Enhancing Competitiveness through Toxics Use Reduction

A Report by the Toxics Use Reduction Institute at UMass Lowell

April 2026

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

Disclaimer

The information presented in this report is based on the best available data at the time of the analysis. The figures and estimates may not capture all costs and savings associated with the toxics use reduction projects examined. Estimating the costs and benefits of toxics use reduction requires in-depth knowledge of facility operations, and a wide-ranging view of public health, worker health and company profits.

The inclusion of company logos is intended to provide examples of organizations engaged in this work and does not imply endorsement by the Toxics Use Reduction Institute (TURI) or any of its partner agencies.

Acknowledgements

This report was prepared by the Toxics Use Reduction Institute.

Lead Author: Colin Hannahan

Contributing Authors: Heather Tenney, Hayley Hudson

Additional Input: Stacie Caldwell, Pam Eliason, Greg Morose

Design: Colin Hannahan, Stephan Anstey

TURI would like to thank the Massachusetts companies under the TURA program as well as the toxics use reduction planners that have worked to protect workers, public health and the environment through safer chemical innovation.

TURI would also like to thank all TURA program staff members, both past and present, as well as all members of the TURA Administrative Council, the TURA Science Advisory Board and the TURA Advisory Committee for their contributions to making Massachusetts a safer place to live and work.

Contact

info@turi.org
978-934-3275
126 John Street Ste 14, Lowell, MA 01852

www.turi.org

About the Toxics Use Reduction Institute of Massachusetts (TURI)

The Toxics Use Reduction Institute (TURI) is a research and training organization dedicated to advancing safer chemical solutions. Established in 1989 following the adoption of the Massachusetts Toxics Use Reduction Act, TURI is based at the University of Massachusetts Lowell.

TURI works in close collaboration with businesses of all sizes, government agencies, local communities, non-profits, labor groups and international partners to develop and promote safer alternatives to hazardous chemicals. Together with its partner organizations—the Office of Technical Assistance and the Massachusetts Department of Environmental Protection—TURI has helped make Massachusetts a safer place to live and work while strengthening the competitiveness of businesses across the Commonwealth and beyond.

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

About the Toxics Use Reduction Act of Massachusetts (TURA)

Adopted in 1989, the Toxics Use Reduction Act (TURA) of Massachusetts is designed to protect public health and the environment while enhancing the competitiveness of Massachusetts businesses. Under TURA, facilities that use large amounts of TURA-listed substances are required to report annually on their chemical use, conduct toxics use reduction planning every two years, and pay a yearly fee. The Toxics Use Reduction Institute, The Massachusetts Office of Technical Assistance (OTA) and the Massachusetts Department of Environmental Protection (MassDEP) are responsible for implementing TURA.

The fees paid by TURA filers support the work of the TURA implementing agencies, and are used to provide a wide variety of services, including training, grant programs and technical assistance. Data collected under TURA is unique globally and is available to the public at TURAdata.org. More information on TURA is available on TURI's webpage.

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

OTA
OFFICE OF TECHNICAL ASSISTANCE & TECHNOLOGY

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection

Preface

Enhancing the competitiveness of Massachusetts businesses is a core objective of the Toxics Use Reduction Act (TURA). Since its adoption in 1989, incentives and support under TURA have successfully provided companies with a range of competitive advantages. Across Massachusetts, small manufacturers from diverse industrial sectors, multinational corporations and family-owned businesses have all benefitted economically through safer chemical innovation. While the motivation and goals for companies differs depending on sector, size and structure, the results remain the same – lower costs with stronger protection for public health, workers and the environment. This report highlights the experience of companies that gained a competitive advantage following toxics use reduction implementation.

In an increasingly difficult landscape for businesses in Massachusetts, the technical and financial support provided by the TURA program is more essential than ever. Federal prohibitions for chemicals still used by small businesses in Massachusetts are being introduced. Corporate and government policies targeting PFAS are emerging rapidly. Drawing on examples of companies which have successfully leveraged TURA technical and financial support, this report showcases the program as a globally unique model for public-private collaboration with the potential to achieve public health, environmental and industry goals. It concludes that renewed investment in the TURA program is a winning strategy for people, business, and health.

Table of Contents

1. **Introduction:** Toxics Use Reduction and Competitiveness 1

1.1 Cost Effectiveness of Toxics Use Reduction 2

1.2 Toxics Use Reduction to Gain a Competitive Advantage 4

New Method Plating Case Study: TURI Grant Supports Safer Chemistry and Real Cost Savings 7

1.3 A History of Enhancing Competitiveness: The Toxics Use Reduction Act of Massachusetts 9

1.4 TURA Program Services to Enhance Competitiveness 10

1.5 The TURI Grant Program 12

TURI's Drive to Zero Case Study: From Halogenated Solvents to Competitive Advantage 14

2. **Improved Productivity** through Toxics Use Reduction 15

2.1 Increased Throughput 16

2.2 Waste Reduction as a Measure of Productivity 17

Boyd Case Study: TURA Program Collaboration Leads to Greater Throughput 18

3. **Stronger Market Position** through Toxics Use Reduction 20

3.1 Meeting Market Expectation 21

3.2 Facilitating Supply Chain Collaboration 24

3.3 Staying Ahead of Regulations 26

3.4 Lower Regulatory Costs 29

4. **Greater Resource Efficiency** through Toxics Use Reduction 33

4.1 Lower Water, Energy and Chemical Costs 34

4.2 TUR Planning for Greater Resource Efficiency 36

4.3 Reducing Personal Protective Equipment Costs 38

CD Aero Case Study: Unlocking Resource Savings and Production Capacity through TUR 40

Conclusion and References 42

1

Introduction: Toxics Use Reduction and Competitiveness

1.1 Cost Effectiveness of Toxics Use Reduction

1.2 Toxics Use Reduction to Gain a Competitive Advantage

New Method Plating Case Study: TURI Grant Supports Safer Chemistry and Real Cost Savings

1.3 A History of Enhancing Competitiveness: The Toxics Use Reduction Act of Massachusetts

1.4 TURA Program Services to Enhance Competitiveness

1.5 The TURI Grant Program

TURI's Drive to Zero Case Study: From Halogenated Solvents to Competitive Advantage

1.1 Cost Effectiveness of Toxics Use Reduction

Preventing pollution at the source is the most effective way to reduce harm from hazardous chemicals. Removing chemicals from the environment is difficult and costly, often requiring significant taxpayer investment. Between 1997 and 2017, $21 billion was spent to mitigate pollution under the EPA superfund program.[1] PFAS, a class of chemicals which is highly persistent in the environment*, costs between $2.7 million and $18 million dollars per pound to remove and destroy from municipal wastewater.[2]

* See TURI PFAS Fact Sheet for more info

To address widespread PFAS pollution in Massachusetts, over $900 million in public funds have been spent on mitigation loans to municipalities with contaminated drinking water.[3]

Toxics use reduction (TUR) stops pollution before it enters the environment. It prevents future clean-up and is the most cost-effective method for protecting public health, workers and the environment from hazardous chemicals. Figure 1 (p. 3) details the solutions targeted by the TUR approach.

$21 Billion

Spent on pollution cleanup under the EPA superfund program from 1997 to 2017

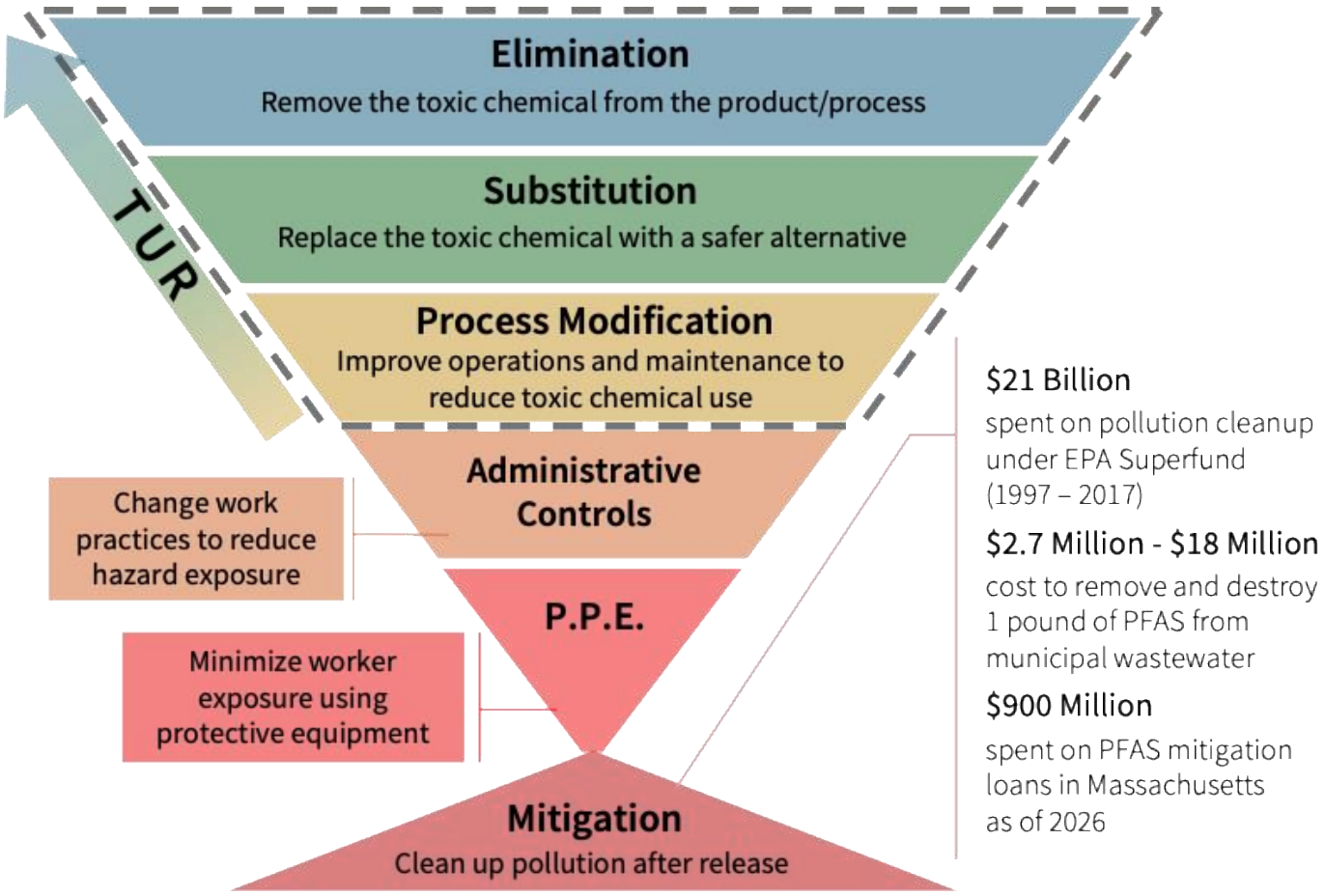
$900 Million

Spent on PFAS mitigation loans in Massachusetts as of 2026

$2.7 Million to $18 Million per pound

Cost to remove and destroy PFAS from municipal wastewater

Figure 1: Hierarchy of Solutions Targeted by Toxics Use Reduction

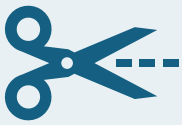


1.2 Toxics Use Reduction to Gain a Competitive Advantage

Toxics use reduction (TUR) saves businesses money and enhances their competitiveness. The EPA's Pollution Prevention (P2) program supports small businesses to implement TUR solutions. A program assessment found that 504 businesses receiving P2 grants between 2011 and 2022 saved over $2.3 billion. [4]

The Toxics Use Reduction Act (TURA) program has helped Massachusetts industry to become a leader in safer chemical innovation. Despite significant reductions in chemical use and release, businesses that report under TURA continue to grow. From 2000 to 2023 TURA filers increased their production by 51%. [5,*]

This report highlights how businesses grow and gain a range of competitive advantages through TUR implementation. Figure 2 (p. 4) outlines the competitive advantages gained by companies which implement TUR. Table 1 (p. 5) provides an overview of key companies covered in the report.



$2.3 Billion

Saved by businesses under EPA's P2 program from 2011 to 2022

51% Increase

In production among TURA Filers from 2000 to 2023

* Among 2000 TURA Core Group. See TURA Information Release for more details

Figure 2: Competitive Advantages Delivered Through Toxics Use Reduction

Improved Productivity

Eliminates process bottlenecks, reduces waste, and increases throughput—allowing companies to produce more with fewer resources.

Stronger Market Position

Better prepares businesses for evolving regulations and customer expectations, reducing compliance costs and expanding market access.

Greater Resource Efficiency

Reduces use of chemicals, energy, and water along with lower costs associated with waste management, PPE, and pollution control equipment.

Table 1: Massachusetts Companies Highlighted in this Report

Company (sector)	Annual Savings	Toxics Use Reduction (lbs./year)	Competitive Advantages Gained
CD Aero (electronics component manufacturing)	$46,450	5,600	
Steel Art Co. (signage)	$52,275	6,020	
Boyd (electronics component manufacturer)	$31,000	16,000	
Umicore (industrial metals)	$24,461	2,000	
New Method Plating (metal finishing)	$57,000	980	
Synventive (plastics)	$31,000	2,800	
Vishay Sprague (semiconductors)	$8,750	1,700	

New Method Plating Case Study: TURI Grant Supports Safer Chemistry and Real Cost Savings

New Method Plating, a third-generation family business in Worcester, MA, leveraged TURI technical support and grant funding to implement a toxics use reduction innovation that eliminated their use of trichloroethylene*, a known carcinogen.

The safer chemical solution strengthened worker and community health protections while delivering significant cost savings.

* See TURI TCE Fact Sheet for more info

$57,000
Annual Cost Savings

65%
Reduction in Energy Use

1.5x
Greater Throughput

Improved Productivity
Increased throughput with reduced need for worker training and maintenance.

Stronger Market Position
Avoided federal restrictions while strengthening supply chain relationships. Saved on costs related to regulations and hazardous waste management.

Resource Efficiency
Drastically reduced energy use while lowering chemical and PPE costs.

In December of 2025, New Method Plating and TURI collaborated to host an on-site demonstration event for the new technology. The event highlighted the benefits of the TUR solution and to advance adoption across Massachusetts.

A full case study on New Method Plating's toxics use reduction journey is available online.

Photo from TUR Demonstration Event Hosted by TURI and New Method Plating [6]

New Method Plating Co., Inc.
Established 1931

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

1.3 A History of Enhancing Competitiveness: The Toxics Use Reduction Act (TURA)of Massachusetts

Since its adoption in 1989, the Massachusetts TURA program has supported enhanced competitiveness among a diverse range of businesses in the Commonwealth.

Figure 3 includes past projects in which businesses worked with TURA program agencies to gain a competitive advantage. More details on these projects can be found in the 2017 report *Toxics Use Reduction and Resource Conservation: Competitiveness Impacts for Massachusetts Businesses*.[7]

50%

Drop in operating costs within 7 years of TURA's adoption [8]

$4.5 Million

Annual savings due to TUR implementation from 2000 to 2006 [9]

Figure 3: Past Projects in which Businesses worked with TURA program agencies

2005 Metal Plater Achieves Annual Savings Over $1 Million

A safer chemical solution replaced a carcinogenic metal and tripled the facility's production capacity.

2001 - 2004 TURI Leads Consortium of 25 Businesses to Remove Lead from Electronics

Companies along the electronics value chain, including 14 MA facilities, implemented lead-free solutions, ensuring global competitiveness and increasing speed to market.

2014 Semiconductor Manufacturing uses TUR Planning to Conserve Resources

A multinational corporation reduced water use by 90 million gallons, saving hundreds of thousands of dollars over the next decade.

1.4 TURA Program Services to Enhance Competitiveness

TURI and OTA provide a suite of services that support businesses to reduce their use of hazardous chemicals and enhance competitiveness.

Companies in Massachusetts can access these services free of charge. The TURA program's capacity to provide businesses with free services depends on the fees paid annually by the regulated community.

Laboratory & Research Services

TURI's labs are staffed by experienced chemists, engineers and science professionals. They help businesses identify new solutions as well as support on performance testing and validation.

On-site Assistance

Facility visits by TURA program expert staff help to identify TUR opportunities and implement safer solutions. OTA's on-site services are completely confidential.

Financial Assistance

TURI's industry and research grants fund projects and provide technical support which advance safer chemical solutions.

Training & Education

The TURA program facilitates collaboration between businesses and conducts demonstration events to spread the adoption of TUR innovations. Events and courses help businesses learn TUR strategies and techniques.

Tools & Reports

The TURA program ensures its knowledge and experience is useful to businesses via a range of tools and reports. Examples include TURI's CleanerSolutions Database to assist in finding safer industrial cleaning chemicals and the P2OASys tool for hazard assessment.

Quantifying the Value of TURA Program Services

The TURA program's expertise and infrastructure have proven invaluable for small businesses with limited capacity to conduct rigorous research and development. Services by TURA program agencies help companies identify and implement safer alternatives that are both reliable and affordable. In other states, companies must invest significant employee time and money, or hire consultants, to develop and implement similar toxics use reduction efforts.

Table 2 is from an industry analysis on costs and resources required to develop an alternative to trichloroethylene (TCE) in industrial cleaning applications.[10] TCE is carcinogenic and its use is restricted in the United States. TURI has helped many companies develop and implement safer alternatives to TCE. Companies in Massachusetts can approach TURI for support on these activities free-of-charge.

Table 2: Estimated Costs of Activities to Develop Safer Alternatives

Activity	Employee Time (Hours)	Cost
Research cleaning options	60	$7,500
Independent lab testing	-	$4,000
Fine tune equipment and process design	40	$8,000
Evaluation of testing	8	$1,000

1.5 The TURI Grant Program

The TURI grant program assists companies in Massachusetts to achieve long-term cost savings and an improved market position via TUR innovation. Small businesses, facilities with difficult toxic chemical issues, and innovations that enable broader TUR adoption across the state are prioritized under the program. Many of the companies detailed in this report were supported by TURI grants.

Business Grants

Business grants provide companies with financial and technical assistance to implement TUR projects. Grantees are encouraged to host demonstration events that help additional companies in Massachusetts and beyond to adopt similar innovative technologies. Between 2017 and 2025, every $1,000 spent on TURI business grants resulted in companies saving an average of $1,150 every year.*

* Among companies for which total savings data is available.

Research Grants

Research grants connect Massachusetts businesses with university scientists to develop safer alternatives for toxic chemicals that are difficult to replace. The projects target high-performing chemicals such as PFAS or those which require precision functionality in, for example, medical or aerospace applications.

115%

Annual savings generated relative to TURI grant funding (2017-2025)

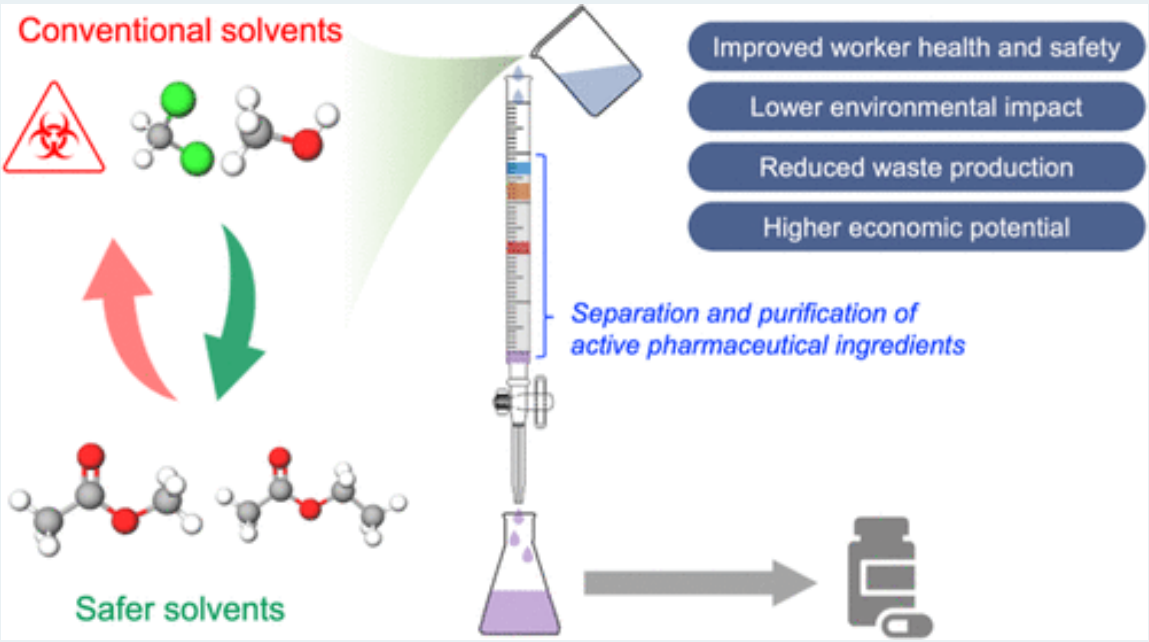
VERANOVA

TURI Research Grant Enables Academic Collaboration for a Safer and More Efficient Massachusetts Life Sciences Industry

The TURA program helps biotech companies improve safety and competitiveness by funding research into safer, more efficient chemical use. A TURI research grant supported a collaboration with Veranova (formerly Johnson Matthey) to test alternatives to the carcinogen methylene chloride for its use in purification of drugs such as ibuprofen and aspirin.

The substitutes developed under the grant indicated better performance and efficiency under laboratory conditions, creating a potential opportunity for significant cost savings to be explored during the pharmaceutical manufacturing process.

Figure 3: Diagram Showing Potential of Safer Solvents in Pharmaceutical Manufacturing from ACS Journal Article Published Following Collaboration [11]



TURI's Drive to Zero Case Study: From Hazardous Solvents to Competitive Advantage

Halogenated solvents are a class of chemicals widely used in industrial cleaning and manufacturing processes, as well as in some consumer products such as paint strippers and adhesives. They share common hazards such as acute respiratory irritation, liver toxicity and nervous system effects. Several are classified as carcinogens and are facing bans in the United States and globally.

Companies that find safer alternatives to halogenated solvents enhance their competitiveness by lowering costs, improving their position in the supply chain, and reducing liabilities associated with releases, exposures or future restrictions.

The TURA program has a long track record of success supporting companies to eliminate their use of halogenated solvents. Resources such as TURI's CleanerSolutions Database [12] and the TURI Report on *Alternatives to Halogenated Solvents Used in Surface Cleaning*[13] seek to make this experience useful to other companies.

TURI's "Drive to Zero" was launched in 2023 and aims to fully eliminate halogenated solvent use in Massachusetts and has resulted in a safer, healthier and economically stronger Commonwealth. It is an example of the TURA program's ability to enhance competitiveness by targeting safer solutions to a particular group of harmful chemicals. The TURA program has recently prioritized PFAS for similar action.

TURI TOXICS USE REDUCTION INSTITUTE UMASS LOWELL

Results of TURI Work on Halogenated Solvents Alternatives (2017-2025)

$270,000
Annual Savings Generated

$1.4 Million
Invested into Safer Chemical Technology

1,390 Workers
Protected from Hazardous Solvents

62,100 lbs.
Carcinogenic Chemicals Eliminated

2

Improved Productivity through Toxics Use Reduction

2.1 Increased Throughput

2.2 Waste Reduction as a Measure of Productivity

Boyd Case Study: TURA Program Collaboration Leads to Greater Throughput

2.1 Increased Throughput

An American Industrial Hygiene Association (AIHA) study of over 50 companies found that hazard elimination and safer substitution create efficiencies throughout business operations, resulting in large payoffs.[14]

Ways that toxics use reduction can increase throughput include reducing the need for maintenance, speeding up production cycles and eliminating obstacles to process efficiency.

Companies that leverage TURA program services to implement safer chemical solutions often increase their throughput, allowing them to sell more products and increase revenue. Businesses across Massachusetts have achieved greater productivity while participating in the TURA program. From 2000 to 2023, companies under TURA achieved a 51% increase in production while reducing overall chemical use by 67%.[14]

S.E. Shires Co.

S.E. Shires Implements TUR to Improve Process Efficiency, Gain Manufacturing Capabilities and Increase Throughput

SE Shires is a brass instrument manufacturer that has operated in Holliston since 1995. A TURI grant and technical support from the Office of Technical Assistance (OTA)* helped SE Shires identify and implement innovations to reduce its use of two carcinogenic halogenated solvents.

The safer chemical solution enhanced the efficiency of the company's manufacturing process, reducing bottlenecks at key production stages and increasing its capability to manufacture larger instruments.

The CEO of S.E. Shires examining an instrument part [15]

* See OTA Case Study for more info

2.2 Waste Reduction as a Measure of Productivity

Waste reduction is a key indicator of improved productivity and TURA has helped Massachusetts Industry become a leader in this area. Since TURA's adoption, Massachusetts has achieved greater reductions in waste generation than 45 out of 48 states.[+] Reporting data under TURA shows a 73% reduction in waste generation between 2000 and 2023 (Figure 3).[*]

These numbers are both adjusted for changes in production, meaning companies in Massachusetts are producing more output with less waste. This trend also reflects substantial cost savings from reduced waste handling, treatment and disposal.

3rd

Massachusetts Ranking among States in Waste Reduction since TURA's adoption

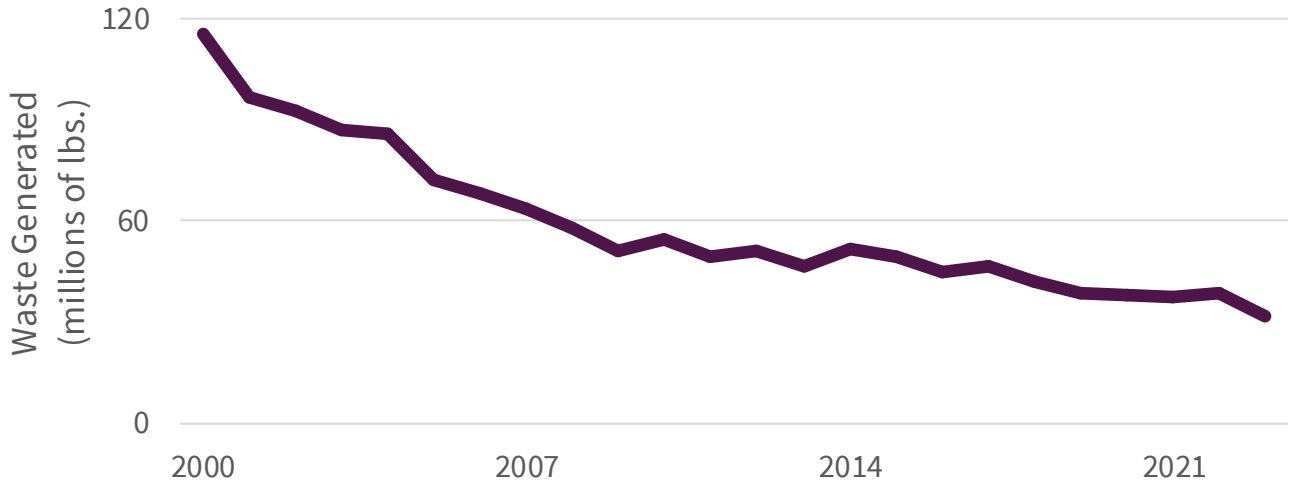
73% Reduction

Hazardous Waste Generation since 2000

+ According to production-adjusted data for continental us states under the Toxics Release Inventory

* Among 2000 TURA Core Group. See TURA information Releases for more details

Figure 4: Reduction in Waste Generation Under TURA from 2000 to 2023*



Boyd Case Study:
TURA Program Collaboration Leads to Greater Throughput

Boyd Corporation, a manufacturer of components for the medical and semiconductor industries, worked with TURI over 6 years to eliminate a carcinogenic chemical used in its cleaning process.

A TURI industry grant and free services provided by TURI's lab gave Boyd the confidence to make a $270,000 investment in a safer chemical solution that provided it with a range of competitive advantages.

$31,000
Annual Cost Savings

3x
Greater Throughput

95%
Reduction in Labor Input

Improved Productivity

The newly automated system reduces cleaning time and requires far less labor input, freeing up the capacity of staff.

Stronger Market Position

The safer alternative eliminated several regulatory obligations, including hazardous waste handling costs, EPA bans and workplace protection requirements.

Resource Efficiency

Costs related to chemical purchasing fell 62% and $6,000 of annual savings on PPE were achieved upon TUR implementation.

Boyd presented on its toxics use reduction journey at a 2025 webinar organized by TURI's Training Program.

Slides from the presentation are available online.

The Water-Based Safer Chemical Technology Implemented by Boyd

3

Stronger Market Position through Toxics Use Reduction

3.1 Meeting Market Expectations

3.2 Facilitating Supply Chain Collaboration

3.3 Staying Ahead of Regulations

3.4 Lower Regulatory Costs

3.1 Meeting Market Expectations

TURA has consistently driven improvements in compliance and market position across the Massachusetts business community.

By prioritizing safer solutions over bans and monitoring global regulatory trends, TURA program staff help companies anticipate future requirements and meet evolving expectations from customers and corporate leaders in the global economy.

Regulatory pressure, corporate sustainability policies, and consumer preferences have all caused increased demand for safer products. To take ensure they can meet this demand, many businesses and brands have used TURA program services. For example, TURI helps to fulfil consumer-recognized sustainability standards and retailer requirements. This gains companies new customers and improves their market positions.

TRANSENE COMPANY, INC.

TURI Research Grants Help Microelectronics Company Find PFAS Alternative to Meet Customer Demands and Lower Prices

Transene, a manufacturer in the microelectronics industry, worked with TURI to eliminate PFAS from a key product. This request was partly driven by demands from downstream customers concerned about increasing liability and regulatory burden associated with PFAS use.

TURI, Transene and UMass Lowell researchers collaborated to develop a PFAS-free ingredient in eighteen months. The safer alternative delivered equal performance at less than a tenth of the price – quickly achieving widespread adoption among Transene's clients.

"This collaboration accelerated our ability to manufacture and sell safer etching products, which helps companies in the electronics supply chain meet new regulatory requirements and protect health and the environment."

— Christopher Christuk, President of Transene Company

TURI's Greg Morose works with the CEO of Transene, Chris Christuk, to evaluate PFAS-free alternatives for microelectronics applications

An EPA Safer Choice Partner of the Year, TURI Helps Companies to Improve Reputation and Gain Customers

TURI's laboratory is a recognized testing facility that provides performance evaluations for companies seeking to earn the EPA Safer Choice label for their products. Safer Choice is a trusted certification awarded to products that meet rigorous safety and performance specifications.

In a survey of over 2,000 consumers, 76% said they would use the label to inform purchasing decisions. Large retailers, such as Target and Walmart, prefer Safer Choice certified products as they align with their own chemical management strategies.[16]

TURI is a Safer Choice Partner of the Year recipient. In 2024, TURI helped a range of businesses, including Massachusetts-based manufacturers, certify over 70 products as EPA Safer Choice.

RESULTS

> 70

Products Certified by TURI as Safer Choice in 2024

TURI Helps Brands Meet Retailer Requirements

76%

Of Consumers Use Safer Choice Label to Inform Purchases

Video Link: TURI 2024 EPA Safer Choice Partner of the Year

3.2 Facilitating Supply Chain Collaboration

TURI works across the supply chain to ensure small businesses can meet the specifications of their downstream customers. A TURI-led consortium in the early 2000s brought together multinational corporations and small manufacturers to develop alternatives to lead compounds in electronics. The collaboration resulted in strengthened global competitiveness and increased speed to market for members of the consortium.

TURI supports the validation of safer alternatives to hazardous chemicals in applications with precise and rigorous specifications, such as those of the medical and defense sectors. This enables smaller manufacturers upstream to use those alternatives and reap the economic benefits of safer chemical innovation.

TURI Consortium Enables TUR Adoption along Aerospace Supply Chain

A consortium facilitated by TURI with partners in the defense and aerospace industry has advanced the development of safer alternatives to the carcinogen hexavalent chromium – a TURA higher hazard substance since 2012. Through joint research, this consortium has identified and evaluated safer hexavalent chromium alternatives which meet the demanding requirements for defense applications.

Massachusetts companies in the aerospace and defense supply chains can work with TURA agencies to implement these solutions and create safer working conditions for manufacturers and product users. These alternatives will help these suppliers remain competitive in the global defense and aerospace markets, especially as European restrictions on hexavalent chromium and the U.S. military's focus on safer substitutes reshape supply chain requirements.

TURI's Greg Morose at NASA's Testing Facility next to Aerospace Panels containing Safer Alternative to Hexavalent Chromium[17]

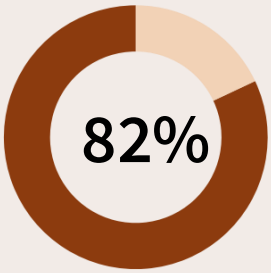
3.3 Staying Ahead of Regulations

Regulations increasingly require companies to either eliminate certain hazardous chemicals or invest in costly workplace protection measures. This trend is likely to continue given the bipartisan support for stronger government action on pollution (Figure 5).

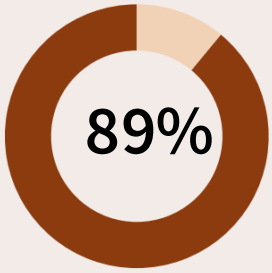
The TURA program prioritizes R&D and implementation activities for chemicals already under scrutiny by regulators and environmental advocacy groups. TURI has helped many companies avoid chemical prohibitions set by the Environmental Protection Agency, such as risk management rules for halogenated solvents under the Toxic Substances Control Act (TSCA).

This proactive approach helps businesses act years before requirements take effect, saving them money, expanding market access and strengthening their positions in the supply chain.

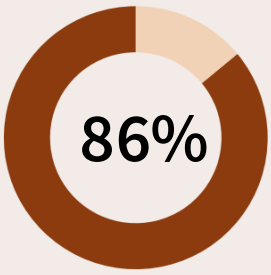
Figure 5: Surveys Demonstrating Support for Strong Government Action on Hazardous Chemicals



Think the government should take stronger action to reduce hazardous chemical exposure [18]



Support the goal of the U.S. Toxic Substances Control Act (TSCA) to ban harmful chemicals [19]



Oppose weakening the Environmental Protection Agency [20]

TURA Higher Hazard Substances

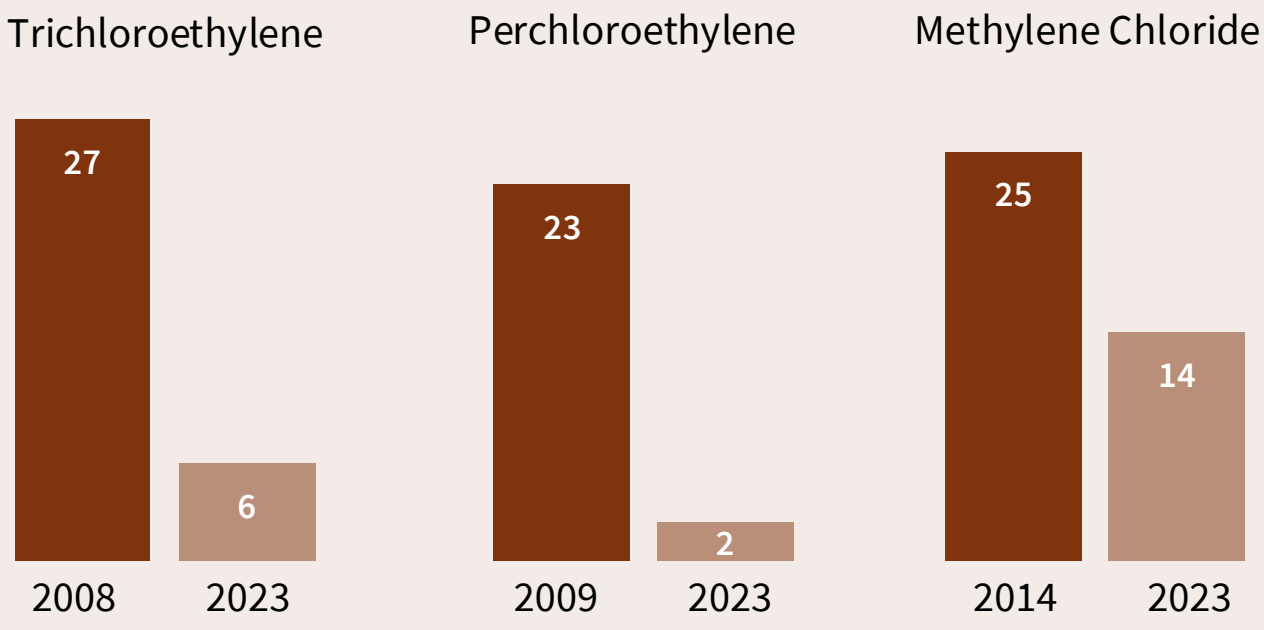
Early compliance achieved by Massachusetts businesses for a range of regulations has been driven by the designation of certain chemicals of concern as TURA Higher Hazard Substances (HHS). Many chemicals that are currently facing restrictions and costly workplace protection requirements by the EPA have been TURA HHS for years.

The lower reporting threshold for HHS connects more businesses with free TURA services. This helps them to find safer solutions long before restrictions come into effect. The HHS designation has been especially effective at enabling support for small manufacturers to eliminate their use of key toxic chemicals.

As of March 2026, trichloroethylene, perchloroethylene and methylene chloride are all subject to prohibitions and/or workplace requirements under TSCA. All these chemicals have been designated as TURA HHS for several years and the number of users in Massachusetts has declined significantly since their designation (Figure 6).

The companies that have stopped reporting these chemicals under TURA are from diverse sectors and many received TURA program support to find safer alternatives. These businesses strengthened their position in the market by having a proven alternative in place ahead of regulatory actions.

Figure 6: Reduction in TURA Reported Users following TURA HHS Designation



Small Business Works with TURI to Achieve Early Compliance and Stronger Market Position

Outstanding Bath Refinishing, a small business based in Milford, Massachusetts, strengthened its market position and reduced risk by proactively eliminating methylene chloride (a TURA HHS) from its bathtub refinishing process. With grant funding and lab support from TURI, the company transitioned to a safer alternative that did not require changes to its restoration methods. The alternative solution improved worker safety, reduced regulatory liability, and eliminated the need for costly respiratory protection and hazardous chemical handling protocols.

When the EPA's commercial ban on methylene chloride went into effect, Outstanding Bath Refinishing avoided last-minute disruptions, compliance costs, and loss of access to key products. The shift enhanced regulatory readiness and demonstrated how safer chemistry can serve as a strategic advantage for small businesses navigating changing regulations and workforce concerns.

Bathtub Refinishing Project Result by Outstanding Bath

3.4 Lower Regulatory Costs

Many companies have worked with TURI and OTA to eliminate or reduce their obligations under TURA and a range of other regulations such as the Resource Conservation and Recovery Act (RCRA), The Clean Air Act (CAA) and more.

This can drastically cut costs related to recordkeeping, pollution control equipment operation and liability. Reduced regulatory exposure also streamlines processes and minimizes potential disruptions due to regulatory change.

Reducing Costs under TURA

The TURA fee structure is designed to incentivize reductions in hazardous chemical use such that eliminating the use of a chemical can lead to lower or zero fees (Figure 7) .

Companies which fully eliminate their use of TURA-listed chemicals no longer incur the costs associated with TUR Planning or chemical reporting under TURA.

The costs of TUR planning vary depending on factors such as the size of the business and the number of TURA-listed chemicals used. To better understand potential savings through reduced TUR planning obligations, an informal consultation was carried out with a group of veteran TUR planners. They estimated costs to range from $1,500 for a simple TUR plan renewal addressing one chemical to $10,000 for a large company developing a new plan covering several TURA-listed substances.

Figure 7: Companies that Eliminated TURA Costs through Safer Chemical Innovation

Morgan Advanced Materials

Specialty Materials - New Bedford, MA

$6,825

Annual Savings on TURA Fees

Southbridge sheet metal works, inc.

Metal Fabrication - Sturbridge, MA

$2,950

Annual Savings on TURA Fees

steel art Architectural Signage

Steel Art Co. Leverages TURA Support to Eliminate Regulatory Obligations and Increase Efficiency

Since 1952 Steel Art Co. has been designing and manufacturing high-quality sign products. With the support of a TURI grant and TURA program technical support, the company implemented a safer alternative chemical to clean its metal sign letters.

Steel Art Co. eliminated their reporting obligations under TURA and federal hazardous waste handling laws. The new system also operated at a lower temperature and pressure, increasing workplace safety while reducing energy costs.

RESULTS

$52,275
Annual Savings

$7,150
Regulatory Costs Eliminated

97%
Reduction in Chemical Costs

62%
Increase in Energy Efficiency

Steel Art Co. High Quality Signage during Production [21]

Avoiding Workplace Compliance Costs

Beyond enabling businesses to reap the benefits of early compliance, TURA also helps them avoid substantial costs related to mandatory workplace protection measures.

Figure 7 quantifies the costs avoided by businesses which eliminate their use of trichloroethylene (TCE). This analysis is based on an independent report requested by the EPA to estimate the costs of complying with a proposed TSCA risk management rule for TCE.[22]

The costs are quantified for a hypothetical facility with 10 employees that uses TCE for open-top vapor degreasing. Under the rule, this facility would be required to comply with a workplace protection program, the costs of which are estimated in the EPA report.

Many similar facilities have worked with TURA agencies and received TURI grants to help switch away from using TCE in open-top vapor degreasing applications.

Figure 7: Estimated Costs of Workplace Compliance under EPA Risk Management Rule for Trichloroethylene use in Open-Top Vapor Degreasing

	Up front	Annually
Administrative Costs Labor costs for rule familiarization, recordkeeping and customer notification	**$593**	**$522**
Skin Protection Costs for gloves and other dermal protection equipment, labor costs for development of procedures and training	**$357**	**$1,008**
Respiratory Protection Costs related to workplace air monitoring program and respirator equipment	**$9,225**	**$20,962**

TURA Enables Small Business Investment into Safer Chemical Technology to Avoid Compliance Costs and Save Money

TURI has supported numerous family-owned dry-cleaning businesses to replace the toxic chemical perchloroethylene (PCE) with professional wet cleaning equipment – a proven safer alternative. In 2024, the EPA initiated a rule that prohibits the use of PCE in dry cleaning.

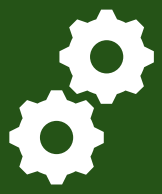
All companies who worked with TURI found that their new professional wet cleaning processes provided comparable performance to dry cleaning with PCE while also reducing overall operation costs. Assistance from TURI helped offset the capital costs of implementing alternative processes. The TURI report *Alternatives to Perchloroethylene for the Dry- Cleaning Industry* makes this information available for other businesses interested in safer solutions.[23]

Dry Cleaning Professional Using a Safer Alternative

Table 3: Savings Achieved by 3 Dry Cleaning Facilities supported by TURI to Implement Wet Cleaning

	Annual Savings	Payback Period
Facility A	$6,016	1.4 years
Facility B	$5,300	0.3 Years
Facility C	$2,907	3.3 Years

4



Greater Resource Efficiency through Toxics Use Reduction

4.1 Lower Water, Energy and Chemical Costs

4.2 TUR Planning for Greater Resource Efficiency

4.3 Reducing Personal Protective Equipment Costs

CD Aero Case Study: Unlocking Resource Savings and Production Capacity through TUR

4.1 Lower Water, Energy and Chemical Costs

Companies which implement toxics use reduction typically lower their use of resources including water, electricity and chemical feedstocks. They also find savings across operating costs that users of hazardous chemicals must pay, such as those related to the operation and maintenance of pollution control equipment.

TURA technical and financial support gives companies the confidence to invest in safer chemical innovations which enable these savings. TURI grants frequently help businesses upgrade to more efficient equipment and adopt processes that run at lower temperatures or pressures—improving both worker safety and energy efficiency.

Figure 8: Examples of Companies that used TURA Program Services to Lower Chemical Purchasing Costs

VISHAY

Semiconductors - Attleboro, MA

$4,695

Annual Savings on Chemical Costs

Synventive molding solutions
A business of BARNES

Plastics - Peabody, MA

$20,000

Annual Savings on Chemical Costs

umicore

TURA Collaboration Supports Safer Chemical Innovation for Dramatic Energy and Chemical Cost Savings

Umicore, a manufacturer of materials for the electronics industry, collaborated with TURA program staff to implement a safer solution that eliminated their use of the carcinogen perchloroethylene.

The TUR innovation delivered dramatic reductions in chemical and energy costs while aligning with the company's goals for a safer workplace.

RESULTS

50% Reduction

In Electricity and Chemical Costs

$21,500

Annual Savings

4.2 TUR Planning to Increase Resource Efficiency

The toxics use reduction planning process is especially effective at identifying opportunities to cut costs. For example, it often helps guide businesses towards identifying cost-effective safer alternatives, countering the common misconception that safer means more expensive.

In 2006, an amendment to TURA gave companies the option to periodically conduct Resource Conservation (RC) Planning. It focuses on opportunities for more efficient use of water, energy or raw materials. Many businesses in Massachusetts have achieved significant savings through RC planning under TURA.

RIVERDALE

Wire Mesh Manufacturer uses RC Planning and TUR to Cut Costs and Drastically Reduce Energy and Water Consumption

Riverdale Mills is a leading Massachusetts manufacturer of premium welded wire mesh for marine, construction and agriculture industries. Through the the TURA RC planning process, the company achieved major water and energy savings along with improved manufacturing efficiency

Outcomes of the company's RC planning included installation of new welding machine controls and improvements to its galvanizing process. These solutions were supported by a TURI grant and technical support.

RESULTS

$278,762

Annual Savings

923,100 Gallons

Annual Water Savings

1.33 million kWh

Annual Electricity Savings

Worker on the Shop Floor at Riverdale Mills

4.2 Personal Protective Equipment Costs

Personal Protective Equipment (PPE) is used to minimize worker exposure to hazardous chemicals and ranges from basic gloves and goggles to complex filtered respirators. The U.S. Occupational Safety and Health Administration (OSHA) has developed rules, many of which are enforceable by law, for PPE use in settings where hazardous chemical exposure is possible.

PPE costs are consistently lower when less hazardous chemicals are used. The American Industrial Hygiene Association determined that relying on PPE as the main form of worker protection requires extraordinary effort to verify that expected protection levels are achieved in real-world conditions. The same study also concluded that the greatest cost savings in the context of workplace safety interventions results from the elimination of PPE use.[24]

$2,000 Up front + $3,000 Annually

Estimated cost per worker for respirator program required under proposed EPA Rule for perchloroethylene [25]

"Relying on PPE as the primary means of protection requires extraordinary measures to ensure that expected levels of protection are validated in actual field operations"

– American Industrial Hygiene Association Report, *Demonstrating the Business Value of Industrial Hygiene*

Central Metal Finishing works with TURI to Improve Working Conditions and Save on Resource Costs

Central Metal Finishing serves the aircraft, automotive and electronics industries. The company partnered with TURI's cleaning lab and received a grant to replace n-propyl bromide (nPB)*. Due to hazards such as carcinogenicity, an EPA regulatory process is underway to potentially restrict the use of nPB.

The implemented TUR solution provided Central Metal Finishing with a range of resource savings. It also eliminated the need for full-face respirators, which management identified as a key factor in high worker turnover.

* See TURI nPB Fact Sheet for more info

RESULTS

$6,200

Annual Savings on PPE Costs

40% Reduction

Energy Use

66% Increase

Chemical Use Efficiency

CD Aero Case Study: Unlocking Resource Savings and Production Capacity through TUR

A leading manufacturer of electronic capacitors globally, CD Aero has been in business in New Bedford, Massachusetts for over 100 years. A TURI industry grant helped CD Aero replace its outdated vapor degreaser to eliminate the use of n-propyl bromide (nPB), a chemical linked to cancer and neurological damage.

The shift to a safer, water-based cleaning system improved worker safety and prevented over 2,300 pounds of chemical release annually while positioning CD Aero as a leader in cutting-edge cleaning technology.

$16,000

Cost Benefit from Reclaimed Manufacturing Space

$46,000

Annual Cost Savings

43%

Reduction in Steam and Electricity Costs

Improved Productivity

The modernized system reduced cleaning cycle time and requires far less labor input, freeing up the capacity of staff. It unlocked over 1,600 feet squared of manufacturing space.

Stronger Market Position

The elimination of nPB lessened costly regulatory obligations related to pollution control and avoided potential EPA bans.

Resource Efficiency

Over $35,000 of annual savings on steam and electricity were saved due to the safer chemical innovation.

TURI's Alicia McCarthy Providing On-Site Assistance for TUR Implementation

Conclusion

The Massachusetts Toxics Use Reduction Act Program is a globally unique model for advancing innovation, improving competitiveness and protecting public health and the environment.

This report clearly demonstrates that toxics use reduction results in lower costs, improved throughput, reduced regulatory burdens, expanded market access and increased resource efficiency. These outcomes helps companies gain a competitive edge in a marketplace that is challenging and rapidly evolving.

The deep technical knowledge of TURA program staff combined with the on-site support and laboratory testing provided under the program has enabled companies to undertake complex transitions to safer alternatives with confidence and measurable success. As public demand for government action on emerging issues like PFAS grows and federal regulations tighten, the capacity of TURA program agencies to support safer chemical innovation and provide technical assistance to businesses is becoming increasingly critical.

TURI's Lab Team Evaluating Safer Alternatives

Renewed investment in the TURA program will be essential to meet the growing needs of Massachusetts businesses. The fees paid by TURA program filers, which fund the technical support offered by TURI and OTA, have not changed since the law was adopted in 1989.

Accounting for inflation, TURI grant funding has fallen 84% since 2000. Given the savings and productivity generated through projects enabled by TURI grants, this reduction in funding represents a significant unrealized economic benefit for the Commonwealth.

A sustainable TURA program is paramount to not only ensure small businesses can reap the benefits of toxics use reduction, but also to prevent taxpayer dollars from being spent on costly pollution cleanup. TURA's proactive approach stops the environmental release of hazardous chemicals in the first place, preventing harmful exposures and saving public funds.

With renewed investment and new partnerships, a strong and secure TURA program can be achieved — driving economic competitiveness while making Massachusetts a safer place to live and work.

An Aerial Shot of the Merrimack River in Downtown Lowell where TURI's Office and Lab are located

References

1. Anderson, B. (2017, August 14). *Taxpayers pay billions for industrial contamination cleanup*. News21. https://troubledwater.news21.com/taxpayers-pay-billions-for-industrial-contamination-cleanup
2. Minnesota Pollution Control Agency. (2023). *Groundbreaking study shows unaffordable costs of PFAS cleanup from wastewater*. https://www.pca.state.mn.us/news-and-stories/groundbreaking-study-shows-unaffordable-costs-of-pfas-cleanup-from-wastewater
3. Commonwealth of Massachusetts. (n.d.). *PFAS mitigation loans*. Mass.gov. https://www.mass.gov/info-details/pfas-mitigation-loans
4. U.S. Environmental Protection Agency. (2025). *Results for P2 grants and SRA grants: 2011–2022*. https://www.epa.gov/system/files/documents/2025-01/results-for-p2grants-and-sra-grants-2011-2022.pdf
5. Massachusetts Department of Environmental Protection. (2025). *Toxics use reduction information release: Reporting year 2023*. https://www.mass.gov/doc/tura-information-release-reporting-year-2023/download
6. Finishing & Coating. (n.d.). *Vacuum degreasing comes of age: Inside TURI's push to replace TCE*. https://finishingandcoating.com/index.php/cleaning-pretreatment/2689-vacuum-degreasing-comes-of-age-inside-turis-push-to-replace-tce
7. Toxics Use Reduction Institute. (2017). *Toxics use reduction and resource conservation: Competitiveness impacts for Massachusetts businesses*. https://www.turi.org/publications/competitiveness-impacts-for-massachusetts-businesses-2/
8. Massachusetts Toxics Use Reduction Program. (1997). *Evaluating progress: A report on the findings of the Massachusetts toxics use reduction program evaluation*. https://archives.lib.state.ma.us/server/api/core/bitstreams/a183c8fa-9715-43a7-a7f0-ec86a0ade7f0/content
9. 2009 Independent Survey conducted by ABT Associates

10. Kanegsberg, B., & Kanegsberg, E. (2023, September 28). *The real costs of changing the cleaning process*. Finishing & Coating. https://finishingandcoating.com/index.php/cleaning-pretreatment/1743-the-real-costs-of-changing-the-cleaning-process

11. Ayafor, C., Burton, T., George, N., Morose, G., & Wong, H.-W. (2024**).** *Safer solvents for active pharmaceutical ingredient purification using column chromatography. ACS Environmental Au, 4*(3), 236–247. https://doi.org/10.1021/acsenvironau.4c00015

12. Toxics Use Reduction Institute. (n.d.). *CleanerSolutions database*. https://www.cleanersolutions.org/

13. Toxics Use Reduction Institute. (2021). *Alternatives to halogenated solvents used in surface cleaning*. https://www.turi.org/publications/alternatives-to-halogenated-solvents-used-in-surface-cleaning/

14. American Industrial Hygiene Association. (2008). *Demonstrating the business value of industrial hygiene: Methods and findings from the value of the industrial hygiene profession study.*

15. S.E. Shires Co. (n.d.). *Sustainability*. https://www.seshires.com/sustainability

16. Williams, B., & Yakal, R. (2018, February 13). *EPA's Safer Choice program* [Webinar slides]. Beyond Benign. https://www.beyondbenign.org/bbdocs/webinars/20180213_SaferChoice.pdf

17. Kanegsberg, B., & Kanegsberg, E. (2024). *NASA beachfront corrosion test results for safer conversion coatings*. *Finishing & Coating*. https://finishingandcoating.com/index.php/conversion/2704-nasa-beachfront-corrosion-test-results-for-safer-conversion-coatings

18. Program on Reproductive Health and the Environment. (2022, October 11). *Poll: Voters agree on need for more protections from chemicals*. https://prheucsf.blog/2022/10/11/poll-voters-agree-on-need-for-more-protections-from-chemicals/

19. Organisation for Economic Co-operation and Development. (2024). *Insights on "attitudes towards chemicals": From the Surveys on Willingness-to-Pay to Avoid Negative Chemicals-Related Health Impacts (SWACHE) project* (Series on Risk Management No. 83). https://one.oecd.org/document/ENV/CBC/MONO(2024)19/en/pdf

20. Environmental Protection Network. (2024, November). *2024 voter priorities: Post-election poll results on voters' views of the Environmental Protection Agency*. https://www.environmentalprotectionnetwork.org/wp-content/uploads/2024/11/2024-Post-Election-Poll-EPN-Questions-Deck.pdf

21. Steel Art Company. (n.d.). *Our process*. https://www.steelartco.com/our-process

22. U.S. Environmental Protection Agency. (2023, October 31). *Economic analysis of the proposed regulation of trichloroethylene under TSCA section 6(a)*. Regulations.gov. https://www.regulations.gov/document/EPA-HQ-OPPT-2020-0642-0178

23. Toxics Use Reduction Institute. (2012, June). *Alternatives assessment for perchloroethylene for the dry cleaning industry*. University of Massachusetts Lowell. https://www.turi.org/publications/alternatives-assessment-for-perchloroethylene-for-the-dry-cleaning-industry/

24. American Industrial Hygiene Association. (2008). *Demonstrating the business value of industrial hygiene: Methods and findings from the value of the industrial hygiene profession study.*

25. U.S. Environmental Protection Agency. (2024, December 18). *Economic analysis of the final regulation of perchloroethylene under TSCA section 6(a)*. Regulations.gov. https://www.regulations.gov/document/EPA-HQ-OPPT-2020-0720-0347

Enhancing Competitiveness
through Toxics Use Reduction

April 2026

TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL

info@turi.org
978-934-3275
126 John Street Ste 14, Lowell, MA 01852

www.turi.org