



**An introduction to MYT[®]
Waste-to-Energy-Carriers
A Serious and Viable Alternative
for**



Glen Tobiason
InnoWaCon, LLC

2022-03-08



Points of the Presentation

- The Challenge!
- A possible solution
- Basic concept
- Basic layout
- Scalability and Flexibility
- Outputs and Uses/Markets
- Costs of the plant
- Costs to the citizen
- Environmental Impact
- Availability
- Public Acceptance
- Conclusion

The Challenge:

Finding new, yet tried and proven technologies that:

- Fit Canada's waste challenges now and into the future
- Fit Canada's waste regulations now and into the future
- Fit Canada's various waste streams now and into the future
- Are based on sound technologies and future oriented
- Comply with Canada's environmental goals and regulations





- Canada is:
 - Looking for tried-and-proven technologies
 - Creating legislation
 - Demanding diversion organics from landfill
 - Reducing tonnage to landfills
 - Creating environmentally friendly renewable energy sources
 - Embracing newer technologies and solutions not just status quo

A possible Solution:

- The Mechanical-Biological Treatment (MBT) process to treat household waste
- Shunned in the past
- Now available as a tried-and-proven, flexible very adaptable solution
- MYT® (Maximum Yield Technology)



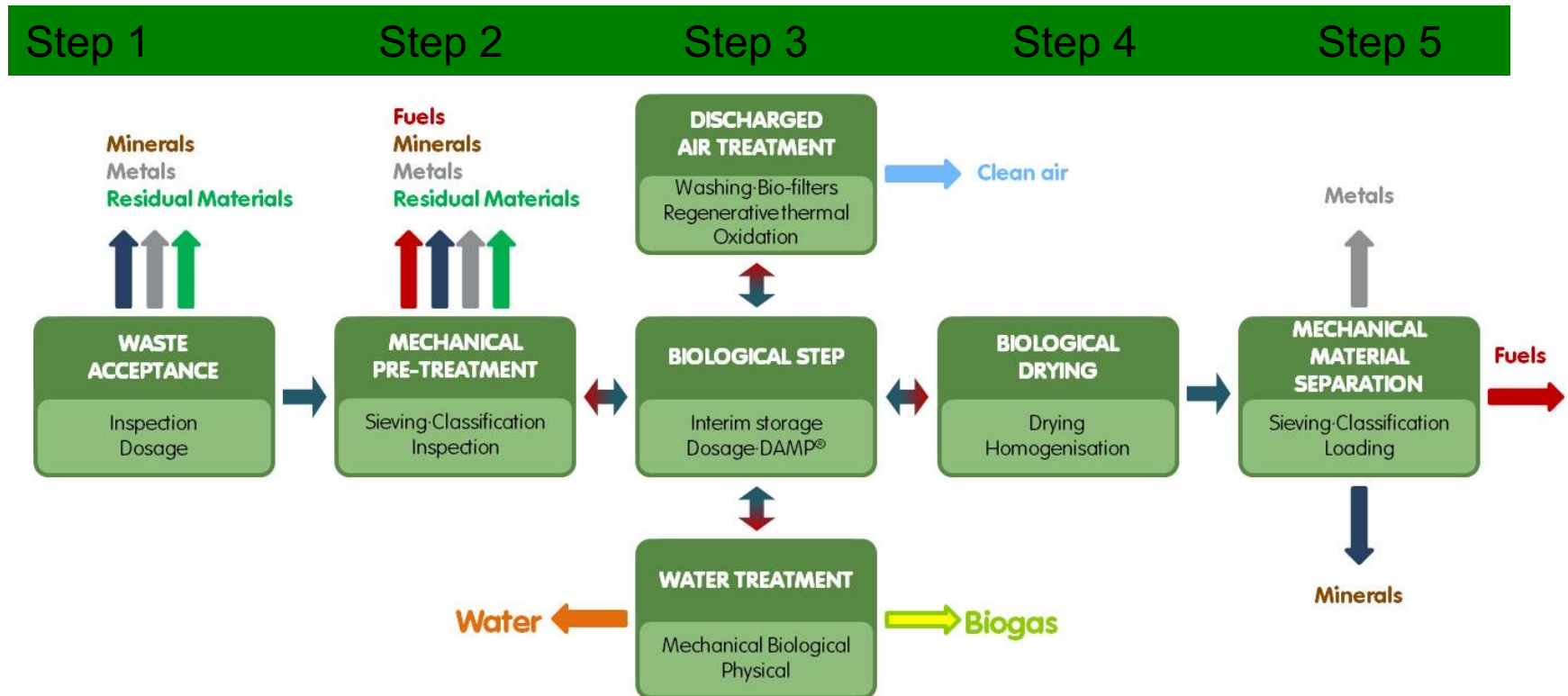
Basic Concept of MYT®:

- Input of MSW *with* the organic components
- Mechanical-Biological treatment
- High quality outputs
- Sound, proven design
- Maintainable and sustainable process
- Flexible
- Scalable

Basic Layout of MYT®:

- Step 1 Waste Acceptance
- Step 2 Mechanical Pre-Treatment
- Step 3 Biological Step
- Step 4 Biological Drying
- Step 5 Mechanical Material Separation

Basic Layout:





Exemplary – Waste acceptance hall – flat bunker



Exemplary - Mechanical pre-treatment



Exemplary – Biological drying



Exemplary – Example MBT-Kahlenberg

Inputs:



Household waste

Organic-waste

Packaging

Paper

Glass

ZAK -Kahlenberg

MYT® can take....

**Waste management based on
local/regional waste, needs & requirements**

Scalability and Flexibility:

Scalable:

min approx. 20,000 tpa

max 500,000 tpa or more designable

Modularly scalable

Flexible:

Designed to fit the waste at hand now and in the future

MYT® – *Not a black-box, not a product, not a machine!*

Outputs and Uses/Markets:

- Biogas
 - Proven consistent 70 - 71% methane content
 - Conversion to natural gas quality (RNG) for use in vehicles or insertion into the grid
 - Direct thermal utilization (CHP) (Combined Heat and Power) or other process
 - Use in other complementary processes such as creation of diesel/jet fuel and ethanols/methanols and other fuels/chemicals

Outputs and Uses/Markets:

- Refuse Derived Fuels (RDF)
 - 90+% +dry
 - Calorific values - size dependent
 - e.g. 0-40 mm about 16,000 kj/kg
 - Smaller sizes considered as a bio mass
 - Storable
 - Transportable (moving floor truck)
 - Usage: Powerplants, RDF to Fuels, RDF to Syngas, RDF to Chemicals

Outputs and Uses/Markets:

- Refuse Derived Fuels (RDF)



Outputs and Uses/Markets:

- RDF utilization
 - Cement industry: Chloride content typically $< 1\%$
 - Power plants - co-burned with coal
 - RDF power plants
 - Direct use in BFB
 - Use in other complementary processes such as creation of syngas, ethanols/methanols and other fuels/chemicals
 - Do not landfill! Too good to bury! *Why landfill energy?*





Paper plant – RDF for energy



Cement plant: rotating kiln – RDF for Energy

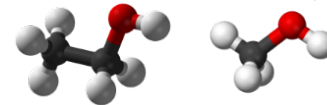


Power and heat generation plant Pforzheim LLC

Outputs and Uses/Markets:

- Plastics

- Extracted and sorted by type (PE, PP ...) and brought back into the circular economy
- Thermally utilized
- Use in other complementary processes such as creation of syngas, ethanols/methanols and other fuels/chemicals



- Metals

- Sorted by type Fe/NE and sold to scrap dealers



Outputs and Uses/Markets :

- Minerals / Inerts
 - Stones, Sand, Porcelain chips
 - Clean enough to landfill
 - Possible use as a road base material
 - Glass
 - Could be sorted by color and
 - brought back into the circular economy
 - Landfilling
 - Ideal for some building materials

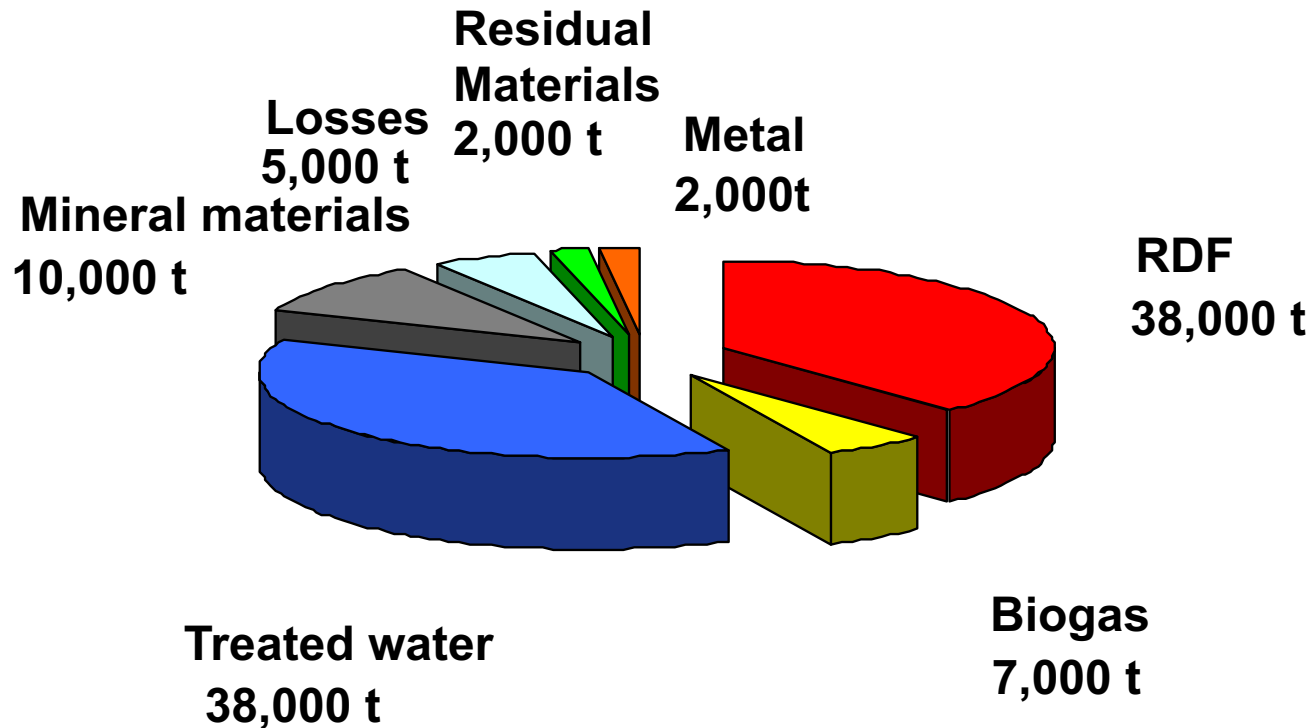


Outputs and Uses/Markets :

- Process water
 - Is the feedstock for the biogas fermenters
- Treated process water
 - reused in MYT® process - practically eliminates use of fresh water
 - Possible usage as fertilizer
 - Clean enough for the local sewage treatment plant



For the MBT Kahlenberg
The important outputs generated from the treatment
of about 100,000 tons of household waste / a



Costs of the plant

If MYT plant in Germany, processing 100,000 tons/year of MSW with the organic components, was rebuilt now.

Approx. 62 Mio. EURO or approx. 86 Mio CAD

- The above based on German costs, labor, insurance, regulations, Equipment/parts etc.
- The final Canadian price would vary
- A very large portion of machines, equipment, parts etc. – sourced in Canada!
- O&M – standard values

Costs to the citizen

- Low - especially when a total package of waste collection, recycling centers and the MYT® -process is well thought out
- Example: 4 Person household in the Ortenau county (Germany) pays 91,00 Euro / year (approx. 127 CAD/year) for the **complete service!** (2022)
 - MYT-Plant and operation
 - Complete collection of all waste streams
 - 20+ recycling centers
 - Admin

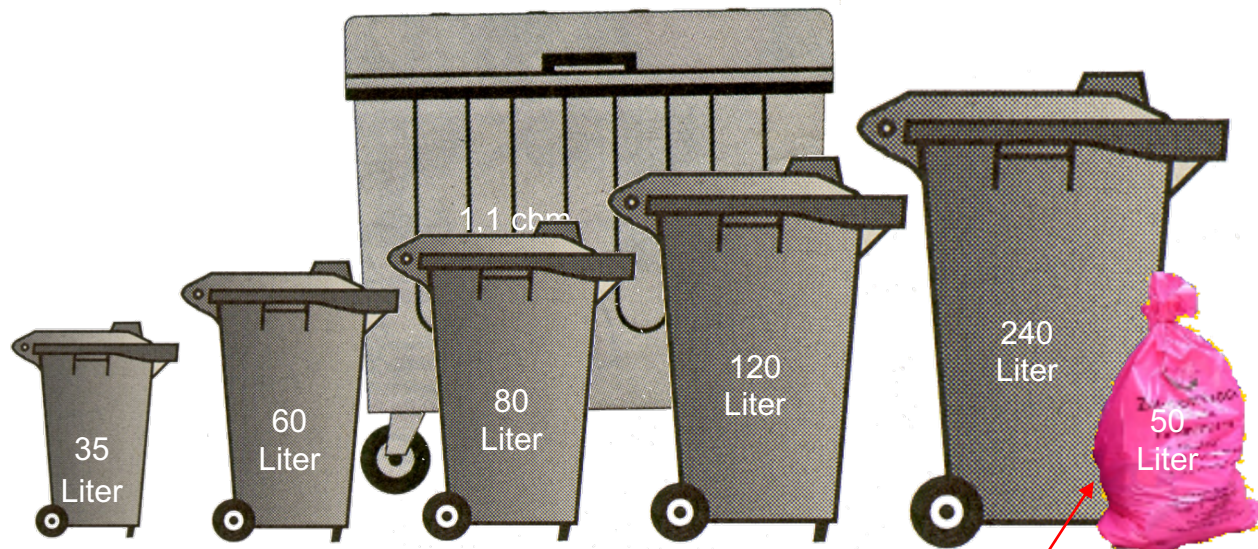
Waste tariff model for the Ortenau county

Introduction of a quantity-dependent waste fee system

Fees accd. to the number and size of the bins – the homeowners choose the size needed themselves

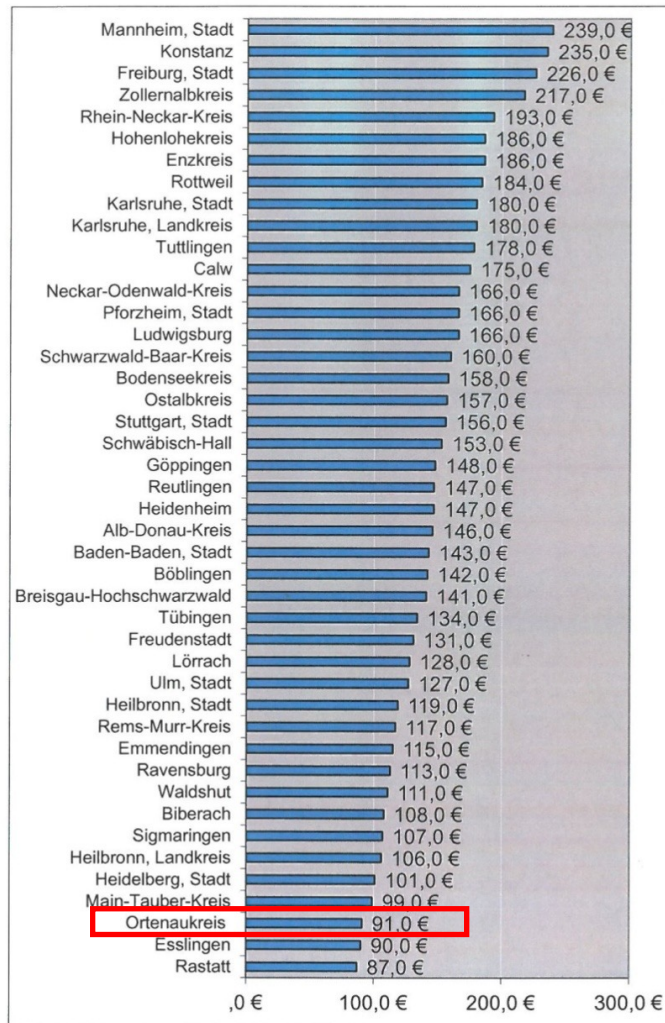
In 2022 in Ortenau county **91,- Euro / Year** for a **4 Person Household**

Major advantage: Citizens are motivated to create less waste!



If one has to dispose of more waste, than additional waste bags can be purchased, therewith the costs are covered

Abfallgebühren 2019 einer vierköpfigen Familie *



Quelle: Abfallbilanz 2018 des Umweltministeriums Baden-Württemberg

* Beim Vorliegen einer Gebühren-Bandbreite wurde der untere Wert herangezogen.

Waste fees Baden-Württemberg

Comparison of 4-person
households in 2022

The Ortenaukreis has a
simple and clear waste
management concept and
tariff system

The waste fees are low!

Environmental Impact

- ✓ Extremely low emissions into air, water and ground
 - Monitoring emissions according to regulations imposed
 - Air: Subjective „odor-units“ less than half than what permitted
 - Water: Subsequent cleaning as if normal sewage - locally
 - Ground: nothing
- ✓ Net energy producer! Renewable energy source
- ✓ Minimal resources needed for operation
- ✓ Supply all collection vehicles with RNG
 - Renewable not fossil fuel!

Availability

- In the first sense:
 - The Kahlenberg facility - at full load since Aug. 2006 - no downtime!
 - No typical two weeks / year overhaul time!
- In the second sense:
 - Now!

Public acceptance

- Located adjacent to a landfill
- Landfill with formerly high odors
- Landfill regulatory closure mid 2005 - no odors
- Various solutions were evaluated - MYT® MBT chosen because of advantages
- Visitors walk right by the ZAK MYT® plant 24/7
- Readily accepted public information events
- 300 meters!



Conclusion

- Advantages of **MYT® Maximum Yield Technology**
 - Truly viable, sustainable, economical and environmentally sound mechanical-biological waste treatment process
 - Reliable
 - High availability
 - Flexible
 - Adaptable
 - Sustainable
 - Incorporation into existing local waste regime
 - Safe and clean work-place
 - Regulations upheld
 - Costs kept to a minimum – designed to fit

References

- ZAK in Ringsheim, (D) 100.000 tpa since 2006
- Symevad, Hénin-Beaumont, (F) 86.000 tpa since 2015
- China 20.000 tpa since 2015 (is being enlarged)
- On-Nut, Bangkok Thailand 300.000 tpa since 2019
- More MYT plants in progress

Thank you!



InnoWaCon LLC

Innovative Waste Conversion technologies

Glen Tobiason

President & CEO

734 East Penacook Road

Hopkinton, NH 03229-2911

Cell: +1 603 406 9883

E-Mail: glen.tobiason@innowacon.com

URL: <https://innowacon.com>

LinkedIn: <https://www.linkedin.com/company/71246538>