

Toxics Use Reduction Program Report FY2010



Prepared for:

The Governor of the Commonwealth of Massachusetts
The Commonwealth of Massachusetts House of Representatives
The Commonwealth of Massachusetts Senate

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Massachusetts Department of Environmental Protection (MassDEP)
Toxics Use Reduction Institute (TURI)

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Twenty Years of Innovation

Enacted in 1989, the Toxics Use Reduction Act (TURA) made Massachusetts the first state in the nation to adopt a comprehensive toxics use reduction and pollution prevention law. This historic compromise between industry and environmentalists represented innovation in protecting public health and the environment.



TURA 20th Anniversary Symposium

Passed unanimously by both houses of the state Legislature, TURA eschewed reliance on traditional “end-of-the pipe” pollutant standards.

The law instead required that firms in industrial categories look at their toxic chemical use. If they use large quantities of listed toxics, they must report on that use and the wastes generated. They are also required to develop toxics use reduction (TUR) plans that identify and evaluate opportunities to reduce the use of toxics and the generation of toxic byproducts (wastes).

Toxics use reduction is thought to be the best method for protecting public health and the environment from hazardous chemicals. It goes beyond limiting releases of pollutants to air, water and land by requiring the toxics user to evaluate the need to use the chemical and to identify alternatives. This method is seen as a way to decrease risks of major transportation and storage accidents, protect workers from dangerous workplace exposures and create safer products for consumer use.

Another key element of the planning process is that it leads to more efficient chemical use, thereby boosting the competitiveness of Massachusetts firms. Illustrative of this is the golf ball manufacturer which, before TURA, gave little heed to how much cleaning solvent was lost through evaporation. The new focus on efficient use of materials reduced production costs, which became more important than ever when a Japanese firm became a competitive threat.

Beyond regulating industry, TURA also created a new institutional structure to foster its goals. The Massachusetts Department of Environmental Protection (MassDEP) was charged with enforcing the law’s annual reporting and biennial planning mandates, and promoting TUR as the preferred way to bring facilities into compliance with other environmental regulations. The Office of Technical Assistance and Technology (OTA) was created to provide hands-on confidential help to toxics users. The Toxics Use Reduction Institute (TURI) was established at UMass Lowell to support research on cleaner materials and processes and to train the TUR Planners who would certify that companies covered by the law’s requirements had completed adequate TUR plans.

This newly-created environmental profession – the Toxics Use Reduction Planner-- is certified by MassDEP, and certified planners act as third-party reviewers of the TURA plans and plan updates. They have successfully carried the TUR approach into hundreds of Massachusetts facilities, including those that are not required to complete TUR plans.

In the 15-year period from 1990 to 2005, considerable progress was achieved. After adjusting for an increase in production, the Core Group (the industry categories and chemicals subject to reporting in each of those years) reduced:

- toxic chemical use by 40 percent
- toxic byproducts by 71 percent
- toxics shipped in product by 41 percent
- on-site releases of toxics to the environment by 91 percent
- transfers of toxics off-site for further waste management by 60 percent

This means that a comparable amount of industrial production is now achieved with substantial reductions in risk to workers, consumers, public health and the environment.

With much accomplished, the law was amended in 2006 to move the program forward. First, the amendments streamlined the reporting and planning requirements. They provided options aimed mainly at firms that had already gone far with TUR planning. Under certain circumstances, these firms may elect to develop a resource conservation plan for energy, water or materials, or they can implement an environmental management system.

The amendments also gave new authority for the program to focus on substances of higher concern. The TURA Administrative Council, the six-member governing body, was given the power to categorize chemicals as Higher Hazard or Lower Hazard Substances. The reporting threshold for Higher Hazard Substances was reduced, and the per-chemical fee for those designated as Lower Hazard Substances was eliminated.

On November 4, 2009, more than 200 people participated in a 20th Anniversary TURA Symposium¹, celebrating the accomplishments of twenty years of TURA work. The conference was a day of looking back as well as forward, with more than a dozen sessions on science, pollution prevention, policy matters, and community and environmental health.

The take-home message from the symposium was that TURA has worked. Describing the experiences of industry under TURA, companies noted millions of pounds of

¹ The Symposium was made possible in part by a cooperative agreement award to TURI from the National Institute for Occupational Safety and Health (NIOSH) at the US Centers for Disease Control and Prevention.

reductions in toxic chemicals used as well as documented reductions in air emissions, water and energy use while saving millions of dollars each year. Representatives of Philips Lightolier of Fall River, Allegro Microsystems of Worcester, AlphaGary of Leominster, Vicor of Andover and Skyworks of Woburn were among the 45 speakers at this event (see Symposium agenda in the appendix. Links to the presentations are available at www.turi.org – click on “Facility Leaders Tour - Spring 2010” for information about each visit.

The symposium provided opportunities to learn and build connections, and to recognize leaders in toxics use reduction. A short video was created as an outreach tool for companies and the TURA program. Also, a special edition of the international, peer-reviewed *Journal of Cleaner Production*, published in February of 2011, features many of the papers presented at the Symposium.

After the symposium, with the assistance of OTA and MassDEP, TURI organized a “TURA 20th Anniversary Leaders’ Tour,” a series of events to honor “TURA leaders” - companies that had done an exemplary job of searching for and finding opportunities to reduce toxics, energy and water use, and waste. For example, Gentex Optics, which produces corrective lenses, reduced solvent use by 87 percent, cut water use by 4.5 million gallons per year, and decreased energy use by about 2 million kWh per year. The



TURA 20th Anniversary Leaders Tour

following companies were honored, in most cases during a site visit at the facility:

- [Allegro Microsystems, Worcester](#)
- [Analog Devices, Wilmington](#)
- [A.W. Chesterton, Groveland](#)
- [Cape Cod Cooperative Extension, Barnstable County](#)
- Churchill Coatings, Grafton
- [Cobham, Lowell](#)
- [Ferraz Shawmut, Newburyport](#)
- [Gentex Optics, Woburn](#)
- [L&J Manufacturing, Worcester](#)
- Lightolier, Fall River

- [MD Stetson, Randolph](#)
- [Millipore, Bedford](#)
- [Moreno Auto Body, Roxbury, and the Boston Public Health Commission](#)
- [PerkinElmer, Salem](#)
- [Raytheon, Waltham and Andover](#)
- Skyworks, Woburn
- Vicor Corporation, Andover

The attached brochure describes the environmental accomplishments of these firms. These are just a few examples of the success stories of TURA. Over the years, the program has produced numerous case studies, conference presentations, and demonstration sites illustrating how companies have managed chemicals and other resources efficiently. These innovations have added to the company bottom line by fostering the development of new products and viable processes, with reduced health, safety and environmental risks.

Today, as 20 years ago, the Massachusetts TUR program remains an award-winning national leader in pollution prevention and toxics regulation and innovation, continuing to compile demonstrable reductions in toxic chemical use and waste, while expanding its services to include energy and water conservation.

The Administrative Council

During this past year, the program continued work related to Higher and Lower Hazard Substances, developing guidelines for such designations that are also useful for shaping program priorities. The Council followed the designations of perchloroethylene (PERC) and trichloroethylene (TCE) as Higher Hazard Substances (HHS) with a listing of n-propyl bromide (nPB) as a toxic substance, reinforcing a practice of anticipating what the regulated community may turn to as a consequence of HHS designations. The Council also began consideration of additional HHS listings, beginning with formaldehyde. The Council deepened interagency collaboration on toxics, with a focus on persistent, bioaccumulative toxins (PBTs), including uses by entities not currently covered by TURA.



TUR Administrative Council

The TUR Advisory Committee

The Council is advised by a multi-stakeholder Advisory Committee, which reviews and is actively engaged in all the issues brought before the Council, and which provides focused input on program and policy development and other aspects of TURA program operations. In 2010, the Committee reviewed and provided input prior to presentation to the Council on the listing of the chemical nPB, priority user segments, additional candidate chemicals for Higher Hazard Substance designation, the TURA decision-making process document, and several other recommendations concerning chemicals. Members reiterated support for a focus on worker protection, specifically noting the importance of incorporating the evaluation of irritants, sensitizers and asthmagens in any prioritization or listing decision. Advisory Committee members evaluated a proposal, developed by program staff, to restructure the TURA fees to make them more equitable to all companies required to file under TURA. Recommendations from the Committee included reducing impacts on small businesses, and placing a greater emphasis on the quantity of chemical used and the inherent hazards of the chemical, rather than only on the number of employees at a facility.



TUR Advisory Committee

Committee members strongly articulated the value of program services to firms and TUR planners, and the need for stable funding. They advised the reinstatement of the dedicated fund for TURA fees. In the FY11 budget, Governor Patrick responded by recommending a “retained revenue” approach to funding TURA program offices, which was authorized by the General Court. Under this approach, all TURA fee revenues are placed in a MassDEP account and are used to fund the three TURA implementing agencies.

Interagency Coordination

According to the TURA statute, the Administrative Council is to “promote increased coordination of efforts to enforce (toxics) laws and regulations and also determine how state programs should be coordinated to promote most effectively toxics use reduction in the Commonwealth.” Council representatives shared information on the toxics-related activities of each member agency, in an effort to promote increased coordination. Recent updates from Council members include:

- MassDEP’s conference on pharmaceutical and personal care product discharges and impacts on waters of the Commonwealth;
- MassDEP’s regulatory and grant activities, including implementation of the Mercury Management Act, updating ambient air limits for toxics, updating

asbestos regulations, and supporting household hazardous waste collection programs;

- MassDEP's participation in the Interstate Chemicals Clearinghouse;
- Interagency workgroup on nanotechnology (which includes OTA, TURI, Division of Occupational Safety, and Department of Public Health) and the Division of Occupational Safety's (DOS) new nanotechnology webpage;
- Department of Public Health's (DPH) publication of an advisory on bisphenol-A in children's food containers and outreach to certain cultural groups engaged in the ritualistic use of mercury and other hazardous materials;
- DPH regulatory activities, including implementation of its regulations on the use of lead and cadmium in children's products and the new ban of cleaning products that contain trace amounts of phosphates;
- Department of Fire Services' draft regulations on hazardous material processing safety;
- DOS focus on hexafluorosilicic acid.

The Decision-Making Process

At the Council's request, TURI prepared a policy background and guidance document on decision-making in the TURA program. The objective was to provide background information for existing and new members of the Council and advisory groups, and to ensure transparency and consistency in decision-making. The document focuses on three key areas of decision-making: adding substances to, or removing substances from, the TURA list of toxic or hazardous substances; designating Higher and Lower Hazard Substances within the larger TURA list of reportable substances; and prioritization of program focus areas and activities. During FY10, TURI facilitated extensive engagement with members of the Science Advisory Board, the Advisory Committee, the Administrative Council, and program staff to ensure that the document was useful and reflective of actual decision making processes. The document will be updated and appended as needed in future years.

Review of Asthmagens

Presentations to the Council and its Advisory Committee by researchers from the Lowell Center for Sustainable Production drew attention to the fact that nearly "150,000 children and 500,000 adults currently have asthma in Massachusetts," and that many chemicals, some TURA-reportable, are contributing either to the onset or the exacerbation of the disease.² This research was sponsored by TURI as part of the

² *Asthma-Related Chemicals in Massachusetts: an Analysis of Toxics Use Reduction Data*, Jacobs & Hoppin, 7/09. TURI Methods and Policy Report No. 25. Of the 335 substances known or suspected of causing or exacerbating asthma based on evidence from a variety of sources examined in the report, 41 have been reported in TURA

Department of Public Health's *Strategic Plan for Asthma in Massachusetts (2009 – 2014)*. As a result of this research, the Council and the program agencies have initiated the following actions:

- The Science Advisory Board has expressly included asthmagens as an end-point in data collection and evaluation of chemical hazards.
- The Council supported increased participation in the objectives of DPH's state-wide asthma action plan, including supporting the OTA's recommendation to focus its annual research on barriers to TUR implementation on asthmagens in the workplace.

The Science Advisory Board

TURA created a Science Advisory Board (SAB) to work with the Institute and provide input on the health and environmental effects of toxic chemicals. The scientists on the SAB make recommendations concerning chemical list additions and deletions and HHS and LHS designation, based solely on the scientific evidence available for the substance at issue. TURI then adds a policy analysis to the SAB scientific analysis and forwards a recommendation to the Advisory Committee and the Administrative Council.

In 2010, the SAB reviewed alternatives to the Higher Hazard Substances TCE and PERC in order to guide users in making less toxic replacements. As a result of this review, the SAB recommended the listing of nPB (also known as 1-bromopropane) and 2-bromopropane. The SAB also reviewed the chromium compounds category and recommended separating hexavalent chromium compounds from non-hexavalent chromium compounds. They then recommended that hexavalent chromium compounds category be designated as a Higher Hazard Substance. Finally, the SAB recommended formaldehyde as a Higher Hazard Substance. They expect to continue their review of formaldehyde in 2011, pending a National Academy of Sciences review of the chemical.

Revenues and Appropriations

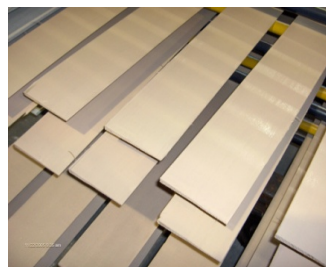
Reporting year 2008 toxics use fees collected (in FY10) totaled \$3,475,305.35. The FY10 final budget appropriated \$688,204 for OTA, \$831,182 for DEP and rolled up the appropriation for TURI into the University of Massachusetts line item with no earmark amount. UMass subsequently arranged for TURI to receive \$1,342,534 in MA Department of Education stimulus funds to fund its operations.

filings. Fifteen have been characterized as "more hazardous" by the Science Advisory Board. For 100 additional chemicals identified as capable of causing and/or exacerbating asthma, there is no reporting requirement under TURA.

TURA Program Activities

Focus on Alternatives

The program increased efforts to anticipate and avoid shifts to hazardous chemicals that are not currently listed under TURA but pose significant hazards. After designation of TCE (2007) and PERC (2008) as Higher Hazard Substances, it was anticipated that many companies would consider nPB as a suitable “drop-in” substitute to the two chemicals used in cleaning operations. However, nPB has come under increasing scrutiny because its use presents hazards to workers and the environment³. As noted above, the SAB conducted a hazard review of nPB and recommended listing the chemical based on its hazard, and TURI prepared a policy analysis, also recommending listing⁴. With concurrence from the program agencies and the Advisory Committee, the Administrative Council voted to add nPB to the TURA list of covered chemicals.



Alternative, Less Toxic Wood Coating On Cedar Siding

The program has committed to providing accurate and timely information on alternatives to firms, particularly for HHS, to avoid the unintended consequences of toxics users shifting to newer, less well studied and regulated chemicals. This information will assist facilities as they prepare their TUR plans and evaluate options. TURI is working with the SAB to review other classes of solvents that are viable substitutes for TCE and PERC and not currently on the TURA list.

Outreach and Assistance on Perchloroethylene and Trichloroethylene



Wet Cleaning Machine

As a result of the designation of PERC as an HHS, the program has provided extensive outreach and assistance to dry cleaners. All three TURA offices cooperated to provide three training sessions in TURA filing and to prompt awareness of alternatives. Guidance was issued to assist first-time filers in estimating their chemical use for reporting under TURA. TURI provided grants for dry cleaners to convert to “dedicated wet cleaning,” and opportunities for other cleaners to see that equipment demonstrated.

³ For example, In July of 2003, the Hazard Evaluation System & Information Service (HESIS), of the California Department of Health Services issued a Health Hazard Alert for nPB recommending that workplace exposure be limited to about 1 ppm in order to protect against reproductive and nerve toxicity.

⁴ The nPB Policy Analysis is available at: <http://www.turi.org/content/view/full/6648>.

Dedicated wet cleaning avoids the use of PERC and also hazardous alternatives such as hydrocarbon-based cleaners (see TURI's section below for details).

The program performed extensive outreach to ensure that dry cleaners were aware of the regulatory requirements. This included visits by OTA staff to over 200 garment cleaning outlets to determine whether PERC was being used and to offer assistance in looking at alternatives.

The program also provided extensive outreach, technical assistance and ongoing laboratory testing services to industrial facilities on alternatives to TCE, a still widely-used solvent.

Priority Users of Higher Hazard Substances (PrUS)

Beginning in 2009 and continuing through 2010, OTA, TURI and MassDEP reviewed the use of Higher Hazard Substances by facilities not currently covered under TURA. The driver for this review was the 2006 TURA amendments that set a four-year window, from the time of designation, for consideration of priority user segments (PrUS) designation for companies using HHS. While the designation of a substance as Higher Hazard lowers the threshold for TURA from 10,000 pounds per year to 1,000 pounds, the designation of a Priority User Segment removes the ten-employee threshold for coverage under TURA. OTA is directed under the TURA statute to provide the Administrative Council with recommendations concerning PrUS designations. With assistance from TURI, MassDEP, the Advisory Committee, and officials from member agencies of the Administrative Council, OTA completed an analysis of whether PrUS designation is appropriate for lead or mercury – both designated as HHSs in October, 2006. Dioxin, a waste-byproduct of combustion and several other persistent, bioaccumulative, toxins (PBTs) were also examined. During the review, it became clear that either these substances are not expected to be used in the operations of very small companies in TURA-covered sectors, or that TURA is not the appropriate mechanism to address potential issues regarding these substances. OTA found that the authority to take comparable action already exists under air and hazardous waste law for some uses. For example, dioxin from waste incinerators is likely to be more efficiently addressed through existing programs for such facilities at MassDEP.⁵

OTA did not find a compelling case for PrUS designation for the purpose of extending TURA's reach to very small companies for these examined toxics. However, the office did find uses that could pose threats to public health and the environment from uses that are not covered by TURA. For example, PBTs are:

- contained in products not manufactured in Massachusetts, and

⁵ See *Progress Report: OTA's Research on Priority User Segment Designations*, 2/9/10.

- used in sectors excluded from TURA coverage, such as hospitals, schools, municipalities, and operations and services such as shooting ranges and bridge repair.

Members of agencies of the Administrative Council have various authority and resources that might be applied to reduce risks from PBT toxics use currently not covered by TURA. With support from the TURA Advisory Committee, OTA recommended that the Administrative Council's agencies work in concert to address PBT use in facilities and operations not covered by TURA.

Resource Conservation Planning (RC)

The original concept of TURA was that companies would learn to use the least amount of toxics necessary, and that continuing to do TURA plans every two years would ensure that they would continue the effort over time. A continuing requirement to do TUR planning would ensure that increases in toxics use would not occur as a result of changes in management, or erosion of commitment due to changes in focus, and that new technologies would be considered as they are developed. The 2006 Amendments to TURA recognized that some companies that have already made great progress on reducing toxics use can put their scarce resources to better use to reduce ordinary waste, polluting energy sources, water use, or reduce the use of toxics that are not reported under TURA. In 2010, 11 facilities applied their skills and methods for TUR planning to conduct RC planning, and 25 facilities submitted 31 progress reports on RC planning they had previously conducted. Thirteen progress reports concerned efforts to reduce energy use - eight on efforts to conserve water, three on reducing solid waste, three on reducing chemical uses not regulated under TURA, and four on reducing chemicals used in amounts under the threshold for coverage under TURA.



TUR in Environmental Management Systems (TURA/EMS)

The TURA amendments also allowed companies to incorporate their TUR planning activities into an existing EMS. Thirteen companies have chosen this option, which integrates TUR planning with other environmental management activities and is considered to be an efficient management approach.

Facilities reported reducing:

- **1.4 million pounds of solid waste**
- **53,000 pounds of non-reportable toxic chemicals**
- **88 million gallons of water**
- **8.3 million kilowatt hours per year.**

In all categories, actual reductions exceeded company projections.

Environmentally Preferable Products (EPPs)

In October 2009 Governor Patrick issued Executive Order (EO) 515, requiring state agencies to reduce their impact on the environment and enhance public health by procuring EPPs and services whenever such products and services perform to satisfactory standards and represent best value. The Massachusetts EPP program began as an OTA project in 1994 and has become institutionalized by the Administration and Finance Operational Services Division (OSD, the purchasing agency of the Commonwealth). In 2010, OTA organized an interagency toxics reduction committee to advise OSD, and worked to inform agencies of the EO requirements and to develop a base line for measuring progress. The EPP EO is a significant opportunity to reduce toxics in products and for the Commonwealth to lead by example. The Advisory Committee has encouraged the program to leverage state investment in EPP by looking for ways to facilitate the use of EPP tools by municipalities and private firms.

The TURA Model of Government Action to Promote Sustainable Manufacturing

In 2010, the program performed its work within a context of sharply increased attention to toxics on the national and international level. The US Environmental Protection Agency (EPA) announced its intention to revamp the nation's approach to toxics by reforming the Toxic Substances Control Act (TSCA) and issued Action Plans for Chemicals of Concern. Additionally, several states passed restrictions on specific chemicals; the Green Chemistry and Environmental Supply Chain movements garnered increased interest; and restrictions on chemical use or requirements for transparency came into force in Europe, China, and other countries.⁶ The TURA program was

⁶ For a summary of state chemicals legislation and policy, see the Lowell Center for Sustainable Production report, *State Leadership in Formulating and Reforming Chemicals Policy*, 2009, <http://www.chemicalspolicy.org/downloads/StateLeadership.pdf>.

frequently cited as an instructive example⁷, and companies covered by TURA are finding themselves in an advantageous position relative to companies that have not already focused on toxic constituents in their products.

As activity around toxics increases, program agency staff share their expertise and also benefit from collaboration with various networks, projects and agencies. Massachusetts TURA program members participated in the Green Chemistry and Commerce Council (GC3), a project of the Lowell Center for Sustainable Production at the University of Massachusetts Lowell. The Council includes several large companies dedicated to transforming their products and practices to be more environmentally sustainable through safer chemical use.



High-Speed Digital Printing

TURA staff also participated in multi-state discussions of chemical policy through the National Pollution Prevention Roundtable (NPPR), and through discussions hosted by the Northeast Waste Management Officials Association and the Lowell Center. TURI worked with California, Connecticut, Illinois, Maine, Michigan, Minnesota, New York, Oregon, and Washington to create a “States Alternatives Assessment Wiki,” building a shared understanding of what constitutes an evaluation of potentially safer alternatives to a chemical of concern. TURA staff contributed significantly to the development and submission of comments by NPPR on EPA’s proposed changes to the Toxic Substances Control Act Inventory Update rule. OTA staff contributed to the formation of a new Underwriters Laboratory standard for a sustainable organization. TURA’s experience with fostering process, input, policy and organizational changes to efficiently reduce environmental footprint was a key factor in effective participation in these efforts. OTA and TURI included information on international and national toxics regulations in its education of companies engaged in international trade, and assisted companies in meeting the growing demand for green products.

⁷ See, for example, the *Story of Stuff*, a 2010 book based on the popular internet film by Annie Leonard, (p. 218); Clean Production Action, http://www.cleanproduction.org/library/Factsheet3_ToxicsUseReduction.pdf; the National Conversation on Public Health and Chemical Exposures, Meeting 5 Summary, May 20, 2010, <http://www.atsdr.cdc.gov/nationalconversation/docs/PPWG%20Summary%20of%20meeting%20five.pdf>; UC Berkeley’s Health Research for Action, <http://healthresearchforaction.org/perspectives/preventing-toxic-exposures.pdf>.

In 2010, OTA and TURI began working with the New England region of the Environmental Protection Agency on developing programs to promote green chemistry, (the approach of designing safer chemicals and chemical uses from the start). The New England EPA requested TURA participation because of the program's knowledge of how chemicals are used and its history of working with companies to change their strategic focus. TURI is also participating in the national US EPA's Design for the Environment program, examining alternatives to bisphenol A (BPA) in paper manufacture applications, while OTA is assisting companies actively researching the characteristics of available alternatives to BPA.

Program Office Updates

Department of Environmental Protection (MassDEP)

MassDEP administers the regulatory components of the TURA program. Under the statute, large quantity toxics users are required to submit an annual report to the Department on each chemical listed in TURA. These facilities must also develop a TUR plan or plan update every other year. The plans must be certified by a TUR Planner.

The TUR reports are submitted in July but cover chemical usage for the previous calendar year. MassDEP conducts a data quality assurance process to make sure the report information is as accurate as possible. The Department then analyzes the data and works with OTA and TURI to issue an annual TUR information release.

TUR Information Release

The most recent data available at this writing is the 2008 Toxics Use Reduction Information Release, covering chemical usage from calendar year 2008, based on reports submitted in July, 2009⁸. The Department received 1,677 chemical use reports from 530 large-quantity toxics users, on 147 individual chemicals.

The companies reported that they used 778 million pounds of toxic chemicals in 2008 (excluding trade secret data). The "2000 Core Group" - industry categories and chemicals subject to reporting in both 2000 and 2008 - used 632 million pounds, or 81 percent of the toxic chemicals reported used⁹. Adjusting the data to account for a 21 percent decrease in production from 2000 to 2008, over that eight-year period the 2000 Core Group facilities reduced:

- toxic chemical use by 20 percent,

⁸ The report is available at: <http://www.mass.gov/dep/toxics/priorities/08relfin.pdf>.

⁹ Identifying a consistent Core Group enables the tracking of trends in chemical use.

- toxic byproducts by 33 percent,
- toxics shipped in product by 19 percent,
- on-site releases of toxics to the environment by 52 percent, and
- transfers of toxics off-site for further waste management by 39 percent.

TURA Revenues

TURA-regulated facilities must pay an annual fee with the submission of the TUR report. For state fiscal year 2010 (July 1, 2009 – June 30, 2010), MassDEP collected \$3,475,305.35 in annual fees, and \$22,663.27 in late fees from firms that failed to file reports on time. In addition, MassDEP collected \$39,525.00 fees from TUR planners that applied for the Department's certification.

TURA Planner Certifications

In FY10, MassDEP certified 18 new Toxics Use Reduction Planners and recertified 137 planners whose two-year certification was due to expire. The Department also certified 16 planners as eligible to sign Resource Conservation Plans (RCPs) and 14 planners as eligible to sign Environment Management Systems (EMS's). Companies that have prepared a TUR plan and performed two plan updates can elect to do an RCP every other planning cycle, or incorporate TUR planning into an existing EMS.

Data System Upgrade

TURA filers must file with MassDEP both a Form S, detailing chemical use within a facility, and a Form R, detailing releases and transfers



of chemicals from a facility. The Form R is required by the federal Emergency Planning and Community Right to Know Act. Since the inception of the program, large quantity toxics users have had to file form Rs with both the state and US EPA. Under a grant from EPA, the department worked with a contractor and that agency to eliminate this duplicate reporting for most toxic users. This effort involved creating a number of "screens" so that Form R data the state does not want would not flow through. After debugging the system, MassDEP is able to receive Form R data electronically from EPA's computer system.

In addition to streamlining reporting for the filers, this system upgrade provides a new compliance tool. It allows MassDEP to more easily identify firms that should have filed under TURA but failed to do so. The system produced a report that the department will use to conduct potential enforcement on four to six facilities for apparent failure to file a Form S.

Dry Cleaner Project

During 2010, MassDEP initiated a special compliance effort in response to the Administrative Council's designation of PERC as a Higher Hazard Substance with a lower reporting threshold of 1,000 pounds.

PERC is commonly used in dry cleaning, so any cleaners with ten or more full-time employee equivalents using 1,000 or more pounds of it were required to report for 2009. All three agencies provided outreach, training and guidance to the dry cleaners, many of which would be filing for the first time in 2010.



Wet Cleaning Machine

Once the reporting deadline passed, MassDEP set out to identify dry cleaners that probably should have filed for PERC but did not. The department turned to the data in its Environmental Results Program (ERP). Dry cleaning is one of three business sectors subject to ERP, a unique environmental performance initiative which MassDEP uses to ensure compliance from smaller businesses.

Under ERP a company annually certifies that it is and will continue to be in compliance with all applicable state air, water and hazardous waste performance standards. The dry cleaner certification contains information on the number of full-time employee equivalents and the amount of PERC used at the facility.

Using that information, MassDEP identified 20 dry cleaners who appear to have met the employee and chemical use thresholds but failed to file under TURA for reporting year 2009. MassDEP will confirm TURA's applicability and compliance efforts will be undertaken toward these cleaners for failure to file under TURA.

Compliance and Enforcement Activities

MassDEP's Boston office conducted 11 enforcement actions for missing or incomplete TUR reports (ten notices of non compliance and one administrative consent order with penalty). The regional offices conducted 73 inspections for TURA compliance. The inspections resulted in six enforcement actions: two lower level actions (notices of non-compliance) and four administrative consent orders with penalties.

The inspections were a mix of TURA-only review for reporting and planning, and multi-media review. The multi-media inspections use a whole-facility approach to check for compliance with regulations for air, industrial wastewater, hazardous waste, and toxics use reduction.

Inter-Agency Coordination

In addition to its regulatory responsibilities, MassDEP participated in the inter-agency efforts of its TURA partners. The agency assisted with the TURI planner certification

course and administered the planner certification exam. MassDEP staff helped develop guidance documents and participated in the selection process for TURI's community grants.

Toxics Use Reduction Institute

TURI, located at the University of Massachusetts Lowell (UML), provides research, training, technical support, laboratory services and grant programs to reduce the use of toxic chemicals while enhancing the economic competitiveness of local businesses. TURI also manages the SAB and conducts policy analyses that form the basis of TURA program decision-making on chemical listing, de-listing, and categorization, ensuring the development of sound policies with a strong grounding in science. Additionally, TURI collaborates with diverse groups such as communities, businesses, institutions, government, and public entities to develop innovative ideas and share best practices. Some FY 2010 highlights are summarized below.

Public Events

In order to highlight the contributions of the companies who have led the successful efforts to reduce the use of toxic chemicals, the TURA partners conducted a "TURA 20th Anniversary Leaders' Tour" in the spring of 2010. The facilities, listed previously in this report, were selected to highlight excellent models of toxics use reduction planning, implementation, resource conservation, or innovation. Facilities participated in designing their own events and in each case it was an opportunity not only for the TURA program and state legislators to honor the businesses, but for senior management to recognize their dedicated and talented environmental, health and safety staff, TUR Planners, municipal and state partners, and their employees – all of whom contributed to the tremendous successes of each company. (See the attached brochure, which summarizes the facilities and their accomplishments.)

- As described previously, TURI organized the TURA 20th Anniversary Symposium held on November 4, 2009, entitled "Improving the Health of Workers and the Environment: Twenty Years of Toxics Use Reduction." This event was funded through a grant from the National Institute of Occupational Safety and Health (NIOSH), and featured 45 speakers – including Paul Schulte, Director, Education and Information Division, NIOSH and Marjorie Alt, Executive Director of Environment America.



TURA 20th Anniversary Symposium

- TURI was honored by Salem State College (now Salem State University) as part of its annual Earth Day celebration on April 22, 2010. TURI received Salem State's Friend of the Earth Award "in recognition of its outstanding commitment to reducing toxic chemicals, fostering energy and resource efficiency, and promoting sustainable economic activity."
- State legislators joined TURI at the State House in June 2010 to recognize Massachusetts companies and community organizations for their outstanding environmental accomplishments. Michael Ellenbecker, Professor of Work Environment at UMass Lowell and Director of TURI, praised the honorees for finding innovative ways to reduce toxic chemical use and educating the public on how to make safer choices. He was joined by speakers and state officials: Ian Bowles, then Secretary of Energy and Environmental Affairs, and Sen. Anthony Petrucci and Rep. William Straus, then co-chairs of the Joint Committee on the Environment, Natural Resources and Agriculture. The trio addressed 19 companies and three community organizations that have made the Commonwealth a safer place to live and work.
- In addition to these events, TURI staff members gave presentations at a wide variety of conferences and other gatherings around the state.

Education and Training

- Every year, the Institute develops and hosts a seven-day course for new toxics use reduction planners and offers continuing education conferences in both the fall and spring. Topics ranged from resource conservation and environmental management systems in support of the 2006 TURA Amendments to managing nanotechnology risk and design for the environment. More than 270 health and safety managers and environmental consultants attended the trainings in FY 10.
- TURI continued to provide information in response to requests from the Massachusetts Legislature. Among other activities, in March 2010 TURI staff members organized a briefing for members of the joint Environment, Natural Resources and Agriculture Committee at the request of the committee's co-chairs. TURI, OTA and DEP staff also responded to requests for detailed technical input on proposed legislation such as the Safer Alternatives Bill, which, if passed, would be implemented by TURA program agencies.
- TURI staff has been part of the Massachusetts Clean Energy Center (MassCEC) workforce development, career pathways, and business roundtables offered around the state. In addition to bringing TURA experience in clean technology diffusion and stakeholder facilitation, this partnership is also connecting TURA companies with the resources and emerging markets fostered by the MassCEC to support their RC efforts.

Research

The Toxics Use Reduction Institute is a leader in the innovation and implementation of alternatives assessments as a way of promoting a shift towards safer chemicals in industrial processes and consumer products. This work has focused not only on Massachusetts industry and small business needs, but has also included national and international level collaborations. The Institute also provides science and policy research to support the work of the SAB, and to inform the Institute's recommendations to the TURA Administrative Council.

- *The New England Lead-Free Electronics Consortium.* 2010 represents the tenth anniversary of this very successful collaboration between New England industries (mostly based in Massachusetts), TURI, UMass Lowell, and EPA, representing the entire printed wiring board (PWB) supply chain. The goal of Consortium projects is to achieve a level of lead-free solder joint manufacture and reliability comparable or better to that of leaded solder joints. Consortium members working with TURI, university researchers and students ran an exhaustive set of experiments to test materials, manufacturing processes and reflow strategies. Lead-free conversion testing parameters included material selection (raw PWBs, component finishes, solders and fluxes); process selection (reflow parameters, temperatures and environment); mix of component types and finishes; acceptability (visual inspection); reliability; and planning to address consequences to lead-free conversion. The consortium has also employed Six Sigma tools to focus research efforts and enhance the quality of testing results. These efforts have led to the successful development of reliable, affordable electronics assemblies that can successfully compete in the global environment, where requirements such as the EU RoHS (Restriction of Hazardous Substances) directive require such products to be lead-free.
- *University of Massachusetts Research.* By funding UMass research, TURI helps to keep Massachusetts companies on the leading edge of technologies that are ahead of compliance trends, and environmentally, occupationally and economically sound. Two projects were supported in FY 10:
 - BPA-Free Epoxies. Dr. Daniel Schmidt, Assistant Professor at UMass Lowell, studied a potential replacement for BPA used in epoxy resin coatings for food and beverage can applications. The resin studied was an analog to a commercially available BPA-free alternative for rigid plastic uses, such as in water bottles, developed by Eastman Chemicals. The results of this initial research were promising and Dr. Schmidt will continue the research in collaboration with industry partners.

- Sustainable Processing of Non-Halogenated Flame Retardants. Dr. Ramaswamy Nagarajan and Dr. Jayant Kumar continued their research into naturally derived flame retardants (based on cashew nut oil) and non-halogenated phenol based oligomers for use in textile applications. The researchers plan to continue their investigations in collaboration with industry partners to test and optimize their non-halogenated flame retardants for carpet and other textile applications.
- TURI participated in the “primary prevention” subgroup of the Center for Disease Control *National Conversation on Public Health and Chemical Exposures*. In this process TURA, and TURI’s work in alternatives assessment, has emerged as a model that has been proposed as part of the policy change recommendations, which can be found at <http://www.webdialogues.net/cs/nationalconversation-action-library/view/di/229?x-t=library.view>

Community Assistance

TURI assists municipalities and community organizations in reducing the use of toxics at the source. A number of projects were supported in FY 10:

- Wampanoag Tribe, Martha’s Vineyard. Through its project “Wampanoag Greening Cleaning,” the Wampanoag Tribe worked to replace conventional cleaning products in Tribal homes across the Vineyard. The project included outreach through printed materials about the health hazards of conventional products and feasible alternatives that are safer and less expensive. The project team also provided sample cleaners for professional house cleaning services and for the Tribal Administration.
- School Disinfection Workgroup, Statewide project. The Workgroup continued its work from FY 09 and generated information about disinfection, sanitization, and hand hygiene options to reduce the use of unnecessary disinfectants in schools. This year, training materials were developed to be presented to school nurses, facility managers, and teachers and were piloted through training programs run by the EPA Tools for Schools program.
- Municipal Organic Lawn Demonstration Project, Northeast Organic Farmers Association (NOFA), Barre. The towns of Ayer and Stoneham established organic lawn care demonstration sites within their communities with the guidance of a local NOFA Accredited Organic Lawn Care Professional. The project was designed to reduce the use of harmful pesticides in those communities and create a visible learning site to encourage people within the community to use organic lawn care methods.
- Safer alternatives for dry cleaning. TURI worked with dry cleaners across the state and the region to encourage the reduction of the use of PERC in their

shops. TURI awarded Best Neighborhood Cleaners of Medford an \$18,000 grant to discontinue the use of perchloroethylene, a chemical known to cause cancer, and demonstrate wet cleaning. Through an EPA Region 1 grant, that Medford shop then offered four demonstration events, showcasing its wet cleaning equipment to other cleaners across the state and region. The EPA grant also supported TURI reaching out to members of the hospitality sector to educate them about non-PERC alternatives for their dry cleaning needs.

Laboratory Services

By providing free testing services to Massachusetts companies looking for safer cleaning alternatives, TURI helps companies reduce the amount of hazardous chemicals used in surface cleaning. The TURI Laboratory tested the performance of safer cleaning solutions for Massachusetts companies and suppliers representing the metal working, biomedical, coating and cleaning chemicals sectors. For more than



Laboratory at TURI

ten years, the TURI Laboratory has been providing the third party performance testing for M.D. Stetson's cleaning products, a necessary step for the company's products to get certified by GreenSeal and EcoLabel—two of the toughest independent certification bodies for cleaning products. In this year, 17 companies were served and test results made available in an internet database. Laboratory staff spoke about safer surface cleaning around the state at trade association events, companies and service organizations, and they have created an online blog.

Library Services

The TURI Library, part of the Massachusetts Library System (MLS), is one of the only libraries in the US that focuses on information related to toxics use reduction. It provides resources and research services by a professional librarian to students and faculty, businesses, communities, government agencies and individuals on an international basis. Its collection, which is documented in an online catalog, includes approximately 14,000 items. One of the library's services is a popular weekly email newsletter for businesses, researchers and citizens called the *Greenlist Bulletin*. It summarizes and provides links to recent reports, news stories, web sites and articles related to toxics.

Publications

TURI continued to make its work accessible to state, national and international audiences through its publications. In FY 10 these included:

- "Decision-making under TURA. 2010." TURI Methods & Policy Report No. 28

- “Asthma-Related Chemicals in Massachusetts: an Analysis of Toxics Use Reduction Data. 2009.” TURI Methods and Policy Report No. 25.
- “Massachusetts Chemical Fact Sheet: Perchloroethylene (PCE)” (updated fall of 2009)
- “Silver Hanger Case Study.” Tri-fold Brochure. 2010
- 37 issues of the Greenlist Bulletin (electronic)
- Six issues of the TURI Newsletter (electronic)
- “Making the Case for Wet - Not Dry – Cleaning” by Joy Onasch, published in *Green Lodging News*.
- “Measuring Green Cleaning” by Jason Marshall, published in *Cleaning and Maintenance Management* and “The 5 principles of Design for Safer Nanotechnology” by Gregory Morose in the *Journal of Cleaner Production*, February 2010.
- “Safer alternatives assessment: The Massachusetts process as a model for state governments” by Pamela Eliason and Gregory Morose, in press at the *Journal of Cleaner Production*.
- “Helping Small Businesses Implement Toxics Use Reduction Techniques: Dry Cleaners, Auto Shops, and Floor Finishers Assisted in Creating Safer and Healthier Work Places” by Joy Onasch TURI, Paul Shoemaker BPHC, Hoa Mai, Nguyen Viet-AID and Cora Roelofs UML, in press at the *Journal of Cleaner Production*.
- “Program Assessment at the 20 Year Mark: Experiences of Massachusetts Companies and Communities with the Toxics Use Reduction Act (TURA) Program,” by Rachel Massey, in press at the *Journal of Cleaner Production*.
- A *Journal of Cleaner Production* Special Issue on the Massachusetts TURA Program will be published in February 2011. Nine peer-reviewed articles were authored and editorial work done by TURI in FY2010.
- Ten research posters were created for the TURA 20th Anniversary Symposium on topics including green chemistry, nanomaterial safety, and toxics chemical usage in Massachusetts.

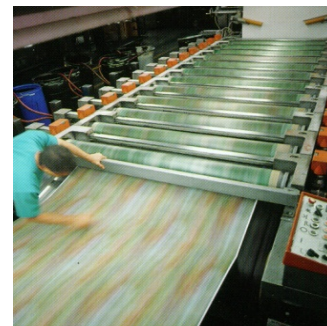
Office of Technical Assistance and Technology

Assistance Services

On-site technical assistance continues to be at the core of OTA’s services. During FY 2010, OTA engineers made 57 visits to 51 facilities in the metal products, electrical, paper, textiles, chemicals and plastics industries, and also visited a half dozen educational, research and public works facilities. The visits were evenly divided between those companies required to file under TURA, and those not – 70 percent of those entities visited had previously received on-site assistance from OTA. About half

of the total site visits were referrals from the MassDEP, US EPA, Massachusetts Office of Business Development, the Department of Occupational Safety, or a publicly-owned treatment works (POTW). Another 20 percent of the visits were initiated by the company and an additional 30 percent were a result of OTA outreach activities.

During the year, OTA engineers provided more than 265 recommendations to the visited facilities – 48 percent of the recommendations concerned energy efficiency or clean energy options, 31 percent were related to regulatory compliance, 16 percent concerned toxics use reduction or pollution prevention, and 5 percent concerned water conservation. Implementation rates of recommendations made range from a low of 25 percent for energy efficiency recommendations to 63% for regulatory compliance.



Textile Manufacturing Operations

The office published a case study and several “vignettes” of successful projects by companies that received OTA’s assistance. The following are examples of that work.

- Sika Sarnafil, a leading manufacturer of high-tech thermoplastic membranes used in roofing and waterproofing systems, with technical assistance from OTA, significantly increased the amount of post-consumer roofing material they recycled for reuse into new products. Within two years Sika Sarnafil increased its recycled post-consumer roofing material by more than 200,000 pounds, which kept customer’s vinyl roof waste out of landfills and saved Sika \$100,000 in waste disposal and raw material costs. Buoyed by its success in Massachusetts, Sika Sarnafil has expanded its resource recovery program nationally.
- Ophir Optics, a manufacturer of infrared lenses in North Andover, reduced its use of mineral spirits (a coolant in precision lathe operations) by 70 percent through careful calibration according to need. Following up from suggestions made by OTA during the on-site visit, the company pursued both alternative coolants and process optimization to reduce coolant use. The result of this investigation was a recognition that even when the mineral spirit use was significantly reduced, there was no decrease in lens quality. This simple method, involving no capital expense, reduced emissions (VOCs) by 3,872 pounds and saved the company an estimated \$15,000 annually in material costs.
- ITW Devcon/Plexus, a manufacturer of epoxies and adhesives, replaced acetone used for cleaning parts and process equipment, with a commercially available soy based cleaner suggested by OTA. The substitute reduced 10,000 pounds of acetone use annually and saved about \$5,000 a year in compliance and management costs.

- OTA helped Marlboro Nissan obtain rebates from National Grid before replacing 323 lights and fixtures with T-8 and T-5 compact fluorescent lights. The total cost of the project was \$35,000, but after utility rebates Marlboro Nissan paid only \$8,800. The lighting upgrades eliminated thousands of dollars in annual maintenance costs and reduced electrical load by 47,000 kWh per year, resulting in an annual cost savings of \$5,300. The payback period for the project was less than 15 months. Had the company replaced the lights on its own without the rebates, the payback would have been about three years.
- Polartec, LLC, located in Lawrence, Massachusetts, manufactures Polartec® fabrics that are used in the outdoor apparel and military industries. The company sought an alternative cleaning chemistry to remove knitting lubricating oils- one that would not require the use of caustic soda, a TURA listed chemical, and which would remove contaminants at ambient temperature. The company identified and substituted a less toxic chemistry that worked well at the low temperature required during processing. The substitute not only removed the extractable oils, but also removed 76 percent of the silicone oils contained in the spandex that is used to knit the Polartec® fabric. After changing to the new cleaning alternative, Polartec was able to significantly reduce the time required for many dye cycles without compromising product quality. The reduced dye cycle times allowed the company to improve manufacturing efficiency by 16 percent, reduce chemical use by 10 percent, and lower utility costs by 12 percent through reduced steam and water use.
- The A. W. Chesterton Company manufactures and distributes industrial maintenance products, mechanical seals, packing and gasketing material and other devices. OTA recommended that the company purchase an ultrasonic leak detector to identify and locate air leaks in its extensive compressed air system. The company implemented a new procedure to scan the compressed air system and, in less than six months, Chesterton staff located and repaired compressed air leaks that represented \$33,242 in electricity cost savings. OTA also helped the company with implementation of a management system and procedures for routine preventive maintenance for the facility's hot water heaters and steam boilers; fabrication and installation of energy efficient covers on a number of process tanks; replacement of two rooftop HVAC units that used electric heating, with higher efficiency natural gas fired units; and replacement of 12 eight-foot T-12 lamp fixtures with more energy efficient T-8 lighting fixtures.

Evaluating OTA's Assistance to Non-TURA Filers

As part of the program assessment conducted by TURI, information about the economic impact of OTA's technical assistance on firms that are not TUR filers was gathered by Pure Strategies, Inc. The study focused on 11 companies which were not required to

report under TURA and had received assistance from OTA. Four of these companies provided quantitative information about recent cost savings from projects they implemented as a result of OTA's assistance. The projects implemented at the four firms had a total net present value of \$870,000. In addition, seven companies provided qualitative information on the benefits resulting from the technical assistance they received, citing improved worker health and safety and improved environmental compliance. OTA had assisted one company in developing a coating that was free of volatile organic compounds (VOC free), which the company later patented. The firm credited OTA with helping it keep its doors open, and continues to employ 35 people at its Massachusetts headquarters.

Energy Assistance Services

OTA continued to connect companies to utility energy efficiency incentive programs (both gas and electric): the DOER deep energy retrofit grant opportunity; audit services at the Industrial Assessment Center at UMASS Amherst; and the trainings conducted by the Massachusetts Energy Efficiency Partnership. OTA reviewed utility bills to identify opportunities for savings (e.g., reducing demand charges), and educated companies about the opportunities for cost savings through enrollment in the ISO New England demand response program.

For some companies, OTA investigated installing solar (photovoltaic and thermal) and wind power systems - providing information on technologies, vendors and contractors, resources for evaluating system feasibility (e.g., wind mapping), rebates (from the Commonwealth Solar and Wind programs), other financial incentives (tax credits, accelerated depreciation, RECs, net metering), and interconnection requirements.

OTA continued to provide energy efficiency services to businesses. Specific recommendations include:

- increasing the efficiency of steam systems (e.g., increasing boiler combustion efficiency, heat recovery from boilers, steam trap maintenance, insulating steam and condensate lines);
- heat recovery from ovens and other process heating systems
- increasing the efficiency of compressed air systems (e.g., fixing leaks, heat recovery from air compressors);
- improved space heating;
- installing energy efficient lighting (including the use of occupancy sensors and daylighting controls);
- optimizing the efficiency of refrigeration and chiller systems.

Innovative Technology Development: Digital Printing for Textiles

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 technology inspired by OTA. The project grew out of pilot demonstration managed by OTA involving the application of digital printing, first developed for printing on paper, to textiles. Conventional textile screen printing involves “wet” processes in which fabrics are printed with colored pigments or dyes supplied through screens, with each screen dedicated to print one color. High-speed digital printing holds the promise of delivering a cleaner more efficient method of transferring colors to the textile substrate, which will reduce chemical inputs, chemical wastes, wastewater discharges, and the consumption of energy. The technology enables rapid changes in printing design and sample output. This can be useful to maintain a niche position in textile production for companies in the Northeast, and possibly help to stem the long-term trend of reduction of textile production capacity in this country.

Water Conservation

With funding from the US EPA and the MassDEP, OTA completed a two year grant project providing water audits to significant industrial, commercial and institutional water users in the city of Marlborough. EPA and DEP asked OTA to attempt to find water savings because the city of Marlborough was at its wastewater treatment and discharge capacity limits, and reducing discharges (a consequence of reducing use) was critical to reducing the costs of any future development in the city. OTA supervised confidential water audits that were performed in conjunction with independent professional engineers, and offered to facilities in city at no charge. The project found potential savings in all facilities audited. Thirty-six viable options were identified at eight facilities, which would save an estimated 15,000,000 gallons of water.

- Nineteen, or slightly more than half, had paybacks of less than two years, and would save 10,154,088 gallons per year, at a total cost of \$253,399.
- Projects being implemented are expected to save about 6,066,000 gallons per year, at a total cost of about \$96,000, with expected annual savings of about \$55,900.
- Projects have already been implemented at a cost of about \$36,000, which are expected to save over 2.5 million gallons per year and about \$25,900 per year.

These results were obtained in the absence of financial incentives that are typically supplied to promote energy efficiency, quantitative use information communicated to users, and innovative pricing to incentivize conservation.

Outreach and Collaboration

OTA staff made presentations on energy reduction options and related financial incentives at several industry-sponsored events including the Massachusetts

Biotechnology Council, the Small Business Development Center, the Central Massachusetts Business Environmental Network, and the Regional Technology Council. The office continued to develop and promote tools for sharing information about environmental issues and opportunities.

- Business Network- In 2010, OTA launched a business environmental network in collaboration with the North Central Chamber of Commerce and the North Central Economic Development Council. The purpose of the organization is to share information about environmental issues and opportunities (through TUR, “greening” of operations, and corporate social responsibility). Its first meeting focused on MassDEP’s new restrictions on solvents used in “cold” cleaning, and informed attendees of alternatives, with speakers from MassDEP and the TURI Laboratory, which has performed hundreds of evaluations for companies on alternatives to toxic solvents.
- Sustainability Coordinators Roundtable – Working with Second Nature, Suffolk University, and other university representatives, OTA helped form the Massachusetts School Sustainability Coordinators Roundtable (MSSCOR) to facilitate the sharing of information by those responsible for sustainability programs at colleges and universities.
- Raw Materials Tracking Software - OTA continued work with the Northeast Waste Management Officials Association (NEWMOA), on EMFACT™, a unique software tool designed to be used within companies for systematically tracking materials and energy use; releases, discharges, and wastes; and associated costs. The software is now available, at no charge, at the NEWMOA website <http://www.newmoa.org/prevention/emfact/about.cfm>.
- Safe Development of Nanotechnology Publication - In August 2010 OTA released a first-of-its-kind guidance document on the Safe Development of Nanotechnology.¹⁰ Nanotechnologies provide the potential for environmental improvement, along with the economic benefits of new products of higher quality and greater variety. The guidance included suggestions for developing facility risk reduction plans, beginning with worker protection and including avoiding environmental releases, providing warnings to waste handlers and consumers, and mitigating risks over the product life cycle. The document was favorably reviewed and noted by prominent nanotechnology business and legal representatives.¹¹

¹⁰ http://www.mass.gov/Eoeaa/docs/eea/ota/tech_reports/ota_nanotech_guidance.pdf.

¹¹ See, for example: <http://www.thenanonewswire.com/Entry.aspx?eID=134>;
<http://www.nanolawreport.com/2010/08/articles/massachusetts-issues-nanoehs-guidance-document/>;
<http://www.lawbc.com/news/2010/08/massachusetts-releases-nanotechnology-guidance-document/>.

- Preventive Emergency Planning - The TURA program served as a model for those looking to reduce the chances of catastrophic accidents involving toxic chemicals. The newly-appointed director of the U.S. Chemical Safety Investigation Board, Rafael Moure-Eraso, consulted with OTA on *preventive emergency planning*, an approach to emergency preparedness pioneered by OTA in collaboration with the New England Region of the EPA. By invitation OTA staff also provided comments to the Deepwater Horizon Commission on how contingency planning may more reliably incorporate strong accident prevention efforts, and not focus solely on response once an accident has happened. The US EPA also requested OTA to present its preventive approach at an emergency planning conference, and to assist a Massachusetts municipality in implementing preventive strategies.

Appendix

TURA 20th Anniversary Leadership Tour

[TURA 20th Anniversary Leaders Reduce Toxic Chemical Use by 3 million Pounds: Facility Tours Demonstrate Environmental Accomplishments of Massachusetts Companies](#) - TURA 20th Brochure featuring the participating companies. The facilities were selected to highlight excellent models of planning, implementation, resource conservation or innovation.

<http://www.turi.org/content/download/6166/64839/file/TURA%2020th%20Leaders.pdf>

TURA 20th Anniversary Symposium and Conference

http://www.turi.org/tura_government_program/what_s_new_at_tura/tura_20th_anniversary_symposium_and_conference/speakers_and_presentations

Speakers and Presentations

Opening: How it All Began

- Ken Geiser (Past Director at TURI, UML Professor)
- Mike Ellenbecker (Director at TURI, UML Professor)

Plenary Speaker

- Marjorie Alt (Environment America)

Luncheon Keynote

- Paul Schulte, Director, Education and Information Division, NIOSH

Session A: TURA Policy Lessons

- Rachel Massey (TURI) TURA Program Assessment

- Rick Reibstein (MAOTA) The Various Paradigms that TURA Shifted
- Lee Dillard Adams (MA Bureau of Waste Prevention) Progress in Regulatory Integration

Session B: TURA, Twenty Years of Industry Experience

- Jack Luskin (TURI/UML) Framing Twenty Years
- Jack Bailey (TURP at Bose) TURPA
- Frank Marino (TURP at Raytheon) Asset Protection at Raytheon
- Lucy Servidio (TURP at Capaccio Engineering) TUR Consulting

Session C: Pollution Prevention Assistance

- Rich Bizzozero (Director of MAOTA) Technical Assistance in the TURA Program
- Terri Goldberg (Deputy Director, NEWMOA) Northeast Regional P2 Network
- John Raschko (MAOTA) Energy Technical Assistance
- Jason Marshall (Director, TURI Laboratory) Hands-on Replacement Testing in the TURI Lab

Session D: TURA: Community and Environmental Health

- Paul Shoemaker (Boston Public Health Commission), Safe Shops in the Community
- Hoa Mai Nguyen(Viet Aid) Safer Floor Finishing Services
- Joy Onasch (TURI) Wet Cleaning -- Alternative to Dry Cleaning
- Julia Brody (Silent Spring Institute) In the Home: Lessons Learned from Household Exposure Studies

Session E: TURA Science and Policy Interface

- Rich Bizzozero (MAOTA) Introduction to TURA's Governance and Advising/Decision-making System
- Richard Clapp (Professor at BU) Early Experiences Advising the TUR program
- Beth Rosenberg (Assistant Professor at TUFTS) The Silica Story
- Panel: Bill Judd (TURA Advisory Committee), Rich Bizzozero (TURA Administrative Council), Richard Clapp, Beth Rosenberg

Session F: Alternative Planning, A New Option for Planners and Companies

- John Fischer (Branch Chief, MassDEP)
- Ed Gomes (TURP at Vicor) Resource Conservation at Vicor
- Sherri Gaudette (TURP at Skyworks) EMS at Skyworks
- Ron Westgate (TURP Officer at Lightolier) Resource Conservation at Lightolier

Session G: Product Design, Tools for Assessment

- Pam Eliason (TURI) Assessing Safer Alternatives
- Jennifer Atlee (Building Green) Selecting Building Products: Alternatives assessment and a precautionary orientation in practice
- Cara Bondi (Seventh Generation) Apply the precautionary principle to consumer product. Design as an approach to mitigate the environmental and human health effects of toxics in household cleaning products

Session H: TUR Beyond the Massachusetts Border

- Dwight Peavey (EPA Region 1) Beyond TURI and TURA "The Next Generation"
- Bev Thorpe (Clean Production Action) How NGOs are promoting Toxics Use Reduction in South East Asia and Latin America
- Joseph Castrilli (Canadian Environmental Law Association) The New Ontario TUR Law

Session I: Occupational Health and Safety

- Karla Armenti (NH Division of Public Health Services) Primary Prevention of Occupational Health
- Marian Flum (PhD UML) Linking Toxics Use Reduction and Worker Health and Safety Effects on Chemical Usage
- Stephen Gauthier (GE, IUE/CWA Local 201 Union) Worker Health and the Bottom Line
- Joel Garrett (VP of Op at Kluber Lubrication NA) Integrating EH&S in business and Building Skills and Regional Strengths

Session J: TUR and Competitiveness

- Steve Greene (Polaroid and Other Companies)
- Ray Lizotte (TURP at Texas Instruments and American Power Conversion)
- Gary Nedelman (TURP at AlphaGary)
- Don Alger (TURP at Allegro)

Session K: Research and Innovation

- Mike Ellenbecker and Candace Tsai (PhD, UML) Engineered Nanoparticles: Safer Substitutes for Toxic Materials or a New Hazard?
- Greg Morose (TURI, LCSP) A Successful Industry Collaboration Model to Achieve Toxics Use Reduction
- Sanjeev Manohar (Associate Professor at UML) Alternative Commercial Surface Finishes for Printed Circuit Boards
- Ramaswamy Nagarajan (Assistant Professor at UML) Greener Routes to Non-Halogenated Flame Retardants