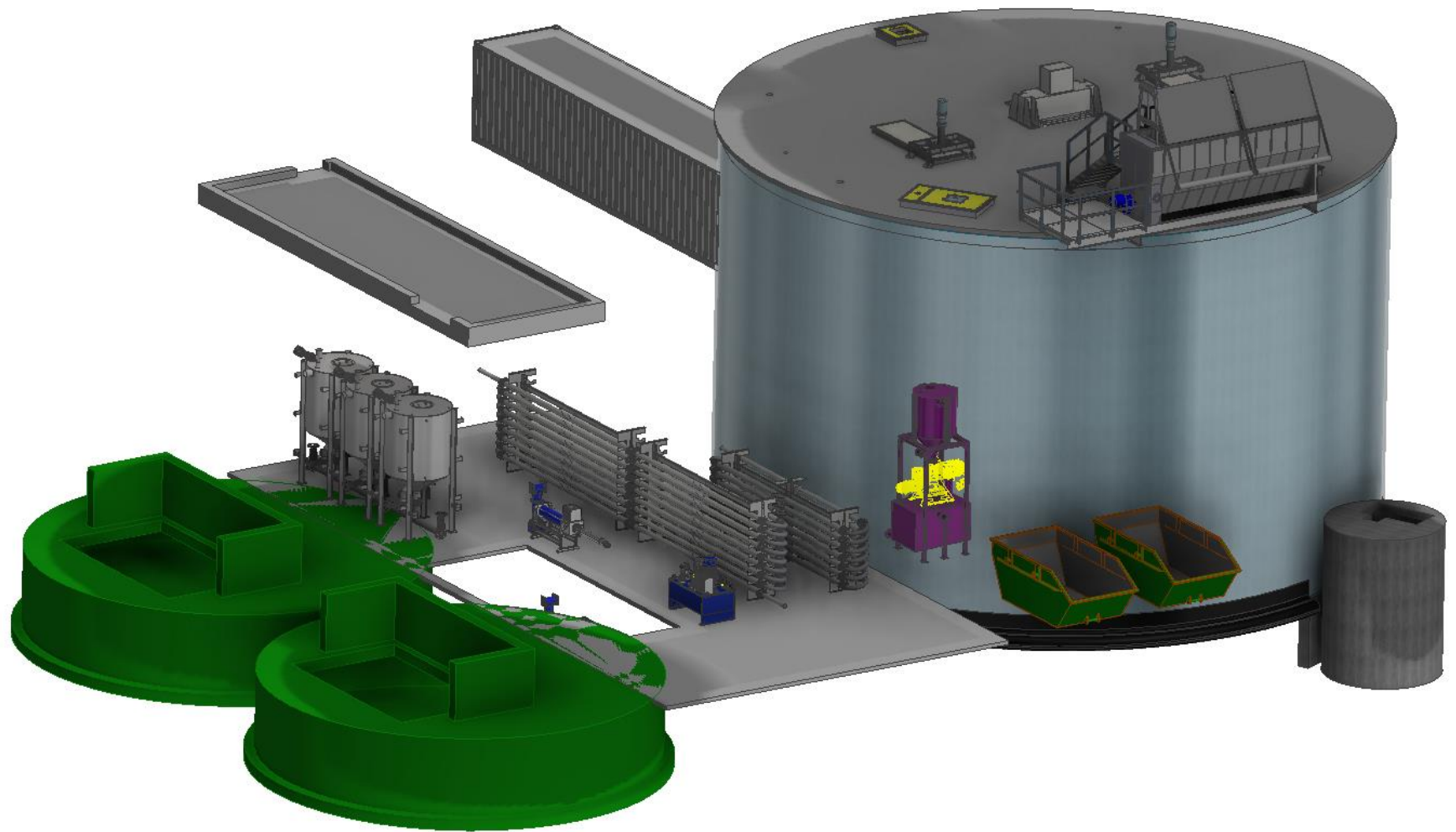
Integrated 4 kW pump moves the skimmed material to a top mounted screw press with a 1 mm screen.

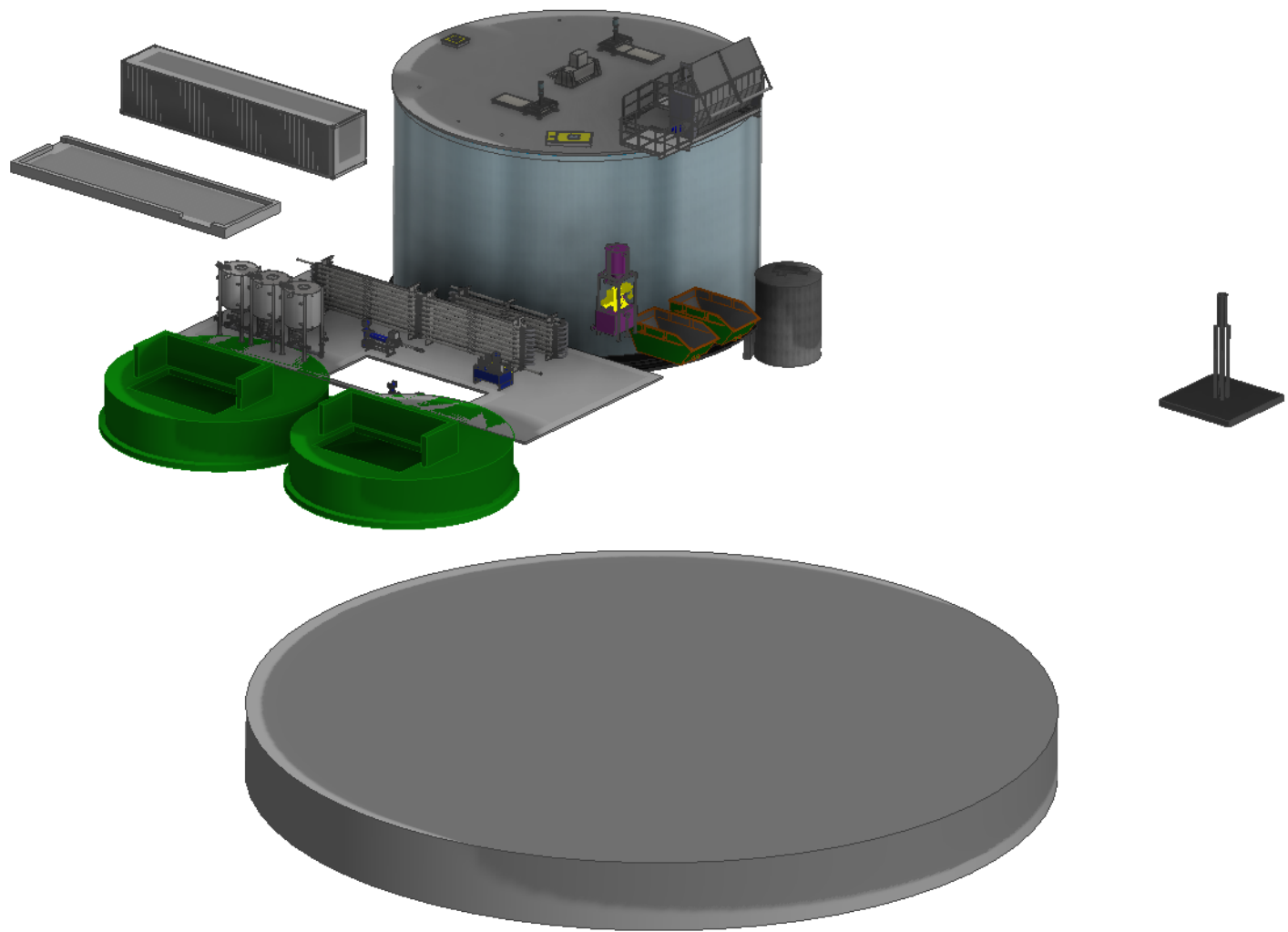
In the end all digestate leaving will be filtered through this system and is free of visible contamination.

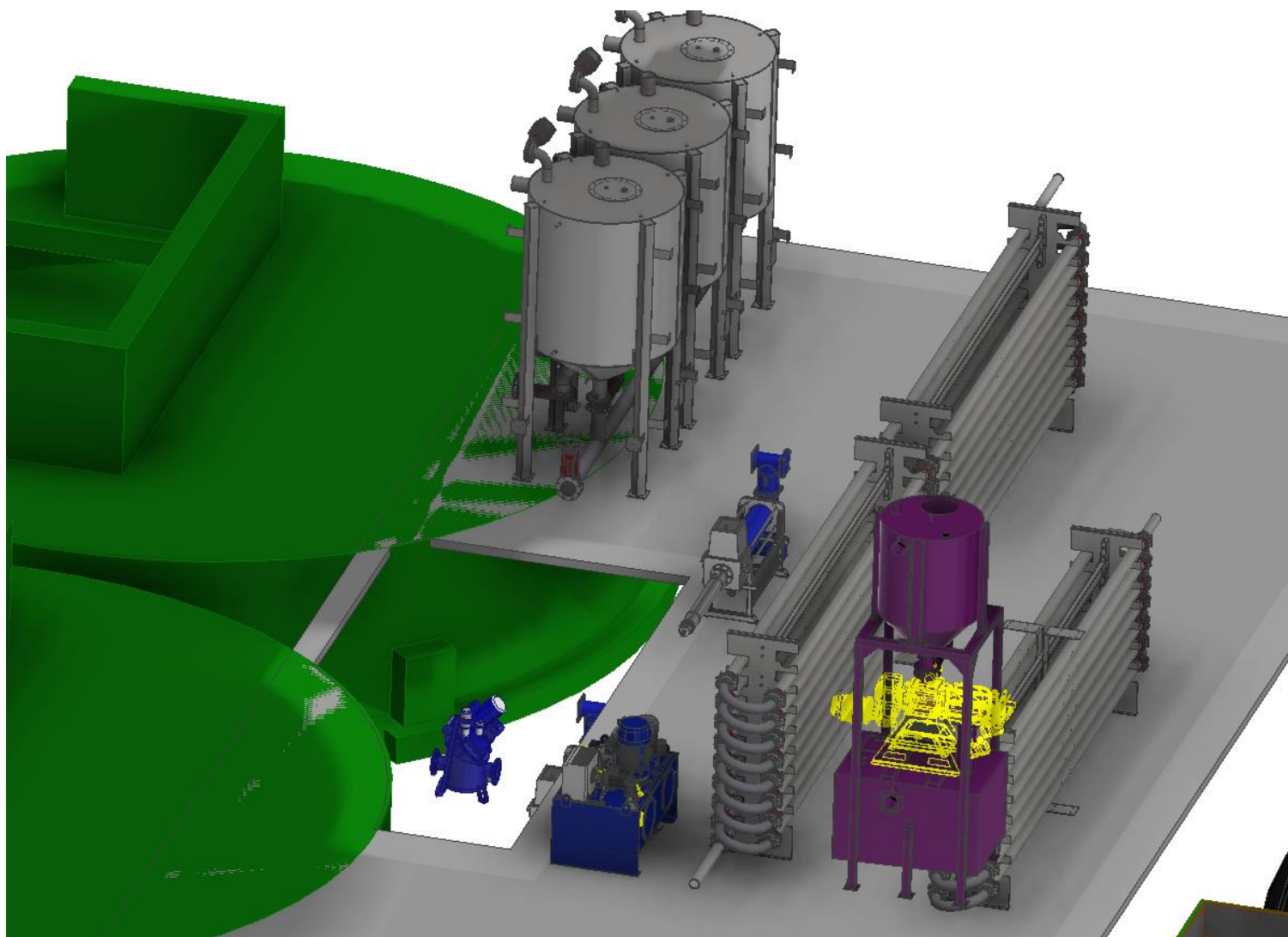


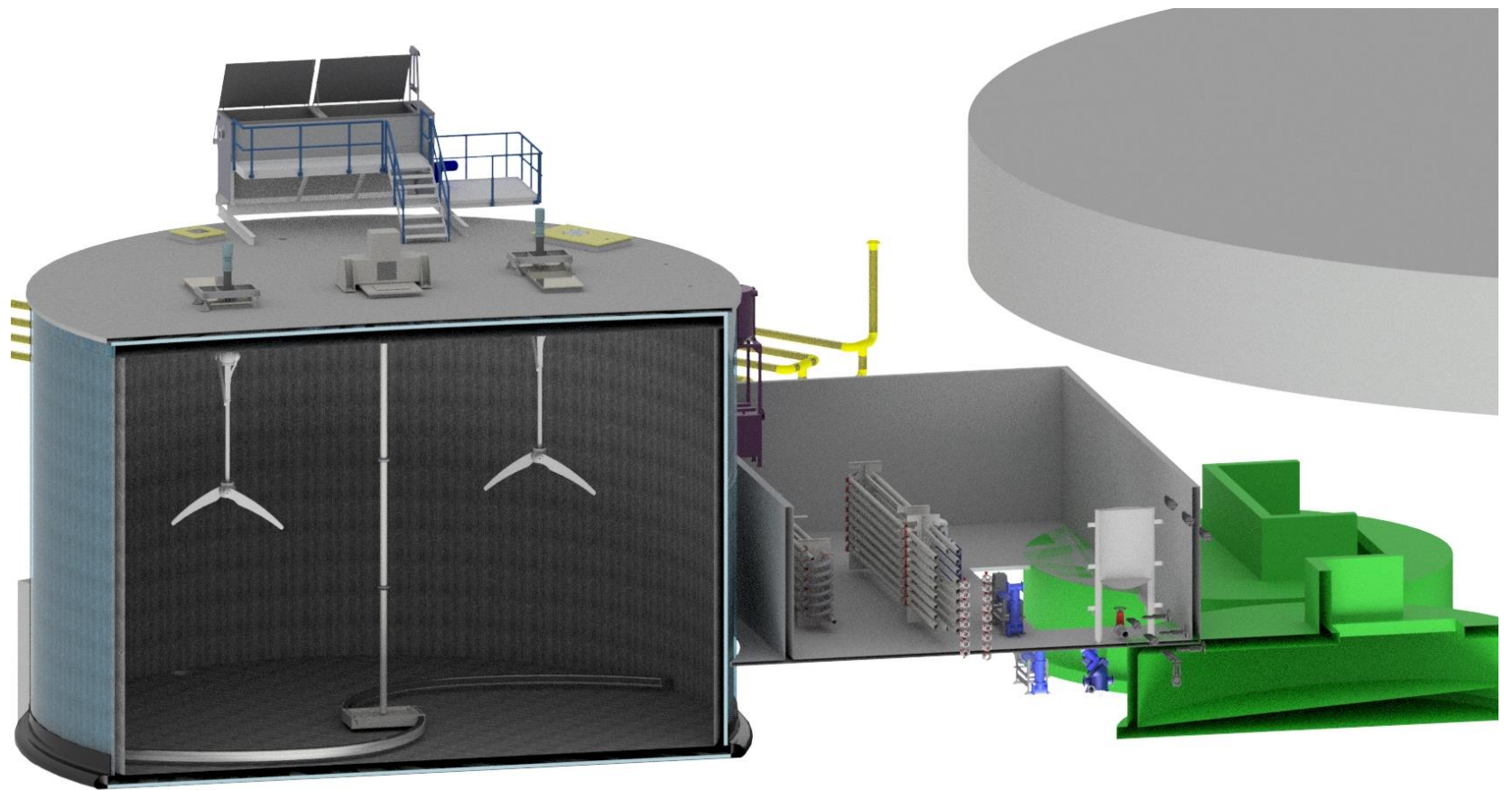
**PROCESS MORE
ORGANICS AND AVOID
COSTLY DOWNTIME**

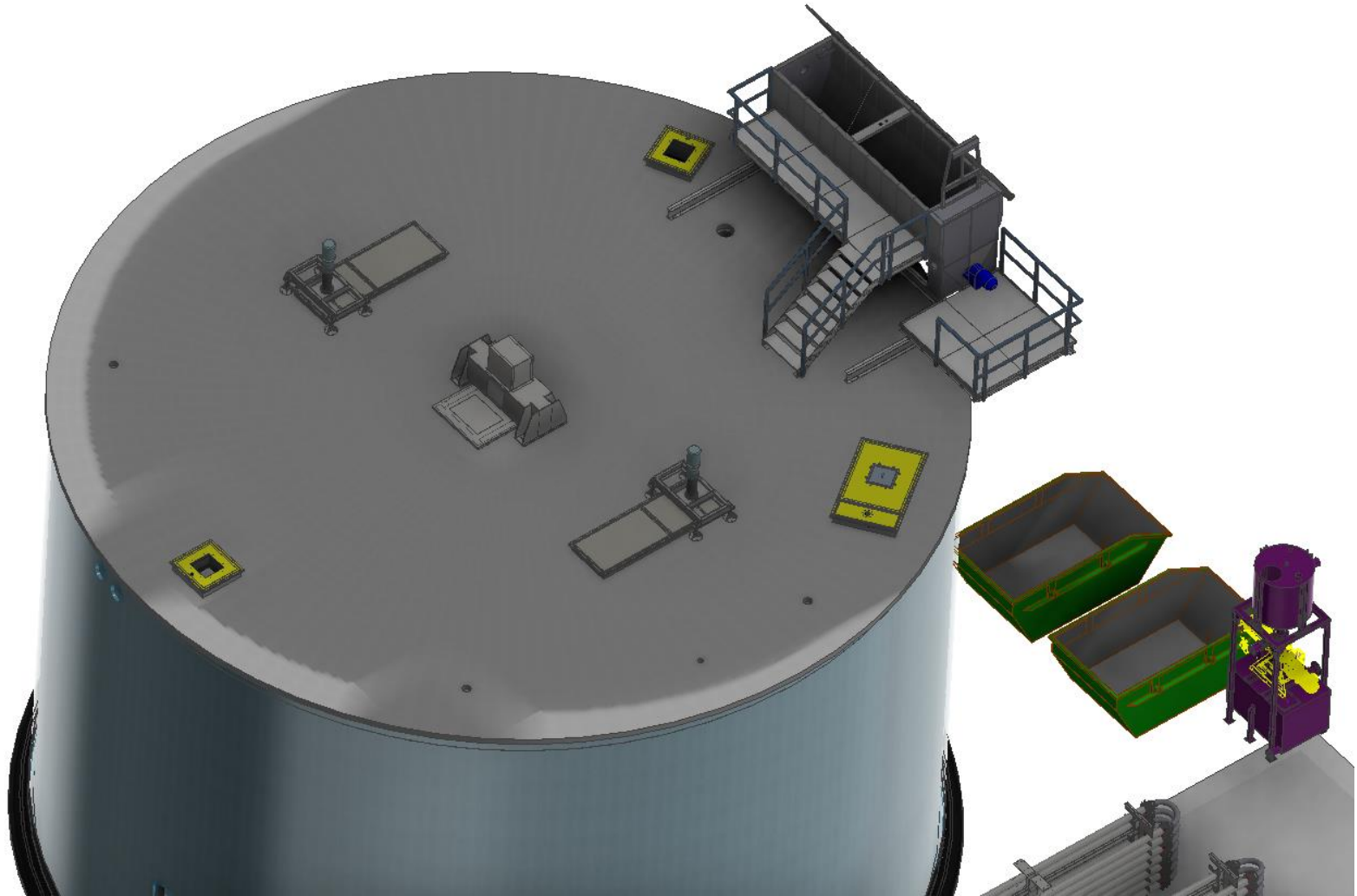






















THANK YOU

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