

Academic Research Program Fiscal Year 2010 Request for Proposals

Introduction

The Toxics Use Reduction Institute (TURI) is pleased to invite proposals from University of Massachusetts system academic researchers and their industry partners for support under TURI's Academic Research program. This program provides support for academic researchers and students to investigate new technologies, chemistries, processes and techniques that support a sustainable economy.

Since 1992 TURI's academic research programs have tapped the research capabilities of the University of Massachusetts to advance the investigation, development and evaluation of sustainable technologies that are environmentally, occupationally and economically sound. These programs have provided research funding to University of Massachusetts faculty and graduate students on a competitive basis and encouraged faculty/industry partnerships and cross-campus collaboration.

For the last decade, the Academic Research program has funded innovative research, primarily in applied technologies and materials important to Massachusetts industry. TURI funds a broad range of academic research projects, including policy and methods research, resource conservation and materials for consumer products.

To date, over 30 academic research projects have been supported resulting in the adoption of new, less toxic chemistries and processes in research and in industry throughout the Commonwealth. In addition, TURI has funded several projects that focus on methods and policy research to support long-term adoption of toxics use reduction. Projects that were funded are summarized on TURI's web site (www.turi.org) under the Industry tab.

For fiscal year 2010 TURI hopes to support up to two academic research projects. Our ability to do so will, however, be dependent upon the amount of funding TURI receives from the State of Massachusetts.

Applications must be
received no later than
June 26, 2009

The Massachusetts Toxics Use Reduction Institute

TURI's mission is to promote reduction in the use of toxic chemicals and the generation of toxic by-products in industry and commerce in Massachusetts. TURI provides training to industry professionals and the public, conducts research on alternatives, sponsors industry mentoring programs, and promotes green chemistry. TURI also houses the largest collection of toxics use reduction (TUR) and pollution prevention research materials in New England and a university-based laboratory that tests and evaluates safer alternatives to hazardous cleaning solvents. We support community efforts to reduce toxics through education and grant projects.

TURI is funded through the Massachusetts TURA Program and is located within the School of Health and the Environment at the University of Massachusetts Lowell. It maintains a core staff of analysts, engineers and educators and draws upon the expertise of community and public interest groups, industrial managers, workers,

government officials, private consultants, and faculty from the University of Massachusetts Lowell and other universities.

Suggested Research Focus Areas

TURI seeks proposals on research focus areas that have particular relevance to Massachusetts companies as well as to local, state, national and/or international policies associated with the use of chemicals and materials. The following suggested focus areas are not intended to be exclusive, however, and researchers are encouraged to contact TURI to discuss research ideas.

Safer Chemicals

Substances that have been designated as higher hazard chemicals under TURA include Cadmium and its compounds, Trichloroethylene and Perchloroethylene. Other chemicals on the TURA Science Advisory Board's "More Hazardous Substance List" that are being considered for higher hazard chemical designation include Cyanide and its compounds, Ethylene Oxide, Nickel and its compounds, Chlorine, Arsenic and its compounds, Formaldehyde and Benzene. Each of these chemicals represents an excellent candidate with respect to finding safer alternatives for specific applications.

Research into safer alternatives to these substances for applications that relate to Massachusetts industry sector uses (e.g., electroplating, plastics formulations, medical device production, solvent cleaning, metal finishing, etc.) would be appropriate for this focus area. Research could include determination of human and environmental health impacts of identified alternatives for these toxic chemicals (e.g., n-propyl bromide as an alternative to perchloroethylene in professional garment cleaning applications) through literature search of current body of evidence, exposure studies, evaluation of adverse health events related to use of the alternative or limited laboratory studies. Research might also focus on the efficacy and performance of the alternative for a specific application.

Safer Alternatives

In response to a request by the Massachusetts' Legislature TURI conducted an assessment of safer alternatives to five toxic chemicals in 2006¹. As a result of its research into alternatives for five chemicals (lead, formaldehyde, perchloroethylene, hexavalent chromium and di (2-ethylhexyl) phthalate (DEHP), TURI identified specific opportunities for toxic chemical use reduction in Massachusetts. TURI remains committed to finding safer alternatives to the use of these chemicals in specific applications.

Possible safer alternatives to specific applications of the chemicals that could be the focus of research for FY10 include:

- **Lead** – Examples of research opportunities include use of nano-clays to enhance performance of non-lead heat stabilizers for PVC wire and cable products, and nano-solder and nano-adhesives for electronics applications that are exempt from European Union restrictions and for reducing energy consumption for non-exempt applications.
- **Formaldehyde** – Examples of research opportunities include formaldehyde-free adhesives for building panels and wet-strength resin that is NOT based on epichlorohydrin².
- **Perchloroethylene** – Examples of research opportunities include alternative dry cleaning formulations and alternative aerosol brake cleaning formulations (see below).

¹ Go to www.turi.org and click on "Five Chemicals Study" for more information about this study and our findings.

² This could have broad application in the paper and the wood industry.

- **Hexavalent Chromium** – Examples of research opportunities include performance improvements for use of trivalent chromium and other alternatives in hard and decorative chromium electroplating operations.
- **DEHP** – Examples of research opportunities include alternative plasticizers and/or materials for medical device applications, and use of nanomaterials to replace DEHP as a plasticizer, or to enhance the properties of non-DEHP alternatives.

Safer Materials

The development of alternative materials may allow researchers and companies to avoid the use of toxic chemicals traditionally used in manufacturing and products. Examples of safer materials research that would be appropriate for FY10 academic research include:

- **Rigid Plastics** – Consumer concern about the use of bisphenol-A (BPA) in rigid plastic consumer products such as baby bottles and water bottles
- **Nanomaterials** – Recently, the use of nanomaterials has presented an exciting opportunity to discover potentially safer ways of creating manufactured products for the Massachusetts economy.
- **Flexible Plastics** – The use of plastics that have inherent flexibility may eliminate the need for added plasticizers.

TURI encourages researchers to consider the use of emerging alternative materials that allow a reduction in the use of toxic chemicals.

Safer Processes

The principles of green chemistry³ provide guidance on how to conduct research and chemical syntheses in a way that minimizes the impact on the environment and human health. Research topics that adhere to the goal of green chemistry to create safer processes, chemicals and/or products for Massachusetts industry would be appropriate. Specific opportunities may be found in the pharmaceutical and life sciences sectors.

In addition, TURI is interested in furthering its research and development of alternatives assessment tools for Massachusetts industries. Research that focuses on the associated methodology, the development of relevant databases (e.g., toxicology, performance, etc.), and/or the implementation of an economic model to predict the impact on Massachusetts companies and workers of adopting safer alternatives would be appropriate.

Safer Products

TURI supports research related to various products used in the Commonwealth. Possible areas of research might include alternatives to and/or study of life cycle implications associated with cosmetics, artificial turf or brake cleaner formulations.

- **Water and Baby Bottles** – Consumer groups and state legislators across the country have become increasingly concerned about the presence of potentially toxic chemicals such as BPA in water and baby bottles. Research into alternative materials and/or product designs that satisfy the performance criteria for these and related consumer product uses while eliminating the use of toxic chemicals such as BPA would be appropriate for this funding source.

³ Go to http://www.turi.org/industry/alternatives_research/green_chemistry to learn more

- **Cosmetics** - The cosmetics industry uses many potentially toxic chemicals in their various formulations. Research into alternative cosmetic formulations (e.g., nail products) that do not use toxic chemicals and do not generate hazardous by-products would be appropriate for this funding source.
- **Artificial Turf** – There is community interest in finding safer alternative materials for artificial turf applications. In addition, it may be of interest to study the life cycle implications of grass versus artificial turf.
- **Aqueous-Based Brake Cleaner Formulations** – TURI has worked with small businesses to find alternative cleaning solutions for brakes. The need for the development of aqueous-based alternatives that can be used in small pressurized can applicators has been identified by our industry and community partners.

Please Note: *TURI does not fund research for end-of-pipe technologies, such as pollution control, treatment or remediation*

TURI encourages researchers to identify a specific product or manufacturing sector as their focus of research and to call us to discuss project ideas.

Eligible Recipients

A primary goal of the Academic Research program is to provide support for students to gain knowledge in sustainability principles, and the associated chemistries, materials, processes and techniques that can be used. Therefore research proposals that do not include direct support for students will not be considered.

University of Massachusetts faculty and graduate and doctoral level students from any of the five UMass campuses are eligible for this research funding. Student led projects are welcome, but must include the commitment of faculty supervision. This research is not intended for industry or consultant research unless in collaboration with and under the direct supervision of academic faculty and supporting the funding of students within the research.

Industry/Community Partners

Collaboration with industry, associations, non-profits, or other researchers is strongly encouraged for all project proposals. TURI will give preference to research projects with clear Massachusetts industry or community application and support. Support may be either financial or in-kind, and must relate directly to this project. Development of intellectual property as a result of the research shall be managed through the University of Massachusetts Lowell Commercial Ventures and Intellectual Property (CVIP) program.

Project Selection Criteria

An important element of the research is the impact of an alternative process or chemistry on the economy of Massachusetts. Researchers are encouraged to consider research that can lead to an improvement in the economic sustainability of existing Massachusetts industries. The proposal review will consider those research projects that directly relate to the Massachusetts economy more favorably than others. In addition, TURI will favor research that clearly utilizes sustainable technologies and chemistries over research that has the potential for more negative environmental and human health impacts. The successful proposal will include a thoughtful description of how the research supports TURI's mission to reduce the use of toxic chemicals in the Commonwealth.

The following specific criteria will be considered when reviewing proposals for the Fiscal Year 2010 TURI Academic Research Program. No weighting value is assigned to these criteria. TURI will preferentially fund proposals that address each item and identify limitations associated with the proposed research.

1. Proposal addresses the focus areas suggested above or addresses an alternative to the use of a known toxic chemical.
2. Proposal addresses a specific manufacturing or consumer use relevant to the Massachusetts economy.
3. Proposal identifies the commercial viability of the resulting alternative. Partnership with relevant industries is encouraged, though not required, as part of this project.
4. The alternative chemical or process proposed is expected to be safer than the target chemical or process it would replace. Specifically, safer alternatives must not include any known or probable human carcinogens, persistent, bioaccumulative and toxic (PBT) chemicals, or very persistent and very bioaccumulative (vPvB) chemicals. Contact TURI for information on how to determine whether a chemical or material is considered inappropriate for this research.
5. Additional occupational health and safety considerations, including other critical potential health effects (e.g., endocrine disruption), acute worker toxicity and operating conditions of proposed process (e.g., high temperature or pressure required) must be considered.
6. If studying the use of a chemical or material for which there is little or no data on its carcinogenicity or persistence/bioaccumulation, thoughtful justification for why this alternative is appropriate to this funding source must be presented. This shall include an assessment of the potential hazards associated with the use as well as a discussion of the uncertainties associated with this alternative chemical or material.
7. Proposed research is achievable with the time and budget constraints associated with this project
8. Proposal indicates how students will be used in research, and emphasizes the relevant learning aspect of the research.

Funding

Funding for academic research will be available based upon the amount of funding TURI receives from the State of Massachusetts legislature. This program emphasizes the importance of graduate and doctoral level student engagement, and the bulk of the funding is intended to compensate students actively involved in the research over the course of the academic year. Funding for research will therefore focus on supporting a full time (18 hr/week) research assistant (RA) during the academic year, including full stipend for tuition and fees. In addition, up to \$2,000 will be available for the purchase of materials and supplies directly related to the completion of the research, assuming that the materials are appropriate for this source (i.e., toxic chemicals will not be approved for this research without specific justification for why a safer alternative cannot be used). The total amount of funding for each research project will be up to \$19,000.

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Funding is only awarded for one academic year; project deliverables must be completed by June 30, 2010. Projects may, however, include a proposal for a second year of funding - awards for FY10 will be contingent on TURI funding and on the project's success in FY10.

Due to budget constraints, TURI anticipates awarding no more than two (2) grants for this fiscal year.

Responsibilities of Researcher

Researchers receiving the award of this project funding are responsible for the following:

- Attendance at a kick off meeting, to be held at or near the research facilities of the funding recipient;
- Participation in monthly project status in person meetings or conference calls with TURI staff;
- Presentation of one interim project update, to be conducted at TURI's classroom in a 20 minute slideshow presentation format followed by 10 minutes of questions and answers (target January 2010);
- One draft final report (due May 2010);
- One final written report (due by June 30, 2010); and
- At least one presentation at a professional conference (if no appropriate external information dissemination opportunity occurs during the course of this research, other potential outreach mechanisms may be negotiated with TURI).

Please note that researchers are required to prepare a written, detailed report as part of this program. In the event that intellectual property is developed as part of the research, the report must provide as much detail about the research methods and results as possible without directly impacting intellectual property rights. The written report will be made available to the public via TURI's website (go to http://www.turi.org/industry/alternatives_research/academic_research_program for examples of past reports). Other than the written final report, TURI does not typically claim ownership rights to any intellectual property.

Proposal Instructions

Proposals shall include the following information:

1. Project title;
2. Principal Investigator(s), including UMass affiliation and department;
3. Student(s) to be supported in conducting this research;
4. Industry or other partners, including their role and contribution;
5. Project description, including:
 - Research objectives and Research Development Plan, including an indication of where the research is along the development path (from basic research to commercialization),
 - Sustainability implications (e.g., toxics use reduction and/or other environmental, health and safety, economic and social) of the research,
 - Methodology, describing the research activities that will be accomplished in order to achieve the specific objectives of the sustainability research, including detailed description of any chemicals or materials that will be used in the research,
 - Justification for research that involves any chemicals or materials for which there is little or no environmental or human health effect data,
 - Relevance to Massachusetts industry or communities,
 - Description of how the research supports TURI's mandate to promote the reduction of toxic chemical use in Massachusetts,
6. Brief description of the PI's previous and related research, in general and specifically at UMass;

7. Description of any related research for which the PI has, is, or anticipates receiving funding, including the level and duration of funding;
8. Tasks to be completed and questions to be answered in final report;
9. Budget – show breakdown, with the total amount not to exceed \$19,000, for:
 - Student stipend and tuition/fees. The University prefers to fund full time (18 hr/week) research assistants, who will be eligible to receive a stipend for full tuition and fees. There is the possibility of funding 2 students as half-time (9 hr/week) RAs, upon approval of the Dean and Vice Provost for Academic Affairs. Half-time RAs will receive half stipends. Student stipend and tuition/fees are paid out according to University of Massachusetts Lowell “TA, TA Match and RA Contract PROCEDURES” for the current academic year (go to <http://www.uml.edu/hr/Forms.html> for form).
 - Other salaries (consultant salaries shall not exceed 10% of the overall project budget, with hourly rates negotiated with TURI),
 - Testing services, equipment, and/or supplies.

Note that travel expenses are not typically allowed. TURI has some flexibility in the proportion of the total budget amount that will be paid out for different uses. However, the total amount that students can receive is strictly limited by University policy (see above).
10. Curriculum vitae of PI(s) and all students to be supported; and
11. Letters of support from industry, NGO and/or community partners, if available, detailing the level and type of commitment for the proposed project.

Proposal Review Process and Schedule

Proposals will be reviewed by TURI staff and a review panel consisting of research and industry experts. In addition, TURI may seek the advice of our newly formed University Partnership Council on the quality, timeliness and impact of proposed research on Massachusetts businesses. The project selection criteria cited above will act as guidance in the review panel’s selection process.

Please submit proposals with the subject line (or in an envelope clearly marked) “Academic Research Proposal FY10” no later than June 26, 2009.

You are encouraged to contact Pam Eliason, Industry Research Program Manager, at 978-934-3142 or pam@turi.org, to discuss your research project ideas and to receive assistance in completing the proposal by the June 26 deadline.

*Research awards
will be announced
on or before
July 24, 2009*

Proposal Submittal

You may submit your proposal by conventional mail, email, or hand-delivery, although TURI prefers that proposals be sent in electronic format, preferably Microsoft Word.

Electronic Mail: pam@turi.org

Mailing Address: Pam Eliason, Industry Research Program Manager
Toxics Use Reduction Institute
University of Massachusetts Lowell
One University Avenue
Lowell, Massachusetts 01854

Hand Delivery: You may deliver copies of your proposal to TURI between the hours of 8:00 am and 4:00 pm. Go to the Pinanski Building, 3rd floor, Room 303.

