



NORTHEAST Assistance & Pollution Prevention News

FEATURE ARTICLE

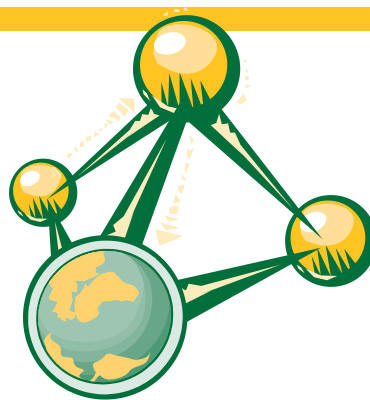
Green Chemistry & Engineering in the Northeast

Green chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances across the entire life cycle of a product, including its design, manufacture, and use. Green engineering is the design, commercialization and use of processes and products that are feasible and economical while reducing the generation of pollution at the source and minimizing the risk to human health and the environment. These concepts and approaches are complementary and frequently practiced together and are an essential aspect of pollution prevention. See page 3 for a description of the 12 principles of green chemistry.

State pollution prevention (P2) programs have long promoted the adoption of green chemistry and engineering among their clients. This includes helping companies to utilize the products of green chemistry and implement green engineering processes, developing and implementing environmentally preferable purchasing, and creating curriculum and educational opportunities at high schools and colleges. The following pages provide some examples of these efforts, a roundtable discussion with two green chemistry leaders in the region, and a description of a new multi-state regional initiative.

Maine Reduces Chlorine in Swimming Pools

In December of 2010, the Maine Department of Environmental Protection (ME DEP)'s Business Assistance Program worked with two public swimming pool owners to explore alternative technologies to reduce their use of chlorine. This was a voluntary project completed with funding from the U.S. Environmental Protection Agency (EPA). Chlorine



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THE NORTHEAST WASTE MANAGEMENT OFFICIALS' ASSOCIATION (NEWMOA)

NEWMOA is a non-profit, non-partisan interstate governmental association. The membership is composed of state environmental agency directors of the pollution prevention, hazardous and solid waste, and waste site cleanup programs in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

NEWMOA's mission is to develop and sustain an effective partnership of states that helps achieve a clean, healthy, and sustainable environment by exploring, developing, promoting, and implementing environmentally sound solutions for:

- Reducing materials use and preventing pollution and waste,
- Properly reusing and recycling discarded materials that have value,
- Safely managing solid and hazardous wastes, and
- Remediating contaminated sites.

The group fulfills this mission by providing a variety of support services that:

- Facilitate communication and cooperation among member states, between the states and the U.S. EPA, and between the states and other stakeholders;
- Provide research on and evaluation of emerging issues, best practices, and data to help state programs maximize efficiency and effectiveness; and
- Facilitate development of regional approaches to solving critical environmental problems.

NEWMOA's Assistance and P2 Program was established in 1989 to enhance the capabilities of the state and local government environmental officials in the Northeast to implement effective multi-media source reduction and assistance programs to promote sustainability and improvement in public health and the environment. The program is called the Northeast Assistance & Pollution Prevention Roundtable (NEA & P2 Roundtable). This program involves the following components:

- NEA & P2 Roundtable meetings and workgroups,
- Regional information resource center and online databases,
- Source reduction research and publications,
- Training events, and
- Regional policy coordination and development.

For more information, contact:

Terri Goldberg, NEWMOA (617) 367-8558 ext. 302, tgoldberg@newmoa.org; visit www.newmoa.org/prevention.

is used to treat pools to reduce water-borne pathogens. All public pools in the State are required to have two parts per million (2 ppm) of free chlorine in the water for adequate sanitation. Chlorine has been linked to skin and eye irritation, lung damage, and asthma, particularly in children. In addition, accidental spills of chlorine can cause burns, release toxic air emissions, create persistent organic pollutants, and can be costly to clean up.

Maine DEP partnered with Water Purification Associates (a distributor of a food grade enzyme formulated by Orenda Technologies) and Portland's YMCA and Clarion Hotel – both of which have swimming pools with levels of phosphates over 200 parts per billion (ppb). Excessive amounts of phosphates (over 50 ppb) can reduce chlorine's overall effectiveness in the pool. Introduction of the enzyme reduces the amount of phosphates and enables the chlorine to work more effectively.

Prior to the pilot project, the Portland YMCA used 5-7 gallons of sodium hypochlorite per day to maintain the 2 ppm chlorine standard. Since they started adding the Orenda product, they have been able to reduce their usage to 2-3 gallons per day, about a 60 percent reduction of chlorine. The YMCA's net monthly savings, including the cost of the enzyme, is approximately \$160 per month.

NORTHEAST Assistance & Pollution Prevention News

Northeast Assistance & Pollution Prevention News is published a few times per year by NEWMOA's Northeast Assistance & Pollution Prevention Roundtable (NEA & P2 Roundtable). The publication is provided free to the Northeast states, EPA, and other interested individuals and is supported by funds from EPA Region 1-New England and the Northeast States.

The NEA & P2 Roundtable would like to thank the following people for writing and producing this newsletter: Karen Angelo, MA TURI; Peter Cooke, ME DEP; Stephanie D'Agostino, NH DES; Mike DiGiore, NJ DEP; Rich Enander, RI DEM; Rob Guillemin, EPA Region 1; Gary Gulka, VT DEC; Timothy Kirchgraber, NYS DEC; Paul Lockwood, NH DES; Jim McCaughey, NBC; Christopher MacIsaac, MA OTA; Alex Peck, EPA Region 2; Rachel Smith, NEWMOA; Kim Trella, CT DEP; Paul Walsh, MassDEP; Kate Winnebeck, NYS P2I; and Melissa Zych, NH DES. Terri Goldberg and Rachel Smith managed the production of the newsletter.

Please use the form at the back of this issue to request an address change, to add your name to the mailing list, or to request a hard-copy version of the newsletter.

The 12 Principles of Green Chemistry

1. **Prevention**
It is better to prevent waste than to treat or clean up waste after it has been created.
2. **Atom Economy**
Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
3. **Less Hazardous Chemical Syntheses**
Wherever practicable, synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.
4. **Designing Safer Chemicals**
Chemical products should be designed to affect their desired function while minimizing their toxicity.
5. **Safer Solvents and Auxiliaries**
The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used.
6. **Design for Energy Efficiency**
Energy requirements of chemical processes should be recognized for their environmental and economic impacts and should be minimized. If possible, synthetic methods should be conducted at ambient temperature and pressure.
7. **Use of Renewable Feedstocks**
A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.
8. **Reduce Derivatives**
Unnecessary derivatization (use of blocking groups, protection/ deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.
9. **Catalysis**
Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
10. **Design for Degradation**
Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.
11. **Real-time Analysis for Pollution Prevention**
Analytical methodologies need to be further developed to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.
12. **Inherently Safer Chemistry for Accident Prevention**
Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.

Anastas, P. T.; Warner, J. C.; *Green Chemistry: Theory and Practice*, Oxford University Press: New York, 1998.
Source: www.epa.gov/greenchemistry/pubs/principles.html.

The Portland Clarion Hotel also significantly reduced its use of chlorine to treat its 30,000 gallon indoor pool. With the addition of enzymes, the Clarion reduced its use of chlorine by 87 percent. Their net monthly savings is approximately \$70.

Both pool operators have experienced positive results in water and indoor air quality, with many swimmers commenting on the improvements.

For more information, contact:
Peter Cooke, ME DEP (207)
287-7100.



Massachusetts' Green Chemistry Projects

The Massachusetts Office of Technical Assistance and Technology (OTA) has a long track record of supporting green chemistry initiatives. The mission of OTA – helping companies find less toxic alternatives, preventing pollution, and conserving resources – is synonymous with the principles of green chemistry. Recent examples of projects include:

- Overseeing the “Toxics Reduction Task Force” as part of an effort to direct state agencies to use environmentally preferable products (EPPs). In 2009, Governor Patrick signed Executive Order #515 establishing an Environmental Purchasing Policy for all Common

wealth Executive Departments. The Executive Order represents a transition from simply identifying and qualifying environmentally preferable products to requiring their purchase when appropriate. The Executive Order established an interagency “Toxics Reduction Task Force” to communicate the change in product requirements to relevant staff. The Task Force helps ensure that available EPPs can successfully substitute conventional items without reducing the effectiveness and helps state agencies understand the value of EPPs.

- *A project with Ophir Optics, a maker of infra-red lenses in North Andover, to reduce their use of mineral spirit coolants.* MA OTA worked with the company to implement a set of recommendations following a site visit. Four employees formed a Six Sigma project team to monitor the use of mineral spirits. The investigation showed that when the mineral spirits were significantly reduced, there was no decline in the quality of lens functioning. Metered use rates and fine tuning several other parameters allowed further reductions.

This simple method of process control, involving no capital expense, lowered mineral spirit use by 70 percent, resulting in a reduction of 3,872 pounds of volatile organic compound (VOC) emissions and an estimated annual savings of \$15,000 in material costs. The company is pursuing options for further reductions of VOC emissions; including evaluating alternative chemicals to perform the same function.

Following up from other OTA suggestions, the company pursued alternative coolants. OTA recommended that water-based coolants could provide high quality results, but the company must design a fluid capture and solids removal system in order to implement the change.

For more information, contact: Jim Cain, MA OTA (617) 626-1081.

- *A project with ITW Devcon/Plexus to reduce the use of acetone in their cold cleaning process.* MA OTA visited the company and made several recommendations for alternatives that could be used to clean the parts and process equipment used in the manufacture of epoxies and structural adhesives. Following one of the recommendations, Devcon reduced their use of acetone in their cleaning process by replacing it

with an environmentally friendly solvent derived from renewable resources. The company saved approximately 10,000 pounds of acetone, resulting in a cost savings of \$5,000.

For more information, contact: Scott Fortier, MA OTA (617) 626-1090.

- *An effort to incorporate digital printing technology for the textile industry.* In October 2010, the Advanced Technology & Manufacturing Center (ATMC) at UMass Dartmouth and the U.S. Army Natick Soldier Research, Development, and Engineering Center (NSRDEC) signed a Cooperative Research and Development Agreement (CRADA) to jointly develop a digital printing technology for the textile industry. The CRADA will guide this work, including ink and pigment improvements, curing methodologies, and advances in print head development. Successful development of the technology for the Army should have important spin-off commercial value.

For more information, contact: Gus Ogunbameru, MA OTA (617) 626-1065, Augustus.ogunbameru@state.ma.us.

New Hampshire's Green Cleaning Efforts

The New Hampshire Pollution Prevention Program (NHPPP) strives to implement greener approaches in all its projects by recommending product substitutions, process changes, and other green chemistry solutions. Examples include ongoing work with ski areas, the hospitality industry, and a P2 internship program with the University of New Hampshire. In addition, NHPPP has provided assistance to the State's Department of Administrative Services (DAS) on a successful green cleaning initiative.

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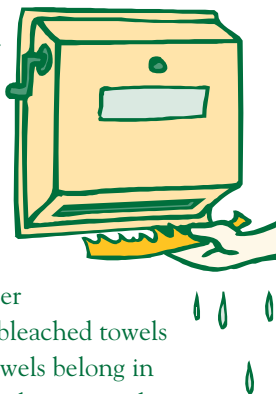


DAS cleans and maintains 35 state buildings with nearly 1.6 million square feet of floor space. In 2003, DAS spent \$24,000 on 227 separate purchases of over 400 gallons of products ranging from hand cleaners to

floor strippers. A review of material safety data sheets (MSDS) for these products revealed many hazardous ingredients, including dichlorobenzenes, methyl ethers, glycol

ethers, and alcohol ethoxylates. A poor tracking system for purchasing and inventory, little or no staff training, and the lack of best management practices (BMPs) led DAS to implement Lean Manufacturing strategies. Out of that project came two other initiatives: the elimination of chlorine-bleached paper towels and a switch to green cleaning products.

Prior to 2009, DAS provided State buildings with bleached, white, folded paper towels in wall-mounted dispensers. The bleaching process uses a large amount of chlorine – 120 pounds per ton of pulp – and generates small amounts of dioxin. DAS decided to switch from bleached white to unbleached brown paper towels. There was initial resistance to unbleached towels from some office staff, who felt “brown towels belong in an industrial setting.” To overcome these objections, the NHPPP initiated a “How Now, Brown Towel?” poster campaign. A small poster next to each towel dispenser explained the environmental and public health benefits of eliminating chlorine-bleached paper towels. Now the staff is comfortable with the change, and the switch not only benefits the environment, but reduces costs.



In 2007, DAS began the switch to greener cleaning products and by the end of 2009, the major cleaning supplies were Green Seal certified with the exception of a floor stripper and floor finisher. The Agency was able to replace a general cleaning product, a washroom cleaner, and a urinal deodorant with environmentally preferable alternatives. The floor stripper and finisher were more difficult because the less hazardous substitutes produced unsatisfactory results. In 2010, DAS purchased a mechanical floor stripper that utilizes an abrasive wheel and water, eliminating the need for a chemical stripper. Based on quantities of each product purchased and constituents listed on the MSDS, over 669 pounds of hazardous chemicals per

year were eliminated. Through more efficient purchasing, management, and application procedures, DAS has saved over \$7,000 dollars per year, while improving the work environment for employees and the quality of its services.

For more information, contact: Paul Lockwood, NH DES (603) 271-2956, paul.lockwood@des.nh.gov.

New York's Green Chemistry Labs

The New York State Pollution Prevention Institute (NYS P2I) worked with SUNY Brockport and SUNY Potsdam to develop a series of green chemistry modules for use in chemistry classes at high schools. The goals of the modules are to introduce students to green chemistry and sustainability through hands-on labs and to reduce the amount and toxicity of hazardous materials in the labs. They are a drop-in replacement or supplement to current high school chemistry labs, fully conforming to Regents Education Standards.

The goals of the modules are to introduce students to green chemistry and sustainability through hands-on labs and to reduce the amount and toxicity of hazardous materials in the labs.

Each module consists of a lab exercise, teacher's curriculum and lesson plan, identification of the learning standards, a review of safe lab practices, and information on green chemistry. The modules were pilot tested by high school chemistry teachers throughout the State and their feedback is currently being incorporated into the modules. Once complete, the final modules will be available to teachers for use in their classrooms. The green chemistry modules cover:

- *Composition of a Hydrate* – A standard experiment in high school involves heating hydrated salt and measuring the mass of water lost in order to find the degree of hydration. Traditionally, the experiment is done with barium chloride, which is highly toxic. The green chemistry lab module uses manganese (II) sulfate. It has a relatively low toxicity, and unlike many salts, it does not decompose upon excessive heating. Benefits also include its ability to be recycled in the classroom, as it absorbs water from the air within a few hours and re-forms the hydrate.

- *Types of Reactions: The Chemistry of Copper* – Single replacement, double replacement, synthesis, and decomposition reactions are typically performed with highly toxic materials because they provide colorful examples. The green chemistry lab module includes a set of copper reactions that illustrate all reaction types, are visually attractive, produce no hazardous waste, and demonstrate the concept of recycling by allowing the product from one reaction to be used in the next.

- *Spices and Perfumes: Isolation of Cinnamaldehyde from Cinnamon* – In the green chemistry lab, cinnamaldehyde is extracted from ordinary cinnamon sticks to illustrate the connection between organic chemistry and products found in nature. The smell of cinnamon is familiar and the functional groups are simple for students to understand.



- *Functional Groups in Organic Chemistry* – In this green chemistry lab, students use color spot tests for different organic functional groups to identify those that are present in an unknown chemistry. Unknowns include isopropyl alcohol, acetone, acetic acid, glucose, tartaric acid, salicylic acid, glycine, and vanillin. They are non-toxic and are used in low concentrations with non-toxic test reagents.
- *Creating Bioplastics from Cornstarch* – Plastics are traditionally made from petroleum products. In this green chemistry lab, plastic is synthesized from cornstarch, a non-toxic renewable material.
- *Solubility of a Sparingly Soluble Salt* – For students studying solubility, a popular experiment involves determining the solubility of a slightly soluble salt, using barium hydroxide. This compound is highly toxic and corrosive, so a safer alternative, lithium carbonate is used for the green chemistry lab module.

For more information, contact: Kate Winnebeck, NYS P2I, kmhasp@rit.edu.

New York State Department of Environmental Conservation's (NYS DEC) Pollution Prevention Unit has initiated a program that focuses on promoting green chemistry statewide in high schools over the next two years. The P2 Unit will conduct pilot projects in Long Island, New York City, Hudson Valley, and the Capital District. This project

is a continuation of the Agency's campaign to reduce toxics in schools. It began with mercury outreach workshops, followed by chemical management workshops, and now focuses on green chemistry in science classrooms.

The project will involve site visits for needs assessments, chemical inventorying, chemical management training, and instruction on green chemistry. Less toxic chemicals purchased and, ultimately disposed of, will save money, generate less waste, lower liability, and benefit the health and safety of students, staff, and the environment.

For more information, contact: Aida Potter, NYS DEC, ampotter@gw.dec.state.ny.us; or Deborah Knight, NYS DEC, djknight@gw.dec.state.ny.us.

Rhode Island Partnerships for Green Chemistry

Over the past several years, the Rhode Island Department of Environmental Management's Office of Customer and Technical Assistance (OCTA) and the University of Rhode Island's (URI) Center for Pollution Prevention have been involved in a number of green chemistry and green engineering assistance, technology, and educational initiatives. Highlights of ongoing efforts include:

- *Safer Schools Committee* – The East Bay Collaborative (a group of eight school districts) is working on a Natural Chemistry curriculum for schools that adapts experiments for use with common household items. They also offer a professional development course that teaches science teachers how to incorporate green chemistry into their work plans.

In addition, many of the Group initiatives have been incorporated into the Department of Education and Department of Health school health regulations. In 2005, the Group spearheaded a project that banned many chemicals



from RI schools. This regulatory change was complemented by a grant that was used to fund school chemical clean-outs. The Group helped EPA develop a Schools Chemical Cleanout Campaign video that

describes the necessary steps and the ways that schools and their partners can achieve success.

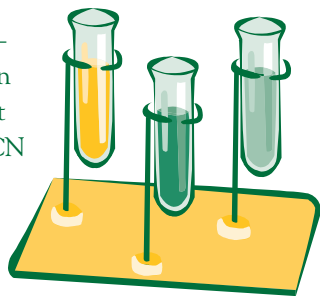
For more information, visit: www.epa.gov/epawaste/partnerships/sc3/pdfs/chem-ri.pdf.

- *Green Hospitality Partnership* – Rhode Island's Green Certification for the Hospitality and Tourism Industry initiative is a voluntary self-certification program to assist the sector with attaining green performance standards, implementing best management practices, and complying with environmental requirements. This program targets the use of green cleaners, environmentally preferable purchasing, waste reduction, and landscape and maintenance activities.

For more information, visit: www.dem.ri.gov/programs/benviron/assist/grncert/index.htm.

URI's Departments of Chemical Engineering and Chemistry are involved in the following initiatives:

- *Vacuum Cycle Nucleation (VCN)* – The National Science Foundation recently funded a research project to determine the feasibility of VCN as a viable, environmentally-preferable replacement for existing parts cleaning operations. VCN is a newly-developed patented process that can be used to enhance the transfer of material to or from the surface of a solid, significantly reducing the use of toxic chemicals in a wide range of industries. Qualitative analysis of various items including tubes, jewelry components, and plates clamped together revealed how VCN can effectively clean irregularly-shaped surfaces through bubble nucleation, sudden changes in vacuum pressure, and the addition of a small amount of hydrogen peroxide (H_2O_2).
- *Non-invasive Measurement Percussion Technology* – URI Chemical Engineering is involved in an applied research and demonstration project with Ultimo Percussion Technology, a Rhode Island-based company that manufactures non-invasive material density and viscosity measurement technology for heterogeneous materials. This new green technology replaces high-energy gamma radiation ($Cs-137$) currently used in nuclear radiation meters.



- *Pollution Prevention Course* – Each year URI offers a graduate level chemical engineering P2 course. The faculty plan to incorporate green chemistry and green engineering principles into the course next year. Students will visit facilities and work as teams to help them improve process efficiencies, eliminate toxic chemical use, and save money.

EPA Region 2's Focus on Green Chemistry & Green Engineering

EPA Region 2 promotes the adoption of green chemistry and green engineering by industry through financial support for states and universities.

The college intern program lead by the NYS DEC promotes green manufacturing and has placed graduate student interns with a number of businesses in such sectors as plastics, pharmaceuticals, energy/bio-fuels, paper/pulp manufacturing, electronics, and chemicals. Participating interns provide businesses with technical assistance in green manufacturing and source reduction. NYS DEC works with the participating companies to ensure that the recommendations identified by the interns are implemented.

During the past year, EPA Region 2 completed a multi-year agreement with Rowan University that highlights how collaborative university/industry partnerships can green pharmaceutical manufacturing processes. Rowan has fostered partnerships with three pharmaceutical companies: Bristol-Myers Squibb, Novartis, and Pfizer. The work with Bristol-Myers Squibb involved the use of a hybrid pervaporation – constant volume distillation operation for the



P2Rx Rapid Response

The Rapid Response Service provides an aid for locating P2 information and answering technical P2 questions. NEWMOA's engineering staff field questions and, in consultation with other P2Rx™ Centers, performs research of P2Rx™ resources and the internet. They then forward any relevant information they find to the person making the request.

For more information, visit: www.newmoa.org/about/library.cfm, or call (617) 367-8558 x306

recovery of the solvent tetrahydrofuran in the production of a new cancer drug. The project with Novartis involved a fixed bed adsorption process to reduce methanol and water

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usage in a reaction step in drug synthesis. It also included the removal and recovery of palladium, a catalyst that when dissolved to drive the reaction must ultimately be separated from the mixture before it can be purified. The initiative with Pfizer showed how attempts can be made to integrate solvent recovery into manufacturing processes already underway. This work has laid the foundation for a project that will extend the application of green engineering to the wider pharmaceutical industry.

For more information, contact: Walter Schoepf, EPA Region 2 (212) 637-3729, schoepf.walter@epa.gov.

New England Green Chemistry Challenge Government Programs & Strategies Group

EPA Region 1 convened leaders in green chemistry during the summer and fall of 2010 in a series of meetings. The participants agreed on a strategy and a plan for advancing green chemistry in the region. EPA named this initiative the New England Green Chemistry Challenge. A coordinating committee chaired by EPA Regional Administrator Curt Spalding and John Warner, Warner Babcock Institute of Green Chemistry, was formed. From this committee, co-leads were selected for six sector-based working groups:

- Government
- Business
- Venture capital and economic development
- K-12 schools, colleges, and universities
- Non-governmental organizations
- Healthcare organizations

The overarching goal for the Challenge is to broaden the understanding and adoption of green chemistry practices and principles in business, education, government, health care, and society as a catalyst to grow a sustainable economy in New England and beyond.

In December 2010, the Challenge convened a green chemistry forum at MIT to:

- Bring together green chemistry practitioners and potential customers and funders;
- Enlist participation in the working groups; and
- Showcase the many successful green chemistry activities in New England.

After this Forum, a Government Programs and Strategies Group convened to identify non-regulatory needs, projects, data, research, and resources to assist EPA and states in the transition towards greener and more sustainable chemistry, products, materials, and processes. The Government Group, including representatives from the six New England States, New York, and New Jersey, has been charged with the development of an action plan that identifies activities that EPA can support. The working group is developing interstate projects that facilitate the exchange of data, lessons learned, and information, which will aid in the acceptance and implementation of green chemistry. NEWMOA and the Rhode Island Department of Environmental Management OCTA are co-chairing the Group.

For more information, contact: Terri Goldberg, NEWMOA (617) 367-8558 x302, tgoldberg@newmoa.org; visit: www.epa.gov/region1/geforum2010/index.htm.

Discussion with Green Chemistry Leaders in the Northeast

NEWMOA conducted interviews with Curt Spalding of EPA Region 1, and John Warner of the Warner Babcock Institute for Green Chemistry to ask for their thoughts on advancing green chemistry in the Northeast

NEWMOA: How do EPA and the Warner Babcock Institute define green chemistry and green engineering?

Mr. Spalding: EPA uses the same definition of green chemistry coined by Paul Anastas and John Warner, and the 12 principles of green chemistry (see page 3). For EPA, green chemistry and green engineering are extensions of the overall pollution prevention strategy. Green chemistry is a strategic approach to consider the toxicity of chemicals in products before they are manufactured and to find ways to avoid the risks and negative outcomes associated with toxic chemical use.

Green chemistry is a huge part of the sustainability movement... By promoting the advancement of green chemistry in Region 1, we are promoting safer products and a green economy for New England.

Dr. Warner: The basic ideas behind chemistry evolved over the past 150 years. Chemists are the only people in the world capable of making a chemical that never existed before. However, often absent from chemists' training is the ability to anticipate environmental harm from those chemicals. Many other fields of study require professional safety courses, yet chemistry does not. Green chemistry attempts to fix this – by promoting the creation of a chemical or material that has minimal impact on human health and the environment.

NEWMOA: What are EPA's goals in promoting green chemistry?

Mr. Spalding: Green chemistry is a huge part of the sustainability movement, which has been going on for

over a decade. By promoting the advancement of green chemistry in Region 1, we are promoting safer products and a green economy for New England.

NEWMOA: How does the concept of green chemistry relate to P2 and sustainability?

Mr. Spalding: Green chemistry is just one piece of P2 and sustainability. Traditionally, sustainability in New England has focused on energy, carbon footprints, and long-term climate change mitigation. Green chemistry is a more direct commitment to public health and the environment and deals with the "here and now." The focus is on sustainable health because people are not exposed to the chemical risks in the first place. There are also huge economic payoffs for green chemistry. There is great potential for Region 1 in moving forward with green chemistry and playing an important role in the national economy.

Dr. Warner: The ultimate goal is P2 because pollution isn't created in the first place. However, the overall concepts of P2 and sustainability are two-tiered and green chemistry is a major part of it. For example, solar panels save energy, but they are also made up of toxic materials. Green chemistry focuses on how to make solar panels safer in the first place. In this way, green chemistry represents the fundamental building blocks of P2 and sustainability.

Green chemistry represents the fundamental building blocks of P2 and sustainability.

NEWMOA: Can you provide some examples of green chemistry in practice at EPA and the Institute?

Mr. Spalding: The EPA Region 1 Laboratory has adopted green chemistry practices. An example is a new laboratory

Discussion with Green Chemistry Leaders in the Northeast *(Continued)*

method that detects chemicals in wastewater and stormwater using a safer chemical catalyst. The EPA Office of Research and Development (ORD) is also integrating the 12 principles of green chemistry in its work.

Dr. Warner: The Institute is currently working on several green chemistry projects, including ceramics for household fixtures; a drug for treating Parkinson's disease; and hair coloring systems. We work with a variety of industries to conduct behind-the-scenes green chemistry research to make any product or application sustainable.

NEWMOA: What are some ways that your agency and program has collaborated with industry and other organizations on green chemistry initiatives and what are your ideas for future collaborations?

Mr. Spalding: EPA Region 1 has been able to organize a group of green chemistry leaders from industry, communities, educational institutions, government, and other stakeholders to discuss what should be done to advance green chemistry in the Region. The Group has pulled together project ideas with rationale on how to move green chemistry forward. Several future collaborations are expected from this effort. *(See side bar on page 8)*

Dr. Warner: The Warner Babcock Institute built its business model on working with industry. The Institute is a for-profit company and consults with businesses on a fee-for-service basis. Since its inception, we have filed 150 patents, have 5 products on the market, and another 5 in the pipeline. The key is to promote the use of green

chemistry to improve competitiveness and innovation.

The Institute has also worked with states, such as Minnesota, to promote safer chemicals legislation, and other organizations involved in the European REACH legislation. We have also collaborated on initiatives with the University of California, Berkeley to develop green chemistry programs.

Many of the current green chemistry initiatives are focused on the demand side of materials, but not the supply. The supply side is a critical missing link. We need students that are graduating with knowledge of green chemistry and can conduct the needed research and development. There are examples one can show to students on how to identify green chemistry; however, this doesn't teach them how to perform green chemistry. We are trying to correct this through the Institute's work with colleges and universities.

NEWMOA: Can you provide some examples of successful cutting-edge methodologies or technologies that are now being used for developing safer products or processes?

Dr. Warner: Each year, the U.S. EPA Presidential Green Chemistry Challenge awards businesses that have implemented successful green chemistry initiatives in commercial operations. Some of the past winners developed new polymers, solvents, and additives (www.epa.gov/gcc/pubs/pgcc/past.html). However, some of the companies that are actually doing the best green



John Warner, President, Warner Babcock Institute

Dr. John Warner founded the Warner Babcock Institute for Green Chemistry in 2007 with Jim Babcock and Bill Kunzweiler. Dr. Warner is considered one of the founders of green chemistry. He has worked extensively on semiconductor design, biodegradable plastics, personal care products, and polymeric photoresists. Dr. Warner holds an M.S. and a Ph.D. in Organic Chemistry from Princeton University and a B.S. in Chemistry from the University of Massachusetts Boston. For information about the Warner Babcock Institute, visit: www.warnerbabcock.com.

Discussion with Green Chemistry Leaders in the Northeast *(Continued)*

chemistry aren't promoting their work. Most had previous products that were toxic or unsafe, so even though they've developed a new safer product, they don't like to point out how bad their products were before. They're doing green chemistry for safety's sake rather than good publicity. It's different for the companies that develop a brand new material or product, because they can use the fact that it's "green" as a marketing ploy.

NEWMOA: What are the priorities for green chemistry research and development?

Dr. Warner: The main priority is training so that students and future chemists can develop the right set of skills to advance green chemistry. Beyond Benign has developed a green chemistry curriculum for teachers. Several chemistry departments at colleges and universities already require students to take a course that teaches them to recognize and create non-toxic chemicals, so this is a step in the right direction.

NEWMOA: What do you see as future opportunities in this field?

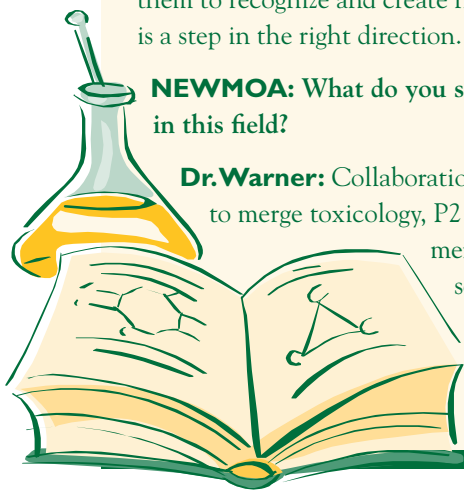
Dr. Warner: Collaboration moving forward needs to merge toxicology, P2 mitigation, and environmental health. There are several groups throughout the Northeast that are working with state

colleges and universities to advance green chemistry. In Massachusetts, the University of Massachusetts (UMass) Boston, Simmons College, Gordon College, and Bridgewater State have integrated green chemistry into their curriculums. UMass Boston also has a green chemistry PhD program.

NEWMOA: What are the important opportunities and roles for state and local government in advancing green chemistry? Are there policies or programs that you think would be effective?

Mr. Spalding: On the national level, government plays a vital role in funding research and creating networks. The hardest part of the New England Green Chemistry Challenge was organizing the business network and getting different companies to collaborate with each other. EPA Region 1 had to put in extra resources to get this to happen. If we had not done so, we would be missing many of the chemists' perspectives, which are important to the overall conversation.

Above all, green chemistry is based on innovation, and governments cannot regulate creativity. We can create performance goals that encourage innovation among businesses and pull together resources to get them to collaborate with each other. The state colleges and universities play a vital role in making this conversation happen and helping businesses to understand the opportunities.



Curt Spalding, EPA Region I Administrator

Curt Spalding has extensive experience in the environmental protection field as an advocate, policy analyst, and administrator. Prior to being Administrator for EPA's New England Region, he served as Executive Director of Save the Bay in Rhode Island, and was an Environmental Protection Specialist and Presidential Management Intern at EPA's offices in Boston and Washington, D.C. Mr. Spalding received his bachelor's degree from Hobart College and an M.P.A. from SUNY Albany in Albany, NY. For information on EPA Region 1's green chemistry efforts, visit: www.epa.gov/region1/gcforum2010/.



GREEN CHEMISTRY WEB RESOURCES

This section of the NE Assistance & P2 News lists useful web resources that are related to the topic of the Feature Article

The American Chemical Society's Green Chemistry Institute (ACS GCI)

strives to enable and catalyze the implementation of green chemistry and engineering principles into all aspects of the global chemical enterprise.

www.acs.org/gci

Beyond Benign is a non-profit organization that focuses on green chemistry and sustainability and integrating these concepts into school curriculums, community outreach, and workforce development. www.beyondbenign.org

California's Green Chemistry Initiative promotes the application of green chemistry through reducing, avoiding, or eliminating the generation of hazardous waste. www.dtsc.ca.gov/PollutionPrevention/GreenChemistryInitiative/index.cfm

EPA's Green Chemistry Program is a collaborative effort with academia, industry, other government agencies, and non-government organizations to promote the use of green chemistry through voluntary and non-regulatory partnerships. www.epa.gov/gcc/pubs/epa_gc.html

The Green Chemistry & Commerce Council (GC3), a project of the Lowell Center for Sustainable Production at the University of Massachusetts Lowell, is a business-to-business forum for discussing and sharing information related to advancing green chemistry and design

for environment initiatives.

www.greenchemistryandcommerce.org

The Green Chemistry Network (GCN)

is an international organization that promotes awareness and facilitates education, training, and the practice of green chemistry in industry, commerce, government, academia, and schools.

www.greenchemistrynetwork.org

The New York State Pollution Prevention Institute (P2I)

is developing green chemistry modules for use in high school chemistry classes. www.nysp2i.rit.edu/academic_programs.html

The Warner Babcock Institute for Green Chemistry

is dedicated to the development of non-toxic, environmentally benign, and sustainable technological solutions for society through green chemistry. The Institute offers professional training courses for businesses and partners with a variety of industry sectors to support and collaborate on cutting-edge research and development efforts. www.warnerbabcock.com



Discussion with Green Chemistry Leaders in the Northeast *(Continued)*

Dr. Warner: Programs that integrate green chemistry into college curriculums across the country are important. The “Green Chemistry Commitment” designed and promoted by Beyond Benign is for colleges and universities to take part in a five step process to build their knowledge base to integrate green chemistry into the standard curriculum. It is a long process, so the commitment extends over five years.

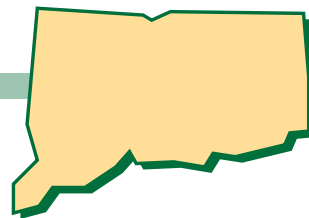
From a business perspective, green chemistry and sustainability represent the future of success for the U.S. in a globally competitive market. If colleges in the U.S. don't teach students these skills, other countries will gain an economic advantage. For example, one college in Delhi, India requires all chemistry students to earn a degree in green chemistry. If Massachusetts pulls together all its university resources to develop green chemistry education and professional career development, we will have the opportunity to attract manufacturers and build a more competitive and successful economy.

NEWMOA: Any additional comments?

Mr. Spalding: The ultimate benefits of green chemistry are to create jobs, preserve the environment, and improve public health. Green chemistry can achieve positive environmental results by aligning economic interests with existing capabilities (e.g., university knowledge) for a greater good. This is environmental management for the 21st Century. Galvanizing innovation around this concept so that it becomes common practice will have great benefits.

Dr. Warner: There are three consistent themes when thinking about green chemistry. First is the moral and ethical component of making safer materials and products. Second is the economic opportunity for workforce development and competitive advantage. Third is the potential for innovation, because ultimately, that is what green chemistry is about.

PROGRAM UPDATES



CONNECTICUT

Connecticut Department of Environmental Protection (CT DEP)

Hospitals Working Towards Sustainability

The Connecticut Hospital Environmental Roundtable (CHER) held a forum in October 2010, “Rethinking Healthcare the Green Way: A Roadmap to Sustainability.” The event was sponsored by BGreen 2020, CT Energy Efficiency Fund, CHER, St. Vincent's Medical Center, and United Illuminating Company (UI) and featured the following speakers:



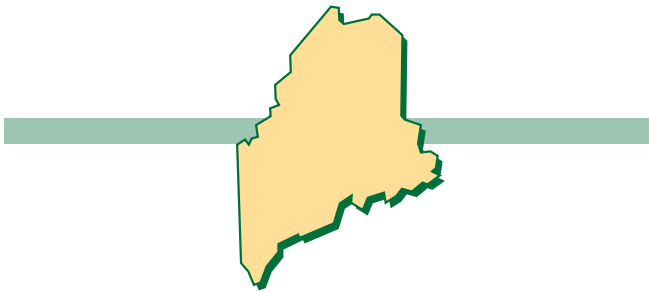
- John Leigh from Dartmouth-Hitchcock Medical Center, on the hospital's program, their accomplishments, the role of purchasing, the systems in place to keep it going, and the importance of measurement and tools to calculate reductions
- Janet Brown from Practice Greenhealth, on a ten step planning process and resources for developing a sustainability plan
- Maureen Hart from Sustainability Measures, on the challenges hospitals face in greening operations and examples of what others have done

For more information, visit: www.ct.gov/dep/cwp/view.asp?a=2708&q=323980&depNav_GID=1763#SVMCOct15.

Increase in Green Lodging Certifications

The CT DEP has certified 28 hotels. Workshops held in 2010 in partnership with Boston Green Tourism helped increase participation. CT DEP staff expects to complete two facility audits during the summer.

For more information, visit: www.ct.gov/dep/greenlodging.



MAINE

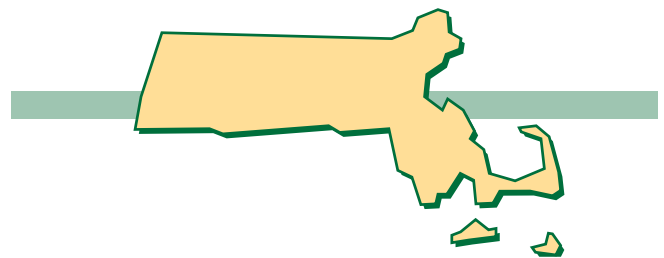
Maine Department of Environmental Protection (ME DEP)

Current activities of the P2 Program in Maine DEP’s Office of Innovation and Assistance (OIA) include:

- Implementing an environmental certification program for lodging facilities. Launched in November 2005, there are currently 112 certified businesses. The P2 program has performed over 60 site visits for this self certification program, making an average of 10 P2 recommendations at each facility. Verification audits of point totals occur annually at 12 random businesses.
- Implementing an environmental certification program for restaurants. Launched in June 2007, there are currently 30 certified businesses. The P2 program provides an average of 10 P2 recommendations at each facility.
- Implementing an environmental certification program for grocery stores. Launched in March 2010, there are currently 9 certified businesses with another 6 stores that are considering the provisional certification. The P2 program has performed 16 site visits for this program, making an average of 10 P2 recommendations at each facility. In addition, it has partnered with the Maine Grocers Association to provide outreach on this initiative, and presented at their annual meeting.
- Managing the Clean Government Initiative to encourage toxics reduction, energy efficiency, and environmentally preferable procurement within Maine state government, while providing assistance to Maine’s Division of Purchases on selection of Green Seal-certified cleaning products, low mercury lighting, and Electronic Product Assessment Tool (EPEAT)-rated electronics.
- Assisting facilities with indoor swimming pools on appropriate chemical purchasing and use (see pages 1-3).

- Conducting onsite compliance assistance utilizing Maine’s Small Business Compliance Incentive Policy (SBCIP).
- Continuing to provide assistance to the Green Campus Consortium in their efforts to move towards sustainability.
- Continuing to provide assistance to a number of industry sectors.
- Utilizing the Compliance Advisory Panel (CAP) to weigh in on OIA activities.

For more information, contact: Peter Cooke, ME DEP (207) 287-7100.



MASSACHUSETTS

Massachusetts Department of Environmental Protection (MassDEP)

Clean Diesel for School Buses

Bus owners in Shirley, Athol, Chelmsford, and Winchendon are now participating in free diesel retrofit installations for school buses under the “MassClean Diesel: Clean Air for Kids” program.

These owners installed controls on 149 diesel school buses that serve approximately 21,750 students across 22 municipalities in the Commonwealth.

Overall, MassCleanDiesel has 38 participating bus owners that have retrofitted 901 school buses, providing benefits to more than 114,000 students across 178 municipalities.

For more information, visit: www.mass.gov/dep/air/diesel/masscleandiesel.htm.

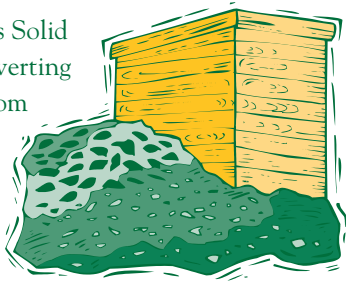
Building Organics Processing Capacity

MassDEP, in collaboration with the Department of Agricultural Resources, the Department of Energy Resources,



and other agencies, has established a Task Force focused on building capacity to manage organic food waste.

The draft 2010-2020 Massachusetts Solid Waste Master Plan sets a goal of diverting 350,000 tons of organic material from disposal by 2020. Meeting this goal will require significant increases in anaerobic digestion, composting, and recycling. Expanding in-state recycling and processing capacity will create jobs and economic development opportunities, have important co-benefits for Massachusetts farms, and will help anaerobic digesters at wastewater treatment plants operate more efficiently and economically.



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The Task Force is charged with:

- Reviewing and updating a list of barriers and opportunities to advance anaerobic digestion, composting, and recycling capacity
- Developing guiding principles to ensure that there is appropriate public participation in the siting process and that facilities are designed, constructed, and operated in a manner that protects public health and the environment
- Recommending actions to overcome barriers, take advantage of opportunities, and identify the entities that should be charged with implementation

The Task Force recommendations will identify what needs to be done, who needs to do it, and how each action should be structured.

For more information, visit: www.mass.gov/dep/public/committee/adtf.htm.

Massachusetts Office of Technical Assistance and Technology (OTA)

Networks to Share Sustainable Practices

MA OTA helped form two networks of facilities to foster information sharing on compliance and sustainable practices. MA OTA's role is to facilitate meetings and identify relevant speakers.

The first network, called North Central Business Environmental Network (North Central BEN), is for companies in North Central Massachusetts, where manufacturing provides a relatively large percentage of employment. Their first meeting was held in December 2010 at the North Central Chamber of Commerce and Economic Development Council. Participating companies were informed of new requirements for low-volatility solvents in cold cleaning operations and received information about the TURI Surface Cleaning Lab's services for assisting in evaluating alternatives. A second meeting was held in March 2011 and included an update on environmental regulatory developments and a presentation on a compliance tool.

The second organization, the Massachusetts School Sustainability Coordinator's Roundtable (MSSCOR), has held two meetings – at Suffolk University and Northeastern, respectively. The purpose of each meeting was to share information about common needs and opportunities.

For more information, contact: Rick Reibstein, MA OTA (617) 626-1074.

Massachusetts Toxics Use Reduction Institute (TURI)

Toxics Use Reduction Community Conference

On April 14, 2011, TURI hosted a conference to inspire and encourage Massachusetts community groups to replicate and expand on past community grant projects. Topics for sessions included reducing toxics used on lawns, in nail salons, and in auto body shops. The deadline to submit TURI Community grant applications is July 29, 2011.

For more information, contact: Joy Onasch, TURI (978) 934-4343, joy@turi.org; visit: www.turi.org/content/view/full/7416.



REACH & RoHS Seminar

On April 28, 2011, TURI is hosting a day-long training featuring two important European Union regulations that impact companies in the U.S. that are part of a global supply chain. The Restriction on Hazardous Substances (RoHS) Directive is being revised with new requirements. The Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) Directive aims to substitute less toxic substances for existing materials, and is creating new customer demands on suppliers.

For more information, contact: Mark Myles, TURI (978) 934-3298, mark.myles@turi.org.

Continuing Education Conference

On May 5, 2011, TURI is offering a continuing education conference on such topics as chemical process safety, green chemistry for industry, case studies on EMS, and recent advances in surface finishing.

For more information, visit: www.turi.org/content/view/full/7228.

Industry Matching Grants

TURI is offering three different grants to support companies in implementing toxics use reduction projects and to provide opportunities for companies to learn about innovations implemented by their peers. The grants for larger and smaller projects, as well as for demonstrations of successful projects, range from \$3K to \$17K.

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For more information, contact: Pam Eliason, TURI (978) 934-3142, pam@turi.org; visit: www.turi.org/for_industry/alternatives_research/industry_matching_grants.

Wet Cleaning Demonstrations

TURI is holding demonstrations of professional wet cleaning technology at ACE Cleaners in North Andover, MA on April 7, April 21, and May

19. ACE Cleaners recently converted its dry cleaning process from using perchloroethylene (perc) to wet cleaning technologies with the help of a \$17,000 grant from TURI.

For more information, contact: Joy Onasch, TURI (978) 934-4343, joy@turi.org.

**NEW HAMPSHIRE****New Hampshire Department of Environmental Services (NH DES)****Greening NH Restaurants**

The New Hampshire Pollution Prevention Program (NHPPP) is working with the New Hampshire Sustainable Lodging and Restaurant Program (NHSLRP) on greening operations for the hospitality industry, resulting in certifications for over 70 lodging facilities and 8 restaurants. NHSLRP and NHPPP recently developed a new certification program for restaurants. The NHPPP has teamed up with the NH DES Wastewater Bureau to offer a workshop for restaurants and other food service establishments on grease trap maintenance and energy, water, and waste reduction. NHPPP staff is conducting site visits at restaurants to: acquire baseline documentation of energy efficiency/waste reduction efforts; introduce restaurants to the certification program; and promote the workshop. The information from these visits will be used to gather metrics and provide guidance for further outreach and education.

For more information, contact: Melissa Zych, NH DES, melissa.zych@des.nh.gov.

NH Partners with Ski Resorts

In conjunction with SkiNH, the NHPPP works with the ski industry to reduce their environmental impact through the Green Slopes Program. A conference is planned for August 2011 for ski areas throughout New England. The conference will focus on alternative energy



and compliance assistance and will include a case study on energy savings through compressor upgrades.

For more information, contact: Melissa Zych, NH DES, melissa.zych@des.nh.gov.

2011 P2 Internship Program

The NHPPP is training interns for the 2011 summer placement. Results from their efforts will be available in the fall.

For more information, contact: Paul Lockwood, NH DES (603) 271-2956, paul.lockwood@des.nh.gov.

Governor's P2 Award – Applications Accepted

The NHPPP is currently accepting applications for the 2011 Governor's Pollution Prevention Award. Each year companies submit applications highlighting their P2 projects. A panel of qualified judges determines the merits of each company's efforts, and winners must pass a compliance check performed by NH DES and EPA. The Governor is invited to present the awards during Pollution Prevention Week.

For more information, contact: Melissa Zych, NH DES, melissa.zych@des.nh.gov.

New Rules for Rock Crushers

In early 2011, the Small Business Technical Assistance Program (SBTAP) hosted three workshops on the new state air rules regarding non-metallic mineral processing plants, commonly known as rock crushing plants or rock crushers. The workshops highlighted the streamlined rules that reduce regulatory burden and fees for small businesses, including a permit by notification option that is now available.

For more information, contact: Sara Johnson, SBTAP, sara.johnson@des.nh.gov.

Auto Body Outreach

NHPPP and SBTAP are conducting site visits to auto body shops to inform them of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) and hazardous waste rules. They are distributing guidance documents to assist the shops with proper management of waste paint filters and waste paint. However, many of the shops are non-notifiers and lack proper booth set ups. As a result of this project, NH DES has developed an environmental justice case study.

For more information, contact: Sara Johnson, SBTAP, sara.johnson@des.nh.gov.

Recycling Mercury Thermostats

In 2010, NHPPP stepped up its efforts to ensure that heating, ventilation, and air-conditioning (HVAC) contractors and wholesalers are collecting and recycling mercury-added thermostats. NHPPP staff visited HVAC wholesalers to check for their compliance with New Hampshire's thermostat recycling law and to provide postcards that wholesalers can distribute to contractors. The postcards remind contractors that they must recycle all mercury-added thermostats they replace. NHPPP also staffed a booth at the "New Hampshire Plumbers and Mechanical Contractors Tradeshow" and found that many of the attendees were aware of the program. However, there were contractors that had heard of the law but were unaware of how to properly recycle the devices.

For more information, contact: Paul Lockwood, NH DES (603) 271-2956, paul.lockwood@des.nh.gov.



NEW JERSEY

New Jersey Department of Environmental Protection (NJDEP)

EMFACT Pilot Project

New Jersey's P2 Planning program requires facilities

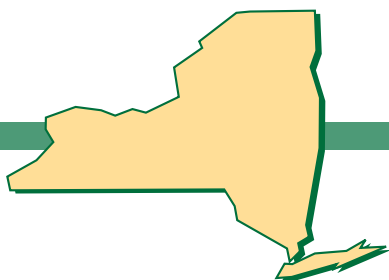
to develop facility- and process-level materials accounting data for hazardous substances used and generated as non-product output. The planning process also requires facilities to develop cost data on the use, treatment, and disposal of hazardous materials, as well as potential cost savings of implementing P2. EMFACT™ is a software tool designed to be used within companies for systematically tracking materials and energy use; releases, discharges, and wastes; and associated costs in ways that can create value. The tool provides a comprehensive picture of resource use and its relation to production and planning that can help improve business environmental performance.



EMFACT™ is a software tool designed to be used within companies for systematically tracking materials and energy use; releases, discharges, and wastes; and associated costs in ways that can create value. The tool provides a comprehensive picture of resource use and its relation to production and planning that can help improve business environmental performance.

With recent funding from U.S. EPA Region 2, NEWMOA initiated a project to test the usability and usefulness of EMFACT in a “real world” situation. The project is designed to provide on-site training and support to volunteer companies in New Jersey and New York in exchange for them implementing EMFACT and using it to track relevant data and develop reports that NEWMOA can use to document the project via case studies. NEWMOA and NJ DEP are working on an agreement with one NJ facility. The NJ DEP is interested in tools that can help facilities with their materials accounting and agreed to be involved in the project. NJ DEP believes that EMFACT has this capability and greater use of it would serve to make reporting easier for the regulated community and improve data quality.

For more information, contact: Michael DiGiore, NJ DEP, Michael.DiGiore@dep.state.nj.us.



NEW YORK

New York State Department of Environmental Conservation (NYS DEC)

Environmental Excellence Awards

NYS DEC is accepting applications for this year’s Environmental Excellence Awards until May 20, 2011. This

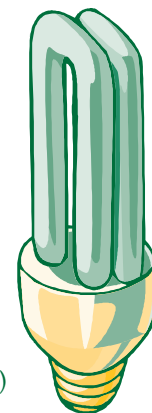
awards program honors eligible applicants that are meeting environmental challenges by using innovative and environmentally sustainable practices or creative partnerships.

For more information, contact: Marna Posluszny, NYS DEC, maposlus@gw.dec.state.ny.us.

Greening State Procurement

NYS DEC is working on implementing an environmentally preferable purchasing program under Executive Order No. 4, and is currently evaluating fluorescent light bulbs and acoustic ceiling tiles.

For more information, contact: Bob Lazzara, NYS DEC, rjlazzar@gw.dec.state.ny.us.



Environmental Leaders Program

The New York Environmental Leaders (NYEL) Program currently has 13 members. NYS DEC is committed to conducting site visits at member facilities at least once during their three year term of participation to assess environmental performance commitments, environmental management systems (EMS), and public outreach programs.

For more information, contact: John Vana, NYS DEC, jmvana@gw.dec.state.ny.us.

Cleaning Products Disclosure

NYS DEC is exercising its statutory authority to require manufacturers of cleaning products to disclose their ingredients. Several industry groups participated in public meetings and submitted comments on a proposal for implementation of the program. NYS DEC is in the process of consulting with key stakeholders and developing a revised version of the standard. NYS DEC is also consulting with NEWMOA’s Interstate Chemicals Clearinghouse (IC2) on the best approach to collect the ingredient disclosure information.

For more information, contact: John Vana, NYS DEC, jmvana@gw.dec.state.ny.us.

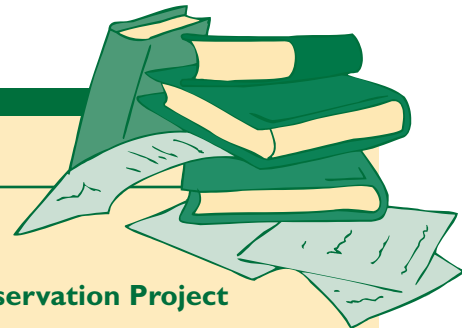
New York State Pollution Prevention Institute (NYS P2I)

NY Promotes Professional Wet Cleaning

The NYS P2I is promoting environmentally preferable alternatives to perchloroethylene (perc) in garment cleaning through information dissemination, assisting cleaners in the conversion to professional wet cleaning, and holding demonstrations at established wet cleaners.

NEW PUBLICATIONS & EDUCATIONAL MATERIALS

The following is a list of **new** publications and other educational resources available online.



CT DEP P2 Web Resources

- Home Green Home
www.ct.gov/dep/cwp/view.asp?a=2708&q=323966&depNav_GID=1763
- Living Green: Information for Individuals & Families
www.ct.gov/dep/cwp/view.asp?a=2708&Q=323958&depNav_GID=1763
- Breathe Easy While Cleaning Recipe Card
www.ct.gov/dep/lib/dep/p2/individual/breathesasywhilecleaningenglishweb.pdf
- Business Sustainability Initiatives – Learn from Your Peers
www.ct.gov/dep/cwp/view.asp?a=2708&q=324046&depNav_GID=1763
- Greening Your Library
www.ct.gov/dep/cwp/view.asp?a=2708&Q=323878&depNav_GID=1763&depNav=#library

CT DEP Resources on Organic Land Care

- Connecticut's Lawn Care Pesticide Ban
[www.ct.gov/dep/lib/dep/p2/government/turf_mgt_without_pesticides_final_\(2\).pdf](http://www.ct.gov/dep/lib/dep/p2/government/turf_mgt_without_pesticides_final_(2).pdf)
- Maintaining Quality Turfgrass under CT's Lawn Care Pesticide Ban
www.ct.gov/dep/lib/dep/p2/government/maintaining_quality_turfgrass_under_cts_lawn_care_pesticide_ban.pdf
- Moving From Conventional to Organic Turf Management
www.ct.gov/dep/lib/dep/p2/government/ccnr_fact_sheets_for_ppis_2009.pdf

Marlboro Water Conservation Project

MA OTA has finalized a report on a water conservation grant project, which includes results from the audits performed at participating facilities in Marlboro.

www.mass.gov/Eoeea/docs/eea/ota/resource_conservation/marlboro_water_final_report.pdf

Polartec, LLC Case Study

MA OTA completed a case study on a less toxic cleaning solution used to remove knitting lubricating oils at Polartec, LLC. After switching to the cleaning alternative, Polartec significantly reduced the time required for many dye cycles, allowing them to improve efficiency, reduce chemical use, and lower utility costs.

www.mass.gov/Eoeea/docs/eea/ota/case_studies/polartec.pdf

Journal of Cleaner Production Celebrates Toxics Use Reduction

A special issue of the *Journal of Cleaner Production* celebrates the 20th Anniversary of the Massachusetts Toxics Use Reduction Act with articles on how to improve public and worker health and the environment through toxics use reduction. Published in March, the journal articles include case studies of toxics use reduction, safer alternatives assessment research, and policies for achieving sustainability.

Contact the MA TURI Librarian Jan Hutchins, jan@turi.org, or purchase the issue from:

www.elsevier.com/wps/find/journaldescription.cws_home/30440/bibliographic.

TURI on Facebook

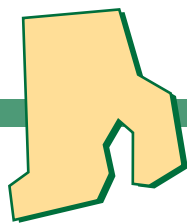
To stay up-to-date on trainings, grants, and news, “like” TURI's Facebook page or visit www.turi.org. Sign up to receive a monthly newsletter and the GreenList Bulletin.

In 2010, NYS P2I mailed 2,100 surveys to dry cleaners to identify barriers to conversion to professional wet cleaning and assess industry attitudes and concerns. The results found that, although the environmental benefits of professional wet cleaning are well known, educating cleaners about the ability to clean garments well without harming fabric is critical. More than half of all survey respondents are interested in professional wet cleaning, and about 20 percent have customers requesting wet cleaning.

The results of the survey found that, although the environmental benefits of professional wet cleaning are well known, educating cleaners about the ability to clean garments well without harming fabric is critical. More than half of all survey respondents are interested in professional wet cleaning, and about 20 percent have customers requesting wet cleaning.

With partial funding from EPA Region 2, two perc dry cleaners, including a facility in Manhattan, will convert their operations to professional wet cleaning. At both conversion sites, NYS P2I will collect operational metrics to compare performance of perc and wet cleaning systems. The cleaners will also host wet cleaning demonstrations at their facilities.

For more information, visit: www.nysp2i.rit.edu/garment_cleaning.



RHODE ISLAND

**Rhode Island Department of
Environmental Management (DEM)**

Outreach to Auto Body Shops

Since September 2010, University of Rhode Island

(URI) P2 staff visited the three largest users of methylene chloride-based (MeCl) paint strippers in the automotive refinishing sector. These facilities were identified as part of the regional NESHAP “Initial Notification and Survey” initiative. A reporting form was modified to collect data on annual usage of MeCl. While at the facility, URI staff encouraged shops to limit their use or switch to ventilated mechanical sanding. All facilities agreed to stop or limit their use of MeCl as a result of these efforts.

Update on ERP Initiatives

RI DEM’s Office of Customer and Technical Assistance (OCTA) has worked on several Environmental Results Program (ERP) initiatives, including the third round of the auto body ERP. The auto body ERP covers P2, air, hazardous waste, wastewater, and Occupational Safety and Health Administration (OSHA) regulatory compliance. Certification materials will be sent to facilities following an industry workshop scheduled for the end of April.

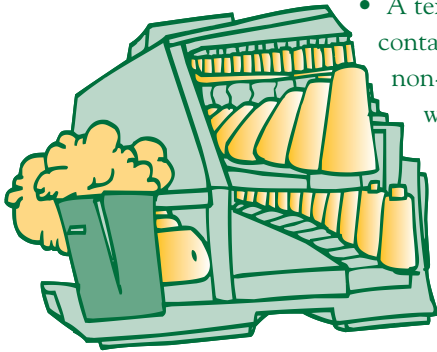
OCTA also recently completed the second round of its auto salvage ERP with a 60 percent participation rate. The Narraganset Bay Commission (NBC) will help conduct randomized field inspections using compliance checklists. Statistical analysis of collected field data will evaluate increases or decreases in industry performance.

URI’s Student Interns

Five graduate students successfully completed a P2 independent study course in the fall of 2010. They evaluated specific chemical engineering approaches towards the application of a new cleaning technology, called Vacuum Cycle Nucleation that can potentially replace many hazardous cleaning operations (see page 7). For the spring 2011 semester, 15 students are participating in this course. Two undergraduate students are also actively involved in the auto body effort described above and the following projects with businesses:

They evaluated specific chemical engineering approaches towards the application of a new cleaning technology, called Vacuum Cycle Nucleation that can potentially replace many hazardous cleaning operations.

- An effort to reduce water consumption and wastewater discharge and improve operating efficiency at a textile company. The company was previously using approximately 2.4 million gallons of water per month. After consulting with URI P2 staff/engineers, they established an improved program to consolidate batch jobs, reuse water, and repair leaky tanks and pipes. This resulted in a 60 percent reduction in water consumption and savings in water, sewer, and energy costs.



- A textile company recently contacted URI and OCTA regarding non-compliant pH levels in their wastewater discharge. URI and OCTA visited the company to perform an initial assessment and have gathered detailed information on flow rates, nature of the pH spikes, and equipment.

- Technical assistance started two years ago at a company to install an ultra-filtration system to recycle process water. URI continues to evaluate and optimize process variables to ensure consistent performance.

For more information, contact: Richard Enander, RI DEM, richard.enander@dem.ri.gov.

Narragansett Bay Commission (NBC)

Sustainable Energy for WWTFs

Since 2008, the NBC, RI DEM, URI, EPA Region 1, Rhode Island Manufacturers Extension Service (RIMES), and National Grid have been working together to help 19 wastewater treatment facilities (WWTFs) identify and implement energy efficiency measures (EEMs) through the use of Sustainable WWTF Energy Focused Environmental Management Systems (EF-EMS).



The EF-EMS is based on the well established ISO 14001 Environmental Management System “Plan-Do-Check-Act” approach and is recognized as consisting of practices, procedures, policies, and technologies that continuously support and sustain WWTF operations into the future. Participating facilities share information on efficient energy management practices, measuring their current energy use, and identifying potential renewable energy use opportunities.

A first step in the planning stage is conducting energy use assessments... These “Scoping Studies” consist of collecting information on baseline energy use and operational performance, and conducting on-site visits by an energy management professional.

A first step in the EF-EMS planning stage is conducting energy use assessments at each WWTF. These “Scoping Studies” consist of collecting information on baseline energy use and operational performance, and conducting on-site visits by an energy management professional. The data from the assessment is analyzed using EPA’s Portfolio Manager and summarized in a final report for the facility.

These Scoping Studies identify energy efficiency opportunities, ranging from light fixture replacements to blower upgrades that can be funded through National Grid’s Energy Efficiency Incentives Program. As of March 2011, 18 WWTFs received an initial Scoping Study funded by National Grid. In addition, NBC’s P2 Engineer conducted renewable energy use assessments for wind energy, biogas production, and hydro-electric energy opportunities.

Pollution Prevention News!

NEWMOA’s Pollution Prevention Resource Exchange (P2Rx™) Center collects and publishes online assistance and P2-related news items. P2News is frequently updated – so check in regularly.

www.newmoa.org/prevention/p2news/



These opportunities are classified as either “Prescriptive” or “Custom.” Prescriptive EEMs can directly apply for National Grid Energy Efficiency Incentives while Custom EEMs require additional data in the form of an Energy Efficiency Technical Assessment (EETA) to quantify costs and energy savings. An EETA consists of an on-site analysis, including:

- Spot power metering conducted by a licensed electrician
- A review of historic equipment power demands
- Completion of a cost benefits analysis showing proposed energy and cost savings

A typical EETA costs \$5,000 to \$15,000. National Grid has agreed to pay for half of the cost of each assessment. NBC has applied for American Reinvestment and Recovery Act (ARRA) funding to cover the remaining costs.

At the completion of the EETA, each WWTF will receive an Assessment Report that summarizes the upgrades studied and includes installation costs, as well as the costs to measure energy savings in kilowatt hours or therms, along with detailed engineering calculations, assumptions, and formulas. NBC will develop a Final Report detailing all technical findings, energy savings, and cost analyses and will present them at an EF-EMS Roundtable meeting.

For more information, contact: James McCaughey, NBC (401) 461-8848 ext 352.



Vermont Department of Environmental Conservation (VT DEC)

Awards for Environmental Excellence

The 18th annual Governor’s Awards for Environmental Excellence will be held in June 2011 at the State House in Montpelier.

New Golf Course Certification Program

VT DEC has launched Vermont Green Links, a green certification program for golf courses under the Vermont

Business Environmental Partnership (VBEP). In March, the Vermont Golf Course Superintendent’s Association sponsored an environmental conference that described the program.



Promoting Clean Marinas

VT DEC participated in a workshop sponsored by the Lake Champlain Basin Program and the Vermont Boat and Marine Association to educate marina owners on water quality issues in Lake Champlain. VT DEC provided an overview of state and federal environmental laws and rules and promoted the Vermont Clean Marinas program.

Hospitality Workshops

VT DEC and the VT Small Business Development Center will co-sponsor three green hospitality seminars with Boston Green Tourism in April. The seminars will address energy conservation strategies and technologies, environmentally preferable purchasing, water efficiency, and green meetings/weddings.

E3 for Manufacturers

VT DEC is involved with the Vermont Manufacturing Extension Center and Efficiency Vermont in an Economy, Energy, and the Environment (E3) pilot project to coordinate technical assistance at manufacturing facilities.

Product Stewardship Initiatives

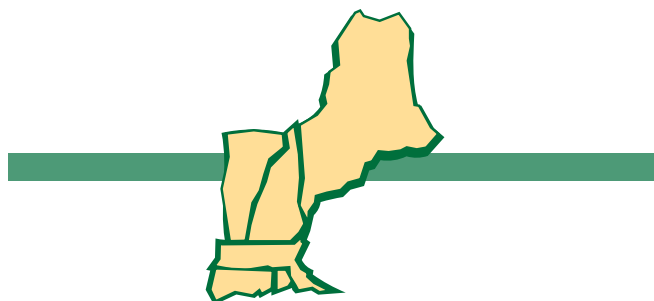
VT DEC is implementing an electronic waste law that requires manufacturers to fund a free collection program, effective July 1, 2011. Vermont households, charities,

VT DEC is implementing an electronic waste law that requires manufacturers to fund a free collection program, effective July 1, 2011. Vermont households, charities, school districts, and small businesses will be able to bring their computers, monitors, printers, and televisions to collection sites at no charge.

school districts, and small businesses will be able to bring their computers, monitors, printers, and televisions to collection sites at no charge. The Agency has adopted a State Standard Electronic Waste Recycling Plan for the program and also a Procedure for the Sound Management of Electronic Waste for Collectors, Transporters, and Recycling Facilities as mandated by the law.

Extended producer responsibility legislation for spent fluorescent lamps is under consideration in the Legislature. The bill has passed in the Senate and will be taken up by the House in April. The current bill requires mercury lamp manufacturers to establish collection and recycling programs at municipal and retail locations for fluorescent lamps, including compact fluorescent lamps, linear lamps, and U-tubes. The program would be available to households, small businesses, and institutions that generate small quantities of spent lamps.

For more information, contact: Gary Gulka, VT DEC (802) 241-3626; gary.gulka@state.vt.us.



EPA REGION 1 – NEW ENGLAND

Asset Management for Water Treatment Facilities

EPA Region 1's Assistance and Pollution Prevention Office and Office of Ecosystem Protection are supporting programs to promote asset management for water and wastewater facilities in New England. A New England Water Environment Association (NEWEA) conference is being co-sponsored by EPA-New England on April 26th, followed by EPA internal training on asset management for staff in the water programs.

For more information, contact: Jack Healey, EPA Region 1 (617) 918-1816 or Gina Snyder, EPA Region 1 (617) 918-1837; visit: water.epa.gov/type/watersheds/wastewater/index.cfm and www.newea.org/Events/SeminarsEvents/AssetManagementSeminar/tabid/434/Default.aspx.

Energy Management for Water Treatment Facilities

EPA Region 1's Assistance and Pollution Prevention Office and Office of Ecosystem Protection are supporting programs to promote energy efficiency and renewable energy generation at wastewater and water treatment facilities (WWTF) in several states in New England using a guidebook developed by the Office of Water and Region 1.

An EPA state innovation grant supports training and energy efficiency assessments at all 19 wastewater treatment plants in RI (see page 20 for more information). EPA has expanded its program to provide energy management training for leaders in energy efficiency for WWTFs in MA. Finally, EPA's program for WWTFs facilities in ME has scheduled roundtable training sessions for the spring and fall.

For more information, visit: www.epa.gov/owm/waterinfrastructure/pdfs/guidebook_si_energymangement.pdf.

For Rhode Island & Maine, contact: Gina Snyder, EPA Region 1 (617) 918-1837; visit www.epa.gov/osem/stategrants/rhodeisland2008.htm.

For Massachusetts, contact: Jason Turgeon, EPA Region 1 (617) 918-1637; visit: www.mass.gov/dep/water/priorities/brpere.htm.

Stormwater Outreach & Education

EPA Region 1's Assistance and Pollution Prevention Office provides assistance on stormwater management. The Region is developing a stormwater public outreach campaign that will raise awareness and support local efforts to educate the public about how to control it. In addition, the Office is working with partners to provide trainings to landscapers, municipal officials, and community groups on how to install rain gardens.



For more information on the stormwater public outreach campaign, contact: Cindy Brown, EPA Region 1 (617) 918-1743.

For more information on the rain garden training, contact: Myra Schwartz, EPA Region 1 (617) 918-1696.



EPA REGION 2

Promoting Green Hospitality in Puerto Rico

EPA Region 2, the Puerto Rico Tourism Company, the Puerto Rico Solid Waste Authority, the Puerto Rico Energy Affairs Administration, the Puerto Rico Department of Economic Development and Commerce, and the Economic Development Bank for Puerto Rico conducted training for hoteliers in Vieques, Culebra, and San Juan in March 2011. The trainings highlighted programs to better manage energy, water, and solid waste. In addition to discussing where to purchase environmentally preferable products (EPP), EPA provided a tutorial on Energy Star's Portfolio Manager. The training also included a discussion of the availability of loans and an overview of the green hotel certification effort in Puerto Rico.

For more information, contact: Joseph Bergstein, EPA Region 2 (212) 637-3890, bergstein.joseph@epa.gov; visit: www.epa.gov/region2/p2/hospitality/index.html.

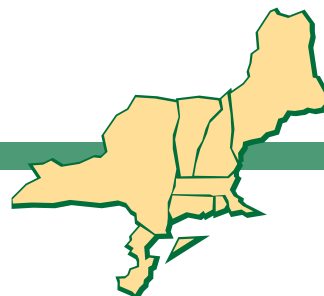
E3 Initiatives

The Economy, Energy, and the Environment (E3) Initiative is a coordinated federal and local technical assistance initiative to help manufacturers focus on sustainability. The program provides technical assessments of production processes and targets opportunities to maximize energy efficiency, reduce wastes, reduce carbon emissions, promote sustainable manufacturing practices, and reduce costs.

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The E3 Initiative became official with the September 2010 signing of a memorandum of understanding among its federal agency sponsors: EPA, the Department of Commerce, the Department of Energy, the Department of Labor, and the Small Business Administration. In February 2011, the E3 partners invited other federal, state, and local stakeholders to a kick-off meeting in Buffalo, NY. The Town of Tonawanda committed to E3 and is working on a pilot project. EPA and its federal partners expect to have a charter and further commitment from the local stakeholders in the near future.

For more information, contact: Charles Harewood, EPA Region 2 (212) 637-3753, harewood.charles@epa.gov; visit: www.epa.gov/greensuppliers/E3MOU.pdf.



NORTHEAST ASSISTANCE & P2 ROUNDTABLE

State & Local Governments Form Interstate Chemicals Clearinghouse

In January 2011, under the auspices of NEWMOA, environmental officials from 10 state, local, and tribal governments announced the formation of the Interstate Chemicals Clearinghouse (IC²) to promote a clean environment, healthy communities, and a vital economy through the development and use of safer chemicals and products. The goals of the IC² are to:

- Avoid duplication and enhance efficiency and effectiveness of state, local, and tribal initiatives on chemicals through collaboration and coordination
- Build agency capacity to identify and promote safer chemicals and products
- Ensure that state, local, and tribal agencies, businesses, and the public have ready access to high quality and authoritative chemicals data, information, and assessment methods

INTERSTATE CHEMICALS



CLEARINGHOUSE

For more information, contact: Adam Wienert, NEWMOA (617) 367-8558 x307, awienert@newmoa.org; visit: www.newmoa.org/prevention/ic2/.

National Sustainable Lodging Network Launched

In April 2011, NEWMOA and the other P2Rx Centers launched the “National Sustainable Lodging Network,” an online social network of sustainable hospitality practitioners and information clearinghouse to support the work of this community. The P2Rx Centers created the website to:

- Provide forums for sustainable hospitality practitioners to share information on practices and challenges
- Elevate sustainable hospitality programs and the facilities that participate in them
- Increase adoption of sustainable practices in the sector

By joining the site; participating in the virtual conversation; and sharing resources, information, and ideas, members will advance their efforts and help to advance the work overall.

For more information, contact: Andy Bray, NEWMOA (617) 367-8558 x306, abray@newmoa.org; visit: www.sustainablelodging.org.

NEWMOA Celebrates its 25th Anniversary

2011 marks the 25th Anniversary of NEWMOA. To celebrate this achievement, the NEWMOA Board of Directors is hosting a reception and dinner on September 22, 2011 at the Sheraton Harborside Hotel in Portsmouth, NH.

For more information, contact: Lois Makina, NEWMOA (617) 367-8558, lmakina@newmoa.org; visit: www.newmoa.org/cwm/newmoais25/.

**POLLUTION
PREVENTION**

P2R

**RESOURCE
EXCHANGE**

The Northeast A & P2 Roundtable is a member of the Pollution Prevention Resource Exchange, P2Rx™, a national network of regional P2 information centers linked together to facilitate information retrieval from experts around the country.

For more information, visit:
www.newmoa.org/prevention or www.P2Rx.org.

NEWMOA Announces New Executive Director

The NEWMOA Board of Directors recently appointed Terri Goldberg as NEWMOA's new Executive Director. The hiring process was competitive. The Board decided that Terri's experience, dedication, and vision for NEWMOA's future made her an excellent choice.

Carbon Footprint Assessment Webinars

NEWMOA, in partnership with the Northwest Pollution Prevention Resource Exchange (PPRC) is hosting a three-part webinar series for P2 and sustainability providers focused on conducting carbon footprint assessments. The webinar series will cover the basics of greenhouse gas (GHG) accounting for annual inventories and reduction projects, why and how businesses and institutions are going through the process, and what tools are helping them along the way.

- Session 1: “Carbon Footprint Assessments - What & Why,” will cover the basics of conducting a GHG inventory or carbon footprint analysis. The session will provide key concepts and resources to support the business case for climate action and the importance of good analysis as a springboard for climate action.
- Session 2: “Carbon Footprints Step-by-Step,” will introduce participants to the protocols and standards used for conducting a greenhouse gas emissions inventory. It will cover the process for conducting an inventory and review existing calculators, tools, various registries and their validation and reporting requirements, and available resources.
- Session 3: “Case Studies of Activities in Scope 1, 2, and 3,” will include case studies of industries and organizations that have gone through greenhouse gas inventory exercises. The session will focus on lessons learned from establishing a baseline, setting GHG reduction goals, and working toward meeting those goals.

Participants are encouraged to participate in the full series and are reminded to register for each session separately.

For more information, contact: Rachel Smith, NEWMOA (617) 367-8558 x304, rsmith@newmoa.org; visit: www.newmoa.org/prevention/webconferences/carbonfootprint/agenda.cfm.

Wet Cleaning Technology Virtual Tradeshow

NEWMOA is continuing to develop a virtual tradeshow to highlight wet cleaning equipment and technologies. The purpose of this “Wet Cleaning Technology Virtual Tradeshow” will be to enable garment cleaners and government technical assistance providers to conduct effective comparisons of available wet cleaning systems. Information in the virtual tradeshow will include: descriptions of each product or technology, including manufacturer specifications; expected environmental benefits, such as reductions in energy, water and waste; implementation and maintenance requirements; relative costs; and other applicable considerations.

For more information, contact: Rachel Smith, NEWMOA (617) 367-8558 x304, rsmith@newmoa.org.

Reducing Waste Paper & Increasing Recycling

Research conducted by NEWMOA, its member-states, and others indicates that increasing commercial paper recycling could significantly reduce greenhouse gas (GHG) emissions. These are business sectors that are not recycling to their fullest potential, including businesses that operate in strip malls and multi-tenant commercial buildings, facilities that do not often have the infrastructure for recycling. While several states have laws requiring that businesses recycle waste paper, enforcement is challenging. Together, these factors result in continued landfilling or incineration of an estimated six million tons of recyclable paper each year in the Northeast, presenting a significant waste reduction and recycling opportunity.

NEWMOA has launched a commercial waste paper recycling initiative to reduce GHG emissions tied to the manufacturer, transport, and disposal of commercial paper through use reduction and recycling by:

- Working with stakeholders to identify strategies to enhance the recovery and recycling of commercial waste paper



- Partnering with stakeholders to prioritize and implement strategies
- Encouraging the increased use of recycled paper by regional paper mills and other domestic end-users

Last year NEWMOA formed a Northeast Commercial Paper Recycling Workgroup that includes representatives from EPA Regions 1 and 2; the Northeast Recycling Council (NERC); and state recycling, solid waste, and economic development programs. This Workgroup oversaw the planning and development of a Regional Summit co-sponsored by NEWMOA, the American Forest and Paper Association (AFPA), Institute of Scrap Recycling Industries (ISRI), NERC, and EPA Regions 1 and 2. The Summer 2010 Summit involved over 50 participants representing waste haulers, paper brokers, government agencies, recycling consultants, paper recyclers, and others. Some of the themes that emerged included:

- Commercial generators need greater incentives to collect waste paper for recycling
- Generators and waste brokers need education on proper collection and recycling
- Potential sectors to target include commercial property managers, retail chains, banks, insurance agencies, law offices, and shopping malls
- State and local agencies could focus on developing a regional action plan and model programs with consistent and harmonized reporting terminology and regulatory frameworks
- Paper mills and end users need to be involved with identifying and supporting effective programs for engaging customers in collection of waste paper
- Stakeholders should work together on developing best practice guidance and setting practical numerical goals and objectives

NEWMOA's Workgroup has followed up on the results of the Summit and developed a workplan for this year that focuses on analyzing available information on the needs of end users of waste paper in the region.

For more information contact: Jennifer Griffith, NEWMOA (617) 367-8558 x303, jgriffith@newmoa.org; visit: www.newmoa.org/hazardouswaste/cwm/paper/.

NORTHEAST ASSISTANCE & P2 CALENDAR

| TITLE | SPONSOR | DATE / LOCATION | CONTACT |
|---|--|--|--|
| 2011 Northeast Water Science Forum | NEIWPC | April 27-29; Portland, ME | www.neiwpc.org/ppcpconference |
| REACH & RoHS Seminar | TURI | April 28; Lowell, MA | www.turi.org |
| Greener Nano 2011 | SNNI & GC3 | May 1-3; Cupertino, CA | www.greennano.org/GN11 |
| Advancing Green Chemistry Practices in Business | GC3 | May 4-5; Cupertino, CA | www.greenchemistryandcommerce.org/events/upcoming.php |
| Spring Continuing Education Conference | TURI | May 5; Lowell, MA | www.turi.org/content/view/full/7228 |
| Environmental Implications of Nanotechnology | CEINT at Duke University | May 9-11; Durham, NC | www.ceint.duke.edu/iceint2011 |
| DECON 2011 | BRMA | May 15-19; New Haven, CT | www.brma.org |
| North American Waste-to-Energy Conference | SWANA | May 16-19; Lancaster, PA | www.swana.org |
| 22nd Annual Non-Point Source Pollution Conference | NEIWPC | May 17-18; Saratoga Springs, NY | www.neiwpc.org/npsconference |
| International Conference on Sustainable Remediation | EPA & UMass Amherst | June 1-3; Amherst, MA | www.umass.edu/tei/conferences/SustainableRemediation |
| 30th Annual Northeast Recycling Conference Expo | NRRA | June 6-7; Manchester, NH | www.nrma.net |
| The Clean Show 2011 | ALM, CLA, DLI, TCATA, & TRSA | June 6-9; Las Vegas, NV | www.cleanshow.com/cleanshow2011 |
| National Environmental Partnership Summit | NPPR | June 7-9; Detroit, MI | www.p2.org/2011-ness |
| 15th Annual Green Chemistry & Engineering Conference | ACS GCI | June 21-23; Washington, DC | http://acswebcontent.acs.org/gcande/ |
| Beyond Green: Alternatives Assessment | Lowell Center for Sustainable Production | June 27-29; Lowell, MA | www.sustainableproduction.org |
| LEAN Logistics Summit | Lean Frontiers | June 28-29; Cincinnati, OH | www.leanlogisticssummit.com |
| International Conference on Mercury as a Global Pollutant | U.S. EPA & Environment Canada | July 24-29; Halifax, Nova Scotia, Canada | www.mercury2011.org |
| LEAN Sales & Marketing Summit | Lean Frontiers | July 26-27; Orlando, FL | www.leansalesandmarketingsummit.com |
| Biomass 2011: Renewable Power, Fuels, & Chemicals | EERC | July 26-27; Grand Forks, ND | www.undeerc.org/biomass11 |
| WasteCON 2011 | SWANA | August 23-26; Nashville, TN | http://wastecon.org |
| LEAN Accounting Summit | Lean Frontiers | September 15-16; Orlando, FL | www.leanaccountingsummit.com |
| 7th Annual PSI National Forum & 26th Annual Hazardous Materials Management Conference | PSI & NAHMMA | September 26-30; Portland, OR | www.productstewardship.us |
| Northeast Recycling Council Fall Conference | NERC | October 25-26; Northampton, MA | www.nerc.org |

For more up-to-date listings of upcoming events, visit www.newmoa.org



Northeast Waste Management
Officials' Association

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Northeast Assistance & P2 News Seeks to Reduce Paper Waste

Please send an email to lmakina@newmoa.org if you wish to continue receiving a hard-copy version of the newsletter. To save money and reduce paper use, NEWMOA is transitioning all readers to electronic delivery, unless they inform us that they prefer to receive a hard-copy

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