Mechanical Biological Treatment of Residual Waste - Lessons from Europe

Jeremy O'Brien, PE, BCEE

Director of Applied Research, SWANA

SWANA Applied Research Foundation

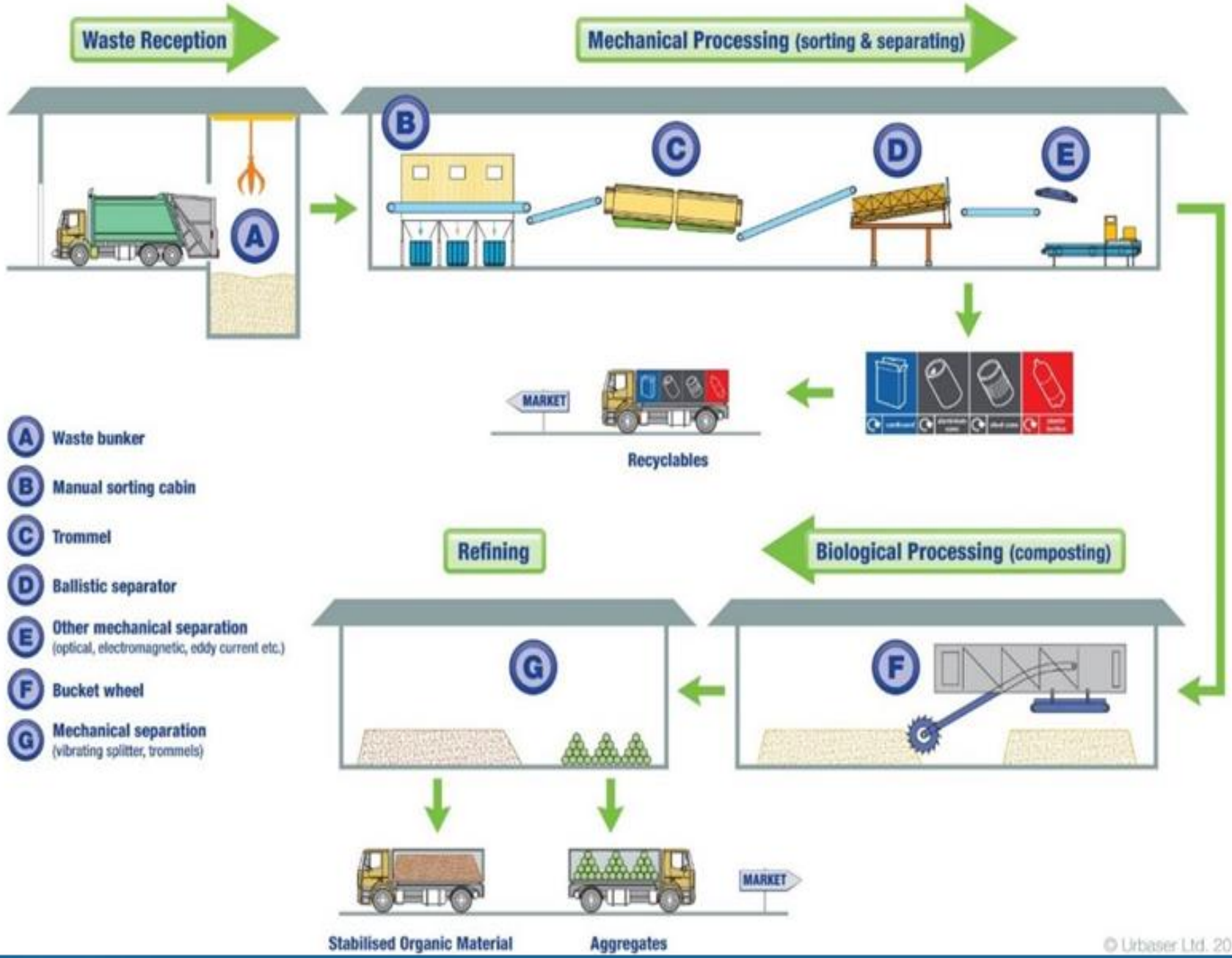
- Founded in 2001
- 49 Local Government and Corporate Subscribers
- Conducts applied research on topics submitted by and voted on by Subscribers
- Four Research Groups – Collection, Recycling, WTE, and Disposal.

Mechanical Biological Treatment of Residual Waste – Lessons from Europe

1. Capital costs and tipping fees can be high
2. Material recovery rates are low
3. Compost quality is poor
4. Diversion rates are low without energy recovery

Mechanical Biological Treatment of Residual Waste – Lessons from Europe

- Developed to meet landfill treatment and stabilization requirements
- 570 active MBT facilities in 2017
- 55 million tons per year
- Another 120 facilities by 2025.


Waste Reception
Mechanical Processing (sorting & separating)
A
B
C
D
E
MARKET
Recyclables
Refining
Biological Processing (composting)
F
G
MARKET
Stabilised Organic Material
Aggregates
A Waste bunker
B Manual sorting cabin
C Trommel
D Ballistic separator
E Other mechanical separation
(optical, electromagnetic, eddy current etc.)
F Bucket wheel
G Mechanical separation
(vibrating splitter, trommels)
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Parameter	Mechanical-Biological Treatment Facility (MBT)	Mixed Waste Processing Facility (MWPF)
Type of waste processed	Residual waste	MSW
Purpose	Supplement to source-separation recycling	Alternative to source-separation recycling
Waste stabilization?	Yes	No
Solid recovered fuel?	Yes	In some cases
Status - Europe	Over 550 facilities	Very few facilities
Status - U.S.	One true MBT facilities	Less than 20 facilities

Residual Waste Composition in Austria in 2004

Fraction	Weight (%)
Organic / biogenic waste	37%
Paper, cardboard and cartons	11%
Hygiene products	11%
Plastics	10%
Composite materials	8%
Textiles	6%
Glass	5%
Inert materials	4%
Metals	3%
Hazardous household wastes	2%
Fine / coarse fractions	2%
Wood – leather – rubber	1%
Total	100%

Company	Where Process was Developed	Company	Where Process was Developed
ArrowBio	Israel	Linde	Austria
Bedminster	Sweden/USA	Nehlsen	Germany
Biodegma	Germany	New Earth	UK
BTA	Germany	OWS Dranco	Belgium
Civic	UK	RosRoca	Spain/Germany
EcoDeco	Italy	Rumen	Finland
GRL	Australia	SBI-Friesland	Nether./Finland
Grontmij	Nether./Finland	SRS (Wright)	Canada
Haase	Germany	Sutco	Germany
Herhof	Germany	Valorga	France
Hese	Germany	VKW	Austria
Horstmann	Germany	Wastec	UK
Iska	Switzerland/Ger.	Wherle	Switzerland/Ger.
Komptech	Austria		

Capital Costs

Throughput	Tons per Year	Capital Costs	$ Per Ton of Daily Processing Capacity
Low	88,000	$66,000,000	$273,750
High	247,500	$165,000,000	$243,333

Tipping Fees in UK

- Average - $95 per ton
- Range - $78 - $101 per ton.

Frog Island MBT Facility (London)

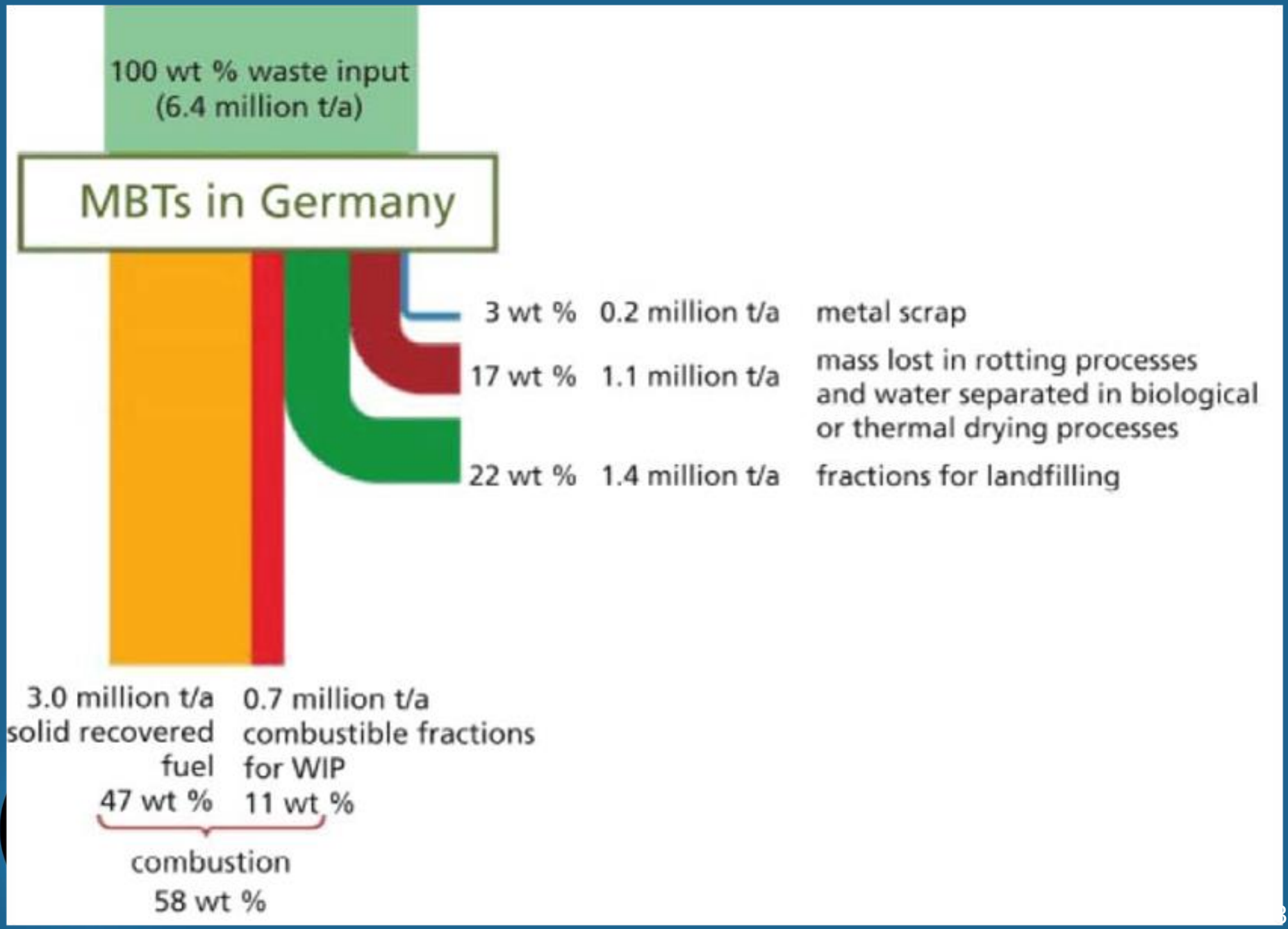
Material Recovery Rates Are Low

- Metals Recovery Rate – 3-10%

New Earth Canford MBT Facility (Dorset, ENG)

Compost Quality is Poor

www.alamy.com - ATGM4P


100 wt % waste input
(6.4 million t/a)
MBTs in Germany
3 wt % 0.2 million t/a metal scrap
17 wt % 1.1 million t/a mass lost in rotting processes and water separated in biological or thermal drying processes
22 wt % 1.4 million t/a fractions for landfilling
3.0 million t/a solid recovered fuel 47 wt %
0.7 million t/a combustible fractions for WIP 11 wt %
combustion 58 wt %

Mass Balance of 61 MBT Facilities in Germany in 2007

	Tons	% Residual Waste	Diversion Rate
Metals Recovered	220,000	3%	3%
Solid Recovered Fuel (SRF)	4,070,000	58%	
Biologically Treated Residues	1,540,000	22%	
Moisture Loss/Fermentation	1,210,000	17%	17%
Tons Processed	7,040,000	100%	20%

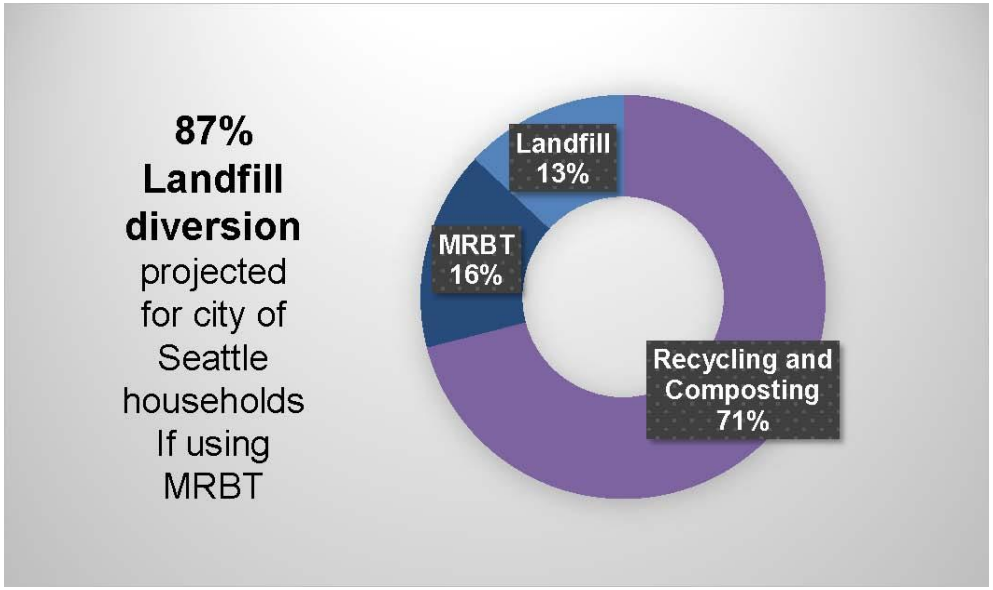
Reality Check Based on German Experience

- Residue Stream = 29% of MSW
- MBT Diversion Rate (w/o Energy Recovery)

  = 20% of RS

  = 20% x 29%

  = 6%.



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Mechanical Biological Treatment (MBT) and Mixed Waste Processing Facilities

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ENTSORGA
GREEN TECHNOLOGY REVOLUTION

"High Efficiency BIOlogical Treatment, a viable option for waste management , recyclers and communities in the post Chinese Ban era."

Entsorga Project Solutions

Advanced MBT, Composting, Anaerobic Digestion

- 80 commercial facilities delivered over 20 years for a combined processing capacity of 2 million tons/year

Advanced MBT:

- Production of Alternative Fuels
- Recovery of recyclables
- Low environmental impact
- Proven and bankable.
- High automation

ENTSORGA
GREEN TECHNOLOGY REVOLUTION

SWANA®
SOLID WASTE ASSOCIATION of North America

What's next for U.S. and North America?

- China National Sword will drive movement toward the domestic use of recyclables which will ultimately reshape the U.S. recycling industry.
  - Diversion will refocus on high quality streams that have end markets within the U.S.
  - Investments will be made in local manufacturing infrastructure for secondary materials

- Communities will have to manage a higher volume of non-recyclable material that will need to be either recovered or disposed.

SWANA® SOLID WASTE ASSOCIATION of North America

ENTSORGA GREEN TECHNOLOGY REVOLUTION

High Efficiency BIOlogical Treatment

- Uses enclosed enhanced natural processes, automation and state of the art sorting equipment
- Recovers valuable recyclables
- Produces alternative fuels
- Diverts up to 85% of incoming waste stream

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SOLID WASTE ASSOCIATION of North America

ENTSORGA
GREEN TECHNOLOGY REVOLUTION

High Efficiency Biological Treatment

Unsorted MSW 100%

BIOLOGICAL TREATMENT

Weight Loss Evaporated **30÷35%**

MECHANICAL REFINEMENT AND SORTING

Recycling Aluminum, Metals, Plastics, **3÷10%**

Processed Engineered Fuel 30÷50%

Fines, inerts to be landfilled **15÷20%**

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ENTSORGA GREEN TECHNOLOGY REVOLUTION

ENTSORGA West Virginia LLC - Martinsburg WV

- First High Efficiency BIOlogical treatment in U.S.
- 110,000 Tons/Yr of MSW from Berkeley County WV
- 7,000 Tons/Yr recyclables
- 55,000 Tons/Yr of EPA-Approved Alternative Fuels
- The plant will start processing MSW in April 2019
- Overall plant cost approximately $30 million
- 16 employees, 5 operators per shift
- Population served approximately 400,000
- Expected 85% diversion of incoming stream

GreenWaste MSW MRF

- Dirty MRF designed to process MSW and recover organic materials
- Two processing lines
  - Single-Family HH – 25 tons/hr
  - Multi-Family HH – 37 tons/hr
- 70% of material is sent to Z-Best for composting

GreenWaste MSW MRF






GreenWaste MSW MRF

- 52,000 sq. ft facility – 30 employees
- Processes MSW from 330,000 HH
- Originally opened in 2008 - Upgraded in summer 2018
- Combined throughput now 90 tons/hr (187,000 tons/year)
- 50% of MSW recovered as commodities or disposed as residue
- Compostable fraction contains up to 80% organics
- Combined diversion rate – up to 75%

Thank You!

- Questions?
- Thoughts?
- Comments?