

Requirements for Food Waste AD Pre-processing -- It All Depends...!"

Norma McDonald – *Organic Waste Systems, Inc.*

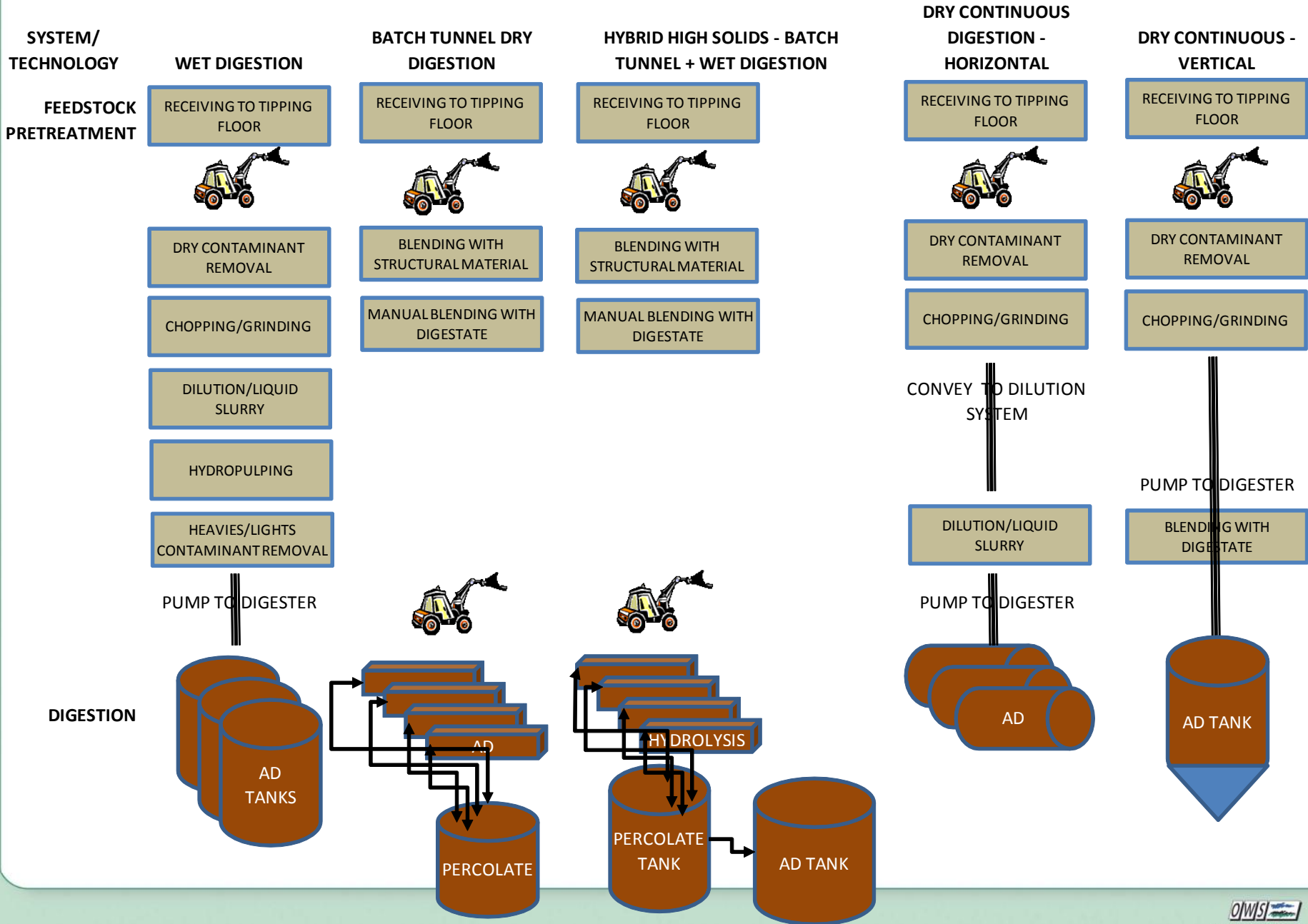
USCC Annual Conference - January 30, 2013

PRE-TREATMENT OF FOOD WASTE FOR AD

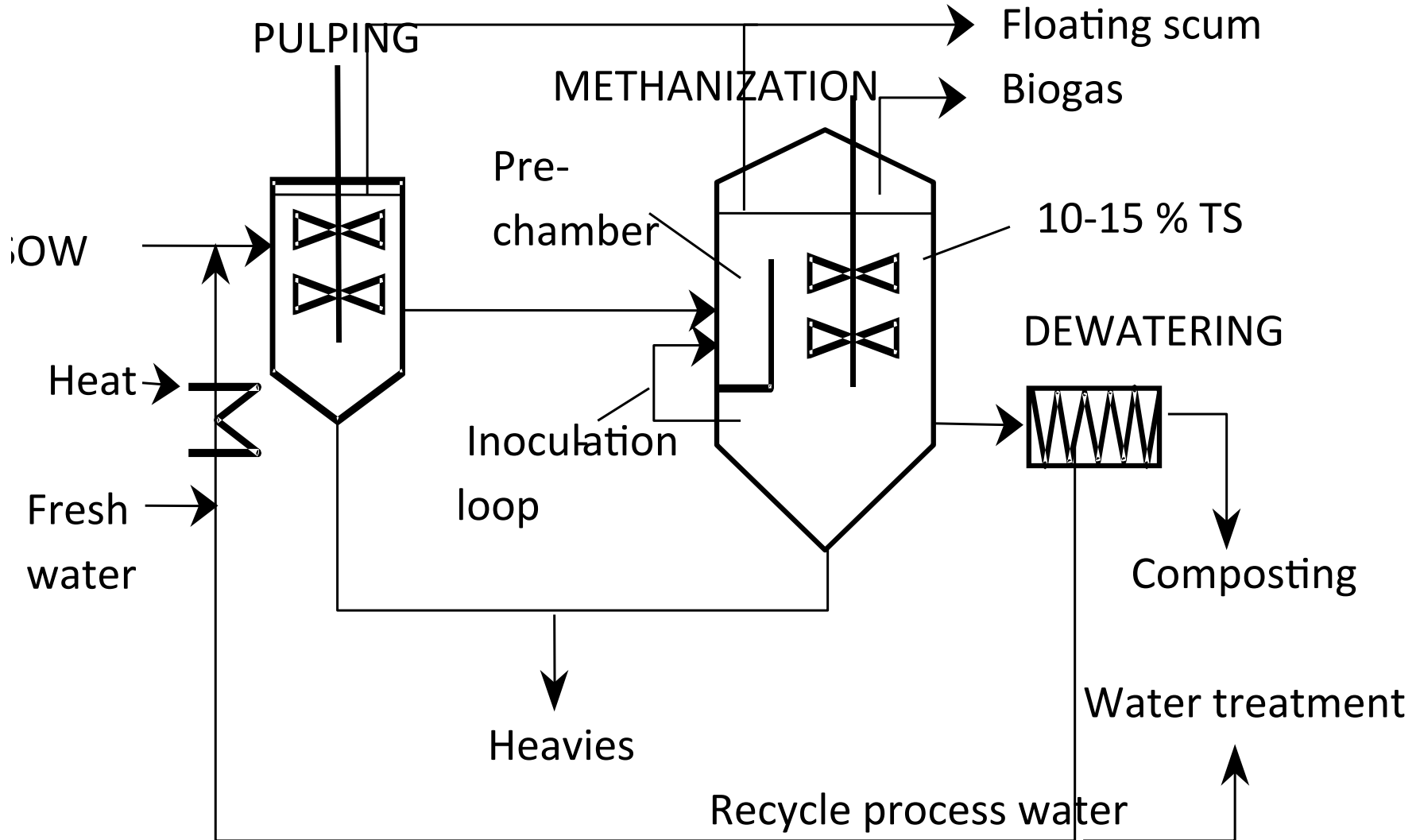
IT ALL DEPENDS

- COMPOSITION OF INCOMING WASTE
- PHYSICAL/MECHANICAL LIMITATIONS OF DIGESTER LOADING EQUIPMENT
- DIGESTER PROCESS MIXING/MECHANICAL CONFIGURATION
- DIGESTATE DEWATERING REQUIREMENTS
- IMPACT OF BIOGAS PRODUCTION ON PLANT ECONOMICS

XYZ



Typical design of a one stage wet system

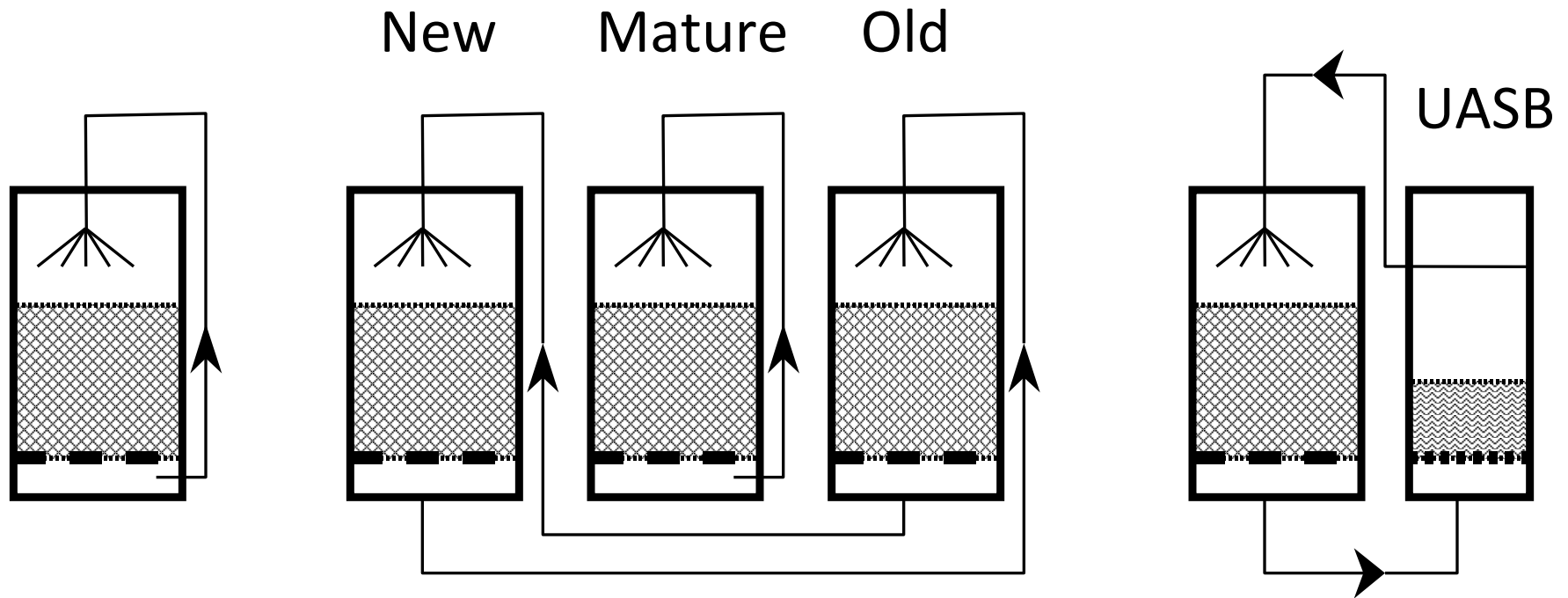


Configuration of leachate recycle patterns in different batch systems

A. Single-stage

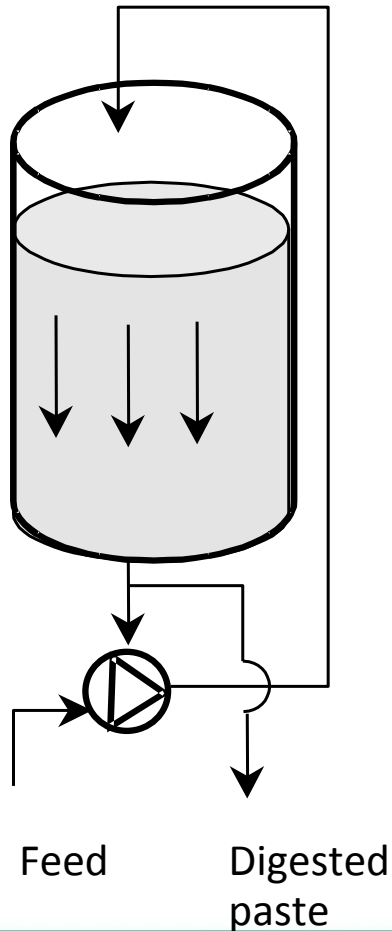
B. Sequential batch

C. Hybrid batch-UASB

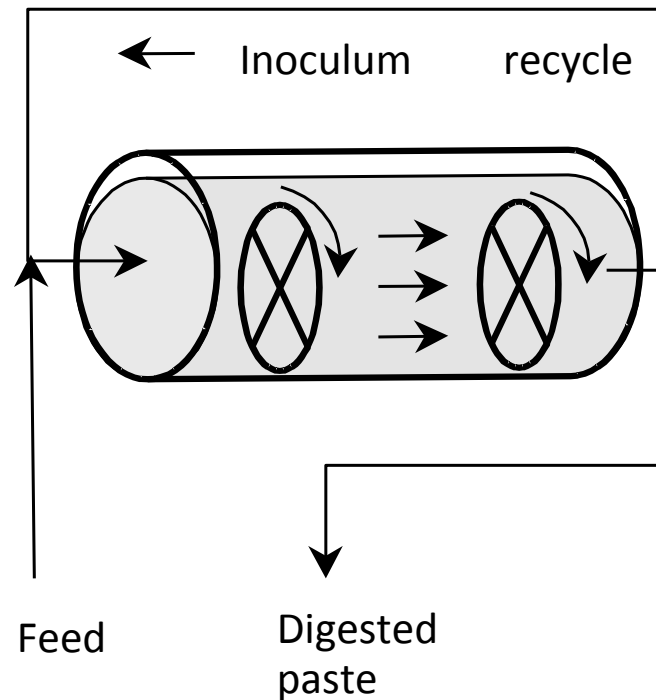


Dry continuous systems (A illustrates the Dranco design, B the Kompogas and BRV designs, and C the Valorga design)

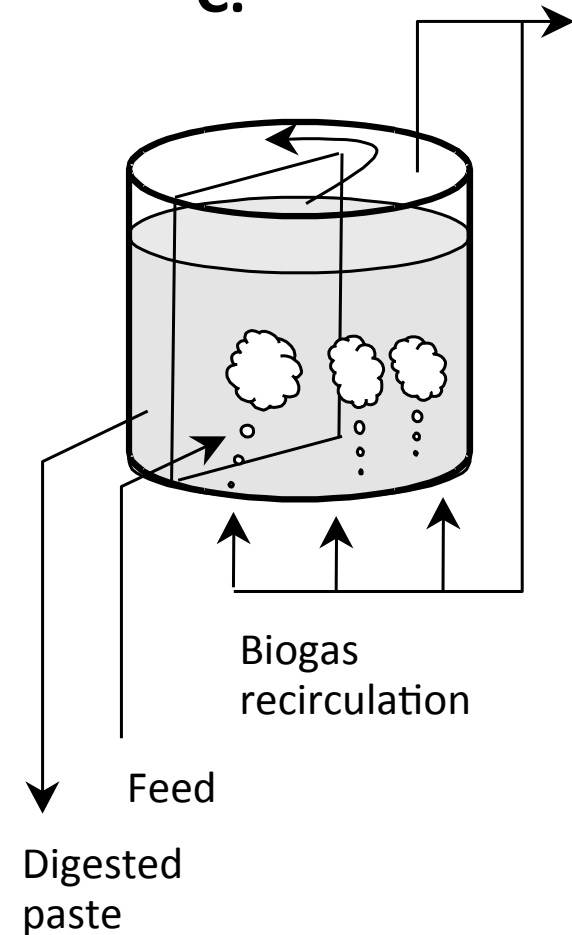
A.



B.



C.



WHY DOES IT MATTER?

Environ Strategy consultants, Inc. statement on repairs to existing equipment at Inland Energy Utility Agency, presented at CalRecycle event May 30, 2012, "Digesting Urban Organics Residuals".

Repairs to Existing Equipment

- Digesters were filled with solids and required cleaning
- Pipes had solids in them and required cleaning
- Electronic controls and equipment needed repair
- Pumps and other equipment required repairs or replacement
- Methane flare had to be repaired
- Biofilter materials and piping was replaced
- Food waste tank piping had to be repaired
- Gas and wastewater piping had to be repaired



COMPOSITION OF INCOMING WASTE



D WASTE AS PART
OF SCOW

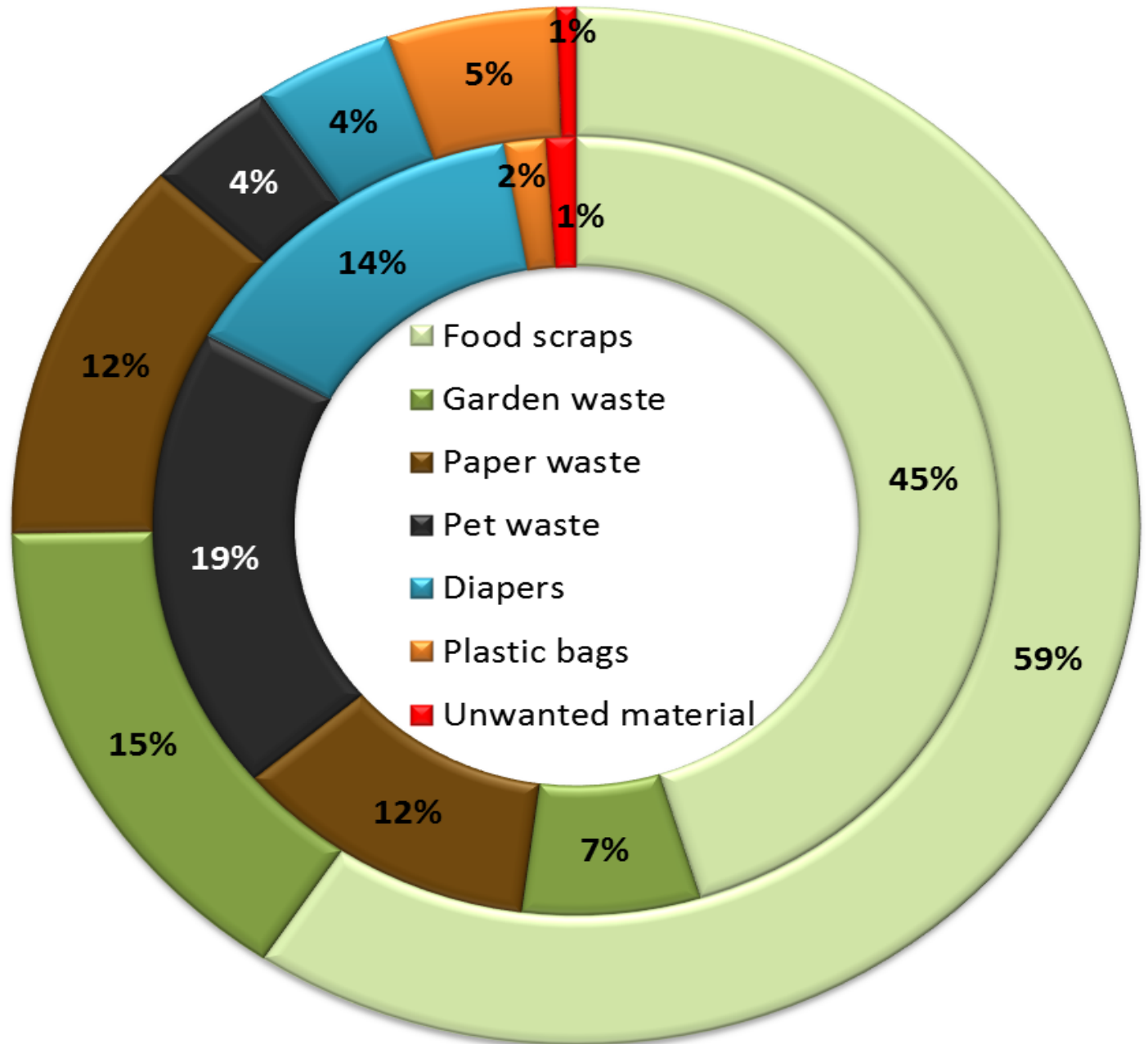


MADISON, WISCONSIN SSOW




Distribution of
sorted waste (fresh
weight):

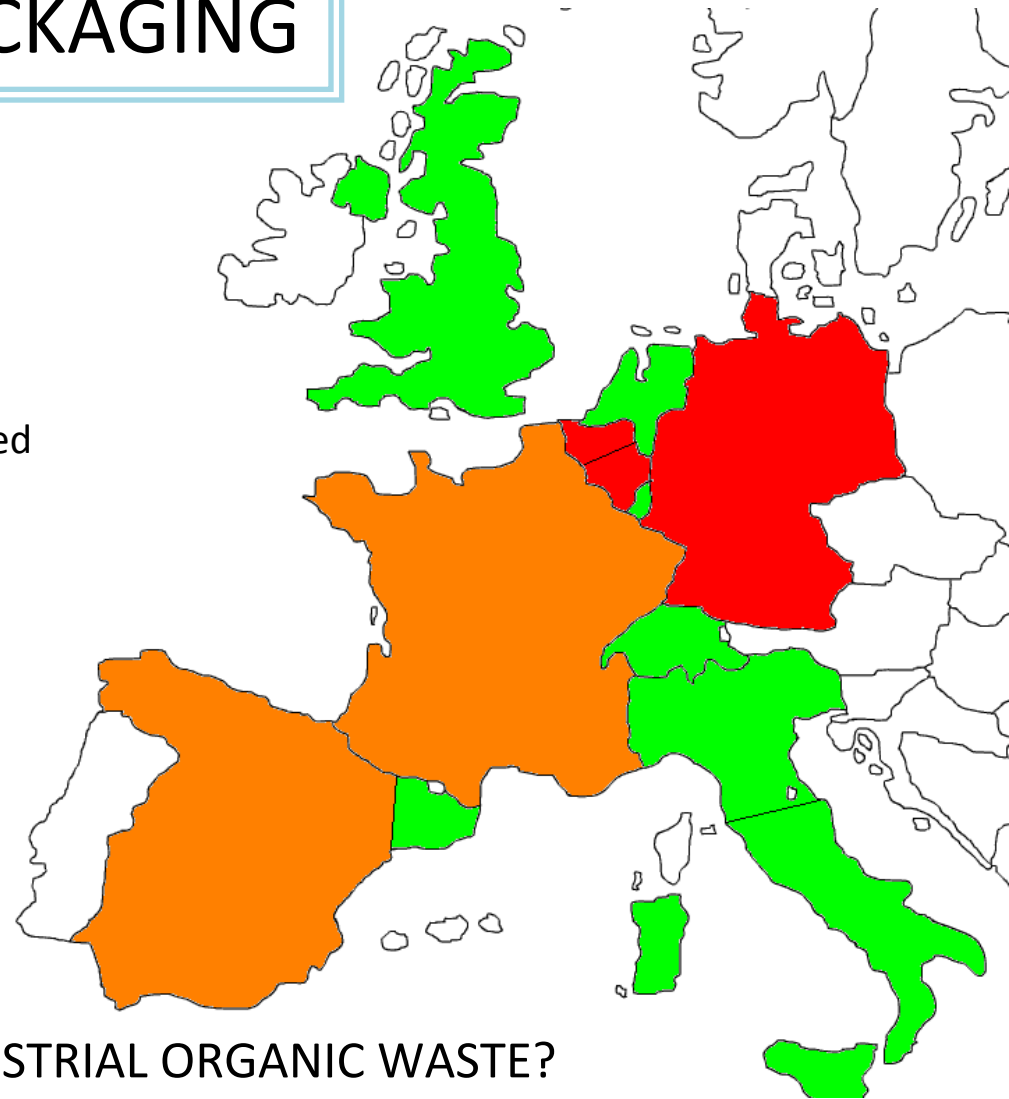
inner ring: 1st
sample

outer ring: 2nd
sample



ACCEPTANCE OF COMPOSTABLE PACKAGING

-  Established and/or allowed/promoted
-  Very limited
-  Not promoted



→ BREAKTHROUGH VIA INDUSTRIAL ORGANIC WASTE?

INDUSTRIAL,
COMMERCIAL,
INSTITUTIONAL
(ICI)



COMPOSITION OF INCOMING WASTE



FOOD
WASTE
AS PART
OF
OFMSW

FACTOR	WET DIGESTION	BATCH TUNNEL	DRY CONTINUOUS
PARTICLE SIZE	PUMPING	COMPACTION	PUMPING
	MIXING, FLOATING, SETTLING	POROSITY, PERCOLATION	RATE OF DIGESTION
	RATE OF DIGESTION	ZONES WITHIN PILE	
	DEWATERING	RATE OF DIGESTION	
LIGHT FRACTION	FLOATING LAYER	PERCOLATION, POROSITY	BIOGAS/TON
	BIOGAS/TON	BIOGAS/TON	
HEAVY FRACTION	SEDIMENTATION	COMPACTION, PERCOLATION	BIOGAS/TON
	BIOGAS/TON	BIOGAS/TON	
SOLIDS CONTENT	8-13%	45% - 55%	25% - 50%

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Size
reduction
equipment
capability
must
match the
materials
in the
waste

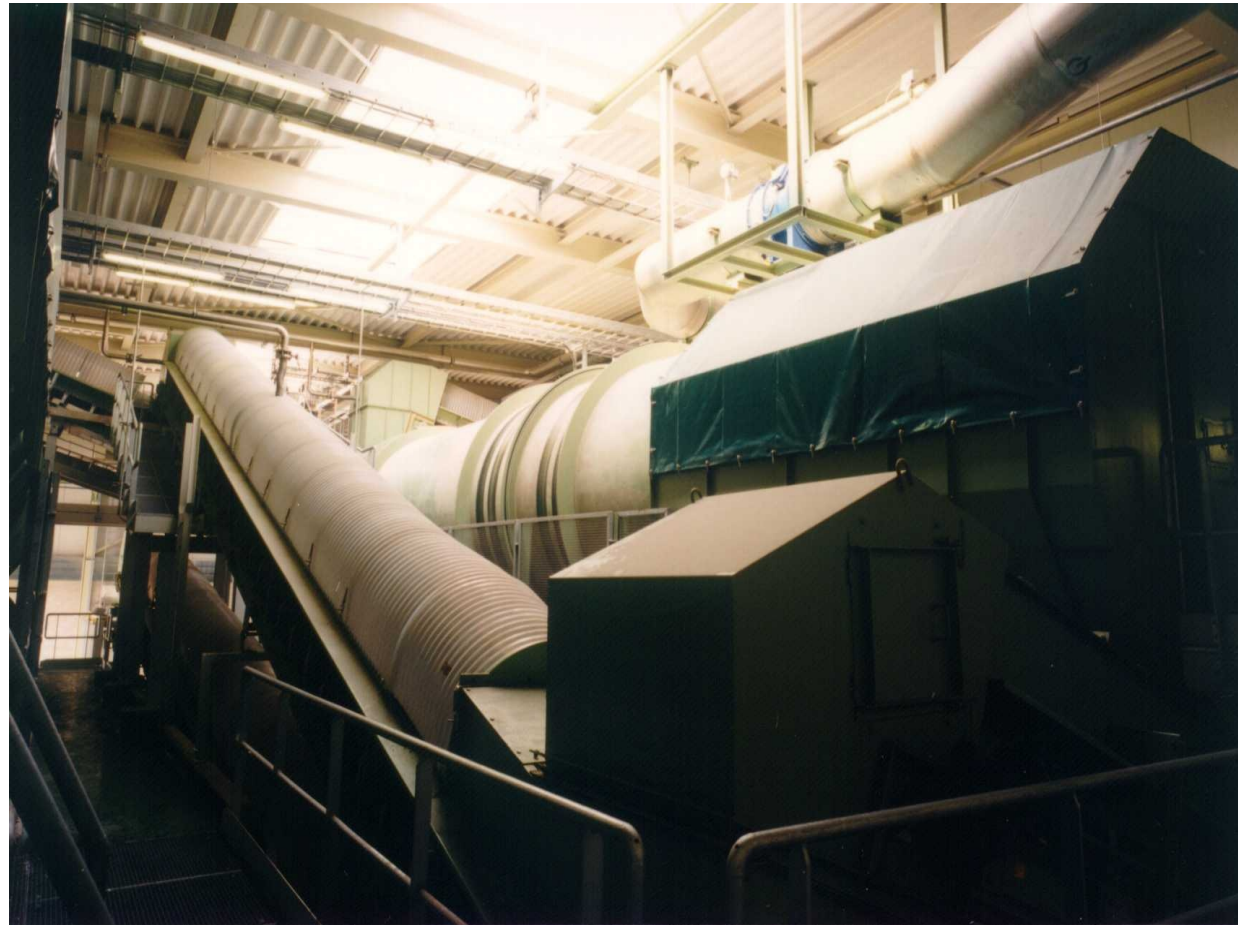
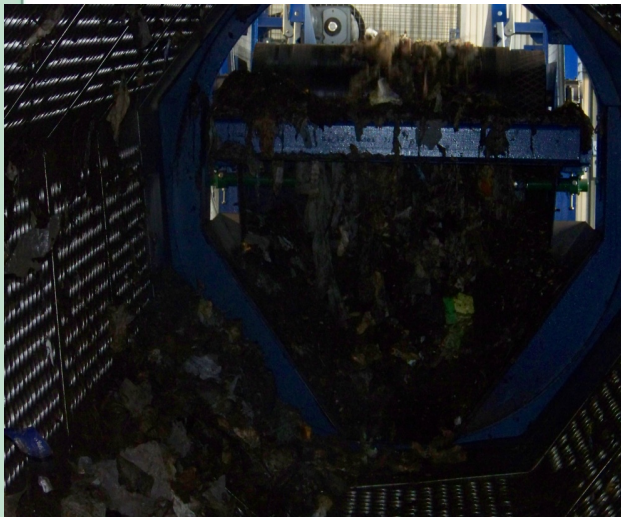
BANANA AND ORANGE PEEL AFTER 17 DAYS OF INTENSIVE COMPOSTING



Homogenization drum for selective reduction of the incoming waste



Rotating Sieves



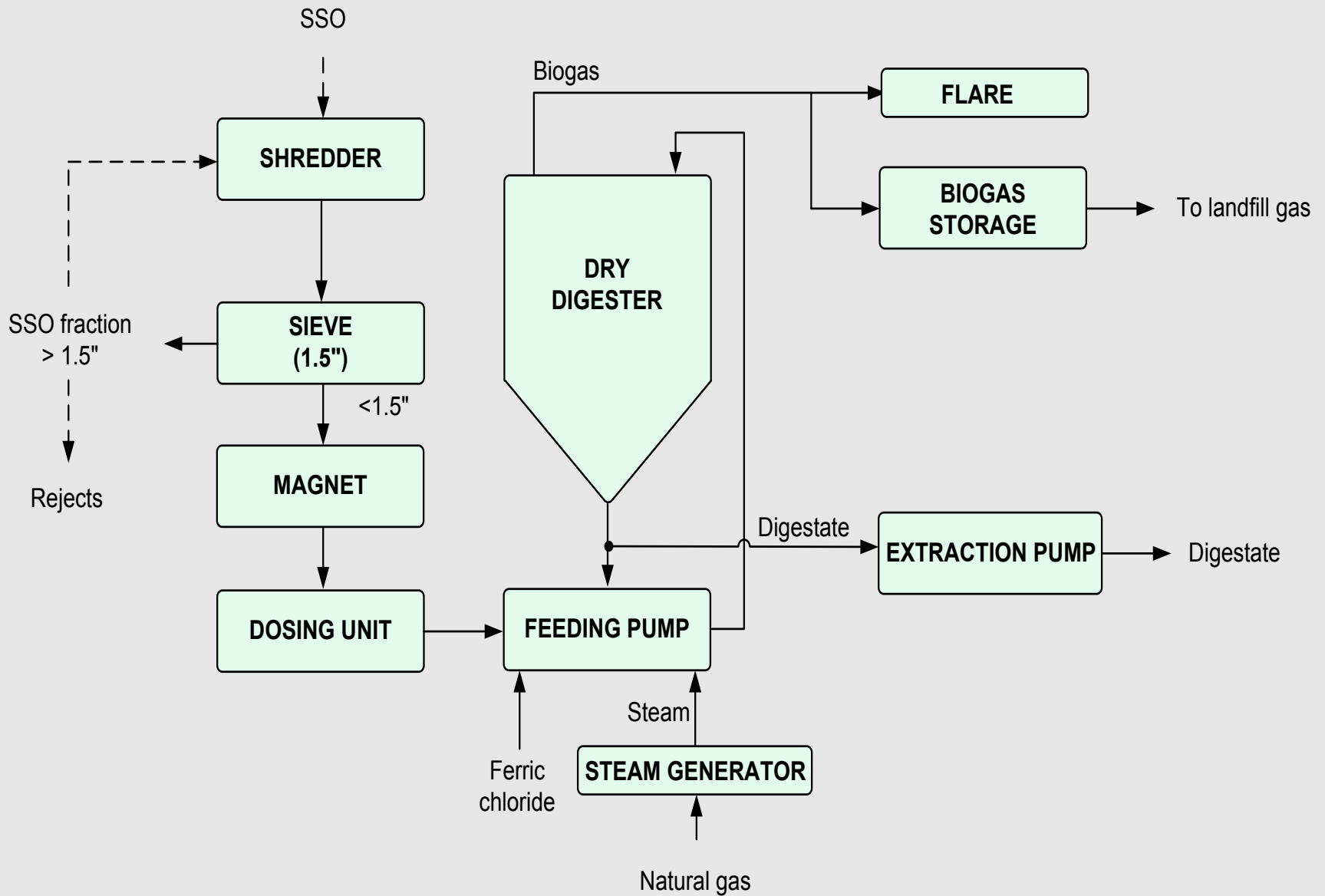
MeWa vertical shredder used to shred SSOW



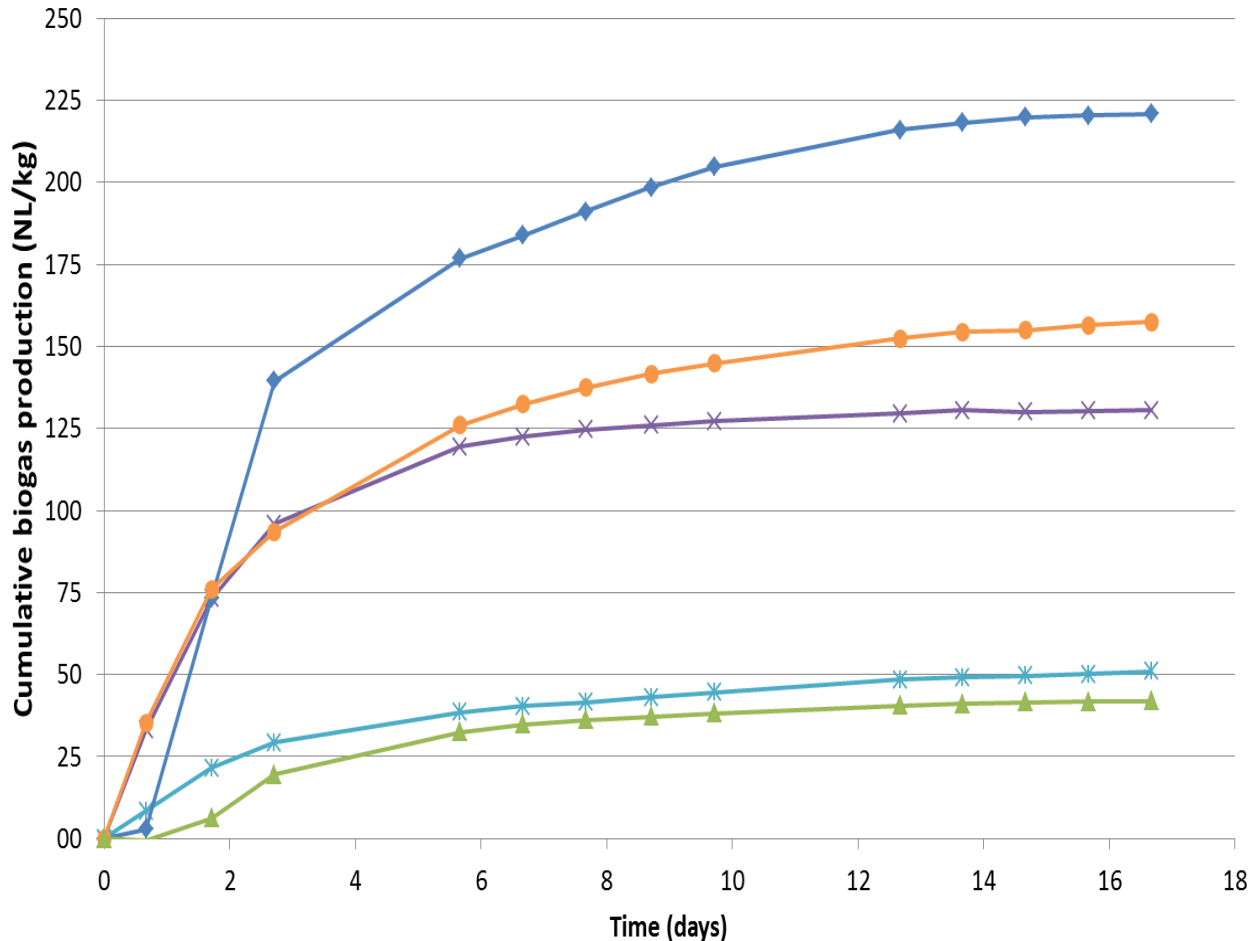
Waste pulper (background) and sand screw for sand and grit removal (foreground)



CONTINUOUS DRY AD SYSTEM



Impact on Biogas Potential



Pretreatment that eliminates certain fractions can decrease biogas potential

—x— GDR-1/2 Food scraps 5/07/12 —*— GDR-1/2 Garden waste 5/07/12 —◆— GDR-1/2 Paper mix 5/07/12
—○— GDR-1/2 Pet waste 5/07/12 —▲— GDR-1/2 Diaper contents 5/07/12

SUCCESS STORIES



OWS has 27 full-scale reference plants in 13 different countries, treating source-separated and mixed-household waste, industrial and commercial waste organics, as well as energy crops. Our “senior” plant has demonstrated 99.59349% in-service, active digestion time over the last 20 years!

OWS: The company

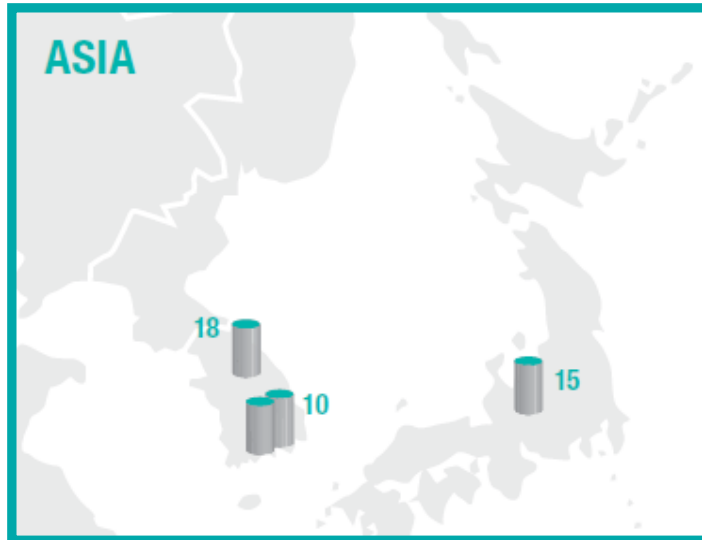
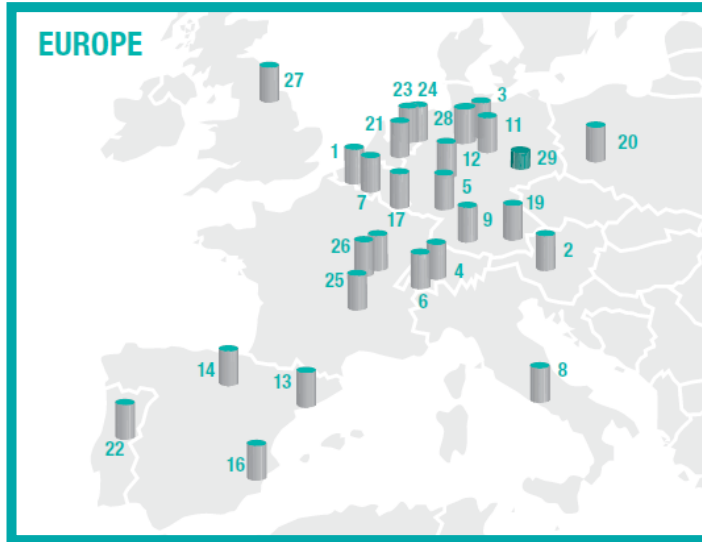
- DRANCO technology: dry continuous digestion technology developed in 1983 at U-Ghent
- OWS created in 1988: >25 years experience in anaerobic digestion of solid and semisolid organics
- Sales: \$25 - 35 million per year
- 70 people
- OWS headquartered in Ghent (Belgium)
3 subsidiaries:
OWS Inc (USA), BES GmbH, DRANCO nv



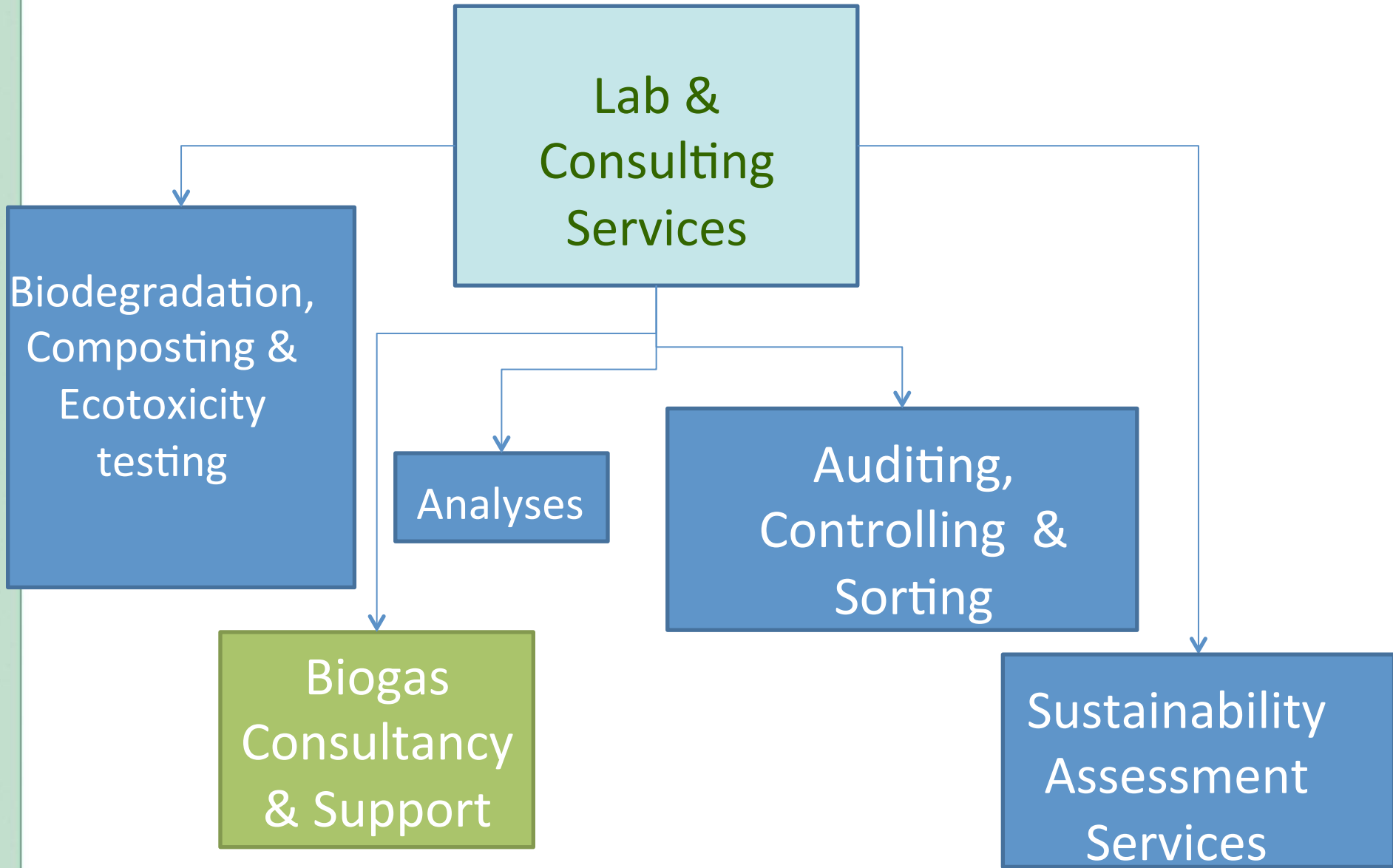
OWS: The company - strengths

- Extensive laboratory
- Owner of patented technology
- Experience with big projects (DRANCO & LAB)
- Core group of personnel with 25 years of experience in digestion, composting & degradability
- Strong references: successful commissioning tests

BIOGAS PLANT REFERENCES



1. BRECHT I (Belgium)	1992	20.000 tpy	biowaste
2. SALZBURG (Austria)	1993	20.000 tpy	biowaste
3. BASSUM (Germany)	1997	105.000 tpy	Residual waste
4. AARBERG (Switzerland)	1998	11.000 tpy	Biowaste
5. KAISERSLAUTERN (Germany)	1999	25.000 tpy	Residual waste
6. VILLENEUVE (Switzerland)	1999	10.000 tpy	Biowaste
7. BRECHT II (Belgium)	2000	50.000 tpy	Biowaste
8. ROME (Italy)	2003	40.000 tpy	Biowaste
9. LEONBERG (Germany)	2004	30.000 tpy	Biowaste
10. PUSAN (South Korea)	2005	70.000 tpy	Biowaste
11. HILLE (Germany)	2005	100.000 tpy	Residual waste+ sludge
12. MÜNSTER (Germany)	2005	80.000 tpy	Residual waste
13. TERRASSA (Spain)	2006	25.000 tpy	Biowaste
14. VITORIA (Spain)	2007	120.000 tpy	Mixed waste
15. HOTAKA (Japan)	2008	3.000 tpy	Biowaste
16. ALICANTE (Spain)	2008	180.000 tpy	Mixed waste
17. TENNEVILLE (Belgium)	2008	39.000 tpy	Biowaste
18. SEOUL (South Korea)	2009	30.000 tpy	Biowaste
19. KEMPTEN (Germany)	2009	18.000 tpy	Biowaste
20. LESZNO (Poland)	2010	50.000 tpy	Mixed waste
21. HENGELO (The Netherlands)	2011	50.000 tpy	Biowaste
22. MIRANDELA (Portugal)	2012	55.000 tpy	Mixed waste
23. WIJSTER (The Netherlands)	2012	57.000 tpy	Residual waste
24. WIJSTER (The Netherlands)	2013	40.000 tpy	Biowaste
25. BOURG-EN-BRESSE (France)	2013	66.000 tpy	Mixed waste
26. CHAGNY (France)	2013	73.000 tpy	Mixed waste
27. NORTH YORKSHIRE (UK)	2014	40.000 tpy	Residual waste
28. NÜSTEDT (Germany)	2006	20.000 tpy	Energy crops
29. LANGENDORF (Germany)	2010		Wet post-digester



Biodegradation,
Composting &
Ecotoxicity
testing

Lab &
Consulting
Services

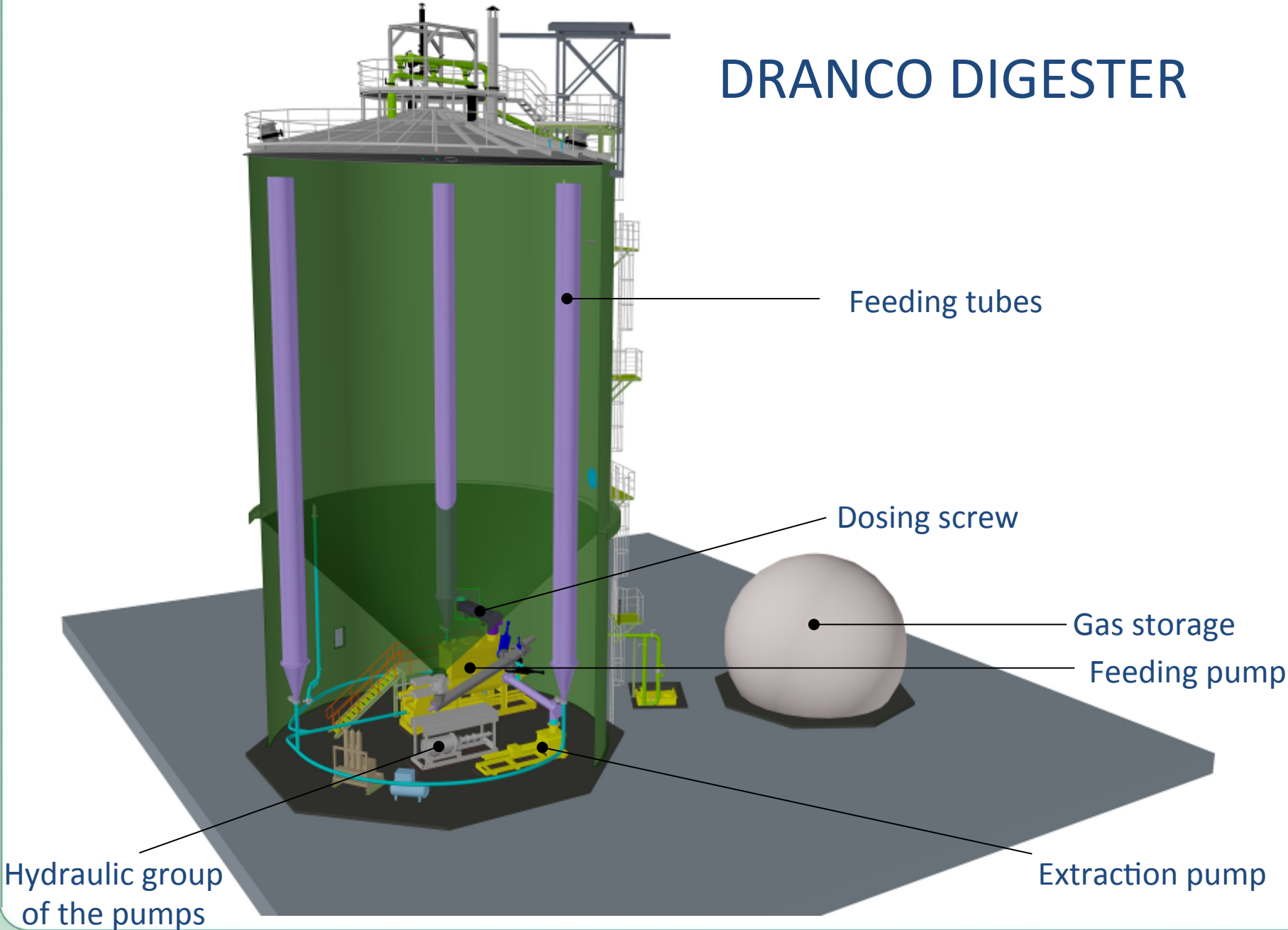
Analyses

Auditing,
Controlling &
Sorting

Biogas
Consultancy
& Support

Sustainability
Assessment
Services

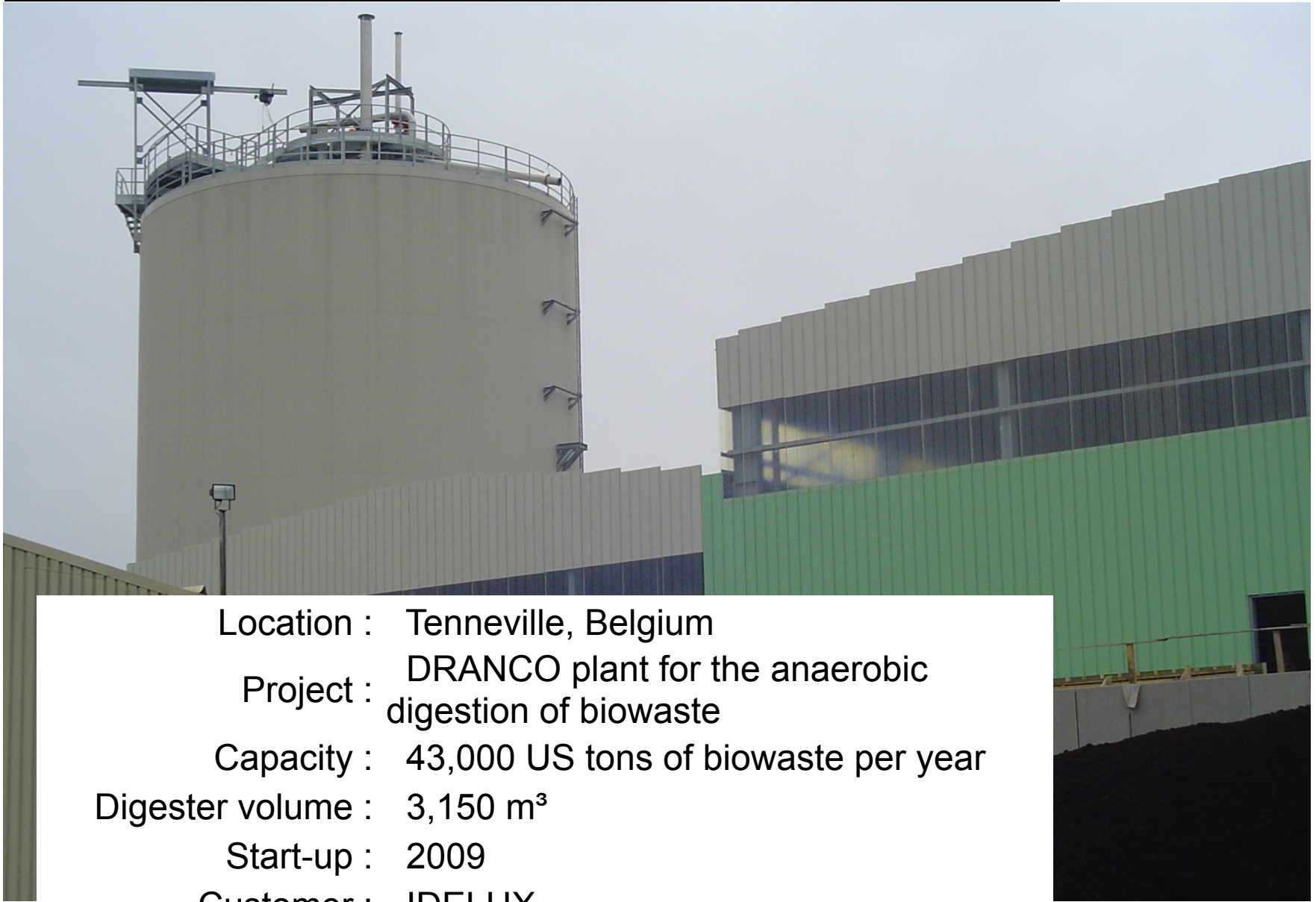
DRANCO DIGESTER



Advantages of the DRANCO technology for SSOW/food waste treatment

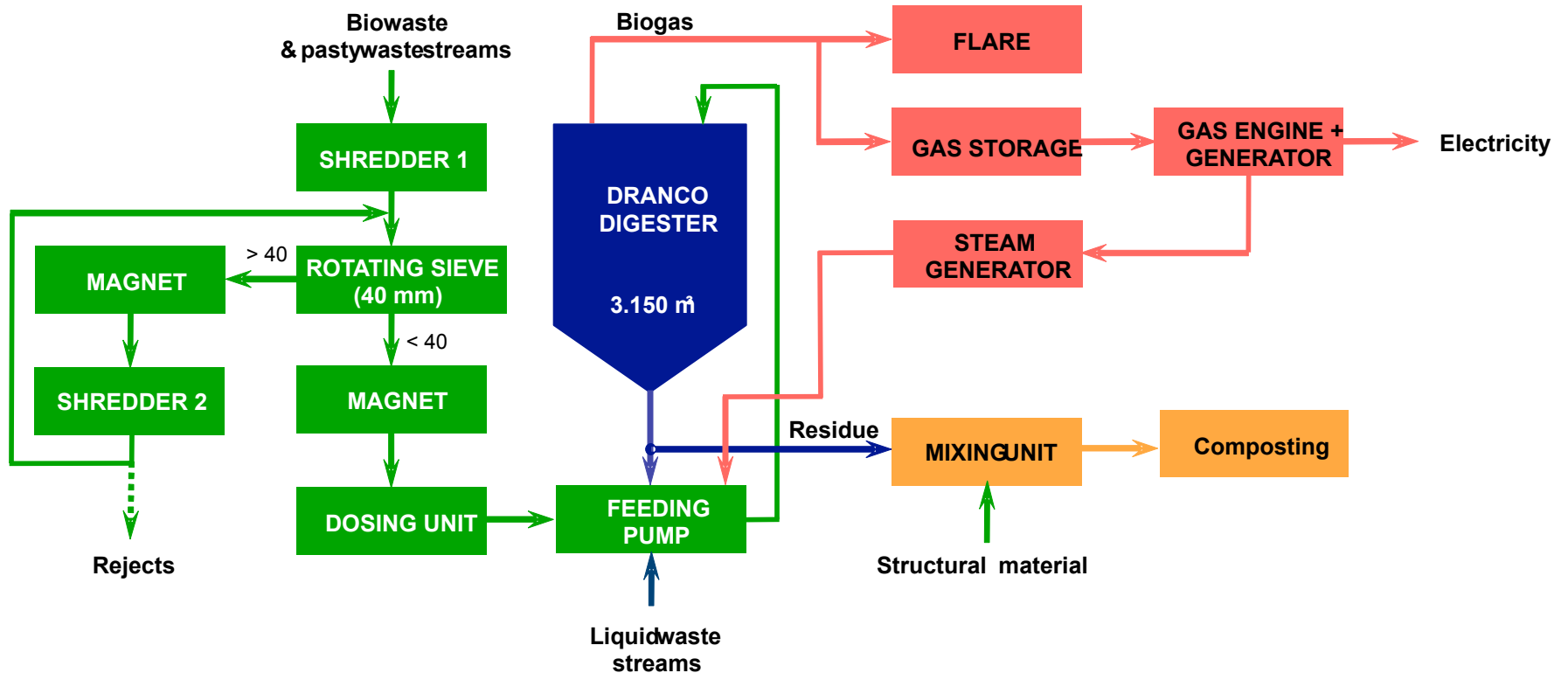
- Less intensive pre-treatment than wet systems, higher biogas productivity than batch tunnel systems
- High flexibility for total solids content inside digester, 15 to 40%
 - Optimal paper degradation
 - No mixing inside the digester
 - No scum formation, no settling in tank
- Simple digester (upright silo, conical)
- Minimal heat requirements
- Intensive and reliable digestion
- Avoids or minimizes wastewater production

DRANCO PLANT TENNEVILLE (BELGIUM)



Location : Tenneville, Belgium
Project : DRANCO plant for the anaerobic digestion of biowaste
Capacity : 43,000 US tons of biowaste per year
Digester volume : 3,150 m³
Start-up : 2009
Customer : IDELUX

DRANCO plant Tenneville, Belgium



Thank you
for your attention

