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National and Kapodistrian University of Athens

Pollution Prevention Strategies for Sustainable Development

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Pollution Prevention Strategies for Sustainable Development

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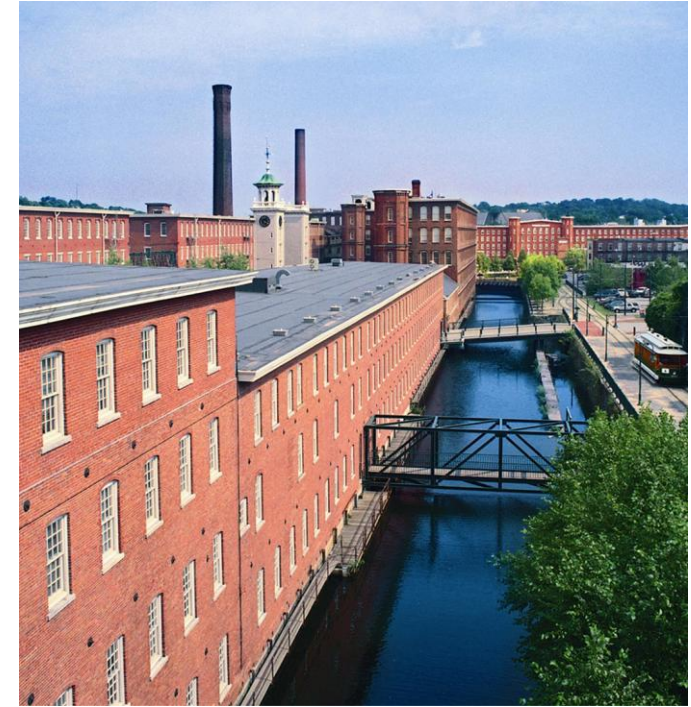
2 Public universities committed to:

Excellence in teaching, research and community engagement

Positive impact through education and advancing knowledge.



UMass Lowell ~13,000 students

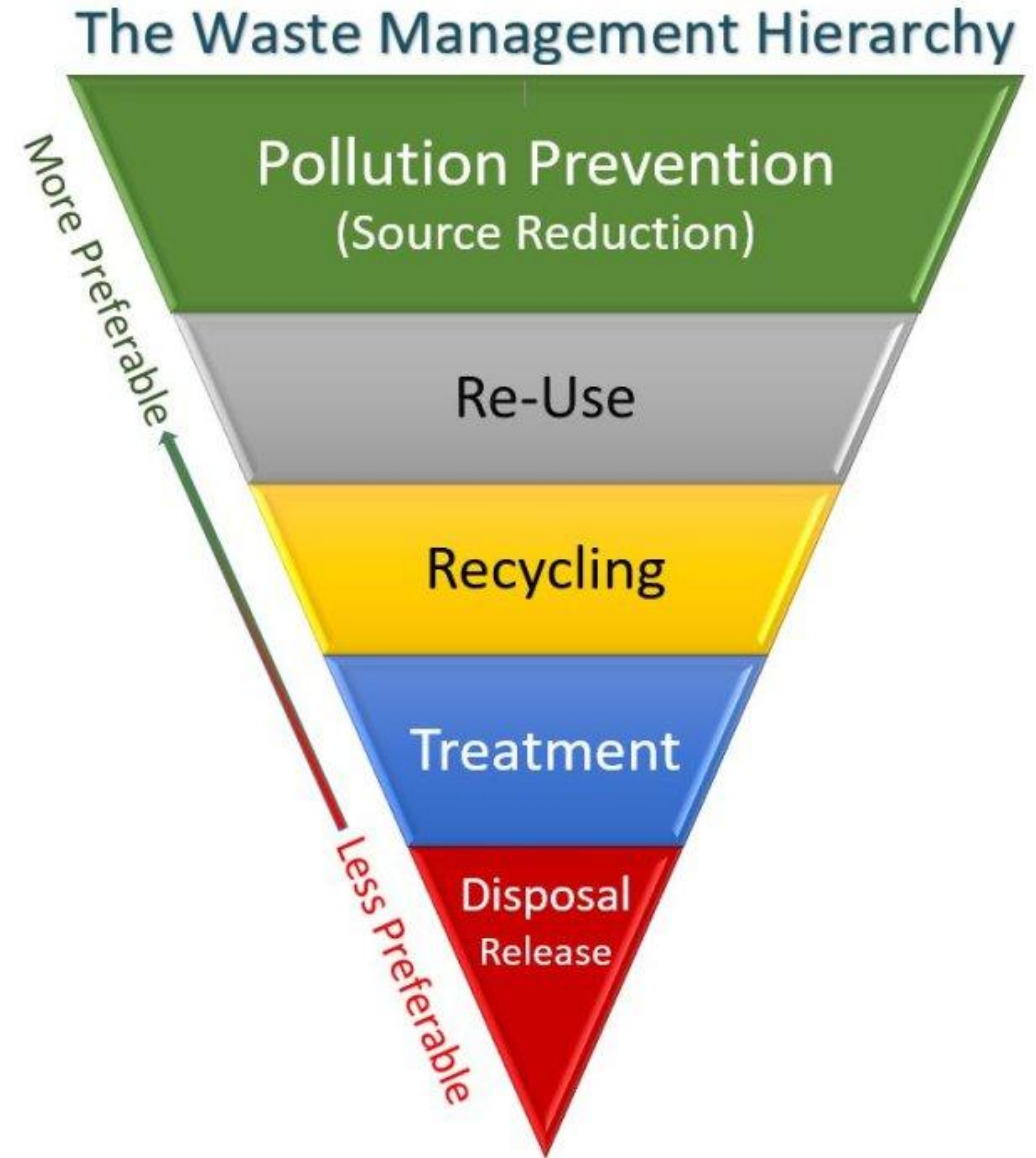


UMass Amherst ~31,000 students



Why Focus on Pollution Prevention?

- Movement from environmental protection to sustainability
 - 1970 First Earth Day in the US
 - “End of pipe” to “upstream solutions”
- Pollution prevention (P2) is any practice that reduces, eliminates, or prevents pollution at its source before it is created. (



Similar changes in other fields?



Benefits of Pollution Prevention Strategies

- Reduce environmental “footprint”
- Reduce/avoid costs
- Reduce regulatory burden
- Enhance image and brand
- May require little or no capital investments
- Engage employees in a meaningful way
- Spark a variety of collaborations around sustainability

**Collaborative
Model to
provide
technical
assistance &
scientific
support**

*Massachusetts Clean Energy Partnership
for Wastewater and Drinking Water
Facilities**

&

*Green the Bottom Line in Food Processing
and Beverage Manufacturing*

Goals: Reduce the use and costs of energy, water, and toxic materials while reducing the generation of solid and hazardous waste.

*The Partnership was recognized by the Harvard Kennedy School's Ash Center for Democratic Governance and Innovation as a finalist in the 2015 Innovations in American Government Awards competition.


Partners

- US Environmental Protection Agency (primary funder)
- UMass Amherst
- UMass Lowell, Lowell Center for Sustainable Production
- Toxics Use Reduction Institute
- MA Department of Environmental Protection
- MA Department of Energy Resources
- MA Department of Agricultural Resources
- MA Office of Technical Assistance & Technology
- RecyclingWorks
- Food and beverage trade associations

Green Your Bottom Line:
Improving Sustainability and Reducing Costs in Food Processing & Beverage Manufacturing

Madeline Snow, UMass Lowell, Lowell Center for Sustainable Production
Joy Onasch, Toxics Use Reduction Institute (TURI)
Lauren Mattison, UMass Amherst Center for Energy Efficiency and Renewable Energy

Food processing and beverage manufacturing use energy, water, and chemicals (e.g., cleaning and sanitizing products) and generate waste. Funded by EPA Region 1 New England, "Green Your Bottom Line" helps this significant sector improve business while benefiting the environment and public health. Research and training are provided on best practices, emerging technology, peer-to-peer learning, and availability of technical and financial resources.

Energy	Cleaning & Sanitizing	Waste	How can this sector:
High energy uses: <ul style="list-style-type: none">• Refrigeration• Ovens• Boilers• Lighting• HVAC• Handling & packaging	Hazardous chemicals are used for janitorial cleaning and food contact surfaces. State resources can help explore new materials or processes to reduce use or eliminate all together.	Solid, hazardous and organic wastes are generated in food and beverage manufacturing. A challenge for Massachusetts companies has been how to comply with the 2014 state ban on disposal of commercial organic wastes by businesses and institutions that dispose of one ton or more per week.	<ul style="list-style-type: none">• Use energy and water more efficiently?• Generate on-site energy?• Reduce waste?• Use safer cleaners and sanitizers while ensuring food safety?• Use pollution prevention strategies to improve operations and business?
Success: The Industrial Assessment Center at UMass Amherst did a free assessment at a participating seafood processing facility and identified over \$40,000/year in potential energy and water cost savings.	Success: A brewing company created a safer work environment by eliminating acids used in "clean-in-place process" at high temperatures. A hydroponic farm evaluated non-chemical options for algae removal.	Success: One food processing company learned at a "Green Your Bottom Line" workshop about a solution for their organic waste disposal challenges, which will save approximately \$60,000 annually.	Workshops & Technical Assistance Free workshops to share best practices on energy, waste, water and safer products, followed by technical assistance.
Resources: <ul style="list-style-type: none">• UMass Amherst Center for Energy Efficiency and Renewable Energy, Clean Energy Extension: www.ceere.org• Efficiency Programs for Businesses, Mass Save®: www.masssave.com/en/business/incentive-programs• MA Clean Energy Center: www.masscec.com/get-clean-energy/business	Resources: <ul style="list-style-type: none">• TURI grants: www.turi.org• TURI Cleaning Lab• MA Office of Technical Assistance (OTA), offering free and confidential on-site technical assistance: www.mass.gov/eea/ota	Resources: <ul style="list-style-type: none">• RecyclingWorks in Massachusetts: www.recyclingworksma.com	

Lowell Center for Sustainable Production
Center for Energy Efficiency & Renewable Energy
TURI

For more information, see www.ceere.org/food or contact madeline_snow@uml.edu, joy@turi.org, laurenm@umass.edu

Introducing P2 as a business strategy

- **Convene** people (in person and virtually) who typically would not know or meet each other
- Create opportunities for **peer-to-peer learning**, not lectures

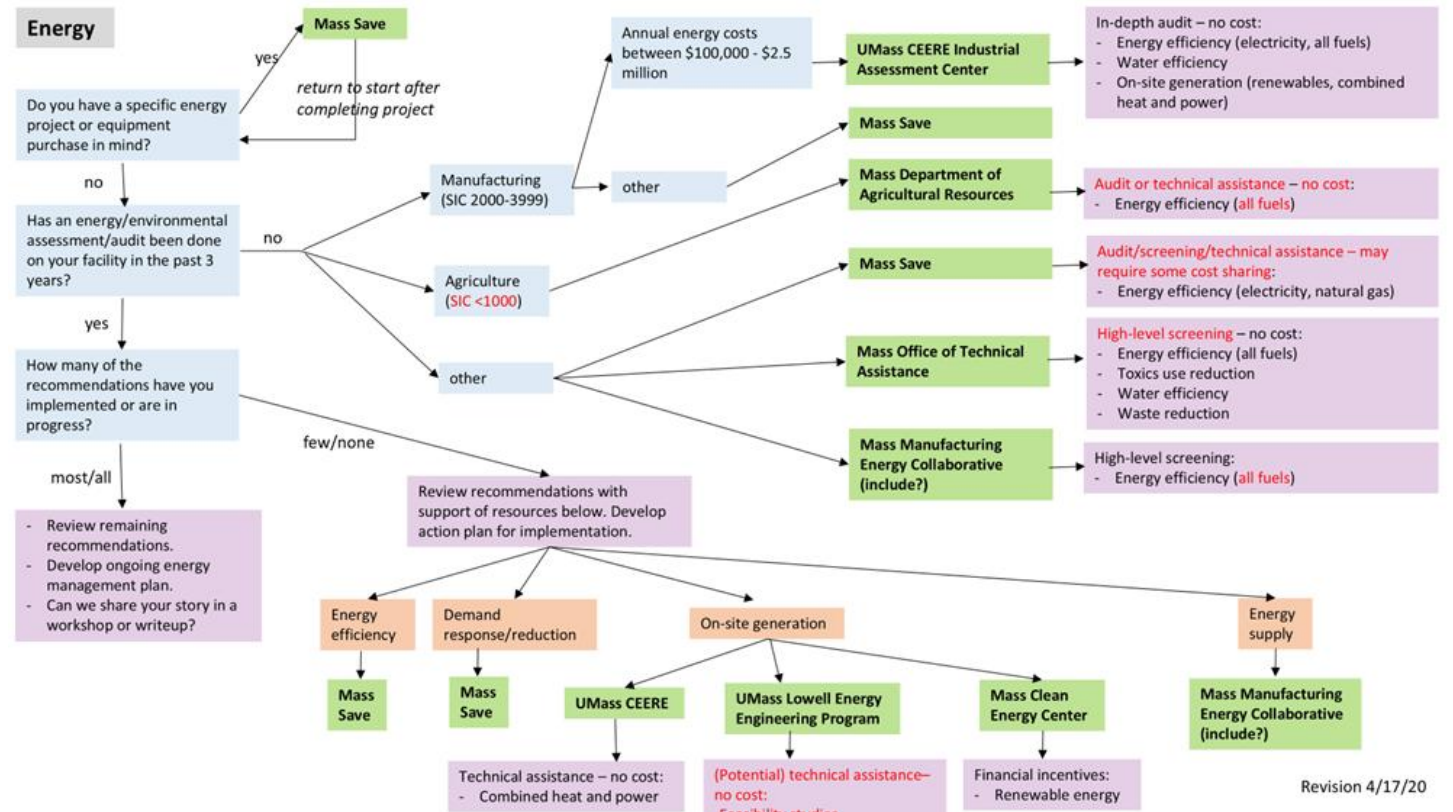


Go to where they are



Clarify what resources are available: Basic lists & “Road maps”

- Government technical assistance (energy, toxics use, waste, water, air)
- Government funding (energy, toxics use, waste, water, air)
- Energy utility incentives (energy, water)



Offer On-Site Audits, Assessments, Technical Assistance

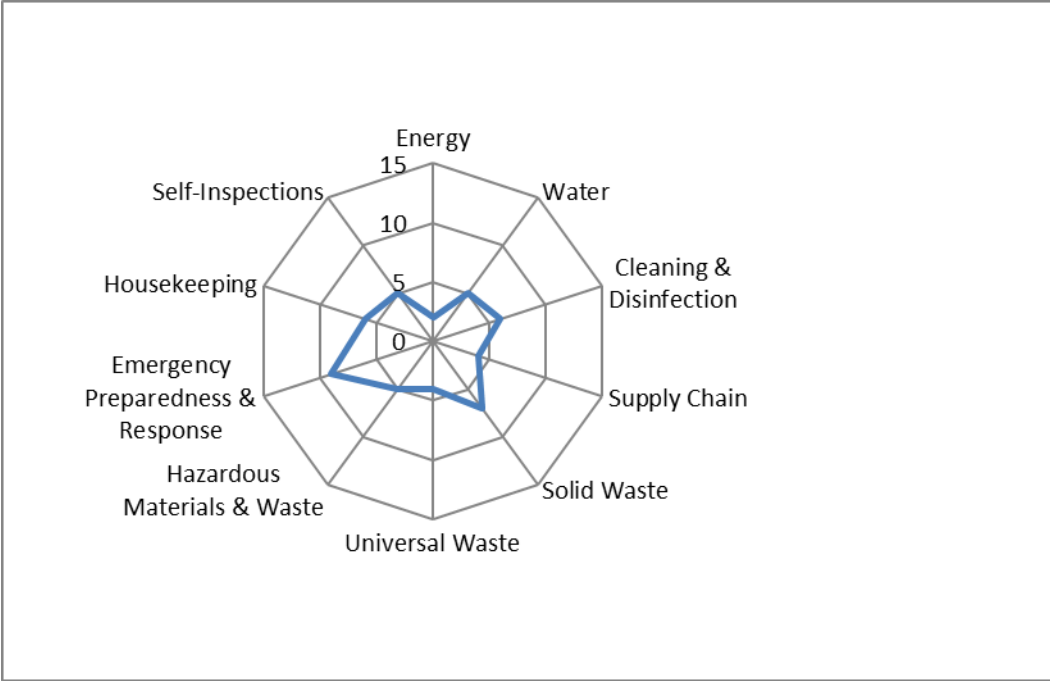
- Energy audits
- Water audits
- Assessments to minimize the generation of waste (solid, hazardous, organic, “universal”)
- Technical assistance to reduce the amount and toxicity of chemicals used for:
 - Cleaning and disinfection
 - Manufacturing processes
- Self-assessment tool

Self-Assessment Tool: Radar Graph (“Spider”)

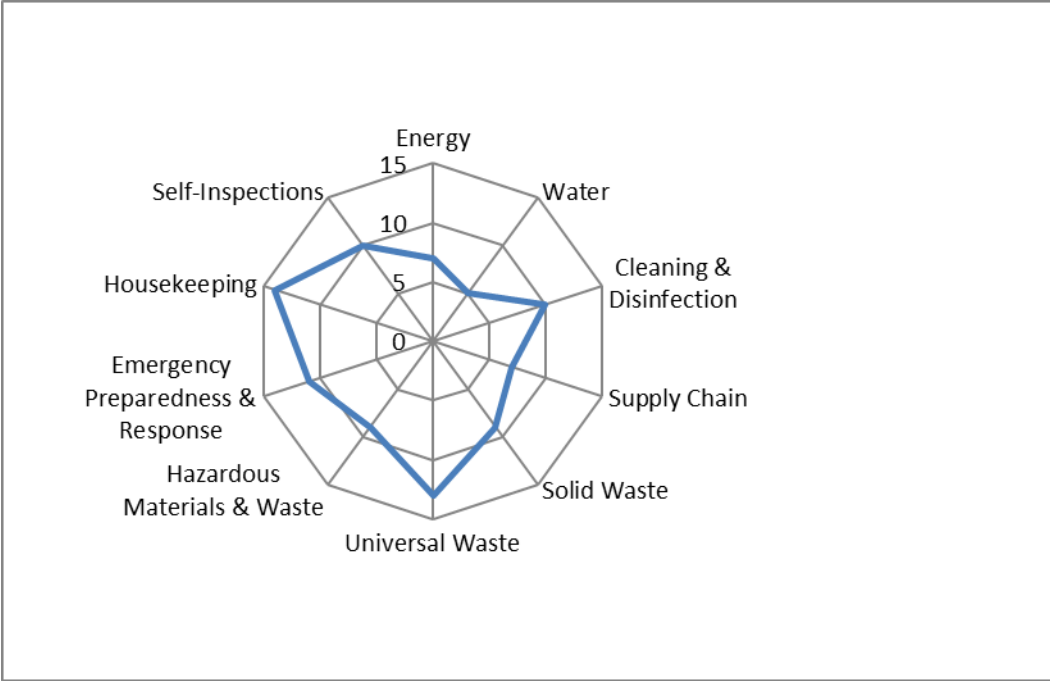
	1	Energy conservation/reduction/efficiency	1 No projects or programs	2	3 Some projects or programs	4	5 Many projects or programs	3
A. Energy Management: efficiency, conservation	2	Review of energy bills	1 Never look at them	2	3 Sometimes review	4	5 Regularly review, analyze and make changes accordingly	2
	3	On-site generation or use of renewables	1 None	2	3 Under consideration	4	5 Yes	2
	Total Score for Energy (A)							7
B. Water management	4	Water conservation/reduction/efficiency	1 No projects or programs	2	3 Some projects or programs	4	5 Many projects or programs	3
	5	Review of water bills	1 Never look at them	2	3 Sometimes review	4	5 Regularly review, analyze and make changes accordingly	1
	6	Reuse or recycling	1 No projects or programs	2	3 Some	4	5 Many	1
Total Score for Water (B)							5	
C. Cleaning & Disinfection	7	Practice of reading labels and/or information on materials	1 What labels?	2	3 Sometimes	4	5 Always & SDS sheets	3
	8	Program or plan to use safer and less toxic materials (while still maintaining food safety requirements)	1 None	2	3 In progress	4	5 In place & documented	4
	9	Purchasing policy to discourage or prevent over-stocking, use of high-hazard products	1 None	2	3 In progress	4	5 In place & monitored	3
Total Score for Cleaning & Sanitizing (C)							10	

An Easy Tool to Visualize Progress

Before



After



Examples of Results

- The Industrial Assessment Center at UMass Amherst did a free assessment at a participating seafood processing facility and identified over \$40,000/year in **potential energy and water cost savings.**
- Another assessment by the Industrial Assessment Center considered energy, waste and process-related improvements for a commercial bakery, resulting in the bakery **reducing its annual operating costs** by approximately \$83,500.

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- UMass Lowell completed a solar feasibility study for a drinking water facility which made a federally-funded installation possible.



Toxics Use Reduction

- A hydroponic farm evaluated **non-chemical options** for algae removal.
- The Toxics Use Reduction Institute provided lab research support and funding for a brewing company to create a safer work environment by **eliminating acids used in “clean-in-place process”** at high temperatures.

-
- One food processing company learned at a “Green Your Bottom Line” workshop about a solution for their organic waste disposal challenges, which will save approximately \$60,000 annually.



Findings

- Pollution Prevention is an efficient and effective strategy for sustainable development.
- It can reduce or avoid costs.
- Reduce regulatory burden.
- Improve image and brand as well as provide entry to supply chains interested in sustainability.
- Inspire other operational improvements.

6 Reflections on Our Experience

- (1) Voluntary nature of P2—Deciding what to do instead of being told what to do.
- (2) Engagement of employees—they know how the processes work and how they can be improved.

Reflections, continued

(3) Power of questions:

- Why we do things this way?
- What would happen if we changed a process?

(4) Document and share results

(5) Continuous improvement



Reflections, continued

(5) Impediments

“We have no money”

“We have no time”

“Why bother looking?”

“We had an energy audit 5 years ago so why do another one?”

“Our operation is so unique....what could we possibly learn from others?”

“Now is not a good time” to do an energy audit (or assessment of water use, waste generation, etc.)

Think of
Pollution
Prevention as a
way of looking
at systems and
processes



For more information

www.epa.gov/p2

<https://www.energytransitionumass.org/>

<https://www.uml.edu/research/lowell-center/>

<https://www.mass.gov/clean-energy-results-program>