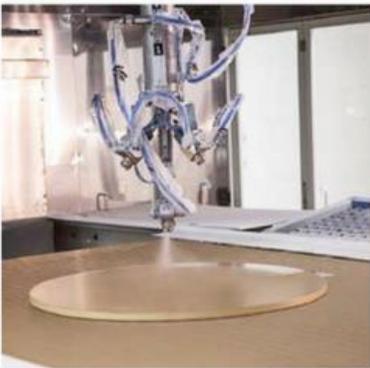


Massachusetts Toxics Use Reduction Program ANNUAL REPORT *Fiscal Year 2017*



Submitted to:
The Governor of the Commonwealth of Massachusetts
The Commonwealth of Massachusetts House of Representatives
The Commonwealth of Massachusetts Senate

Prepared by the Office of Technical Assistance and Technology
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Executive Summary

The Toxics Use Reduction Act (TURA) Program works with Massachusetts businesses and communities to reduce the use of toxic chemicals and investigate and promote the adoption of safer alternatives. This work helps to protect human health and the environment, making Massachusetts a safer place to live and work while also promoting the competitiveness of Massachusetts businesses. In fiscal year 2017 (FY17), the TURA program developed policies and provided a wide variety of services. This work included the designation of Higher Hazard Substances, scientific assessment of chemicals for possible addition to the TURA list of reportable substances, site visits to businesses, grants and research projects, educational events and publications, and a change to the Massachusetts Department of Environmental Protection's "enforcement response policy" for self-disclosure of a failure to file a required TURA report. The new self-disclosure policy maintains some of the features of the one-time reporting Amnesty Program to bring additional filers into the program.

Toxics Use Reduction Grants

The Toxics Use Reduction Institute (TURI) supported projects to protect gymnasts from toxic chemical exposure; develop safer laboratory products for use in medical diagnostics; reduce solvents in windshield washer fluid and in printing; address bisphenol A (BPA) use in thermal paper store receipts; reduce pesticide use; and implement safer cleaning and disinfection in homes, schools and other spaces. TURI continued to support dry cleaners in converting to professional wet cleaning technology, providing a grant to one dry cleaner and hosting a demonstration event at another facility, allowing cleaners across the state to continue learning about safer technologies. TURI continued its work to research and test safer alternatives to toxic chemicals used in the aerospace and defense sector.

The Office of Technical Assistance and Technology (OTA) issued approximately \$70,000 in grants to Massachusetts Regional Planning Agencies as part of a U.S. Environmental Protection Agency (U.S. EPA) funded project to help toxics users incorporate toxics use reduction into emergency preparedness efforts.

Technical Assistance and Lab Services for Massachusetts Businesses

Office of Technical Assistance and Technology (OTA) personnel made 66 site visits to Massachusetts facilities and provided recommendations to those facilities. Approximately 51 percent of the recommendations given during FY17 for pollution prevention opportunities, regulatory compliance, and energy efficiency measures were either implemented or scheduled to be implemented.

As a result of actions taken based on OTA recommendations, facilities reported total financial savings of \$168,935, 875,726 kWh in total annual electricity reductions, and an annual reduction of 19,341 pounds of toxic chemicals used. The cost savings resulted both from toxics use reduction efforts and process changes to improve energy efficiency. For example, a wood finishing facility purchased a solvent recycler on a recommendation from OTA personnel and has reduced the amount of new solvent by at least 80 percent. More examples of direct technical assistance can be found in the OTA section of this report.

The Toxics Use Reduction Institute (TURI) laboratory provided no-cost services to businesses in sectors including metalworking, medical supplies, and adhesives, among others.

Conferences and Workshops

The Toxics Use Reduction Institute (TURI) held a seven-day course to train new Toxics Use Reduction planners; two Continuing Education conferences, covering topics such as chemical safety in severe weather crises and pollution prevention in metal finishing; library-based workshops on how to use chemical databases and other tools; and a Greener Materials Symposium, bringing together industry representatives with university researchers.

Educational Materials

In response to queries received from municipalities, the Toxics Use Reduction Institute (TURI) produced new educational resources on materials used in playing fields. The TURI library provided information in response to a wide variety of queries on specific

chemicals and publications; queries came from businesses, state and municipal agencies, and others. TURI published a number of new resources, including a financial analysis of dry cleaners' experiences with the shift to safer alternatives, and new chemical fact sheets.

Toxics Use Reduction Reporting and Amnesty

The Massachusetts Department of Environmental Protection (MassDEP) collected more than 1,500 chemical use reports from 480 companies. MassDEP also received 424 toxics use reduction plan summaries or plan update summaries for planning year 2016.

In order to address a problem of failure to comply with the TURA reporting and planning requirements, MassDEP offered an Amnesty Program between January 1, 2015 and July 1, 2016. Under program, facilities that voluntarily submitted previously owed reports received a warning letter and were required to pay one year of back fees and statutory late fees. The agency's normal enforcement response had been to issue a Notice of Noncompliance to facilities that had failed to file and require them to pay three years of back fees and statutory late fees.

Because of the success of the program, MassDEP adopted a permanent change to its enforcement response policy for self-disclosure of a failure to file a required TURA report. The new self-disclosure policy maintains some of the features of the Amnesty Program. In addition, MassDEP has instituted a new operational procedure whereby any facility that reports a chemical for the first time without indicating if they are "self-reporting" a substance that should have been reported in a prior year, will receive a formal "Request for Information" (RFI).

Toxics Use Reduction Planner Certification

The Massachusetts Department of Environmental Protection (MassDEP) implemented a new online system for submitting Toxics Use Reduction Planner certification and recertification applications. There are currently 177 Toxics Use Reduction Planners certified as having the training and expertise needed to review and approve toxics use reduction plans.

New Higher Hazard Substances and Science Advisory Board Activities

During FY17, amendments to the 301 CMR 41.00 Toxic or Hazardous Substance List were promulgated to designate 2, 4-toluene diisocyanates ("TDI"); 2, 6-toluene diisocyanates; and toluene diisocyanates mixed isomers as TURA Higher Hazard Substances (HHS).

The Toxics Use Reduction Act (TURA) Science Advisory Board (SAB) recommended adding perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) and their salts to the TURA List of Toxic and Hazardous Substances.

An Overview of the Toxics Use Reduction Program

Unanimously passed by the legislature in 1989 and enacted in 1990, the [Massachusetts Toxics Use Reduction Act \(TURA\)](#) was the first comprehensive state pollution prevention law in the United States. TURA was a result of intensive negotiations among industry, environmentalists, and government, and launched a new approach to addressing the problem of toxics in the environment. The Act set up an innovative combination of regulatory requirements, technical assistance, research and training programs designed to promote the voluntary adoption of cost-effective toxics use reduction techniques.

A cornerstone principle of the law is that the best way to reduce pollution is to address the root cause: the decision to use toxics in the first place. Facilities subject to TURA are required to track and report the amount of toxic chemical use and the amount that is generated as waste in production each year. In addition, every other year TURA-covered facilities conduct toxics use reduction planning to identify and analyze their opportunities to reduce toxics and improve efficiency. Companies often identify options that can both reduce toxic chemical use and lower production costs. Because these biennial Toxics Use Reduction Plans often reveal savings opportunities, they lead to voluntary reductions in toxic chemical use, also reducing hazardous releases and the generation of toxic wastes. These reductions in turn decrease the risks of major transportation and storage accidents, protect workers from workplace exposures, and create safer products.

The resulting efficiencies, financial savings, product improvements and improved environmental performance all work together to support the competitive position of Massachusetts businesses. Global chemical restrictions and customer requirements make companies with safer products more competitive.

TURA Program Agencies

Office of Technical Assistance and Technology (OTA)

The [Office of Technical Assistance and Technology's \(OTA\)](#) staff of engineers, chemists and environmental experts provide Massachusetts businesses with free and confidential assistance with toxics use reduction, energy and water conservation, and compliance with relevant regulations. OTA's non-regulatory assistance services help businesses save money while improving public and employee health through reducing toxics and conserving resources. OTA also produces fact sheets, case studies, and guidance documents on TURA and environmental compliance, and hosts workshops and other educational events.

Toxics Use Reduction Institute (TURI)

The [Toxics Use Reduction Institute \(TURI\)](#), located at UMass Lowell, is a multi-disciplinary research, education, and policy center. TURI sponsors and conducts research, organizes education and training programs and provides information and technical support to large and small businesses and community organizations. Among other activities, TURI trains Toxics Use Reduction Planners (TUR Planners); convenes business working groups; conducts science and policy research and analysis; provides grants to businesses, municipalities, community groups, and researchers; provides laboratory testing for safer alternative chemicals and technologies; and maintains a specialized library on toxic chemicals and safer alternatives.

Massachusetts Department of Environmental Protection (MassDEP)

The [Massachusetts Department of Environmental Protection \(MassDEP\)](#) administers the law's annual reporting and biennial planning mandates; licenses TUR Planners; reviews and analyzes the data submitted by companies to evaluate progress in reducing toxics use and waste; and prepares an annual public data release. The Department is also charged with promoting TUR as the preferred way to bring facilities into compliance with environmental regulations.

TURA Governance and Advisory Structure

Administrative Council on Toxics Use Reduction

The program is governed by the [Administrative Council](#) which coordinates toxics management statewide, and is responsible for managing the list of chemicals covered under the act. The Administrative Council is chaired by the Secretary of the Executive Office of Energy and Environmental Affairs and includes designees of the Commissioners or Secretaries from five additional state agencies (the Departments of Environmental Protection and Public Health and the Executive Offices of Labor and Workforce Development, Public Safety and Security, and Housing and Economic Development).

Advisory Committee to the Administrative Council on Toxics Use Reduction

A multi-stakeholder [Advisory Committee](#) provides input to the Administrative Council. The Committee is composed of sixteen members and includes representation of large and small businesses, labor, environmental and health advocacy, and others.

Science Advisory Board

The [Science Advisory Board \(SAB\)](#) includes members from a variety of scientific backgrounds, and works with the Institute to provide a sound scientific basis for program decisions.

Fiscal Year 2017 Policy Updates

Administrative Council and Advisory Committee

For reporting year 2017, 2, 4-TDI (CAS 584-84-9), 2, 6-TDI (CAS 91-08-7), and TDI Mixed Isomers (CAS 26471-62-5) are now designated as Higher Hazard Substances (HHS). The designation followed a previous council vote, a public hearing and formal 21-day public comment period as well as an additional 60-day public comment period. Businesses using these substances must begin tracking their use starting in calendar year 2017 and the first reports are due to MassDEP by July 1, 2018. The TURA program has issued an updated version of its fact sheet on [Designation of TURA Higher & Lower Hazard Substances in Massachusetts](#) to reflect this change.

The Administrative Council received a new designee appointment from the Executive Office of Housing and Economic Development, John Chapman, Undersecretary for the Office of Consumer Affairs and Business Regulation.

The Advisory Committee gained three new members or alternate members: Kari Sasportas, Cambridge Public Health Department; Peter Yarossi, MWRA; and Jillian Riley, Alternate for the Attorney General's Office.

Science Advisory Board (SAB)

The Toxics Use Reduction Institute (TURI) worked with the Science Advisory Board (SAB) to begin review of the current literature on per- and poly-fluoroalkyl substances (PFAS). The Board began with two specific PFAS: perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), which are very persistent, bioaccumulative and toxic. The Board recommended adding these two PFAS and their salts to the TURA List of Toxic and Hazardous Substances. The Board then began reviewing four shorter chain PFAS (perfluorohexane sulfonic acid (PFHxS), perfluorohexanoic acid (PFHxA), perfluorobutanesulfonic acid (PFBS), and perfluoro-n-butyric acid (PFBA) and one longer chain PFAS (PFNA). The Board is currently in the process of completing that review.

TURI also published a detailed summary of scientific information on the phthalate esters, bringing together key results of TURI's work with the SAB to analyze these chemicals and provide recommendations to MassDEP on its phthalate ester policy.

Office of Technical Assistance and Technology (OTA)

The [Office of Technical Assistance and Technology \(OTA\)](#) is a non-regulatory agency within the [Executive Office of Energy and Environmental Affairs \(EOEEA\)](#). OTA supports the growth of environmentally responsible manufacturing and production in the Commonwealth by encouraging businesses to implement cost-effective toxics use reduction, energy efficiency, water conservation, and other sustainable practices.

Technical Assistance

OTA's staff of engineers, chemists and environmental experts provides Massachusetts businesses with free, non-regulatory, and confidential assistance with toxics use reduction, energy and water conservation, regulatory compliance and waste reduction. OTA provides onsite, phone and email support to help businesses save money while improving public and worker health through reducing toxics and conserving resources. OTA also produces trainings, events, and various publications on toxics use reduction and environmental compliance topics.

During FY17, OTA personnel made 66 site visits to 49 Massachusetts facilities in the following sectors: automotive repair and other repair services, food, furniture and fixtures and wood products, chemicals, electronics, fabricated metal products, instruments, life sciences, machinery, rubber and plastics, stone and concrete, textiles, transportation equipment, and energy generation. Also in FY17, OTA personnel provided technical assistance to a wider pool of facilities via over 500 emails, calls, and other interactions. Through these activities, OTA personnel deliver recommendations to facilities on a wide range of topics.

Sample Outcomes of OTA Onsite Technical Assistance Services

After working with OTA personnel, a metal products company switched from solvent to aqueous cleaning. The company began consulting OTA during FY17 with questions about their solvent cleaning operation. OTA assisted the company with compliance and suggested options for eliminating trichloroethylene (TCE) and methylene chloride. Both chemicals are TURA Higher Hazard Substances that are reportable at 1,000 pounds per year and have significant inherent hazards. Due to continued work with OTA personnel, the company had completely switched to aqueous cleaning with satisfactory results by the end of FY17. The change resulted in a complete elimination of the use of TCE at the facility (a reduction of approximately 1,000 pounds per year). The change also resulted in complete elimination of methylene chloride at the facility, an annual reduction of 300 pounds.

A defense company made several significant reductions during FY17. The facility converted two degreasers from n-propyl bromide (nPB) to aqueous, reducing the use of nPB by 1,000 pounds per year. The facility plans to convert a third degreaser to aqueous as well. nPB is a TURA Higher Hazard Substance and has significant inherent hazards. The reduction in nPB use will save the facility \$2,600 per year. Later in FY17, the facility requested that OTA personnel provide an analysis of its electric bills. As a result of the analysis and corresponding recommendations to reduce electricity costs, the company was able to make changes to reduce electricity consumption annually by 557,726 kWh. The cost to the facility of implementing those changes was approximately \$220,450 not including utility incentives. Going forward, the facility will save \$66,500 per year on electricity.

A cable manufacturer reduced its use of propane and electricity by implementing several simple recommendations made by OTA personnel. As a result, the company will save \$40,000 per year due to the reduced use of propane and \$35,000 per year due to the reduction of 318,000 kWh of electricity per year.

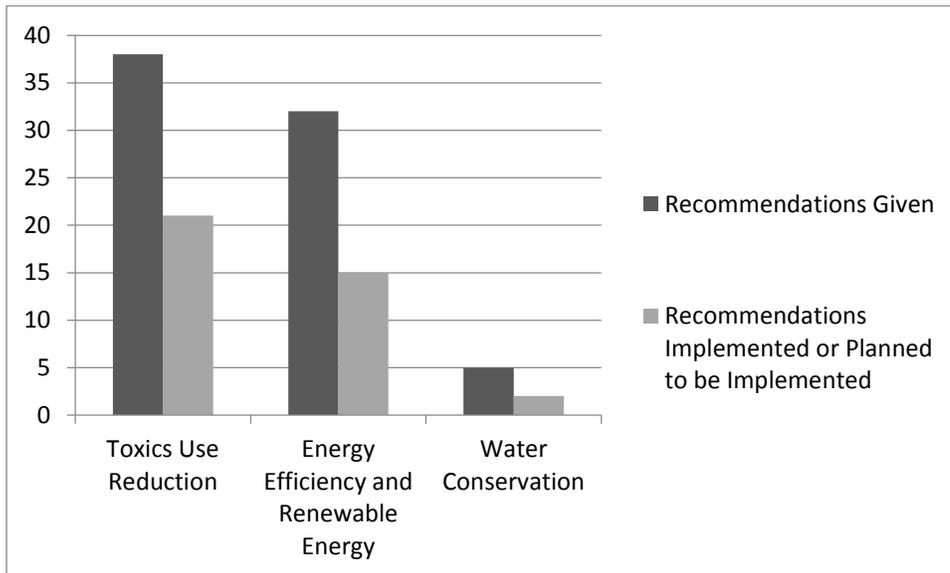
A wood finishing facility purchased a solvent recycler on a recommendation from OTA personnel and has reduced the amount of new solvent by at least 80 percent. The solvent recycler allows the facility to reuse one batch of solvent many times.

Recommendations Given and Implemented

During FY17, OTA engineers provided 187 recommendations to the businesses and facilities that received visits. 59 percent of these recommendations concerned regulatory compliance topics and 41 percent concerned pollution prevention or resource conservation topics like toxics use and waste reduction, energy conservation and water conservation. By July 2017, 51 percent of all FY17 recommendations were implemented or planned to be implemented.

Approximately 53 percent of regulatory recommendations given were implemented or planned to be implemented. Many regulatory recommendations concern air emissions and permitting, hazardous waste, chemical storage requirements, worker safety, and chemical reporting and fee requirements.

Of the recommendations that did not concern regulatory compliance, 51 percent concerned toxics use reduction, 42 percent concerned energy conservation, and 7 percent concerned water conservation. Toxics and waste reduction recommendations that were implemented concern process changes or increased production process efficiency, safer chemical substitutions, recycling to reduce the use of chemicals, and improved maintenance practices. Energy efficiency or renewable energy recommendations that were implemented mainly concerned energy efficiency incentives and funding opportunities.



Pollution Prevention and Resource Conservation Recommendations Implemented

Recommendations Not Yet Followed-Up or Not Implemented

While it may be possible for facilities to implement some recommendations immediately, in most cases, changes take over a year to evaluate and implement; and, therefore, over a year to yield results. OTA technical assistance providers take great care in allowing business personnel enough time to consider and evaluate the feasibility of recommendations. This often means that OTA technical assistance providers do not follow up on a certain percentage of recommendations given during the same year. In FY17, approximately 43 percent of recommendations given had not been followed-up on by technical assistance providers by June 2017. Those businesses will receive continuing assistance and follow-up during FY18.

5 percent of all recommendations given were recorded as “not implemented” for reasons of time constraints and financial or other barriers.

Results

As a result of actions taken based on some of OTA’s recommendations, facilities reported total financial savings of \$168,935, 875,726 kWh in total annual electricity savings, and an annual reduction of 19,341 pounds of toxic chemicals used. The cost savings resulted both from toxics use reduction efforts and process changes to improve energy efficiency.

Company Recognition and Case Studies

OTA regularly works with companies to showcase their environmental achievements in toxics use reduction, energy and water conservation, and other efficiencies like cost savings resulting from materials use reductions and process improvements. The case studies that result from these efforts are posted online and can serve as a reference for other companies as well as positive publicity for the featured companies. During FY17, OTA produced two new case studies.

The [Mark Richey Woodworking Inc: Renewable Energy and Energy Efficiency](#) case study features information on Mark Richey Woodworking's biomass boiler, 600 kW wind turbine, and 500 kW solar array. The company, on average, produces the amount of electricity it needs to operate. The [Mark Richey Woodworking Inc: Toxics Use and Waste Reduction](#) case study contains details on the company's solvent recycling unit, ultrasonic spray gun cleaner, robotic spray line, and use of water based coatings.

On October 27, 2016, OTA partnered with Mark Richey Woodworking to host an event at the facility in honor of Massachusetts Manufacturing Month. The company received a Governor's citation from the Baker-Polito Administration and was recognized by local and state officials as an industry leader in energy efficiency, innovation, toxics use reduction, and environmental stewardship. Attendees included neighboring businesses, local and state officials, and planning and economic development associations, and all were invited on a tour of the facility. The Executive Office of Energy and Environmental Affairs (EEA) issued a [press release for the event](#).

Outreach and Inter-Agency Collaboration

Outreach

Following the conclusion of the MassDEP TURA Amnesty Program, OTA sent welcome letters to companies that were new to the TURA program. The letters contained information about TURA program resources available to companies.

OTA produces a quarterly *OTA Outlook Newsletter* that contains updates on environmental regulations, workshops, grant information and other resources for businesses, and OTA office updates. In September 2016, OTA created a Twitter handle, @Mass_OTA, and began outreach to its growing list of followers throughout the rest of FY17. As the list grows, OTA plans to expand outreach to its audience.

Inter-Agency Collaboration

OTA technical staff were invited to attend Massachusetts Office of Business Development Listening Sessions for Small Businesses and a Small Business Resource Fair to provide attendees with information about OTA's services for new and small businesses. OTA serves as the [Small Business Environmental Assistance Provider](#) for Massachusetts and offers the [Right from the Start Program](#) to assist businesses with permitting requirements, understanding environmental regulations, and avoiding the implementation of processes that rely on toxic or hazardous chemicals.

OTA also supported an EPA-funded grant project administered through the Lowell Center for Sustainable Production: ["Green Your Bottom Line in Food and Beverage Businesses."](#) Roundtable meetings were held and supported by organizations and agencies offering grants, audits and technical assistance. OTA attended the meetings to offer free and confidential onsite technical assistance for toxics use reduction and environmental compliance.

Toxics Use Reduction Task Force

Executive Order 515 mandated that executive branch state agencies make the switch from ordinary products to Environmentally Preferable Products (EPPs) whenever they represent the "best value" for the job. The Executive Order also called for the creation of a Toxics Reduction Task Force to provide targeted technical assistance and guidance to agencies. OTA co-chairs the Toxics Reduction Task Force with staff from the Operational Services Division (OSD). OTA and TURI are key partners in the Massachusetts EPP Program.

According to the [2016 EPP report](#), published in March 2017, growth in purchases from all contracts with EPPs has increased more than a hundredfold from the first days of the program. From 1994 to 2016, eco-purchases on the statewide contracts grew from \$5 million to just under \$400 million, representing about a quarter of all purchases from statewide contracts.

Chemical Safety and Climate Change Resiliency Planning Project

Through a grant from the US Environmental Protection Agency (EPA), OTA is providing funding to seven Regional Planning Agencies (RPAs) to each hold two training events within their region. The first event will consist of a workshop to educate community leaders and stakeholders and give them the tools to understand and identify the use of hazardous chemicals in their communities and the relevant regulatory requirements. The second event will introduce the assessment of vulnerabilities to climate change and the prevention of industrial accidents triggered by climate change by incorporating these issues in community and local emergency planning and at targeted facilities that use toxic chemicals. This effort will build sustainable and replicable models for incorporating toxics use reduction into emergency preparedness and climate change resiliency planning.

During FY17, OTA selected the following RPAs to receive grants of approximately \$10,000 each (\$70,000 in total) for this project:

- Central Massachusetts Regional Planning Commission
- Franklin Regional Council of Governments
- Merrimack Valley Planning Commission
- Montachusett Regional Planning Commission
- Northern Middlesex Council of Governments
- Pioneer Valley Planning Commission
- Southeastern Regional Planning and Economic Development District

During FY17, OTA accomplished the following activities and completed the following items related to this project:

- Created a [Chemical Safety and Climate Change Resiliency webpage](#);
- Created an [interactive map of MA toxics users and climate change vulnerability factors](#), which includes data layers for facilities that store large quantities of hazardous chemicals, active railways, underground storage tanks and other items of concern in relation to FEMA flood and hurricane zones;
- Created a survey to help RPAs quantify toxics use reduction in relation to the trainings;
- Presented OTA's work on an EPA hosted webinar entitled "Disaster Preparation Through Pollution Prevention"; and,
- Presented OTA's work at the annual Soils, Sediments, Water & Energy conference at UMass Amherst on a platform called "Building Resilience to Climate Impacts: Local Efforts to Implement Adaptation Plans."

Toxics Use Reduction Institute (TURI)

The [Toxics Use Reduction Institute \(TURI\) at UMass Lowell](#) provides research, training, technical support, laboratory services, and grant opportunities to reduce the use of toxic chemicals while enhancing the economic competitiveness of Massachusetts businesses. TURI also manages the Science Advisory Board (SAB) and conducts policy analyses that help to 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. TURI collaborates with diverse groups, including communities, businesses, academic institutions, and government and public entities to develop innovative approaches and share best practices.

Education and Training

Throughout the year, TURI hosts events including workshops, conferences, webinars, and training courses on TURA, Toxics Use Reduction (TUR) planning, and toxics. Education and training activities in FY17 included the following items.

Toxics Use Reduction Planner Training Course

Every year, TURI presents a seven-day course to train new Toxics Use Reduction Planners, in a blended format consisting of online slide lectures and live classroom sessions for group workshop exercises and discussion. Basic informational slide presentations are available online, where participants can listen on their own schedule and at their own pace, while classroom sessions are devoted to workshop exercises, group discussion, and team project work. This blended format shortens the time participants must devote to classroom sessions away from their normal duties, and makes it easier for those travelling from a distance. Six additional course modules were added online in preparation for the fall 2016 course; this completes the online component development for the training course.

Toxics Use Reduction Planner Continuing Education Conferences

TURI offers semi-annual [Continuing Education conferences](#) for Toxics Use Reduction Planners to ensure that they have the most up-to-date information on chemical hazards, alternatives, and opportunities. It allows them to improve their skills and assists them with maintaining their certifications. At the fall 2016 conference, TURA program staff and subject matter experts engaged participants on a range of topics including materials accounting, Toxic Substance Control Act (TSCA) and Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) policy, green cleaning and degreasing, using safety data sheets, and industrial energy efficiency. The spring 2017 conference included sessions on pollution prevention in metal finishing, water purification/conservation, chemical safety in severe-weather crises, and real-world TUR projects.

"Beyond the MSDS" Workshop

The TURI library conducts ongoing outreach and workshops for researchers and Toxics Use Reduction Planners, educating them about databases, tools and information to better identify hazards of chemicals. This workshop was provided several times in FY17.

"Greener Materials" Symposium

The [Greener Materials Symposium](#), held at UMass Lowell, brought together industry professionals and UMass academic researchers for a one-day event focused on finding safer alternatives to toxic chemicals. Keynote addresses, on proactive chemicals management and green chemistry innovation, were delivered by Dr. Freimut Schroeder (Vice President for Environment, Health and Safety at Siemens Healthcare) and Dr. John Warner (President and CEO of Warner Babcock Institute for Green Chemistry). Lectures and panels addressed safer surfactants, sanitization, solvents, contact adhesives, and windshield-washer formulations. TURI staff introduced TURI's academic research program and grant opportunities, and a poster session and networking opportunities were provided to attendees.

Grants and Other Projects

Safer Gyms: Eliminating Flame Retardants

TURI provided a grant to Silent Spring Institute (Newton) to work with a gymnastics studio to replace flame retardant foam pit cubes with non-flame retardant foam. The Silent Spring Institute engaged Harvard researcher Courtney Carignan to study the flammability of foam pit cubes and gymnasts' exposure to flame retardants. The study concluded that flame retardants can be eliminated from foam pit cubes and facilities can still meet Massachusetts state and local fire safety standards. Dust at gym facilities has been found to include flame retardants and young children are likely exposed through direct contact with both dust and pit cubes. These final findings, including fire safety results, are continuing to be communicated to fire chiefs and gyms across the Commonwealth.

Safer Laboratory Products

Using seed funding provided by TURI, UMass Lowell faculty researchers partnered with Siemens Healthcare Diagnostics (Norwood) to test new compounds made from sugar and pectin for use in immunoassay lab products. The research project aimed to replace octylphenoethoxylates, surfactants that are listed by the European Chemicals Agency as substances of very high concern. The team identified several bio-based alternative surfactants and is working to test them for performance, cytotoxicity, and biodegradation before final approval.

Reducing Solvent Use

Using seed funding provided by TURI, UMass Amherst faculty researchers partnered with Camco Manufacturing (Leominster) to research and test safer formulations for windshield washer products that contain methanol, a volatile organic chemical linked to reproductive toxicity. Safer, cost-effective alternatives were identified and tested to meet freezing point depression requirements; however solutions that completely satisfied the freezing point requirement were not identified within the grant period.

Also, with support from TURI, Minuteman Press (Foxboro) replaced a lithographic offset press that uses solvent cleaners with a digital envelope press. Installation of the digital press allows the shop to operate free of solvent use. The owners believe that a healthier and safer work environment is worth the incremental operating cost. TURI developed a [case study](#) to document the results.

Reducing BPA

TURI provided a grant to the Transformative Culture Project (formerly Press Pass TV, Haydenville) to create an [educational video on how to reduce exposure to bisphenol-A \(BPA\)](#), a hormone-disrupting chemical that is used to coat thermal paper store receipts, among other uses. The Transformative Culture Project, which uses media arts to provide meaningful employment and education for youth living in low-income neighborhoods, is distributing the video via social media.

Safer Cleaning and Disinfection

In FY17, TURI financially supported several projects related to green cleaning in homes, schools, and other spaces.

- UMass Lowell faculty researchers partnered with MD Stetson (Randolph) to test the effectiveness of cleaners in disinfecting for non-critical applications. The first phase of the research tested multiple variables in the laboratory, including surfaces, products, cleaning methods, wiping materials, and bacteria.
- Merrimack Ales (Lowell), a microbrewery, tested the performance of technologies that use safer chemicals to clean and sanitize brewery tanks.
- The Springfield Childcare and Healthy Homes Pilot Project and Square One (Springfield) trained staff and parents on how to decrease use of toxic cleaning and pest control materials in homes and at Square One facilities. The project also visited homes in Springfield, where there is a high incidence of asthma, to provide education on asthma triggers and referrals to community resources.
- Groundwork Lawrence (Lawrence) conducted workshops about toxics found in common household cleaners and how to make safer cleaning products. Working with bodegas in the community, Groundwork Lawrence shared home recipes for

safer cleaning products using common household ingredients, and created demonstrations, pamphlets, and a video for local access TV and family health centers.

Green Building

Using grant funding from TURI, the Hitchcock Center for the Environment (Amherst) provided educational programs on safer alternatives to toxic chemicals used in building construction. Since opening their “Living Building” in September 2016, the Center has offered building tours to over 1,000 visitors, teaching the public and organizations about toxic building materials identified by the International Living Future Institute and providing information on healthy building options.

Reducing Pesticides

Funded by a TURI grant and working with the Friends of Topsfield Trails, Boy Scout Thomas Lebel of Topsfield built and installed bat houses on the Topsfield Linear Common. By attracting and providing habitat for mosquito-eating bats, the bat houses have the potential to decrease the use of pesticides.

Dry Cleaning

With support from a TURI grant, Belmont Hill Cleaners (Belmont) replaced its dry cleaning machine that used perchloroethylene, a probable human carcinogen, with professional wet cleaning. This brings to 18 the number of dry cleaners TURI has helped to switch to dedicated professional wet cleaning, with technical and/or financial assistance. TURI keeps a [list of dedicated wet garment cleaners](#) for public use.

TURI also provided a grant to and held a demonstration event at Jackson Cleaners in Melrose, which switched from using perc to professional steam cleaning technology, a safer alternative that uses special detergents and a computer controlled cleaning unit. Owner Thanh Dinh is the first in the U.S. to adopt steam cleaning. To date, the facility reports higher quality cleaning and financial savings compared to the perc system; TURI is working with the facility to document these outcomes.

TURI published a detailed economic analysis of the experience of five dry cleaners that received a grant from TURI to shift from perchloroethylene to dedicated professional wet cleaning. All five of the cleaners achieved financial savings as a result of the switch to the safer technology.

Aerospace and Defense Sector

In FY17 TURI completed the third phase of a multi-year collaborative research project working with companies in the aerospace and defense sector and several government agencies to research safer alternatives to the use of hexavalent chromium in coating and corrosion protection applications. Key participants include Raytheon, Lockheed Martin, Northrop Grumman, Bombardier, GE Aviation, Textron Aviation, NASA, the U.S. Navy, and the U.S. Air Force.

The research participants conducted testing at U.S. Navy facilities and NASA to evaluate the technical performance of non-hexavalent chromium structural adhesive bond primers, with positive results for several safer alternatives. An outline of the project methodology and conclusions will be published in the journal *Products Finishing* during FY18.

Safer Alternatives for Sports Fields

TURI has received numerous queries from municipalities and other institutions working to make decisions about whether to install artificial turf fields. In response to these queries, TURI has conducted research and created a number of informational resources. These include an overview fact sheet, a video, and a set of detailed chapters on individual topics, including installation and maintenance costs, heat, injuries, and information on the variety of types of infills that can be used in artificial turf systems. TURI also continues to provide educational resources on options for managing natural grass fields organically, and has created a video about the experience of the town of Springfield in converting its fields to organic management.

Food and Beverage Processing

In FY17 TURI provided three business grants to facilities in the food and beverage sector. Merrimack Ales (Lowell) was provided with a second year of funding to explore safer ways to clean and sanitize their brewing vats; Little Leaf Lettuce (Devens) partnered with UML Professor Boce Zhang to find non-chemicals ways to clean their growing gutters; and Cape Cod Chips (Hyannis) purchased new lab equipment to significantly reduce their chemical use in frying oil testing procedures.

TURI also supported the EPA-funded grant project mentioned earlier in this report, "[Green Your Bottom Line in Food and Beverage Businesses](#)," administered through the Lowell Center for Sustainable Production. This project was designed to advance awareness and adoption of pollution prevention practices to reduce the use of energy, water, and toxics, in the food and beverage sector. TURI's support focused on chemical use reduction.

Laboratory Services

[TURI's laboratory](#) continues to provide free testing services to Massachusetts companies looking for safer cleaning alternatives. The lab tested the performance of safer cleaning solutions for 14 Massachusetts companies in the metalworking, military, furniture, microwave, medical supply, advanced ceramic components, footwear, components, adhesives, laboratory equipment manufacturing, and musical instruments sectors. Additionally, the lab completed 35 fee for service projects for formulators of cleaning projects. These projects were part of the companies' efforts to have products certified for Green Seal, EPA Safer Choice or UL Ecologo. Of these 35 projects, six were from Massachusetts.

The lab continued to offer services to industry and the Commonwealth in the area of janitorial cleaning. The lab worked with the Massachusetts Department of Conservation and Recreation, the Massachusetts Bay Transportation Authority, the Massachusetts Department of Transportation, the Massachusetts Toxics Reduction Task Force, the Massachusetts Operational Services Division (OSD) Environmentally Preferable Purchasing Program, and six cities across the state, helping both state agencies and schools move to greener janitorial cleaning chemicals and systems.

Library and Information Services

The TURI Library continued to respond to information requests from businesses, state and municipal agencies, nongovernmental organizations, and individuals. Information requests have included queries about specific chemicals (e.g., 1,4 dioxane and benzene); industrial processes (e.g., cadmium telluride in solar panels, formaldehyde in wood panel manufacturing); alternatives assessment (e.g., alternatives to formaldehyde, alternatives to crumb rubber used in artificial turf); and safer alternatives (e.g., for road de-icing, wood preservatives, BPA-free coatings for can liners, for polystyrene in drink/food containers and thin film, plastic shopping bags). Literature searches were also performed (e.g., quantum dot toxicity).

TURI published updated fact sheets on [toluene diisocyanates \(TDI\)](#) and [n-propyl bromide \(nPB\)](#), providing information on health and environmental effects, use in Massachusetts, safer alternatives, and regulatory context.

Publications, Presentations, and Educational Materials

TURI publishes educational materials for a variety of audiences, including TUR Planners, professionals in industry sectors that use toxic chemicals, and the general public.

TURI staff also provided educational presentations in a variety of settings. Topics included TURA program resources, updates to the Toxic Substances Control Act (TSCA), alternatives assessments, green chemistry, green cleaning, alternatives to perchloroethylene in garment care, flame retardants, and TUR for business safety and efficiency.

The TURI library's weekly newsletter, *Greenlist Bulletin*, continued to provide information on recent news and publications. *Greenlist* circulates to over 700 opt-in recipients. TURI also publishes a monthly newsletter featuring activities like grants, demonstration and training events, and recent publications, as well as upcoming events.

Press Coverage

Press coverage, both print and online, is another important route for public and business education about safer alternatives to toxic chemicals. In FY17, the work of the TURA program was featured in a variety of press outlets, with coverage of topics including Toxic Substances Control Act (TSCA) policy changes, trichloroethylene (TCE), and artificial turf. FY17 press coverage is shown in the Appendix.

Department of Environmental Protection (MassDEP)

MassDEP administers the regulatory components of the TURA program and supports the work of the other TURA agencies with data and policy analysis, strategic planning, training outreach and education.

Toxics Use Reporting

Each July 1, large-quantity toxics users submit an annual report to MassDEP on each chemical listed under TURA used in above-threshold amounts during the previous calendar year. These reports supplement the Toxics Release Inventory (TRI) report that must be submitted to the U.S. Environmental Protection Agency and MassDEP on the same date. The TURA report documents the quantities of chemicals used, shipped in or as product, or generated as waste. The TRI reports document the quantities of chemical going to air, soil, water, or shipped to an offsite waste management facility or wastewater treatment plan. In FY17, MassDEP processed more than 1,500 individual chemical use reports from 480 facilities. Managing the reporting process involves assisting filers with the reporting process through phone or email; entering reporting and fee data into the data systems; checking reports for accuracy and compliance; following up on chemical use report and plan summary anomalies; identifying facilities that failed to submit required reports; plan summaries and fees; taking enforcement actions, as necessary; and processing fees. In FY17 MassDEP replaced its reporting system, and improved the reporting forms to make it simpler to submit the required data.

Toxics Use Reduction Planning

Every other year large quantity toxics users are required to identify and evaluate opportunities to reduce the use of toxic chemicals. Companies evaluate the options they identify for technical and economic feasibility to determine if there are changes to their production process that would both reduce the use and waste of inputs and make economic and business sense to implement. These plans are reviewed and approved by a MassDEP certified Toxics Use Reduction Planner (TUR Planner).

By July 1, 2016, MassDEP received Toxics Use Reduction Plan (TUR Plan) summaries from 403 companies covering 1189 chemicals; 12 “Environmental Management System (EMS)” plan summaries in which the company incorporates toxics use Reduction Planning into their existing Environmental Management Systems; and 9 Resource Conservation plans which focused on one or more of the following: energy use, water use, solid waste generation, or the use of toxic substances that are not subject to TURA reporting requirements. The analysis of the data from plans submitted was completed during FY17.

Outreach

In FY17, MassDEP updated the [TURA Reporting Instructions and Appendices](#) and the TURA Chemical List. In addition, the agency updated the [TURA Planning, Resource Conservation Planning and Environmental Management System Planning guidance](#) documents.

MassDEP also participated in the development and delivery of the TURI sponsored Continuing Education conferences, and the TURA Planner Training Course. MassDEP worked with OTA and TURI to provide four TUR Reporting Training sessions in spring 2017.

Enforcement

During FY17, MassDEP inspected 55 TURA filers and screened another 222 facilities to determine if they were subject to TURA. MassDEP also issued enforcement actions, including 14 Notices of Noncompliance (NON) for either late filing or failure to file, based on report reviews, and 2 NONs for failure to file, based on inspections.

Amnesty Program and Next Steps

In order to address a problem of failure to comply with the TURA reporting and planning requirements, MassDEP offered an Amnesty Program between January 1, 2015, and July 1, 2016. Under the terms of the Amnesty, facilities that voluntarily submitted previously owed reports received a warning letter and were required to pay one year of back fees and statutory late fees. The

agency's normal enforcement response is to issue a NON to facilities that had failed to file and require them to pay three years of back fees and statutory late fees.

The Amnesty Program was a success. 118 facilities submitted 418 reports they had failed to file between 2010 and 2014. 25 of these facilities had never reported under TURA previously, 26 had reported in prior years but had stopped reporting prior to Amnesty, and 67 facilities were current reporters of other TURA reportable chemicals. 22 of these facilities had reported every year since the program began. The 418 reports covered a total of 91 different chemicals with acids and bases being the most common chemical reports received.

As a result of the Amnesty Program, 11 million additional pounds of toxics substances were reported for reporting year 2015 and 27 million additional pounds were reported for reporting year 2016. The increase between 2015 and 2016 was largely due to a distributor's increased sales of certain listed chemicals.

Because of the success of the program, MassDEP adopted a permanent change to its enforcement response policy for self-disclosure of a failure to file a required TURA report. The new self-disclosure policy maintains some of the features of the Amnesty Program. The terms remain the same for facilities that have never previously reported under TUR and inform MassDEP that they need to file within 45 days of discovering their lapse. "New" facilities that delay notifying the agency, as well as facilities that have filed previously, receive a NON and are required to submit two years of back fees and reports. Facilities discovered by MassDEP receive a NON and are required to submit four years of back fees and reports.

In addition, MassDEP has instituted a new operational procedure whereby any facility that reports a chemical for the first time without indicating they are "self-reporting" a substance that should have been reported in a prior year will receive a formal "Request for Information" (RFI). The RFI requires companies to determine whether they owed a report for the chemical in any prior years, and certify as to the truth of their statement. This approach ensures that facilities do not avoid late fees and a NON by simply reporting a chemical for which they owed back reports when the annual reports are due.

In FY17 MassDEP sent out RFIs to 83 facilities that had submitted reports on previously unreported chemicals without formally participating in the Amnesty or the self-disclosure policy. These RFIs resulted in 8 companies submitting a total of 7 additional reports for reporting year 2013 and 4 additional reports for reporting year 2014, on 9 different chemicals. The additional chemical use reports account for 1.7 million pounds for reporting year 2013 and 3.5 million pounds for reporting year 2014.

Toxics Use Reduction Planner Certification

In even calendar years, large quantity toxic users must complete a Toxics Use Reduction Plan (TUR Plan). If a company has completed a plan and two updates, it may choose every other reporting year to do a similar analysis on other materials or resources used at the facility: its use of water or electricity, generation of solid waste, or use of non-reportable toxic substances. Alternatively, the business may incorporate toxics use reduction planning into its existing Environmental Management System. Toxics Use Reduction and Resource Conservation plans must be reviewed and approved by a certified Toxics Use Reduction Planner (TUR Planner) who has had the appropriate training needed to approve the facility's plan. Environmental Management System (EMS) progress reports must be reviewed and approved by either a TUR Planner or an EMS professional who has had the appropriate training to approve the progress report.

MassDEP certifies General Practice TUR Planners, who are allowed to review and approve plans developed by any company, and Limited Practice TUR Planners, who are allowed to review and approve plans at their place of employment only. As of the end of FY17, there were 177 certified General Practice TUR Planners and Limited Practice TUR Planners in Massachusetts.

In FY17, MassDEP implemented a new online [TUR Planner application and review process](#). Applicants for certification and recertification can provide all of the necessary information about their education and experience and upload the documents (such as proof of attendance at continuing education courses) that back up the information they provided. MassDEP is able to review all of the information online and electronically generate an approval letter and certification card that are emailed to the applicant. In addition, MassDEP offered the TUR Planner exam to nine individuals who had completed the TURI TUR Planner course (eight

individuals passed the exam); certified 7 new TUR Planners and recertified 19 TUR Planners whose two-year certification was due to expire.

Data Analysis

In FY17, MassDEP worked to significantly update and expand the analysis of reported TURA data, with a particular focus on evaluating the implementation of toxics use reduction. The most recent data available derives from the 2014 calendar use reports that were due on July 1, 2015. These facilities:

- Used a total of 901 million pounds of 145 different chemicals;
- Generated 73 million pounds of chemical as byproduct (chemical waste);
- Released 3 million pounds of chemical waste as pollution; and
- Transferred 31 million pounds of chemical waste offsite for further treatment or management.

The data indicate that over three quarters of the facilities that are subject to TURA have adopted measures that reduce the use and waste of their chemicals, and more than half have eliminated reportable uses of one or more chemicals. More information and analysis is available in the [MassDEP information release](#) and [TURI TURADData repository](#).

Fee Revenue

TURA-regulated facilities must pay annual fees, unless they have obtained a financial hardship waiver. In FY17 there were no fee-waiver requests. MassDEP collected:

- \$2,983,355 in annual fees and statutory late fees, and
- \$6,400 in fees from TUR Planners who applied for the DEP's certification or recertification.

Appendix

Fiscal Year 2017 Revenue and Expenditures

FY17 Revenues

TURA Fees Collected: \$2,983,355

TUR Planner Fees: \$6400

Total: \$2,989,755

FY17 Expenditures

OTA

Personnel costs: \$618,089

Administrative costs: \$13,068

Other costs: \$1,708

Total: \$632,865

MassDEP

Personnel Costs: \$632,410

Administrative Costs: \$23,214

Total: \$655,624

TURI

Personnel (staff and students): \$1,157,200

Education and training events¹: \$44,400

University research and laboratory: \$134,300

Grants to businesses, community groups, and municipalities: \$113,600

Administrative: \$45,700

Library and information: \$53,300

Communications, printing, website and educational outreach: \$72,600

Total: \$1,621,100

¹ TURI also collected \$42,500 in training registration fees, which went to support staff salaries and operating expenses.

Fiscal Year 2017 Selected Events, Workshops, and Training Programs

- "Beyond the MSDS" workshops, Lowell, MA, September 15, 2016; February 28, 2017; March 30, 2017.
- Celebration of Massachusetts Manufacturing Month: Tour of Mark Richey Woodworking, Newburyport, MA, October 27, 2016.
- "Environmental Management System (EMS) for TURA Certification" course, Lowell, MA, January 29 and 26, 2017.
- "Green Your Bottom Line in Food & Beverage Processing" workshops in Cambridge, MA, March 13, 2017; Gorton's Seafood, Gloucester, MA, May 3, 2017; at Stop & Shop New England Distribution Center, Assonet, MA, April 4, 2017; in Springfield, MA, November 17, 2016.
- Greener Materials Research Symposium, UMass Lowell, May 10, 2017.
- Hands-on Demonstration of the Professional Steam Cleaning Process, Jackson Cleaners, Melrose, MA, July 20, 2016.
- "Honoring Champions of Toxics Use Reduction in Massachusetts" awards/outreach event, State House, Boston, MA, June 20, 2017.
- "Preparing Do-It-Yourself Home Cleaners" student workshop, Lowell High School, Lowell, MA, November 30, 2016.
- "Reducing Gymnast Exposure to Flame Retardants in Foam Pits" webinar, June 6, 2017.
- TRI/TURA RY-2016 Compliance Assistance Workshops, in Fall River, Holyoke, Worcester, and Newburyport, MA, on May 9, May 11, May 23, and May 25, 2017.
- TURI Open House, Lowell, MA, October 5, 2016.
- TUR Planner Certification Exam, Lowell, MA, December 9, 2016.
- TUR Planners' Continuing Education Conferences, Fitchburg, MA, April 6, 2017; Framingham, MA, November 15, 2016.
- TUR Planner Course, Waltham, MA, September 6, 2016.
- "Using Toxics Use Reduction Planning Techniques to Improve Efficiency and Promote a Safer Work Environment" webinar, February 16, 2017.

Fiscal Year 2017 Selected Publications and Presentations

Reports and Journal Articles

- Eliason, P., To Detox Manufacturing, Businesses Find a Secret Ingredient, GreenBiz P2 Impact, December 2016. Available at <https://www.greenbiz.com/article/detox-manufacturing-businesses-find-secret-ingredient>
- Geiser, K., and Massey, R., Global Chemicals Outlook II: Trends in Production, Consumption and Release of Chemicals and their Environmental, Health and Social Effects. Report submitted to United Nations Environment Programme (UNEP), funded by grant to TURI from UNEP, November 2016.
- Onasch, J. et al., From Perchloroethylene Dry Cleaning to Professional Wet Cleaning: Making the Health and Business Case for Reducing Toxics, Journal of Environmental Health, vol. 79.6, January 2017. Available at http://www.turi.org/TURI_Publications/TURI_Staff_Publications/From_Perchloroethylene_Dry_Cleaning_to_Professional_Wet_Cleaning_Making_the_Health_and_Business_Case_for_Reducing_Toxics_2017
- Toxics Use Reduction Act: CERCLA Phthalate Ester Category – MA TURA Science Advisory Board Review, TURI Report 2017-001, December 2016. Available at http://www.turi.org/TURI_Publications/TURI_Reports/CERCLA_Phthalate_Ester_Category/Phthalate_Esters

Fact Sheets and Case Studies

- "Chemicals in Alternative Synthetic Infills: EPDM," May 2017. Available at http://www.turi.org/Our_Work/Home_Community/Artificial_Turf/Infills_EPDM
- "Chemicals in Artificial Turf Infill: Overview," February 2017. Available at http://www.turi.org/Our_Work/Home_Community/Artificial_Turf/Infills_Overview
- "Designation of TURA Higher & Lower Hazard Substances," revised October 2016. Available at <http://www.mass.gov/eea/docs/eea/ota/fact-sheets/high-hazard-substance-faq-final.pdf>
- "Infill Made from Recycled Tires," May 2017. Available at http://www.turi.org/Our_Work/Home_Community/Artificial_Turf/Infills_Recycled_Tires

- "Mark Richey Woodworking Inc.: Renewable Energy and Energy Efficiency," October 2016. Available at <http://www.mass.gov/eea/docs/eea/ota/case-studies/mark-richey-woodworking.pdf>
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- "Minuteman Press of Foxboro Goes all Green with New Equipment," 2017. Available at https://www.turi.org/TURI_Publications/Case_Studies/Printing/Minuteman_Press_of_Foxboro_Goes_all_Green_with_New_Equipment
- "n-Propyl Bromide," revised October 2016. Available at http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/n-Propyl_Bromide
- "OTA Climate Change Resources for Local Governments," December 2016. Available at <http://www.mass.gov/eea/docs/eea/ota/resources/climate-change-resources-for-local-governments.pdf>
- "OTA Climate Change Resources for Toxics Users," December 2016. Available at <http://www.mass.gov/eea/docs/eea/ota/resources/climate-change-resources-for-toxics-users.pdf>
- "Minuteman Press of Foxboro Goes all Green with New Equipment," 2017. Available at https://www.turi.org/TURI_Publications/Case_Studies/Printing/Minuteman_Press_of_Foxboro_Goes_all_Green_with_New_Equipment
- "Toluene Diisocyanates," November 2016. Available at http://www.turi.org/TURI_Publications/TURI_Chemical_Fact_Sheets/Toluene_Diisocyanates

Presentations

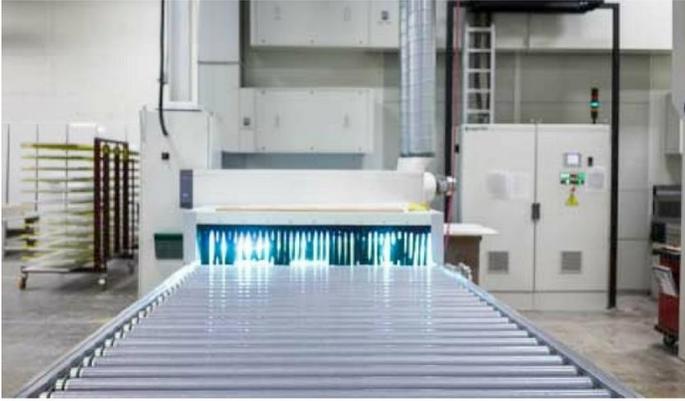
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- Butow, M., "Environmental, Health & Safety Resources Library Guide," presentations in UMass Lowell's "Chemicals and Health" and "Fundamentals of Occupational Health" courses, Lowell, MA, September 13, 2016; in UMass Lowell's "Toxicology and Health" course, Lowell, MA, January 23, 2017; and in Boston University's "Research for Environmental Agencies" course, Boston, MA, February 23, 2017.
- Eliason, P., "Build to Suit: Pragmatic Assessment of Safer Alternatives," Green Chemistry and Engineering Conference, Reston, VA, June 15, 2017.
- Eliason, P., "Moving Towards Safer Chemicals: The Massachusetts Experience." Healthier Procurement: How to Prioritize Human and Environmental Health webinar, November 10, 2016.
- Eliason, P., "Using Toxics Use Reduction Planning Techniques to Improve Efficiency and Promote a Safer Work Environment," Michigan Department of Environmental Quality webinar, February 16, 2017.
- Harriman, E., "Chemicals Regulatory Update: MA TURA, REACH, and TSCA," Invited presentation at National Association of Environmental Managers (NAEM) EHS & Sustainability Management Forum, Denver, CO, October 26, 2016.
- Harriman, E., "Flame Retardants and Fire Safety," GC3 webinar, March 2, 2017.
- Marshall, J., "Cleaning Solvents: How to Choose a Safer One," International Technical Workshop on Climate Risk, Wells, ME, October 21, 2016.
- Marshall, J., "Product Performance and Alternatives Assessments," IC2 Webinar: Evaluating Product Performance during Alternatives Assessment, December 1, 2016.
- Massey, R., "A 21st Century TSCA: Implementing our Nation's New Toxics Law," Invited Panelist, Environmental Conference of the States (ECOS) Meeting, Wheeling, WV, September 27, 2016.
- Massey, R., "The Frank R. Lautenberg Chemical Safety for the 21st Century Act: Opportunities and Resources for States," EPA Region 1 & New England States P2 Roundtable Meeting, Chelmsford, MA, January 25, 2017.
- Massey, R., and Onasch, J., "Sports Turf Alternatives Assessment: Research Update and Discussion." IC2 webinar, May 25, 2017.
- Massey, R., "The Toxic Substances Control Act and Other Policies Related to Toxic Chemicals," presentation in Tufts University's "Occupational & Environmental Health" course, Medford, MA, November 22, 2016.
- Massey, R., "The Toxic Substances Control Act and Other Chemical Policies – For Workplaces and Communities," presentation in UMass Lowell's "Work Environment Policy & Practice" course, Lowell, MA, November 28, 2016.

- Massey, R., "The Toxics Use Reduction Act (TURA): Making Massachusetts a Safer Place to Live and Work," legislative briefing, Boston, MA, May 23, 2017.
- Morose, G., "Evaluating Product Performance During Alternatives Assessments," IC2 webinar, December 1, 2016
- Myles, M., "Toxics Reduction: Good for the Planet, Good for Business," Massachusetts Green Careers Conference, Worcester, MA, September 29, 2016.
- Myles, M., "TUR Financial Analysis," Spring 2017 CE Conference, Chicopee, MA, April 6, 2017.
- Onasch, J., "Alternatives to Perchloroethylene in Garment Care," Massachusetts Health Officers Association Continuing Education Conference, Devens, MA, March 16, 2017.
- Onasch, J., "Flame Retardants in Gymnastics Foam Pit Cubes," Society of Fire Protection Engineers, Norwood, MA, March 6, 2017; Fire Prevention Association of Massachusetts, Southbridge, MA, April 4, 2017; International Society of Fire Protection Engineers webinar, June 1, 2017.
- Peck, S., "Toxics Use Reduction Act 2016 Online Filing," 2017 TURA and TRI Workshops, in Fall River, Holyoke, Worcester, and Newburyport, MA, on May 9, May 11, May 23, and May 25, 2017.
- Peck, S., "TURA Amnesty Results," 2017 TURA and TRI Workshops, in Fall River, Holyoke, Worcester, and Newburyport, MA, on May 9, May 11, May 23, and May 25, 2017.
- Skogstrom, T., "Chemical Safety and Climate Change Preparedness," Spring 2017 CE Conference, Chicopee, MA, April 6, 2017.
- Tenney, H., "The Massachusetts Toxics Use Reduction Act," remote presentation for the Vermont Agency of Natural Resources, Lowell, MA, September 19, 2016.

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- Angelo, K., "Research Aims to Reduce Toxics Used in Manufacturing," UMass Lowell News, December 22, 2016. Available at <https://www.uml.edu/News/stories/2016/TURI-Grants-2017.aspx>
- Angelo, K., "Students Dig Up Dirt at Campus Bike Shop," UMass Lowell News, February 16, 2017. Available at <https://www.uml.edu/News/stories/2017/Students-Bike-Shop.aspx>
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