

***Thermochemical conversion of
waste to value-added products***

Thomas A. Trabold

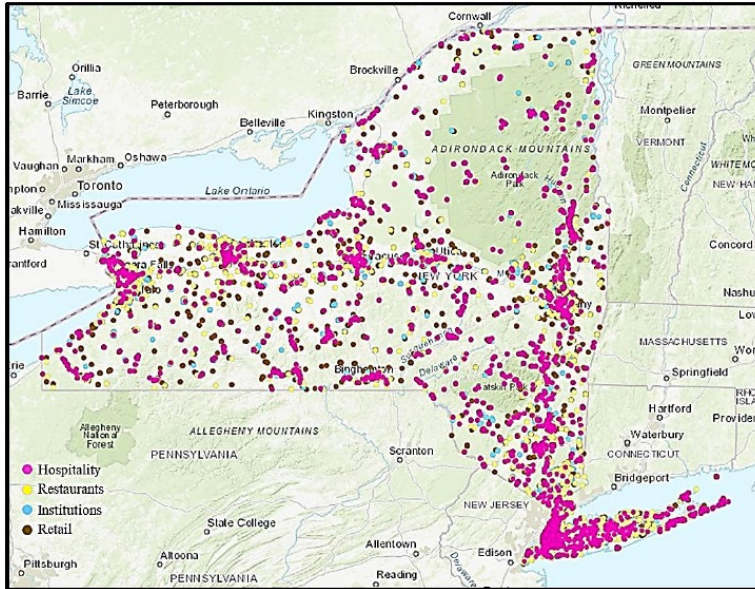
Associate Professor and Department Head

Golisano Institute for Sustainability

Rochester Institute of Technology

RIT research questions

- *Can thermochemical conversion (TC) serve as a viable food waste management technology?*

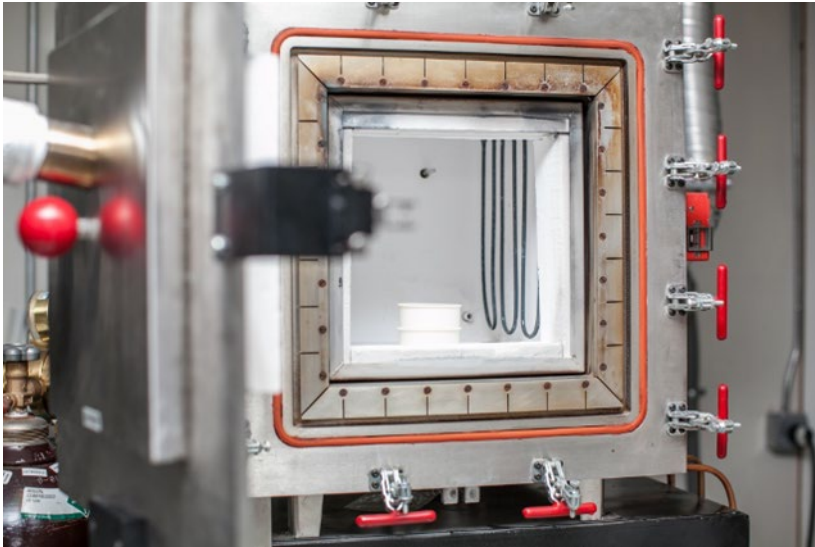


~1700 food sector operations in NYS generate > 2 tons/week

- *How can TC improve the sustainability of existing anaerobic digestion systems?*
- *What other industrial applications are suitable for biochar produced from food sector wastes?*

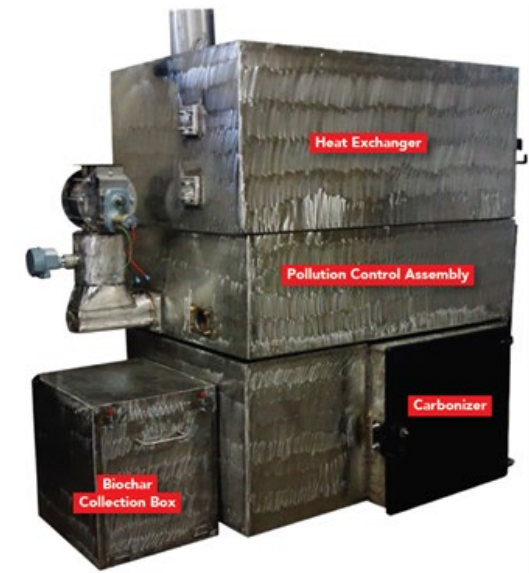
Experimental platforms

Lab-scale: Microwave furnace



- Well controlled atmosphere, temperature, heating rate
- Pure pyrolysis (zero O₂) conditions
- Temperature up to 1600°C

Commercial-scale: Biogenic Refinery



- Minimally controlled atmosphere and temperature
- Simple design for processing wide range of feedstocks
- Combined gasification & pyrolysis conditions
- Temperature range ~500 to 800°C

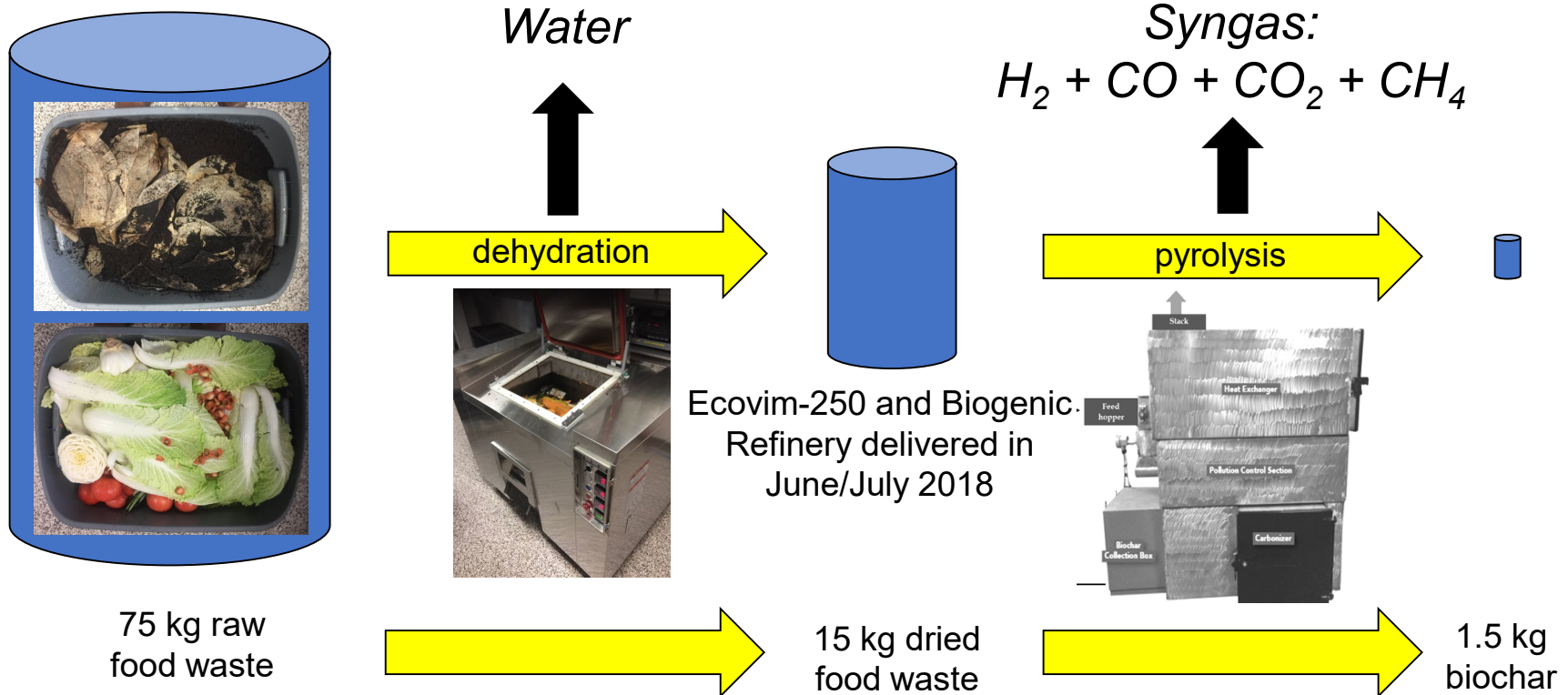
Biogenic Refinery (Biomass Controls)

- *Delivered to RIT in July 2018*

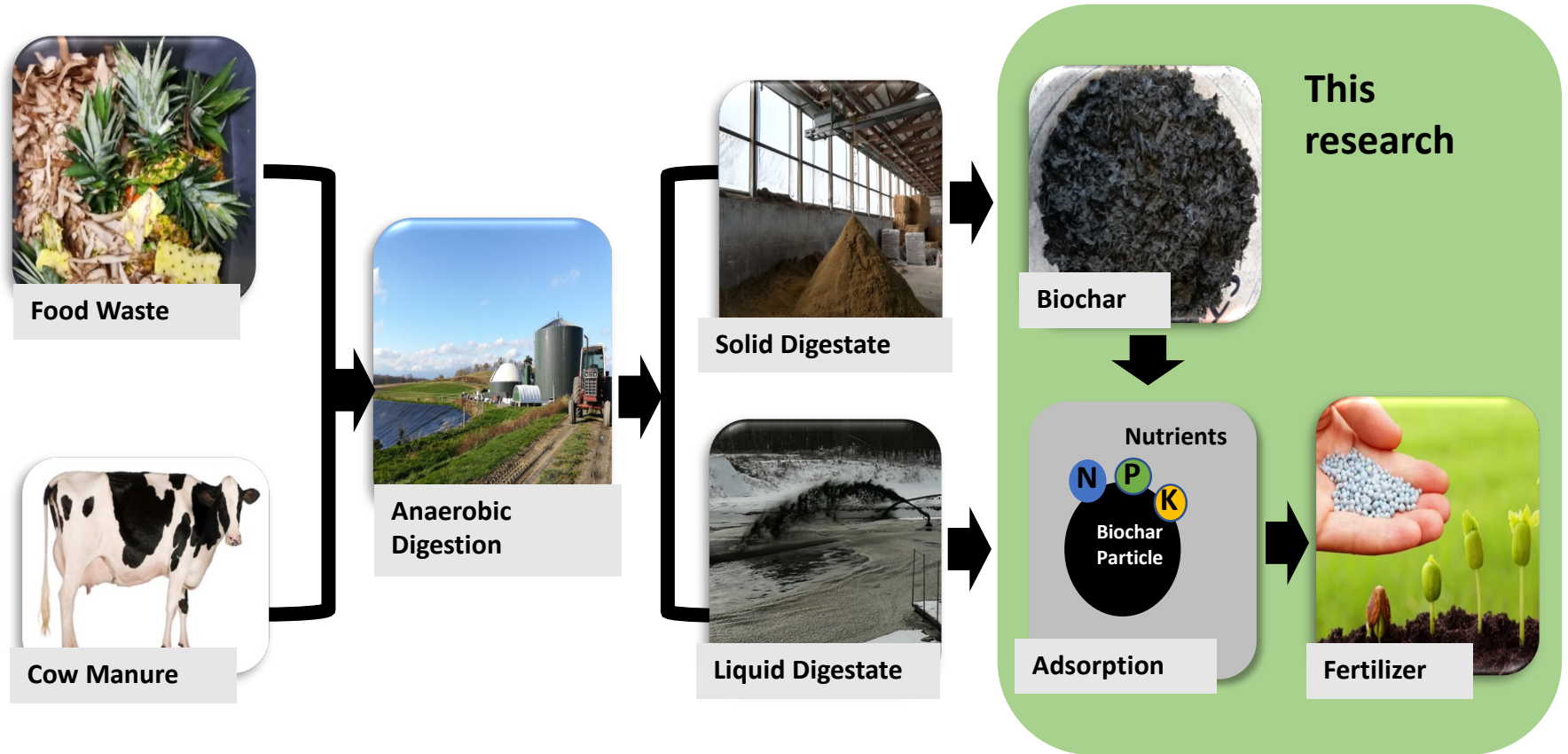


Assess TC as a food waste management technology

- Short residence time makes physical size of system suitable for deployment at a single large generator
- Can process mixed waste: food + paper + plastic packaging
- Significant mass reduction (>90% for mixed food waste)

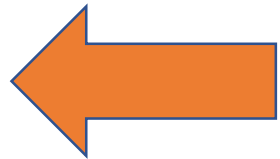


Apply biochar in digestate management

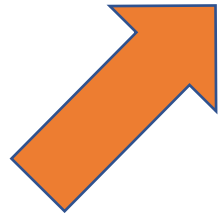
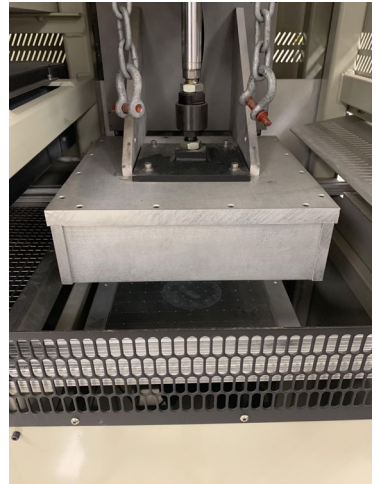
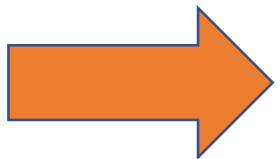


Produce biochar from solid digestate and use it to recover nutrients from the liquid fraction. Assess the resulting “enriched” biochar as a fertilizer.

Explore biochar as a filler in food packaging



10% coffee waste biochar in poly(lactic) acid thermoformed @177°C for 57 seconds



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Thank you!

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