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Golisano Institute for Sustainability
ROCHESTER INSTITUTE OF TECHNOLOGY

A Game-Changing Opportunity: Sustainable Food Production

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Golisano Institute for Sustainability (GIS)

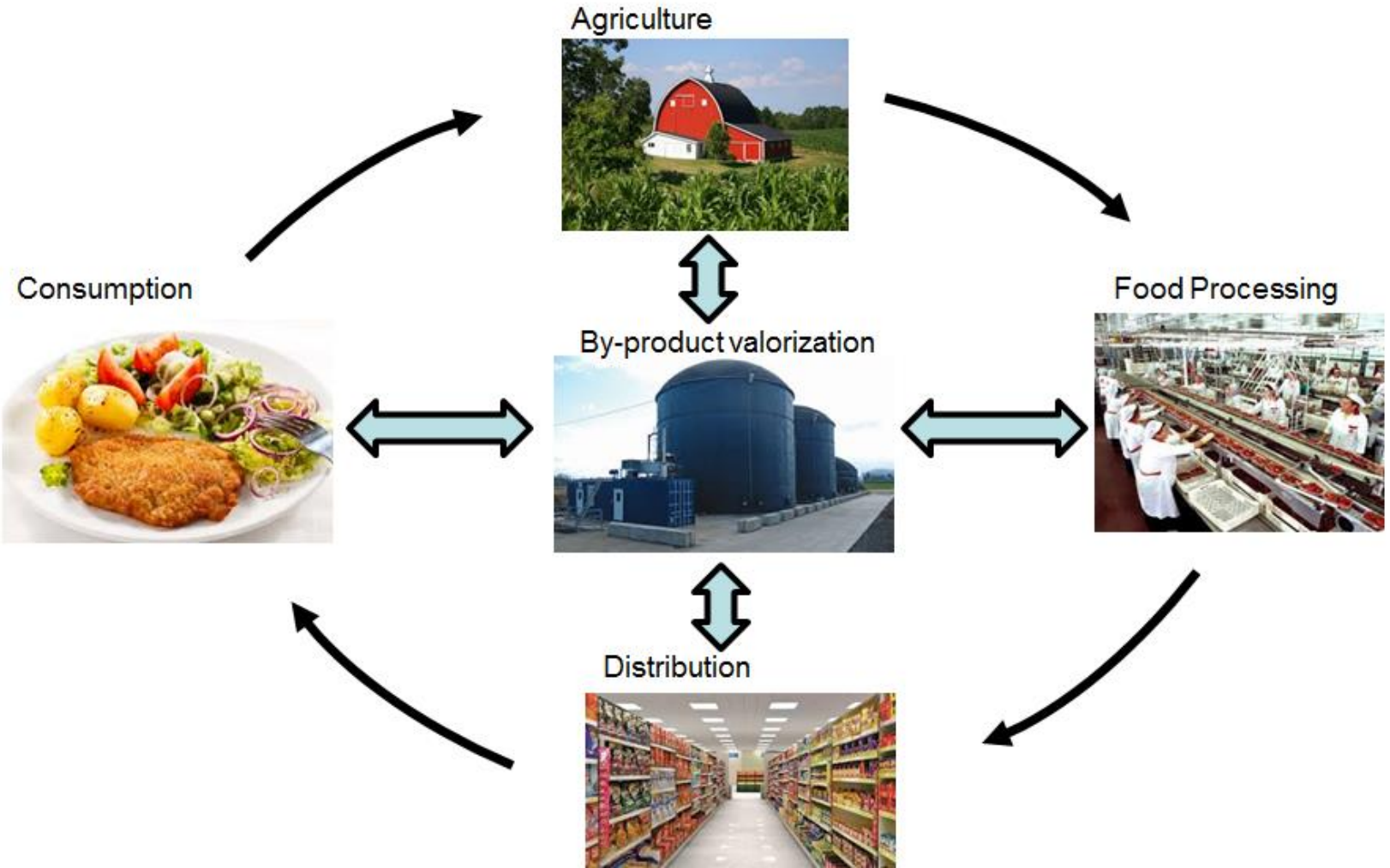
Inter-disciplinary graduate program:

- M.S. Sustainable Systems
- M. Architecture
- Ph.D. Sustainability

- 4 research thrusts
  - Sustainable energy
  - Sustainable mobility
  - Sustainable production
  - Eco-IT

Sustainable Food Production Initiative (SFPI)

Objective: Drive continuous innovation across the food supply chain to make the regional food system a model of economic vitality, environmental stewardship and sustainability.



Genesis of SFPI

The concept of SFPI has evolved since about 2010, when RIT began conducting applied R&D with a large number of food processing plants.

Northern Soy
High BOD tofu waste water

Brooklyn Breweries
Spent grain disposal limiting growth

The common denominator:
Organic waste disposal

Ultra Dairy
High BOD milk waste and DAF

HP Hood
High BOD cheese whey waste

Conventional waste disposal methods are rather absurd. Materials with sustainable energy potential are treated by expending (fossil) energy to render them "harmless".

Waste-to-energy (WtE) strategies utilize organic feedstocks from existing commercial systems.

The food processing industry is burdened by the high cost of disposing material that could be put to productive use.

Data obtained from Monroe County, New York (2010)

Industry	Avg. BOD (mg/L)	Water consumption (1000 gal/yr)	SF	Public works O/M fee[1]	Waste Surcharge
Animal byproducts, oils	7,003	10,875	12.83	$17,509	$224,637
Milk	1,472	25,399	3.50	$40,892	$143,123
Biocides	579	64,474	1.33	$103,803	$138,058
Baked goods	1,326	19,485	3.10	$31,371	$97,250
Landfill	1,217	5,255	10.64	$8,461	$90,020
Tomato products	426	308,722	0.18	$497,042	$89,468
Baking supplies	2,803	11,026	3.24	$17,752	$57,516
Soft drinks	3,598	6,793	5.16	$10,937	$56,434
Baked goods	9,211	1,697	12.22	$2,732	$33,387
Specialty chemicals	3,461	1,631	7.72	$2,626	$20,272

[1]Assuming a standard rate of $1.61 per 1000 gallons consumed.

7 of the 10 largest surcharges are paid by food processing or related companies

T.A. Trabold, R. Ramchandra, M.H. Haselkorn and A.A. Williamson, "Analysis of waste-to-energy opportunities in the New York State food processing industry," *Proceedings of the ASME 5th International Conference on Energy Sustainability,* Paper ESFuelCell2011-54334, Washington, D.C., August 7-11, 2011.

Compelling research questions

1. How can food sector stakeholders make their operations more efficient, to minimize waste production and the use of energy and water?
2. For waste materials that cannot be eliminated, what is the optimal disposition pathway in terms of net cost?
3. For disposition pathways that are economically viable, what are the measurable environmental and social benefits?
4. What are the barriers preventing waste producers from sharing information with potential partners across the farm-to-form spectrum?
5. How can a food “cluster” be organized to share information and best practices, and serve as a clearinghouse across the food-energy-water nexus?

How can we facilitate a paradigm shift from organic wastes to organic resources?

4 focus areas

R&D	***Sustainable Ops***
• Energy efficiency • Water efficiency • Waste valorization • Smart systems	• Supply chain • Packaging • Food Quality • Workforce dev.
Facilities	***Transportation***
• Energy reliability • Micro-grids • Waste reduction • Smart buildings	• Logistics • Asset monitoring • Alternative fuels • Local sourcing

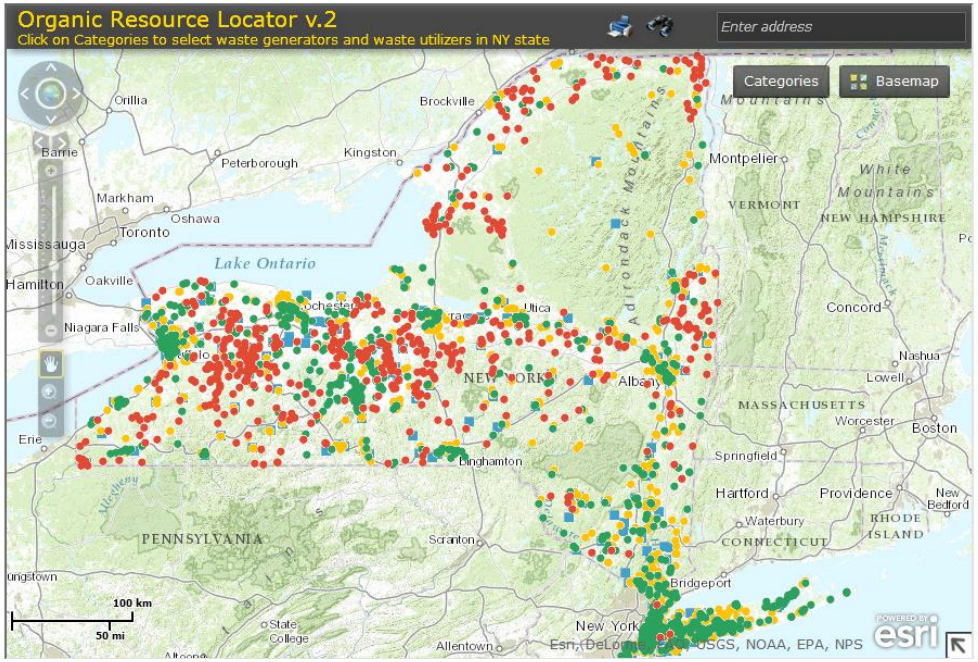
Sustainable Ops Example: Sustainable Supply Chain

The Problem: Lack of communication and transparency among key stakeholders in the food supply chain, making it difficult to connect waste producers with those supporting valorization: energy, compost & secondary products like animal feed.

The Solution: *Develop an "Organic Resource Locator" tool to connect resource producers to valorization businesses, and provide key data to support business development.*

Benefits:

- "Wastes" become valuable resources
- Reduce materials sent to landfills and WWTPs
- New business and job opportunities from utilizing materials currently produced



SFPI: Potential for broad impact