



TMACOG

Toledo Metropolitan Area Council of Governments

LUCAS COUNTY'S UTILITY OF THE FUTURE



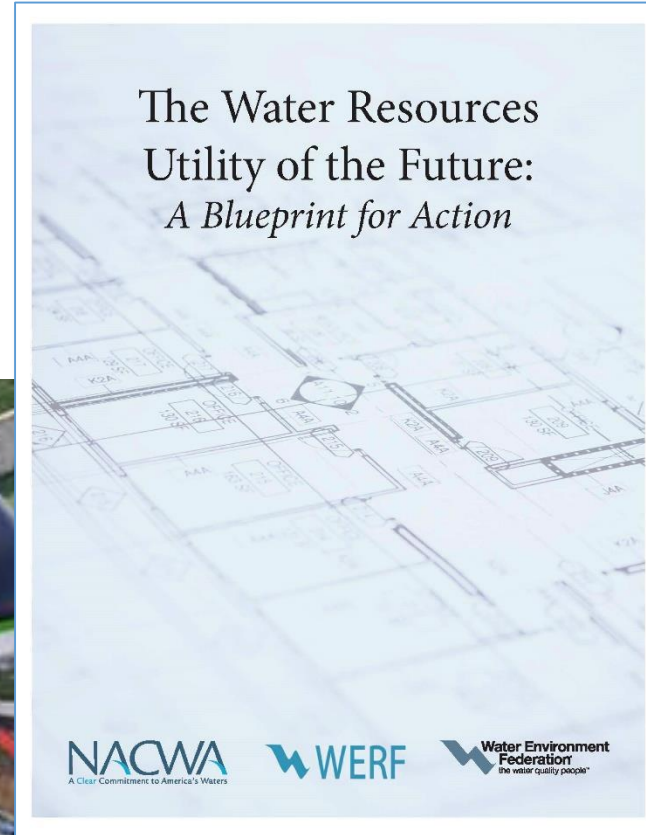
quasar
energy group

The Utility of the Future

“The Utility of the Future transforms itself into a manager of valuable resources, a partner in local economic development, and a member of the watershed community seeking to deliver maximum environmental benefits at the least cost to society.”

It does this by:

- reclaiming and reusing water
- extracting and finding commercial uses for nutrients
- capturing heat and latent energy in biosolids



Sustainable technology solutions . . .

Case Study I: Lucas County, OH

Scope of project:

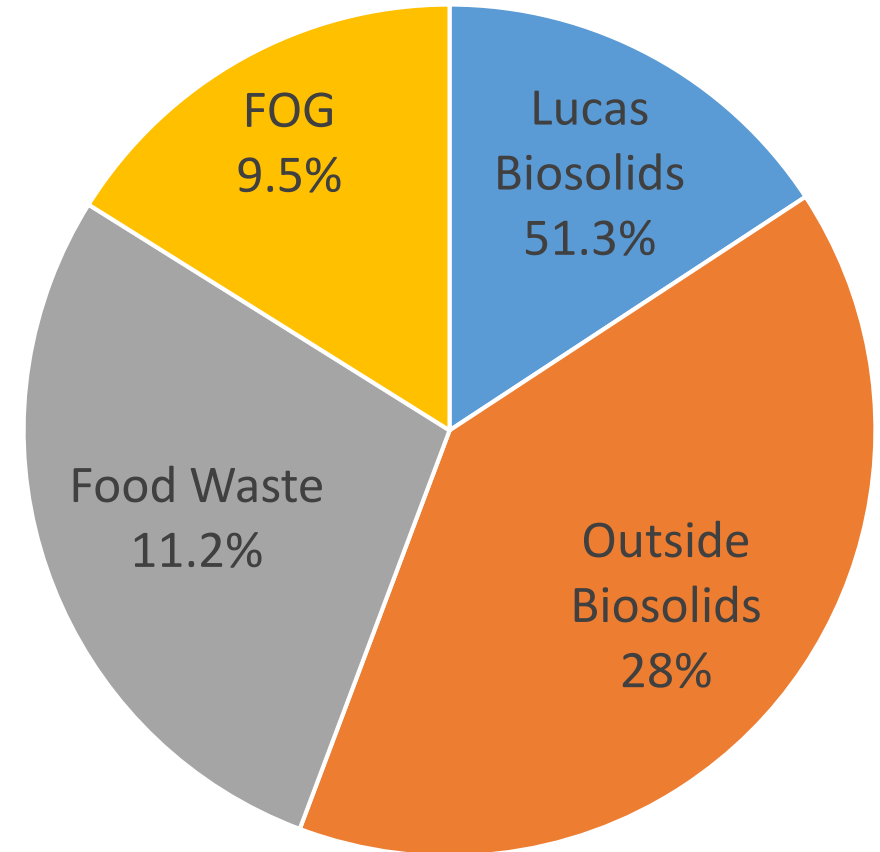
- Project started as digester upgrades, evolved to full codigestion project to make plant energy neutral (1.5 MW)
- Feedstocks include Lucas Co. biosolids and regional food waste, biosolids and FOG
- Installation/Construction of New:
 - Centrifuges and centrifuge building
 - Sludge storage building
 - Flexible membrane roof
 - Solids/ liquids receiving
 - Mixing, flare, heat exchangers, and CHPs
 - Process piping, electrical, etc.
 - Front end Class A process (Lucas Co. currently produces Class B)



Codigestion summary:

- Enough material sourced to make 1.5 MW WWTP energy neutral
- Between tip fees, energy cost-savings and REC revenue, Lucas County will realize over \$2M of revenue/cost savings each year.
- Currently producing Class B solids. New system will produce Class A solids with fewer disposal regulations.

Biogas Production by Feedstock



Utility Of The Future

CLASS A STORAGE &
LOADING

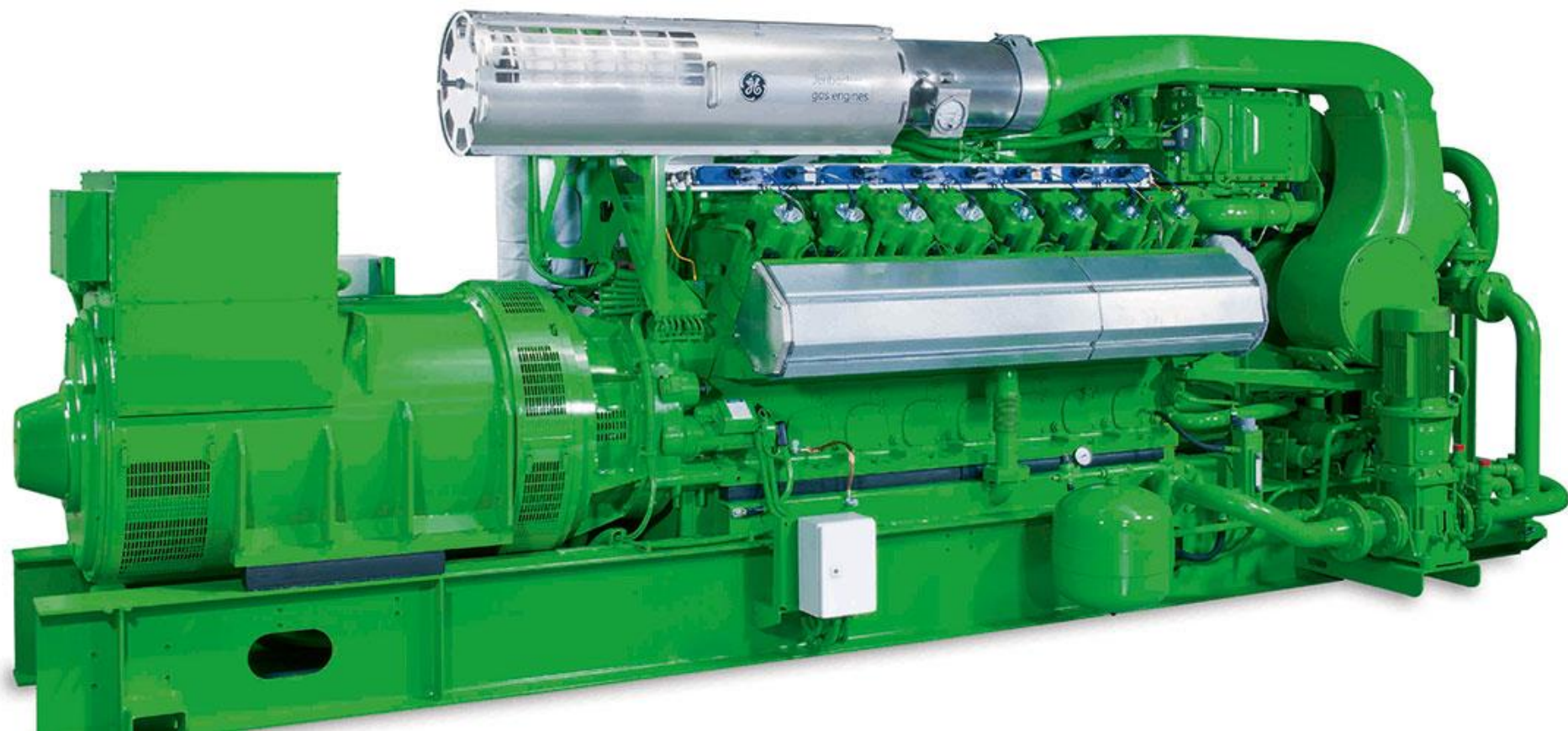
CLASS A PROCESSING

FEEDSTOCK TANK

CO-GEN BLDG.

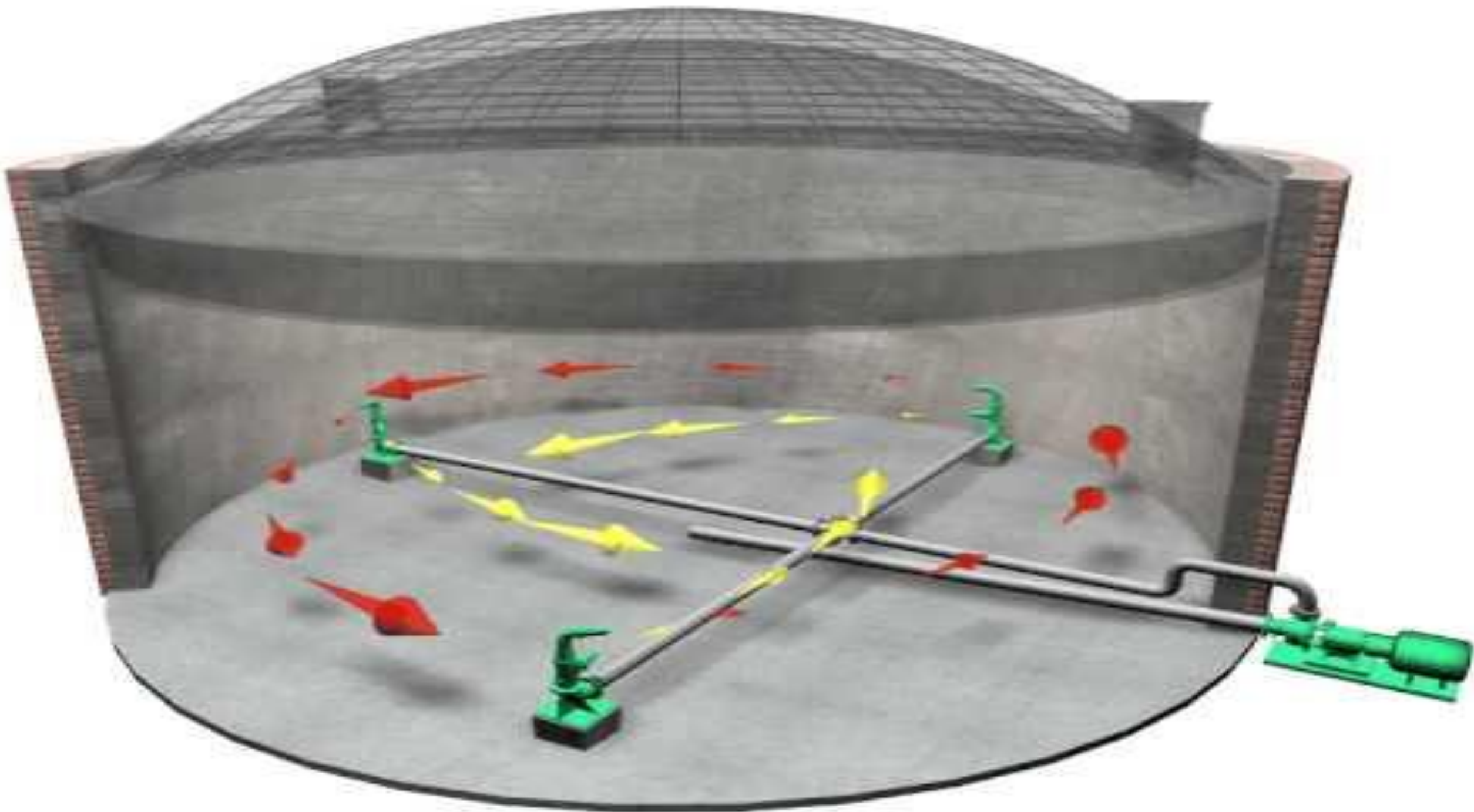
RECEIVING AND DEWATERING
BLDG.

DIGESTERS &
STORAGE TANK









Case Study I: Lucas County, Ohio

Overall	Wet Tons Per Day	% TS	% VS	Dry Tons Per Day	Tons VS Per Day	% CH ₄	BMP	Tip Fee (\$/ton)	Daily Revenue
Lucas Biosolids	233.6	4%	68%	9.1	6.2	55%	10.00	\$0.00	\$0.00
Outside Biosolids	127.3	21%	58%	26.7	15.6	52%	9.51	\$24.00	\$3,054.47
FOG and Septage	43.1	11%	92%	4.5	4.2	60%	13.78	\$16.28	\$700.58
Food & Processing Waste	51.5	22%	81%	11.3	9.1	58%	11.28	\$21.03	\$1,083.64
TOTAL/ AVERAGE	455.5	11%	68%	51.6	35.1	55%	10.57	\$21.81	\$4,838.68

Projected Outcome:

Once complete, the new **energy neutral** Lucas County digester will

- provide the plant with a contingency plan for biosolids processing,
- save over \$700,000 per year in energy costs,
- produce \$128,000 worth of sellable RECs annually
- generate \$1,240,000 in revenue from tipping fees, and
- Lucas County Sanitary Engineers requested Educational Involvement



COLLEGE of ENGINEERING
THE UNIVERSITY OF TOLEDO



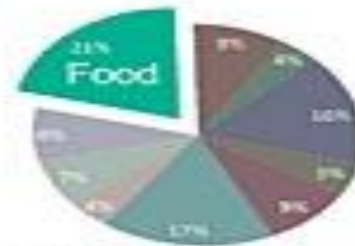
GREENBOX

ABOUT GREENBOX

- The United States currently generates more than 3.5 million tons of food waste each year and over 97% of it is disposed of in landfills.
- Currently, most food waste and organic waste collection systems in the US require the use of curbside collection bins.
- Landfill disposal costs for the US contribute to the low waste recycling diversion rates.

HOW YOU CAN HELP

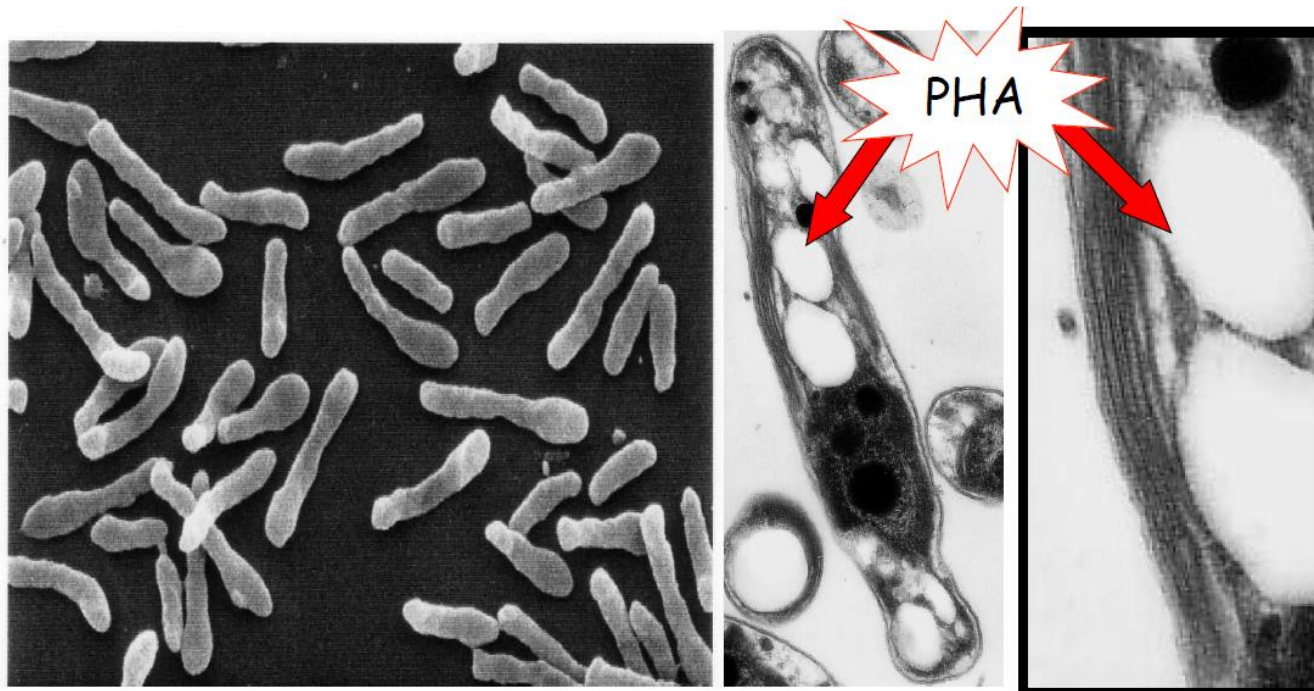
- Greenbox allows people to put their food waste to good use.
- By putting your food in a Greenbox, it will be processed at an anaerobic Digester facility.
- This facility will turn food waste into energy for the environment, which will cut down on the releases of CO2 and other harmful gases released by power plants.



- Food Wastings
- Other
- Paper & Paperboard
- Glass
- Metals
- Plastics
- Rubber & Leather
- Textiles
- Wood

Rhodopseudomonas palustris TN1

VFA $\xrightarrow{\text{Anaerobic fermentation}}$ PHA (70-80% PHA content/DCW)



DEVELOPING BIOPLASTICS

From

WASTEWATER TREATMENT PLANTS



Maneewan (Joy) Suwansaard Ph.D.
Michael Maringer



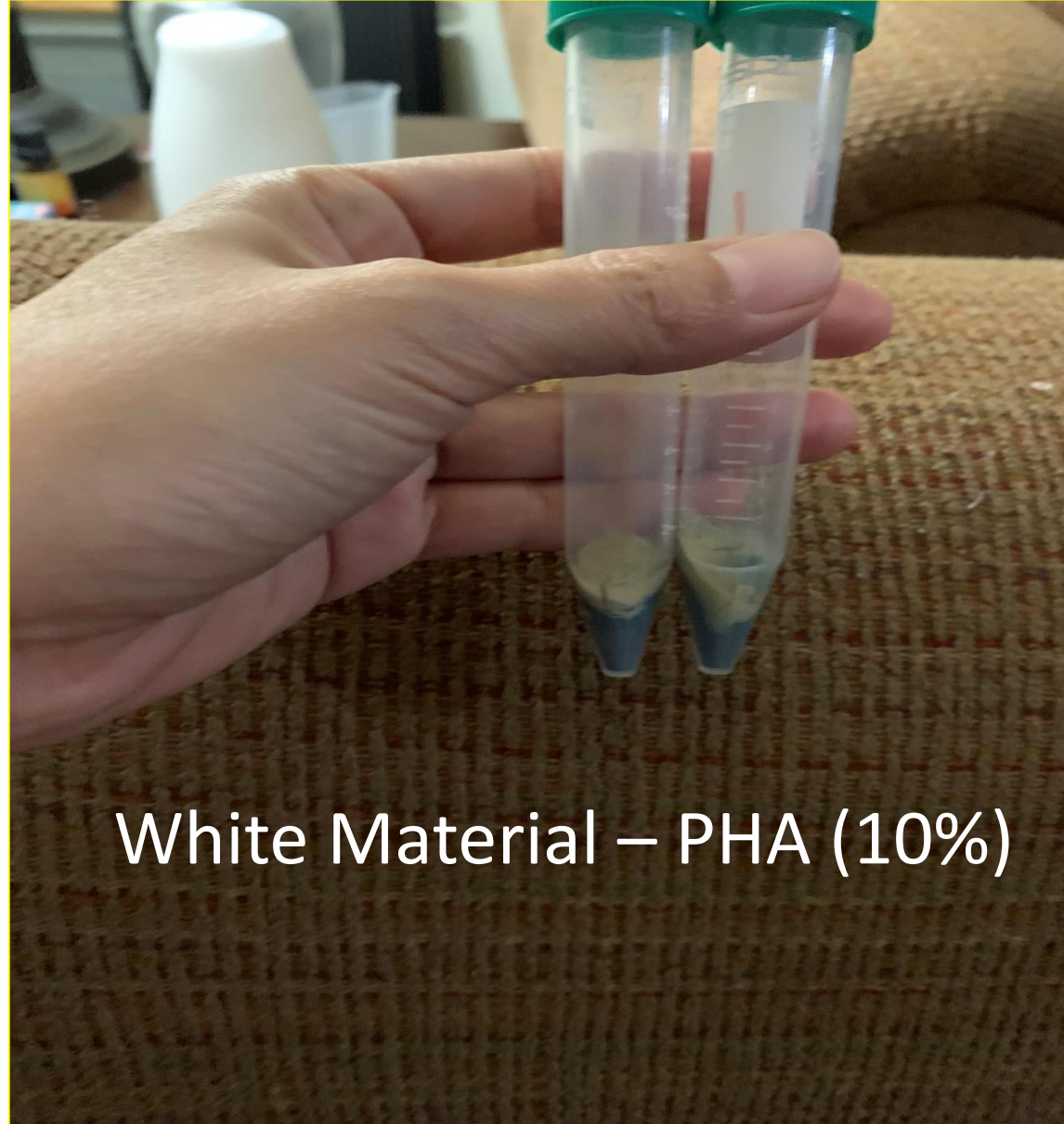
**Thailand Institute of
Scientific and Technological
Research**

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Are there any PHAs originated in wastewater biosolids?



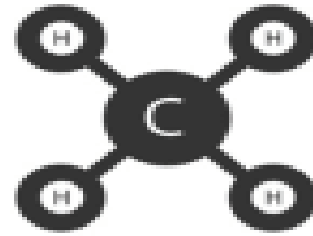
PHA origin in biosolid (sludge)



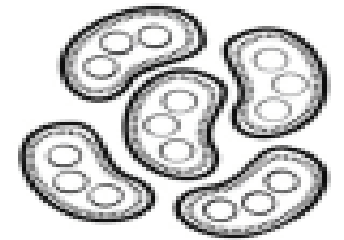




*RESOURCE RECOVERY
facility*



*Methane gas
emissions*



*Microbial
process*

Methane Eating Bacteria Products



*Biodegradable
products*



*PHA
biopolymer*

The Shirt Of The Future Will Be Made By Methane-Eating Bacteria



BIOPOLYESTER



Biodegradation of PHA



100% Degradation in 1 month



100% Degradation in 4 months



100% Degradation in 4 months



100% Degradation in 12 months

June 22, in 1969, the **Cuyahoga River** burst into flames in Cleveland when sparks from a passing train set **fire** to oil-soaked debris floating on the water's surface.

Cuyahoga River fire - 1969

- This river in Cleveland, Ohio was so polluted with petroleum products that it caught fire!



EMERGING TRENDS:

WASTEWATER REUSE

Non-potable, separate distribution

Indirect potable

Direct potable

Local regulation

ENERGY

Recovery of energy (biofuels, co-generation, fertilizer)

Conservation of energy (aeration, pumping, mechanical solids processing, heating, embedded materials)

CO2 caps? ; TRACE CONTAMINANTS; BIOSOLIDS; RECYCLED WATER



A Tribute to the People in this Room !

THANK YOU



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