



Toxics Use Reduction Act Program Assessment

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Executive Summary

TURI Methods and Policy Report #26

TURI
TOXICS USE REDUCTION INSTITUTE
University of Massachusetts Lowell

Making Massachusetts a Safer Place to Live and Work

Massachusetts Toxics Use Reduction Act Program Assessment

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The Toxics Use Reduction Act (TURA) Program is implemented by the following state agencies:



Massachusetts
Department
of
ENVIRONMENTAL
PROTECTION

Massachusetts Department of Environmental Protection (MassDEP)
One Winter Street, Boston, MA 02108-4746; 617-292-5500
www.mass.gov/dep/toxics/toxicsus.htm

Certifies Toxics Use Reduction (TUR) Planners, receives and reviews toxics use reports submitted by companies, provides guidance, takes enforcement actions, and collects chemical use data and makes it available to the public.



Office of Technical Assistance & Technology (OTA)
100 Cambridge Street, Suite 900, Boston, MA 02114; 617-626-1060
www.mass.gov/eea/ota

A non-regulatory agency within the Executive Office of Energy and Environmental Affairs that provides free, confidential, on-site technical and compliance consultations to Massachusetts businesses and institutions.



Toxics Use Reduction Institute (TURI)
University of Massachusetts Lowell
One University Avenue, Lowell, MA 01854-2866; 978-934-3275
www.turi.org

Provides education, training, and grants for Massachusetts industry and communities; sponsors research and demonstration sites on cleaners, safer materials and technologies; provides policy analysis; and manages the TURA Science Advisory Board.

Glossary of Acronyms

BRI	Byproduct Reduction Index
CMBEN	Central Massachusetts Business Environmental Network
DEHP	Di-(2-ethylhexyl) phthalate
EHS	Environmental Health and Safety
EMFACT	Energy and Materials Flow and Cost Tracker
EMS	Environmental Management System
ERP	Environmental Results Program
HAP	Hazardous air pollutant
HVLP	High volume, low pressure
LED	Light-emitting diode
MassDEP	Massachusetts Department of Environmental Protection
MDI	Methylene diphenyl diisocyanate
MEK	Methyl ethyl ketone
NEWMOA	Northeast Waste Management Officials Association
NBEN	Northeast Business Environmental Network
OPAC	Online Public Access Catalogue
OTA	Massachusetts Office of Technical Assistance and Technology
P2	Pollution Prevention
PBT	Persistent, Bioaccumulative, & Toxic
REACH	Registration, Evaluation, and Authorization of Chemicals
REC	Regional Environmental Council
RoHS	Restriction of Hazardous Substances
SPIN	Safe Products in Neighborhoods
TCE	Trichloroethylene
TDI	Toluene diisocyanate
TSCA	Toxic Substances Control Act
TUR	Toxics Use Reduction
TURA	Toxics Use Reduction Act
TURI	Toxics Use Reduction Institute
UL	Underwriter Laboratories
US EPA	United States Environmental Protection Agency
VietAID	Vietnamese American Initiative for Development
VOC	Volatile Organic Compound

Executive Summary

Toxics Use Reduction Act (TURA) Program Assessment

1. Introduction

Enacted in 1989, the Massachusetts Toxics Use Reduction Act (TURA) has been in effect for two decades. During this time, Massachusetts firms have achieved remarkable reductions in their use of toxic chemicals while achieving financial savings and maintaining their competitiveness in global markets.

In 2006, amendments were made to TURA. These changes were designed to update program elements, ensure continued relevance for Massachusetts facilities, and expand the program's focus on the chemicals of highest concern.

The experiences of the TURA program in its early years were assessed and documented in a comprehensive program assessment that was published in 1997. The adoption of the 2006 amendments, along with the approaching 20th anniversary of the TURA program, served as an occasion for the program once again to look back at its experiences, and identify opportunities and new directions going forward. Thus, in 2008 the Toxics Use Reduction Institute (TURI) undertook an assessment of the TURA program. This report presents the findings of this assessment.

The assessment presents a review of TURA program activities; a review of prior studies of the TURA program; the results of an online survey and telephone interviews with Massachusetts companies and consultants conducted by the consulting firm Abt Associates; and results from a survey and interviews conducted with organizations served by the Institute's Community program. Implications of the TURA program for the Massachusetts economy will be discussed in a separate report.

2. Program description

TURA requires certain Massachusetts companies to report their use of toxic chemicals and examine ways to decrease their use of toxic chemicals and wastes generated, with the goal of protecting public health, the environment, and workers, while helping businesses become more competitive. TURA is implemented by three Partner agencies – the Massachusetts Department of Environmental Protection (MassDEP), the Office of Technical Assistance and Technology (OTA), and TURI. The program activities of these agencies can be grouped into eight broad categories.

- *Training programs.* A core means of ensuring that firms have access to TUR knowledge is to provide training for toxics use reduction (TUR) planners. These individuals work with facilities and certify their toxics use reduction plans. Every year, TURI provides a seven-week course to train individuals interested in becoming TUR planners. In addition, TURI, OTA and MassDEP offer continuing education workshops and conferences for TUR planners and others. Both the training course and the continuing education events provide regular opportunities for the program to convey useful new information on technical and policy issues to Massachusetts facilities.

- *Site visits.* OTA provides on-site assistance to facilities, helping them to identify and implement toxics use reduction options that are tailored to their particular needs. As of 2009, OTA has performed more than 3,300 on-site visits and provided an estimated 15,000 recommendations to Massachusetts facilities. The TURI Laboratory also provides site visits to individual facilities in association with laboratory testing activities.
- *Grant programs.* The TURA program uses a portion of its budget to invest in companies, academic researchers and communities that are implementing or investigating innovative TUR opportunities. Grants are provided for industry demonstration sites; environmental management system peer mentoring activities; university research; and projects carried out by municipalities, community organizations, and small businesses.
- *Information services.* TURI, OTA and MassDEP provide extensive information via library services, publications, and internet materials. The TURI Library provides access to over 5,000 books, reports and case studies and more than 50 journals and industry-specific magazines. TURI and OTA have published approximately 150 technical reports, policy reports, and detailed case studies. Other materials include demonstration site reports, brochures, tip sheets, and chemical fact sheets. The TURA program also provides a publicly searchable website showing detailed toxics use data reported by companies since 1990. This unique data set provides a rich source of information for industry, governments, academic researchers, and the public.
- *Compliance assistance and enforcement.* MassDEP implements the regulatory components of the TURA program, including ensuring that facilities comply with their TURA obligations and providing guidance on planning and reporting activities. OTA also provides extensive compliance assistance, helping facilities to comply with the full range of applicable state and federal regulations.
- *Laboratory activities.* The TURI Laboratory works with Massachusetts companies to identify safer alternatives for cleaning and degreasing applications. The Laboratory's activities include one-on-one assistance to individual companies, as well as research and development activities. The Laboratory's extensive online database assists companies in rapid evaluation of substitution opportunities. Since 1993, the Laboratory has helped hundreds of companies to identify and adopt safer alternatives to hazardous cleaning solvents. The Laboratory also works with community organizations and small business associations to identify, test, and implement safer alternatives.
- *Engagement with industry and communities.* In addition to the activities discussed above, the TURA program engages with industry and communities to facilitate specific efforts to reduce the use of toxics. Activities include convening work groups, sponsoring sector-specific training events, and providing technical information requested by small businesses or community organizations. Industry projects include supply chain activities with the electronics industry and the wire and cable industry; the creation of an innovative business environmental network; and facilitation of government and private sector dialogue around safer development of nanotechnology. Community engagement activities include projects to promote toxics use reduction in specific sectors such as cosmetology and dry cleaning, as well as extensive work with Massachusetts public schools.

- *Policy engagement.* Policy activities of the TURA program include educating Massachusetts companies about policies relevant for their businesses nationally and internationally; reviewing and acting upon scientific information relevant to the maintenance of the TURA list of toxic and hazardous substances; and developing and implementing alternatives assessment methodologies. The TURA Administrative Council, led by the Executive Office of Energy and Environmental Affairs, ensures coordination and consistency in state policy related to toxics. The TURA Science Advisory Board provides scientific analysis to inform policy decisions, and the TURA Advisory Committee, a stakeholder group, provides advice to the Administrative Council and the implementing agencies. Upon request, TURA program staff provide information to policy-makers and others working to replicate the TURA model outside Massachusetts.

3. Existing studies of the TURA program

A number of analyses of the TURA program have been produced over the nearly two decades that the legislation has been in effect. The TURA program itself produces annual reports that present and analyze data submitted by companies using toxic chemicals. A program evaluation completed in 1997 looked at the first six years of the program, analyzed trends, and provided information on the cost savings achieved by companies participating in the program.

A 2006 study by OTA analyzed the TURA data for firms that received on-site technical assistance visits versus those that did not. The data analysis showed that visited companies reduced their toxics use by an average of 9% more after being visited by OTA, than before.

In addition to these analyses produced by the TURA program itself, scholars outside the program have provided analysis and commentary. In some cases, these studies have been motivated by interest in replicating the successes of the TURA model in other jurisdictions. For example, since 2006, the government of California has sponsored a series of reports and convened a high-level working group to consider options for chemicals policy reform in the state. The reports have featured detailed consideration of the TURA program as a key model for new initiatives in California. The government of the Canadian province of Ontario has studied the TURA program in detail as part of its effort to replicate the TURA model. Finally, the program has occasionally received letters from stakeholders providing detailed information on their experiences with the TURA program. These letters provide useful information to supplement the findings of formal studies of the program. The authors of the present report examined each of these sources to identify lessons learned and directions for further investigation.

The 1997 program evaluation found that the TURA program had been effective in reducing Massachusetts facilities' use of toxic substances while providing opportunities for facilities to achieve financial benefits. Recommendations and areas for improvement identified in the 1997 program evaluation included consolidation of chemical use reporting systems; identifying technological gaps that could be impeding progress in TUR, particularly related to product quality concerns and customer requirements; rewarding firms that have made progress in TUR and focusing assistance on those that have been less successful; working with smaller quantity toxics users to ensure they make progress in tandem with larger firms; applying the principles of TUR planning to areas other than use of toxic chemicals, such as water and energy use; and analyzing health and environmental effects of toxics in

consumer products during use and disposal. Studies produced independently of the TURA program highlighted many of the same themes.

Some of the recommended changes were adopted in the 2006 amendments to TURA. For example, the 2006 amendments have made it possible for the program to extend its reach to some, though not all, smaller toxics users. The 2006 amendments also implemented the recommendation that the TUR planning methodology be extended to encompass options for conserving energy, water, and other resources.

4. Survey findings

In 2008, TURI contracted with Abt Associates Inc. to conduct an online survey to assess the experience of facilities that are subject to TURA program requirements (hereafter referred to as TURA filers), as well as Toxics Use Reduction planners. Of the 561 facilities that filed in 2006, 196 responded to the survey (35 percent). In addition, 36 general practice TUR planners provided information on the range of their experiences working with multiple facilities. Abt Associates also conducted in-depth telephone interviews with a subset of 18 of the survey respondents. Both the online survey and the telephone interviews focused on facilities' experiences in the period 2000 to 2006.

4.1 How facilities are reducing toxics

The annual reports submitted by facilities on their use of toxic chemicals shows that facilities have steadily reduced their use of toxics. These reductions are documented and analyzed in the TURA program's annual information release. One goal of the survey was to learn more about *how* facilities are achieving reductions in their use of toxic chemicals.

The Toxics Use Reduction Act defines six Toxics Use Reduction techniques: input substitution; product reformulation; production unit redesign or modification; production unit modernization; improved operation and maintenance of production unit equipment and methods; and recycling, reuse, or extended use of toxics using equipment or methods which become an integral part of the production unit of concern.

The survey asked which of these techniques are being used most frequently at Massachusetts facilities. The survey results indicate that facilities are making use of all six of the techniques, although some are used more frequently than others. The largest number of respondents (63 percent) indicated that they have made use of improved operations and maintenance.

A number of additional themes emerged in the survey responses. These include a particular focus on reducing the use of toxic solvents; options for reducing toxics in wastewater treatment; facilities' efforts to reduce or eliminate the use of lead and other toxic substances targeted by the European Union's Restriction on Hazardous Substances; and integration between TUR activities and other management systems.

4.2 Benefits of implementing toxics use reduction projects

Respondents indicated that the TURA program continues to provide significant benefits to Massachusetts facilities, ranging from organizational benefits to financial savings. The results also show clearly that TURA filers are continuing to identify and implement new TUR options. In both the quantitative portion of the survey and in open-ended responses, respondents described a variety of benefits from implementing TUR projects.

- *Organizational benefits.* More than half the survey respondents (55 percent) indicated that the TURA program led to increased management attention to environmental practices within the facility. As one respondent commented, “TURA is a great reason to make sure management and others are involved, and it facilitates routine business discussion.”
- *Health and environmental benefits.* More than half the respondents (51 percent) indicated that their facility has achieved improvements in worker health and safety as a result of implementing TUR projects. Respondents cited examples including automation of certain processes to reducing the possibility of spills and leaks; elimination of the use of carcinogenic solvents; and a range of other examples.
- *Financial benefits.* Just over 40 percent of respondents indicated that their facility achieved financial savings as a result of implementing TUR options in the period 2000-2006.
- *Compliance benefits.* One of the goals of the TURA program is to encourage the use of toxics use reduction techniques as a means to comply with existing regulatory requirements. A third of respondents (33 percent) indicated that their facility had experienced benefits related to compliance with other state or federal regulations as a result of implementing TUR projects. Many respondents also cited the assistance of the TURA program in their compliance with international requirements such as the European Union’s Restriction on Hazardous Substances.
- *Efficiency benefits.* Just under a third of respondents (29 percent) indicated that they achieved improvements in production efficiency as a result of implementing TUR projects.
- *Product-related benefits.* A number of respondents indicated that their facility experienced benefits related to product marketing (21 percent), product quality (17 percent), or retention of a product line (6 percent).
- *Extension of innovations to facilities outside Massachusetts.* Some respondents indicated that innovations developed within Massachusetts facilities subject to TURA program requirements subsequently propagate to facilities in other states.
- *Benefits from working with a TUR planner.* Some respondents placed particular emphasis on the benefits they experienced from working with a TUR planner. One respondent described the facility's relationship with the planner as “some of the best money we ever spent.”

- *Professional benefits for TUR planners.* Most general practice planners that responded to the survey indicated that they also work with facilities that are not TURA filers. Of these planners, 83 percent indicated that their knowledge of TUR is an asset for their work with non-TURA filers.
- *Other benefits.* Other benefits cited by smaller numbers of respondents were improvements in technology and physical infrastructure; compliance with international standards; improved worker-management relations; and improved community relations.

Benefits experienced as a result of implementing TUR projects in the period 2000-present		
Benefit	Responses	Percentage (of 196 Respondents)
Increased management attention to environmental practices	108	55%
Improved worker health and safety	99	51%
Financial savings	81	41%
Compliance with other state or federal regulations	64	33%
Improvements in production efficiency	57	29%
Improved product marketing	41	21%
Improvements in product quality	33	17%
Improvements in technology and physical infrastructure	30	15%
Compliance with international standards	22	11%
Improved worker-management relations	21	11%
Other	18	9%
Improved community relations	16	8%
Retention of a product line	12	6%

4.3 TUR implementation challenges

The TURA program is designed to be flexible, making it possible for facilities to choose which projects make the most sense for them to implement. The survey gave respondents the opportunity to provide additional information on what challenges or barriers they face as they make decisions about what TUR projects to implement.

The challenges that respondents described can be divided into three broad categories: technical, financial, and institutional.

- *Technical challenges.* The most frequently cited barriers were technical feasibility problems; these were cited by 62 percent of facility respondents and 77 percent of general practice planners. These challenges include difficulty identifying a technically feasible alternative; customer specifications that dictate the use of a particular chemical; concerns about product quality; concerns about the environmental health and safety characteristics of alternatives; and, in some cases, difficulty in identifying new TUR options after the first few planning cycles.

- *Financial challenges.* The cost of implementing TUR projects was cited as a barrier by 55 percent of facility respondents and 68 percent of general practice planners. Specifically, respondents noted that safer alternatives may be more expensive in some cases, and some TUR options may involve an increase in operating costs or a significant capital expenditure.
- *Institutional challenges.* A variety of institutional challenges can affect facilities' ability to implement options. Some respondents cited management policies as a barrier, noting that management at their facility places greater emphasis on short-term costs than on long-term benefits, or simply considers TUR to be a low priority. For some facilities, plant policies and procedures are dictated by parent companies. Other respondents considered other management systems to be more useful than TUR in achieving environmental health and safety goals. Finally, a few respondents simply stated that they see toxics use reduction as antithetical to their company's goals.

The design of the TURA program, with its focus on voluntary implementation of TUR options, makes it possible for facilities to choose the most technically and financially viable options. Those options that are less viable from a technical or financial standpoint are set aside in favor of those that are most advantageous to the facility. Thus, even under ideal circumstances, there will always be some options that facilities reject due to technical or financial barriers. However, the TURA program endeavors to help facilities overcome as many barriers as possible, in order to achieve maximum TUR. Thus, the challenges that respondents have listed here provide a basis for identifying opportunities going forward.

Barriers to implementing TUR projects in the period 2000-present		
Barrier	Responses	Percentage (of 196 Respondents)
Technical feasibility problems	121	62%
Financial costs too high	107	55%
Concerns about product quality	97	49%
Customer requirements	88	45%
Lack of sufficient expected benefits	56	29%
Project considered too time consuming	37	19%
Project considered low priority for management	18	9%
Lack of support from supply chain partners	16	8%
Regulatory environment	14	7%
Other	13	7%
Lack of organizational support for implementation	13	7%

4.4 Value of TURA program services and resources

TURA program services, ranging from trainings, conferences, and workshops to on-site technical assistance, are available to all Massachusetts facilities and communities, not just TURA filers and planners. The survey gathered information on the value of these services and resources for TURA filers and planners specifically. The goal of this section of the survey was to determine the extent to which facilities and planners are making use of program services, assess how useful those services are, and identify potential areas for improvement.

Opinion of TURA Program Resources: Respondents on behalf of a facility			
<i>Resource</i>	<i>How useful was [item] in helping your company implement TUR? (% of respondents that used each resource)</i>		
	<i>Very</i>	<i>Somewhat</i>	<i>Not useful</i>
TURA program trainings, conferences, and workshops (154)	33	56	10
TURA program websites (148)	26	66	8
TURA program written resources (120)	15	68	18
TUR planner course (101)	33	57	10
Compliance assistance (94)	28	55	17
Library and reference services (72)	18	63	19
Site visits to your facility (69)	16	58	26
Cleaner technology demonstration site events (64)	14	53	33
Laboratory services (42)	14	52	33
(#)= Number of respondents for specific resource			

The TURA program services used most frequently are the TURA program trainings, conferences, and workshops; TURA program websites; TURA program written resources; the TUR planner course; and compliance assistance. As shown in the table above, these services were considered very or somewhat useful by 89, 92, 83, 90, and 83 percent, respectively, of respondents whose facilities had made use of these services.

General practice planners' responses to this question were recorded separately. The over-all ranking of usefulness was the same. TURA program trainings, conferences, and workshops, websites, written resources, TUR planner course, and compliance assistance were ranked as very or somewhat useful by 96, 96, 94, 96, and 89 percent, respectively, of general practice planners who had made use of these services.

Opinion of TURA Program Resources: General Practice Planner responses			
<i>Resource</i>	<i>How useful was [item] in helping your company implement TUR? (% of respondents that used each resource)</i>		
	<i>Very</i>	<i>Somewhat</i>	<i>Not useful</i>
TURA program trainings, conferences, and workshops (45)	58	38	4
TURA program websites (45)	36	60	4
TURA program written resources (45)	27	67	7
TUR planner course (42)	29	67	5
Compliance assistance (34)	18	71	12
Library and reference services (32)	28	63	9
Site visits to your facility (30)	20	70	10
Cleaner technology demonstration site events (27)	7	67	26
Laboratory services (21)	5	67	29
(#)= Number of respondents for specific resource			

The survey also asked respondents about the usefulness of TUR plan elements. All the plan elements were ranked as “very” or “somewhat” useful by the majority of respondents.

Opinion of TUR Plan Elements: Respondents on behalf of a facility			
Plan element	How useful was [item] in helping your company's TUR efforts? (% of respondents for each plan element)		
	Very	Somewhat	Not useful
Materials accounting and process characterization (190)	41	43	16
Environmental health and safety (EH&S) evaluation of potential TUR projects (186)	35	49	16
Identification and screening of TUR options (188)	34	52	14
Technical evaluation of potential TUR projects (186)	31	54	16
Financial evaluation of potential TUR projects (187)	27	55	18
Soliciting TUR ideas from employees (190)	26	46	27
Developing a management policy (188)	26	59	16
Developing chemical use and byproduct reduction goals (188)	26	52	22
(#)= Number of respondents for specific plan element			

4.5 Changes in facilities' experiences over time

One of the goals of the program assessment was to determine how facilities' experiences in the program have changed over time. The early years of the program were characterized by facilities identifying “low hanging fruit” – opportunities to reduce toxics through simple changes in production systems. These changes were often associated with financial savings as well. The survey posed questions designed to determine how facilities' experiences with TUR planning and other aspects of the program have changed over time.

One key question of interest is whether the TUR planning requirement continues to provide value to facilities over time. The survey asked respondents to indicate how often the first, second, and subsequent TUR planning cycles lead to the discovery of new TUR opportunities or options. Respondents were asked about planning years 2000 to 2006, which pre-date the alternative planning provisions of the 2006 amendments. Thus, responses to this question provide information about the baseline prior to the implementation of the 2006 amendments.

Some respondents indicated that they find that planning is no longer as useful as it was earlier in the program. Others indicated that they do continue to identify new options over time. Seventy percent of respondents “always” or “usually” found new TUR opportunities or options when doing a TUR plan the first time. While a facility's first and second plans are most likely to produce significant insights into the production process, nearly all respondents indicated that they sometimes identify useful TUR options in subsequent planning cycles as well.

Frequency with which the planning process results in the discovery of new TUR opportunities or options						
Plan	Always	Usually	Sometimes	Not Often	Never	Don't Know
First TUR Plan	36%	34%	15%	6%	2%	6%
Second TUR Plan	2%	34%	34%	21%	2%	6%
Subsequent TUR Plans	0%	4%	23%	55%	9%	6%
Note: Totals may not add up to 100% due to rounding.						

Some respondents offered suggestions about how the TURA program could increase the effectiveness of planning and encourage facilities to learn from one another's experiences. One general practice planner recommended shifting the perspective of the planning periodically: "Usually, if we re-metric ... we can find other options that are not readily apparent." Another respondent noted that additional regulatory motivators become increasingly important after the first two planning cycles.

4.6 Survey information on municipal, community, and small business projects

In addition to its work with large quantity toxics users, the TURA program is also charged with providing information and assistance to Massachusetts communities. This includes work with municipal agencies, community organizations, small business associations and others.

To supplement the survey of TURA filers and planners conducted by Abt Associates, TURI staff conducted a brief online survey for individuals and organizations that have worked with the TURI community program, as well as past recipients of TURI community grants. The survey posed questions about benefits gained from the TURA program, challenges in implementing toxics use reduction projects, and suggestions about how the TURA program can serve communities most effectively.

The online survey was sent to 350 individuals. Responses were received from 62 individuals (18 percent), of whom 18 were associated with an organization that had received a grant from TURI at some point in the period 1998-2007. TURI also hired a consultant to conduct interviews with representatives of organizations that had received a TURI community grant in fiscal year 2006, 2007, or 2008. The interviews included questions about the organization's experience working with TURI, the role of the TURI grant in the development of the organization's agenda and activities, the organization's ability to raise funds prior to and after receipt of a TURI grant, and media recognition of the organization's work.

Grant recipients. Of the eighteen online survey respondents that had received a TURI community grant, fourteen provided detailed information on their experience. Findings from this portion of the survey included the following.

- Many projects have continued after the grant period ended. Of the fourteen projects discussed in the online survey, eleven continued after the grant period ended. Only three had received funding prior to the TURI grant.
- In the telephone interviews, respondents indicated that they had been highly successful in leveraging TURI grant funding to gain additional funding from outside sources in subsequent years.

- Projects supported by TURI grants have yielded economic as well as health and environmental benefits. These include marketing benefits for small businesses, such as landscaping and janitorial services. Economic benefits for municipalities included the provision of training to municipal employees and boards, and potential long-term savings from reducing hazards to water supplies.
- The TURI community grant program has provided substantial resources beyond the grant funding itself. Respondents commented on ways in which the grant program provided them with access to scientists and professionals with specialized expertise, media outlets, and opportunities to leverage additional support. Unique resources offered through the grant program included technical support, training, and materials; education and hands on training that would have not been available otherwise; and assistance with media outreach.
- Most grant recipients did not describe major implementation challenges. The problems that were mentioned included difficulty in carrying out the project in the allotted time; difficulty coordinating all the partners and activities involved in the project; and in some cases, regulatory and institutional barriers.

Other respondents. The forty-four respondents not associated with an organization that received a TURI grant also provided information on a range of topics. Of forty-one respondents who answered questions about whether they had witnessed reductions in the use of toxics in their community, eighteen indicated that they had witnessed reductions in the use of toxics in their community, and five had witnessed improvements in worker health and safety related to TUR. Many of these community organizations do not target worker safety, but rather the health and safety of community members in general. Improvements that respondents described in detail included reductions in pesticide use; reduction in the use of toxic household products in homes; reduction of lead in fishing; and reduction in the use of perchlorate flares.

4.7 Non-filers Study

At the conclusion of the Abt survey for TURA filers, a small separate study by Pure Strategies, Inc., investigated the experience of non-TURA filers that had received assistance from OTA. Pure Strategies interviewed eleven companies. Of these, four provided quantitative information about recent cost savings. The net present value of the projects implemented at the four firms was \$870,000. In addition, seven companies provided qualitative information on benefits resulting from the technical assistance they received. Qualitative benefits cited most often were improved worker health and safety and improved environmental compliance. In addition, one interviewee credited OTA with the survival of the company.

5. Conclusions

The survey results indicate that the TURA program elements and the TUR planning process continue to be useful for many Massachusetts facilities. Facilities continue to experience a range of benefits from implementation of TUR options, including improvements in efficiency and product quality, financial savings, and improved communication about environmental issues within the facility. Facilities also continue to make use of a variety of program elements, and cite both agency staff and TUR planners as useful resources.

The survey also provided insights on how the TURA program can improve its effectiveness through program enhancements or modifications, and how the benefits realized by some firms can be studied and

transferred to others. Survey findings identified areas in which program services can be improved. The findings also helped to identify barriers that TURA filers continue to face, and areas in which additional research may be necessary to develop feasible TUR solutions. Several important opportunities are summarized below:

- *Further leveraging of TUR for product quality improvements.* The survey results show that TUR planning and project implementation have led to improvements in product quality for some facilities, while product quality concerns have been a barrier to implementation for others. Demonstration sites, peer networking opportunities, and similar activities can ensure that facilities learn from one another about opportunities to improve product quality through TUR. In addition, there is continued scope for the TURA program to sponsor technical research to address specific product quality issues.
- *Expand the benefits of TUR program services by increasing awareness and use.* There are opportunities to increase facilities' awareness of TURA program services. For example, although companies have made significant progress as a result of site visits, there are many companies that have not received a site visit in recent years. Thus, there is an opportunity to conduct additional outreach to ensure that facilities are aware of the availability of these services.
- *Expand the benefits of the TUR planning process for organizational behavior.* The TURA program helps to shape internal dynamics within a facility. This includes affecting the level of management attention to environmental issues, as well as helping to ensure that employee ideas are solicited and valued. TURA provides a valuable opportunity to empower shop floor employees, resulting in new opportunities and better solutions. There may be an opportunity to encourage better use of this plan element by facilities.
 - There are opportunities to improve the quality and results of the planning process. Some of the general practice planners, in particular, offered suggestions about ways to maximize the benefits from the TUR planning process. For example, because firms that start the planning process early have been observed to get more benefit from it, the TURA program could send reminders to facilities encouraging them to start the planning process early and schedule training events in such a way as to encourage facilities to start their planning early. The program could also offer training for planners on ways to re-metric the planning process, and on other ways to ensure useful planning results after the first and second planning cycles. These opportunities are, of course, in addition to the changes that will result from the new planning options allowed under the 2006 amendments.
 - There are opportunities to increase TUR project implementation rates. Although many facilities were able to identify and implement TUR options, nearly a quarter (22%) of respondents stated that their facility did not do so in any of the 2000-2006 plan years. This finding indicates that there are opportunities to work further with these facilities. The alternative planning options created by the 2006 amendments to TURA can be expected to help improve the number of facilities that implement TUR and Resource Conservation options in future years.
 - There are opportunities to link TUR with other management systems. The TURA program has undertaken a variety of activities designed to integrate the TUR approach with other environmental quality management systems, such as Environmental Management Systems (EMS) and Lean Six Sigma. The 2006 amendments took this effort a step further by making it possible for facilities to develop an EMS in place of a standard TUR plan under some

circumstances. Comments from a number of respondents indicate that this type of integration of management systems is useful to facilities.

- There continue to be opportunities to help facilities learn from one another. For example, there are opportunities for multiple facilities to learn from an innovation initially pioneered at a single facility. There are opportunities to analyze the TUR data to determine sectors and facilities where there may be useful 'lessons learned.'
- *Process-specific opportunities.* Finally, there are many process-specific opportunities for Massachusetts facilities, including new options for reducing use of toxic solvents, options for adopting new energy- and water-saving techniques, options for reducing use of hazardous acids, and more.

The TURA program is currently working on a follow-up study that will consider the economic implications of the TURA program. This economic analysis will draw in part on information gathered through the online survey and telephone interviews with TURA filers, and with individuals and organizations associated with TURI's community program. In addition, the analysis will include information on the experience of non-filing facilities that receive services from the TURA program.

Section 1: Introduction

Toxics Use Reduction Act (TURA) Program Assessment

Enacted in 1989, the Massachusetts Toxics Use Reduction Act (TURA) has been in effect for nearly two decades. During this time, Massachusetts firms have achieved remarkable reductions in their use of toxic chemicals, while achieving financial savings and maintaining their competitiveness in global markets.

The Toxics Use Reduction Act Program (“the Program”) collects and publishes data every year on companies’ progress in reducing toxic chemicals. In 2008 and 2009, the Toxics Use Reduction Institute (TURI) undertook a program assessment designed to gather additional information beyond what we are able to learn from annual data collection and analysis. This program assessment reviews the accomplishments of the program over time, and explores opportunities for improvements going forward.

In 2006, amendments were made to TURA. These amendments provide for new flexibility in the toxics use reduction (TUR) planning process for TURA filers. They also provide for greater focus on the chemicals of greatest concern by allowing for the designation of higher and lower hazard substances. The amendments were developed in response to feedback from TURA filers and others about the need to update certain program elements over time.

The 2006 amendments signal a new phase of the TURA program, making it particularly important to assess the strengths and weaknesses of the program at this juncture in order to be able to monitor changes going forward as the amendments are implemented.

The goals of the program assessment were to:

- Gather and analyze additional information to complement the program’s analyses of toxics use data submitted by firms each year;
- Identify areas of success and consider ways to extend these successes;
- Identify areas of difficulty and consider options for addressing those difficulties;
- Establish a new baseline from which to monitor changes associated with the 2006 amendments, going forward; and
- Formulate recommendations for how most effectively to measure program effectiveness in the future.

Components of the program assessment included:

- Review of existing literature on the TURA program;
- Review of existing TURA program activities;
- Online survey of 241 TURA filers and general practice TUR planners (conducted by Abt Associates of Cambridge, MA);
- In-depth telephone interviews with 18 TURA filers (conducted by Abt Associates);
- Online survey of 62 individuals or organizations served by the Toxics Use Reduction Institute’s Community program (conducted by TURI);

- Telephone interviews with representatives of fourteen community organizations (conducted by a consultant).

The survey results indicate that the TURA program elements and the TUR planning process continue to be useful for many Massachusetts facilities. Facilities continue to experience a range of benefits from implementation of TUR options, including improved communication about environmental issues within the facility; financial savings; and improvements in efficiency and product quality. Firms also continue to experience challenges in implementing TUR, noting barriers such as a lack of technical feasibility, and customer specifications. Facilities also continue to make use of a variety of program elements, and cite both agency staff and TUR planners as very useful resources.

Section 2 of this report provides a review of TURA program activities. Section 3 provides a brief review of prior studies of the TURA program. Section 4 presents the results of an online survey and telephone interviews with TURA filers and planners, conducted by the consulting firm Abt Associates. It also includes the results of an online survey of individuals and organizations served by the Institute's Community program. Finally, Section 5 summarizes lessons and opportunities drawn from the material presented here. Implications of the TURA program for the Massachusetts economy will be discussed in a separate report, also drawing upon survey results from TURA filers.

This program assessment does not include a consideration of the information that can be drawn from the chemical use data that are submitted annually by firms. These data are analyzed in detail in the annual information releases published by MassDEP, as well as in reports that focus on trends in specific categories of chemicals.