

How the Toxics Use Reduction Act continues to promote clean production Internationally

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ABSTRACT

The Massachusetts' Toxics Use Reduction Act (TURA) of 1989 set an important milestone in the roadmap to Clean Production. The Act's focus on a clear definition, methodology, and mandatory planning requirements have proved successful in getting companies in Massachusetts to reduce their use of toxic chemicals in manufacturing processes. Such results are inspirational for government officials and advocacy groups attempting to reduce toxic emissions in their communities and set progressive chemicals use policies. This paper will summarize three initiatives where TURA was a catalyst and continues to impact international chemicals policy: the Sewer Use By-law in Toronto, Canada; the European Union's REACH chemicals legislation and the international campaign by Greenpeace in Asia and Latin America to achieve zero discharge of hazardous substances into rivers. The example of Toronto and REACH show how one or more essential aspects of TURA were incorporated into legislation. In the case of REACH TURA's requirement of mandatory planning became an important example and NGO demand during the formation of Europe's new chemicals regulation and resulted in the first substitution assessment planning requirement in EU wide legislation. Work is now ongoing to promote TURA type legislation in Latin America and Asia. However the ability to transfer the TURA framework to regions with inadequate government oversight and cheap disposal costs is seriously hampered. Although NGO campaigns in Asian and Latin America advocate zero discharge of hazardous emissions through toxics use reduction and elimination, much training and accountability will be needed within government and companies to understand the benefits of toxics use reduction and actually implement all or parts of the TURA framework. The Toxics Use Reduction Act came into force in 1989 with high environmental awareness, an engaged citizenry and a responsive government entity. Perhaps these are the same conditions that must exist for its successful transference to industrializing countries.

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1. Introduction

The Massachusetts Toxics Use Reduction Act (TURA) continues to be a catalyst for pollution prevention planning in regions far beyond its state's jurisdiction. This is due in large part to the success of the Act. When the Act was first passed in 1989 the intent was to reduce by half the use of toxic chemicals in the state of Massachusetts by 1997. Indeed results show that between 1990 and 2001 actions taken by the more than 600 companies who submitted plans resulted in a 45% reduction in chemical use; 69% reduction in toxic chemical byproducts and 92% reduction in releases of toxics. More recently, over the period of 2000–2007 Large Quantity Toxic Users continued to decrease their overall toxic chemical use in real terms (figures adjusted for the production drop) by 14% compared

to the 2000 base year, as well as generating 34% less byproducts or waste per unit of product and reducing by 44% the releases of TRI reported onsite chemicals. The quantities of chemicals shipped in product have also reduced by 14% since 2000. In other words significant decreases are still being achieved.¹

Why has TURA achieved these results? A clear definition and clear methodology allow clear performance measurement. The TURA statute² defines "Toxics use reduction," as in-plant changes in production processes or raw materials that reduce, avoid, or eliminate the use of toxic or hazardous substances or generation of hazardous byproducts per unit of product, so as to reduce risks to the health of workers, consumers, or the environment, without shifting

¹ TURA results: <http://turadata.turi.org/Success/ResultsToDate.html> accessed January 24, 2010.

² Toxics Use Reduction Act Statute (MGL c. 211) accessible at <http://www.mass.gov/dep/toxics/laws/laws.htm#tura>.

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risks between workers, consumers, or parts of the environment. This differentiates toxics use reduction from end of pipe controls to reduce emissions or the management or treatment of wastes once they are produced. Instead, it goes to the heart of the problem: that is the use of toxic chemicals in manufacturing processes.

Furthermore the Act clearly lists the six toxics use reduction techniques that are acceptable to achieve a measurable reduction of the use of toxic chemicals or generation of hazardous byproducts per unit of product:

- Input substitution: changing the raw materials of a product to use nontoxic or less toxic raw materials.
- Product reformulation: reformulating or redesigning end products to be nontoxic or less toxic upon use, release, or disposal.
- Production unit redesign or modification: using production units of a different design than those used previously.
- Production unit modernization: upgrading or replacing production unit equipment or methods.
- Improved operation and maintenance: modifying existing equipment or methods by such steps as improved house-keeping, system adjustments, or process/product inspections.
- Recycling, reuse, or extended use of toxics: by using equipment or methods that are integral to the production unit. External recycling of materials or waste is not considered toxics use reduction.

The Act further sets measurable performance goals within specified timelines, mandatory planning requirements and technical assistance provisions to help companies understand the techniques and produce well thought out and effective toxics use reduction plans. Fees generated from the companies' use of the Act's list of designated toxic chemicals funds the Toxics Use Reduction Institute and its staff as well as the staff of the state's Department of Environmental Protection tasked with TURA's management. The Office of Technology Assessment also plays an established role by providing onsite assistance to companies.

This clear workable and funded framework to implement the goals of TURA and the program's results over the last twenty years have proved inspirational for environmental advocates wishing to advance clean production practices within industrial sectors responsible for the use and generation of hazardous chemicals. However the ability to transfer key elements of TURA to other regions in Canada, Europe and even China and Latin America face challenges which increase with the scale of implementation, political reality and environmental awareness of the region.

2. The impact of TURA on the Toronto sewer use bylaw

The impact of TURA on pollution prevention policy in Canada's largest city allows some straight forward analysis of the effectiveness of the transfer of key elements of the Act. The practice of incineration has always been a contentious issue with local communities and the burning of sewage sludge in Toronto proved no different. In the 1990s community opposition mounted against the burning of biosolids at Ashbridge Bay, Toronto's largest treatment plant. In the mid 1990's World Wildlife Fund Canada began its campaign to reduce toxic discharges into the region's sewer network as part of their Great Lakes campaign.³ Their research revealed that approximately 37% of

toxic industrial effluents that reached surface waters in the Great Lakes ecosystem did so by passing through sewage treatment plants. Furthermore it was calculated that incineration of contaminated sludge generated a range of toxic air emissions into Ontario air including 1095 kg yr⁻¹ of heavy metals.

The campaign focus on indirect discharges through the sewer system was new. Regulatory attention had traditionally been focused on toxic direct discharges into Lake Ontario as part of the Canada/Ontario Agreement and the province's Municipal Industrial Strategy for Abatement (MISA) program was the main framework for Ontario to regulate industrial effluents. The MISA framework set acceptable discharge limits for specific contaminants within specific industrial sectors and required companies to publish an annual report.⁴ However there was no clear guidance on indirect discharges and WWF pushed for a stronger pollution prevention framework. This focus on sewage treatment plants resulted in the creation of a Sewage Sludge Sub-Committee within the Toronto Metro Works department in 1995 and consultations were held with Environment Canada, the Ontario Ministry of the Environment, Canadian Centre for Pollution Prevention and the World Wildlife Fund as well as extensive public consultation with industry associations and other stakeholders.⁵ The strategic focus on sewage sludge contaminants was timely. The city was looking for ways to cut costs and reduce chemical contaminants in the sludge to enable its application to land, forestry or other beneficial uses and this effort tied in well with the local communities' goals to shut down the Ashbridge Bay sludge incinerator.

By 1995, the Massachusetts Toxics Use Reduction Act had resulted in some concrete reductions in toxic chemicals use by Massachusetts companies and the legislation's goal of reducing toxics use by 50% by 1997 was gaining international attention.⁶ The timing was ripe for policies that reduced the use and generation of toxic chemicals: Greenpeace had been actively campaigning for reduction goals within the North Sea Convention in Europe and networking with other NGOs and policy leaders in North America to research best practice that advanced clean production in industry. The TURA and early results of the program were eagerly watched by Clean Production advocates and added to the growing body of expertise on clean production strategies within the international NGO community. WWF Canada tapped into this expertise to promote best practice in the province of Ontario.⁷ The emphasis on mandatory toxics use reduction planning and mass balance audits – all important elements of TURA – were important elements missing in the Ontario chemicals management policy and to this end, the TURA framework became the model for WWF Canada's lobby for regulatory reform. Meetings were held with citizens groups, policy experts, City Councillors and the Canadian Union of Public Employees and support grew for stronger pollution prevention requirements modeled on the TURA.

After much discussion and at times, opposition from some industry sectors, the revised Sewer Use By-law was passed in July

³ World Wildlife Fund. 1995. Toxics In, Toxics Out: Toxics from Sewage Treatment Plants in the Great Lakes and St. Lawrence River. World Wildlife Fund Canada. Poster detailing the range of contaminants from sewage treatment plants in the Great Lakes ecosystem.

⁴ Ontario's Municipal Industrial strategy for abatement: <http://www.ene.gov.on.ca/envision/water/misa/index.htm> accessed January 24, 2010.

⁵ Thorpe, Beverley; Langer, J., et al. The Failure of Ontario's MISA Programme for sewer users: Pollution prevention recommendations for the way forward. Memo to Peter Victor and Phyllis Miller, Director of MISA Programme. October 10, 1995.

⁶ 1995 TURI company case studies available at <http://www.turi.org/content/view/full/4307/offset/48/year//month//day/accessed> January 24, 2010.

⁷ The author was the Clean Production Liaison for Greenpeace International from 1989 to 1999 and represented the organization as a co-founder of the UNEP Cleaner Production Programme in 1990. In 1995 the author was commissioned by WWF Canada to strategize a way forward to reduce toxic emissions from sewers and used the TURA as the framework for WWF's campaign to reduce toxins in Toronto's sewer discharges.

2000 making Toronto the first municipality in Canada to incorporate pollution prevention planning requirements into the Sewer Use By-law.⁸ Eleven metals and twenty-seven organic compounds/group of compounds are addressed in the By-law. Part 5 of the By-law requires the companies that discharge these chemicals to submit a detailed pollution prevention plan that identifies ways to avoid, reduce or eliminate pollutants at source and conduct a mass balance audit to ascertain total input and output of all designated chemicals use.⁹ Technical support is provided by the Canadian Centre for Pollution Prevention and plans are submitted every six years with summary updates every two years. Certain sectors such as the photofinishing and automotive sector must comply with industry specific Best Management Practices as set out by the City and are not required to submit pollution prevention plans. During the same year that the By-law revisions were passed, Toronto City Council approved a proposal to end incineration of sewage sludge at the Ashbridge Bay Treatment Plant with the goal of increasing the beneficial use of biosolids. The key objectives of Toronto's revised Sewers By-law are to:

- help facilities identify ways of reducing and/or eliminating pollutants, at the source
- continuously improve the quality of biosolids
- protect water quality. The new bylaw established more stringent limits on most of the 11 heavy metals found in the Ontario Guidelines for Utilisation of Biosolids and Other Wastes on Agricultural Land and included 27 toxic chemicals.

One of the key sectors identified was dental clinics. Research revealed that dental practices may contribute from 8 to 14% of the mercury to the sewer systems. Dental waste may have up to 500 mg L⁻¹ of mercury and on average, dental offices produce approximately 1.0 L per day per dentist.¹⁰

2.1. Some successes

Although the Sewer Use By-Law does not mandate the actual implementation of the plans, similar to the Massachusetts Toxics Use Reduction Act, early results showed the planning requirement was achieving success. The 2002 Toronto Water and Wastewater Services Annual Report¹¹ noted “that treated wastewater is starting to show a reduction in levels of heavy metals in the influent, biosolids and effluent. The most significant reduction is the mercury level in biosolids. Since establishing this law, the four sewage treatment plants have recorded between a 41% and 72% reduction in mercury levels.”

The 2004 report¹² noted that “agreements contributed \$9 million in revenue through enforcement of the By-law. A number of prosecutions primarily in the metal finishing sector have been conducted.” The same report graphed the substantial reduction in heavy metals in biosolids from the Ashbridge Bay treatment plant. Metal trend data for mercury, zinc, cadmium, lead and chrome over

the last 25 years spanning the years 1978 through to 2004 have declined continuously and the authors note that this is due to the implementation of the Sewer Use By-law.¹³

2.2. Weaknesses identified

However a review of the effectiveness of the Sewer use By-law conducted in June, 2008 by auditors revealed some structural weaknesses in the plan's ongoing implementation.¹⁴ Due to lack of staff resources, the submission of pollution prevention plans is not being monitored for many industries since the priority is given to high-risk business sectors such as metal finishing. Furthermore, many business owners were not always aware of the By-law and criteria and specific procedures and criteria for approval of pollution prevention plans have not been established. This is further compounded by the fact that only one full time staff person is responsible for reviewing the plans. The auditors furthermore noted that the City's lack of legal authority to enforce the implementation of the pollution prevention plans could be a major factor in the lack of compliance.

2.3. Discussion

It is worth comparing the actual management of the Toronto Sewer Use By-law to that of the Massachusetts TURA. Under TURA, a comprehensive training program ensures that a cadre of Toxics Use Reduction Planners (TURPs) is on the ground holding continuous ongoing dialogue with companies to ensure they are aware of their responsibilities and able to complete comprehensive plans. The lack of such a support service in Toronto and the designation of only one staff person to review the plans is an inherent weakness of the By-Law. The lack of staff resources for the Toronto By-law further demonstrates the value of the Massachusetts TURA approach where company fees fund the program and there are clearly established roles for the Toxics Use Reduction Institute, Department of Environmental Protection and the Office of Technical Assistance. It should also be noted that the Sewer Use By-law's scope of only 39 substances falls far short of the Massachusetts TURA list of all chemicals composed of over 600 chemicals listed under the US Toxic Release Inventory. As a minimum the Sewer Use By-law should consider expanding the scope to cover the 393 chemicals currently listed under Canada's National Pollutant and Release Inventory.

The city is now set to finalize its Biosolids and Residuals Master Plan to provide direction on the future management of biosolids to the year 2025.¹⁵ However these structural weaknesses need to be addressed if future use of biosolids is to be chemically clean enough for land utilization and other beneficial uses.

3. Substitution planning within the European chemicals REACH legislation

TURA's requirement of mandatory planning became an important example and NGO demand during the formation of Europe's new chemicals regulation and resulted in the first substitution assessment planning requirement in EU wide legislation. The new

⁸ Toronto Sewer By-law accessed at http://www.toronto.ca/water/protecting_quality/pollution_prevention/index.htm Accessed January 24, 2010.

⁹ Toronto Municipal Code Sewers http://www.toronto.ca/legdocs/municode/1184_681.pdf. See section 681–5. Pollution prevention planning. Accessed January 24, 2010.

¹⁰ Toronto Sewer Use By-law and Dental Offices brochure. http://www.toronto.ca/water/protecting_quality/pollution_prevention/pdf/brochures/brochure_dental.pdf Accessed January 24, 2010.

¹¹ Toronto Works and Emergency Services. Water and Wastewater Services Annual Report 2002. Page 46 http://www.toronto.ca/water/annual_report/pdf/annual_report_2002.pdf accessed January 24, 2010.

¹² Toronto Water. Annual Report 2004. Page 21 http://www.toronto.ca/water/annual_report/pdf/annual_report_2004.pdf accessed January 24, 2010.

¹³ Metal Trend Data in Toronto Water Annual Report 2004. Page 50 http://www.toronto.ca/water/annual_report/pdf/annual_report_2004.pdf accessed January 24, 2010.

¹⁴ Griffiths, J. 2008. Protecting Water Quality and Preventing Pollution – Assessing the Effectiveness of the City's Sewer Use By-Law, Toronto Water. Report accessed Jan 24, 2010 at http://www.toronto.ca/audit/2008/city_sewers_appendix_june2008.pdf.

¹⁵ Toronto Biosolids management: <http://www.toronto.ca/water/biosolids/index.htm> accessed January 24, 2010.

EU chemicals regulation, REACH (Registration, Evaluation, Authorization and Restriction of Chemicals), passed into force on June 1, 2007. The goals of REACH, as cited by the new European Chemicals Agency,¹⁶ are to:

- Improve the protection of human health and the environment from the risks that can be posed by chemicals
- Enhance the competitiveness of the EU chemicals industry
- Promote alternative methods for the assessment of hazards of substances

REACH was groundbreaking in its scope and intent. In short, industry and importers must now register all chemicals in use over 1 tonne per year per company and provide information on the chemicals they place on the market. Data gaps for chemicals already in use will be filled. Substances of high concern are now clearly defined and must go through an authorization process to justify ongoing use by the intended producer or user while being “progressively substituted by safer substances or technologies.”

The drafting process of REACH resulted in the most intensive dialogue ever experienced within the EU over any piece of legislation. Many interests were at work and the NGO and human/environmental health community were well coordinated. In 2000 a network of advocacy groups produced the Copenhagen Chemicals Charter¹⁷ which outlined 5 key demands from the new chemicals legislation:

1. A full right to know – including what chemicals are present in products
2. A deadline by which all chemicals on the market must have had their safety independently assessed. All uses of a chemical should be approved and should be demonstrated to be safe beyond reasonable doubt
3. A phase out of persistent or bioaccumulative chemicals
4. A requirement to substitute less safe chemicals with safer alternatives
5. A commitment to stop all releases to the environment of hazardous substances by 2020

In the last four years leading up to the final text, advocates focused their demands around the issue of substitution and the demand that all hazardous substances should be substituted if safer alternatives were available. The chemical industry was lobbying for the adequate control route for hazardous chemicals and campaigners could see that a fundamental issue was at stake: would substances of high concern be allowed in future through traditional risk assessment and exposure control arguments or would these hazardous substances be prioritized for substitution with inherently safer chemicals? To this end campaigners joined forces with retailers, companies, unions and other ‘downstream users of chemicals’ to promote the substitution principle. The issue then became how to operationalize this.

The Massachusetts’ Toxics Use Reduction Act had demonstrated the success of mandatory pollution prevention planning as a key element in the success of the TURA program. Clean Production Action (CPA) was tasked by the Greenpeace Environmental Trust to prepare a series of case studies to demonstrate how companies were already substituting safer chemicals for toxic chemicals in products and asked to recommend a policy framework to advance

the Substitution Principle within REACH. Policy experts in CPA took the experience of TURA mandatory planning requirement and evolved the practice of toxics use reduction plans into mandatory substitution assessment planning for chemicals of very high concern.¹⁸ Fig. 1 The framework proposed was that when an application for an authorization was made, the applicant should provide details of alternative substances, materials, processes or products currently in use (the substitution assessment). Other parties (e.g. manufacturers of potential substitutes) should be invited to respond to this substitution assessment. If the manufacturer, importer or user of a chemical of very high concern could demonstrate that no viable alternative is available; that there is need for the chemical (with a transparent socio/economic assessment); and that all steps are taken to minimize exposure, and therefore risks from continued use of the substance, then a time-limited authorization may be granted to allow the development of safer substitutes. Manufacturers and/or users would then be required to produce a substitution development plan to enable substitution to take place before the authorization expires.

The report’s framework recommendation generated much interest within the European Parliament and Guido Sacconi, the European Parliament’s rapporteur for REACH, along with a coalition of parties promoted the substitution principle and mandatory planning over the ensuing three years prior to the final text agreement in December 2006. This paper will not detail the political negotiations that ensued¹⁹ but suffice to say, the negotiations were contentious and much debate ensued around adequate control for hazardous chemicals versus the requirement that safer substitutes must be adopted if available.

The outcome was a compromise. In the final REACH regulation²⁰ any application to seek authorization for a chemical of high concern must include an analysis of alternatives considering their risks and the technical and economic feasibility of substitution, including, if appropriate information about any relevant R&D activities. Where analysis shows suitable alternatives are available then a substitution plan including a timetable for proposed actions will be required. Furthermore authorizations will be time limited and reviewed on a case by case basis. In this respect the final REACH regulation mirrors the recommendations of the NGOs and European Parliament.

However, an authorization shall be granted if the risk to human health or the environment can be adequately controlled. If this cannot be demonstrated then an authorization may still be granted if it is shown that socio-economic benefits outweigh the risk to human health or the environment arising from the use of the substance and if there are no suitable alternative substances or technologies. The adequate control route trumps the substitution planning process except for Very Persistent, Very Bioaccumulative and Toxic substance where the adequate control route cannot be a justification for ongoing use. In retrospect, however, it will be time and resource intensive for European companies to prove adequate control and socio-economic need for chemicals of very high concern determined as carcinogens, mutagens, reproductive toxins and persistent, bioaccumulative chemicals. The search for

¹⁶ About REACH. Accessed at http://guidance.echa.europa.eu/about_reach_en.htm accessed January 24, 2010.

¹⁷ Copenhagen Chemicals Charter 2000 accessed January 24, 2010 at http://www.eeb.org/publication/2000/CCC_from_BEUC_corrected_EL_clean.pdf.

¹⁸ Thorpe, B. 2005. Safer Chemicals within REACH. Using the Substitution Principle to Drive Green Chemistry. Report prepared by Clean Production Action for the Greenpeace Environmental Trust. October 2003 updated February 2005. Report accessed January 24, 2010 at http://cleanproduction.org/library/safer_chemicals_within_reach2005.pdf.

¹⁹ For a detailed account of the political fight and negotiations around the substitution principle within the draft REACH legislation visit: http://cleanproduction.org/library/The_fight_for_Substitution_in_REACH.doc.

²⁰ REACH final text available at http://guidance.echa.europa.eu/legislation_en.htm accessed January 24, 2010.

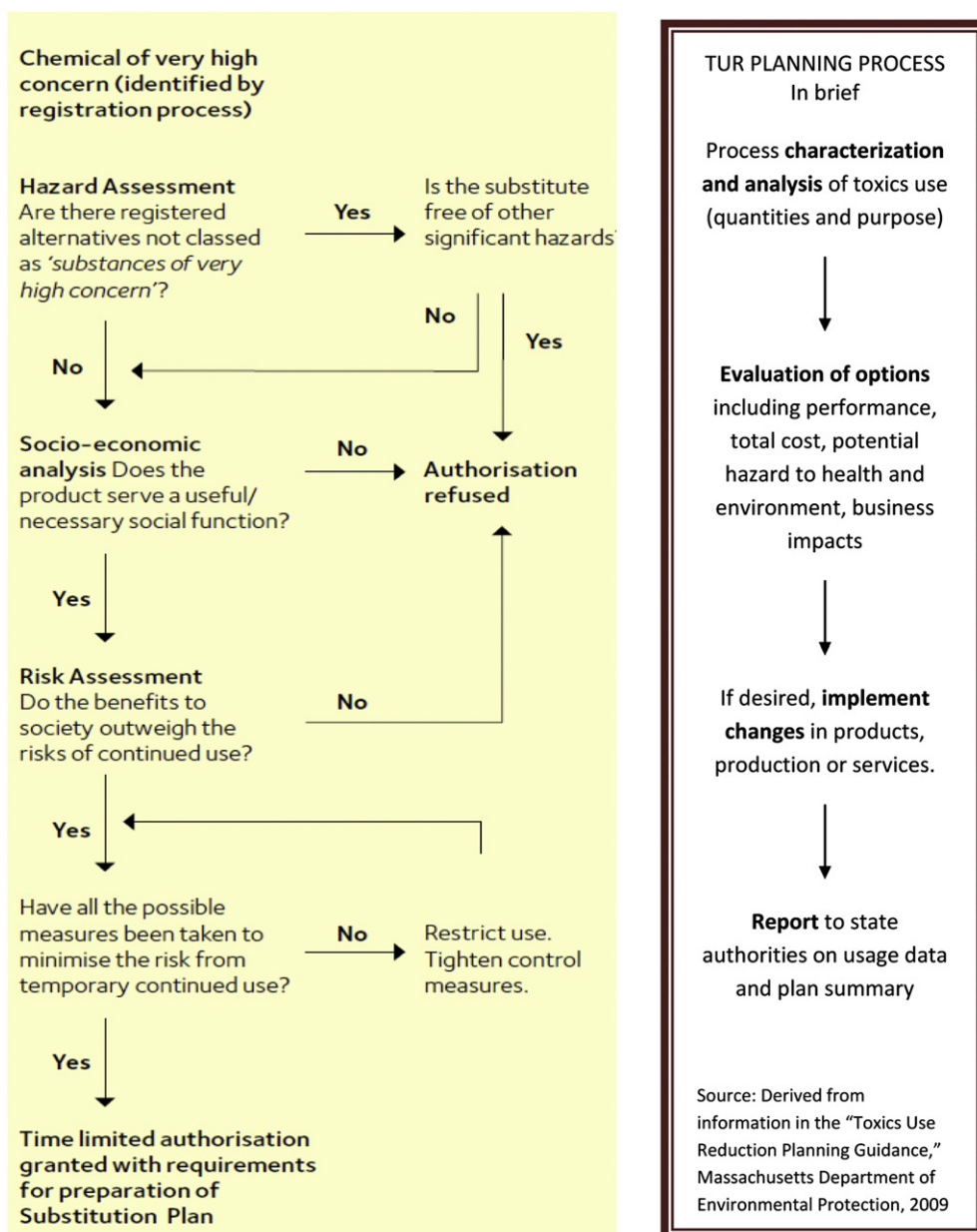


Fig. 1. Proposed decision making process to integrate substitution planning within REACH. Greenpeace, 2005.

safer substitutes that do not meet the criteria of a chemical of very high concern has increased. To date, the REACH Guidance on the Preparation for an Application for Authorization has not been completed and no information is available at the time of writing to comment on the nature of the substitution planning requirement.²¹

3.1. Discussion

The mandatory requirement to substitute chemicals of very high concern with safer alternatives was not directly achieved in the REACH regulation but has spurred company assessments of their chemicals use data to anticipate what possible action they may need to take. The launch of the Substitute It Now (SIN) List by the

International Chemical Secretariat in September 2008 was widely welcomed by many downstream users of chemicals.²² The SIN List was created based on the criteria of chemicals that would meet the need for authorization and in response to the slow pace of nominating chemicals as possible candidates for REACH authorization. Although the list is not currently recognized as an official REACH list it is inspiring companies to use the SIN List in their substitution work. REACH will take years to complete with final implementation of all registration, evaluation and candidate lists for authorization completed by June 2022. It will be interesting to see how the European Union addresses substitution planning requirements and how the search for safer substitutes will be assessed. Third party input will be encouraged via an open source web portal and this

²¹ REACH Implementation Guides are available at <http://ecb.jrc.ec.europa.eu/reach/rip/> accessed January 24, 2010.

²² Chemsec. A Big Day in Brussels: <http://chemsec.org/list/about-sin/the-sin-list-launch>.

could catalyze the creation and dissemination of safer chemical substitutes. However one of the strengths of the TURA was the need to do mandatory planning and have the plans certified. It is still unclear how REACH plans will be assessed for completeness and what guidance will be given to companies. The next few years will offer important opportunities to advance substitution planning and alternative assessment tools that go beyond chemical restriction lists and actually define safer substitutes such as the Green Screen for Safer Chemicals.²³ Experience gained in Massachusetts could be of great use to the European Chemicals Agency in their work to integrate good substitution planning within REACH.

4. The role of toxics use reduction in the international campaign by Greenpeace in Asia and Latin America to achieve zero discharge of hazardous substances into rivers

The burgeoning industrial model in Asia and Latin America has resulted in uncontrolled industrial effluents into many of the world's iconic rivers. Water, always a precious resource, is under increased stress from climate change and the decreasing flows in many of the world's rivers are exacerbating the severe water pollution crisis in many countries.

Greenpeace has responded with the launch of a zero discharge of hazardous substances campaign in Asia and Latin America with a focus in China, Russia, Philippines, Thailand, India, Argentina and Spain. The organization is no newcomer to campaigning against toxic industrial discharges having spearheaded many campaigns to eliminate hazardous discharges and dumping of toxic wastes into the European and North American rivers and oceans in the late 1980s and early 1990s.²⁴ The organization's new focus on eliminating discharges in Latin America and Asia is therefore a timely opportunity to advance the most successful clean production legislation that benefits workers, protects the environment and allows companies to thrive.

Since the creation of the UNEP/UNIDO Cleaner Production Programme in 1990 a wealth of cleaner production case studies and networks has been created and legislative initiatives such as Massachusetts' TURA have been tried and tested. It is this compilation of successful strategies and experience that Greenpeace seeks to proliferate within its international rivers campaign and lessons learned from TURA have now been incorporated into the information and training resources for campaigners in these key countries. In particular, TURA's focus on mandatory toxics use reduction planning, clear definition of pollution prevention and the provision of technical expertise and training for companies has been adopted as priority pushes within the campaign. To catalyze such clean production policies Clean Production Action produced a series of factsheets and training materials for campaigners in newly industrializing countries²⁵ focusing on how to lobby for zero discharge of hazardous substances and clean industrial production processes. The TURA is given prominent place in the training materials.

The world water toxic hotspots²⁶ that the campaign is addressing are the Pearl River Delta in southern China; The Rio Chuela in Argentina; the River Neva in Russia; the Chao Phraya River in Thailand, the Bay of Algeciras in Spain and Laguna Lake in the Philippines.

The Pearl River Delta in Southern China, is known as the world's factory floor and in 2007, 30% of China's exports were made here. The river provides water to 47 million people yet is heavily contaminated with hazardous industrial effluents as a recent investigation reveals.²⁷ The Greenpeace campaign goal in China is to achieve a clean production revolution in the Pearl River Delta and China as a whole. This is to be achieved by a defined set of action points²⁸ with three that particularly mirror TURA's goals and framework. These are the establishment of targets and timelines for progressively reducing and ultimately eliminating the use of hazardous substances; conducting a full chemical accounting and a clean production/solutions audit; and creating well-funded technical resources and providing ongoing help to enable companies (especially small and medium-scale enterprises) to implement plans to eliminate their use of hazardous chemicals. No one underestimates the challenge in advancing such policies but time is running out: currently 70% of the rivers, reservoirs and lakes in China are unfit for human consumption²⁹.

In Argentina, the Rio Chuela houses approximately 4100 factories which are causing the river to run black. Citizen action resulted in a law suit against the government for lack of a cleanup plan and the court has set the goal of 50% reduction of emissions of highly hazardous emissions within five years. In October 2009 a clean production conference and dialogue featured a speaker from the Toxics Use Reduction Institute to give an overview of the success of the TURA program. A series of factsheets prepared by Clean Production Action and translated into Spanish have been widely disseminated to policy makers in Argentina and make specific recommendations to use the TURA program as the framework for TURA type planning and goal setting into Argentina's industrial policy.³⁰ A second clean production conference is being planned for 2010 in China and this will offer more opportunities to spread the TURA framework.

4.1. Discussion

As the campaigners in all these countries become adept at arguing the benefits of mandatory toxics use reduction planning and other clean production strategies, it is hoped that the current unregulated industrial discharges will cease. However the challenge of working in regions which lack effective government run programs to issue permits, monitor compliance and enforce laws necessitates political change. Cheap disposal costs add to the disincentive to address the problem of toxic wastes. It is exactly for these reasons that NGO advocacy and a popular groundswell for clean production strategies are strategically prioritized within the campaigns. Greenpeace believes that change will ultimately occur through campaigns that highlight the crisis and force solutions. Toxics Use Reduction can in theory be applied to any company process but the political and economic realities of many industrializing countries will make the transfer of the key elements that made TURA successful a challenge. Also, it remains to be seen if the toxic emissions currently pouring into the Rio Chuela or Pearl River will be abated using toxics use reduction techniques or end of pipe controls and the transfer of hazardous emissions instead. Although the NGO campaigns in Argentina and China clearly state the need

²³ Clean Production Action. The Green Screen for Safer Chemicals. Available at <http://cleanproduction.org/Greenscreen.php>.

²⁴ Huisingsh, D; Baas, L et al., 1989. Clean Production in the North Sea. Greenpeace International.

²⁵ Thorpe, B. 2009. Clean Production Strategies factsheets accessed Jan 24, 2010 at <http://cleanproduction.org/Publications.php>.

²⁶ Greenpeace International. 2009. Map of world water toxic hot spots at <http://www.greenpeace.org/international/campaigns/toxics/water>.

²⁷ Poisoning the Pearl. Access at <http://www.greenpeace.org/raw/content/china/en/press/reports/pearl-river-delta-2009.pdf> accessed January 24, 2010.

²⁸ Ibid. see page 6.

²⁹ Greenpeace China website <http://www.greenpeace.org/china/en/campaigns/toxics>.

³⁰ Thorpe, B. 2009. Hacia la Produccion Limpia accessed Dec 20, 2009 at <http://www.greenpeace.org/argentina/contaminaci-n/producci-n-limpia/hacia-la-produccion-limpia>. For English version visit <http://cleanproduction.org/Publications.php>.

for zero discharge through toxics use reduction and substitution, much training and accountability will be needed within government and companies to understand the benefits of toxics use reduction and practice its implementation.

5. Conclusion

The TURA has been successful in reducing toxics use in the state of Massachusetts and the analysis of which elements can be credited with supporting these reductions is a topic of some study in this and other journals. O'Rourke and Lee (2004) identified measurable performance goals, mandatory planning and technical assistance as the most successful elements of TURA.³¹ Wilson (2006) reported that in considering model policies for the State of California, TURA's unique toxics use reporting requirements focused facility managers' attention on production processes rather than on end of pipe releases. Further, the planning process that requires firms to evaluate their processes – and to assist them with robust training, technical assistance and research – has been successful.³²

These key elements help to explain why the transfer of TURA type legislation to other regions may not generate the same kind of toxics use reduction results. For example, the lack of a comprehensive enforcement program for the Toronto Sewer Use By-law in Toronto coupled with a small list of targeted chemicals of concern will continue to prevent the elimination of all toxic chemicals flowing into Toronto's sewers. The establishment of mandatory pollution prevention planning as part of the By-law has engaged many sectors but the challenge now is to maintain the early momentum and ensure compliance and ongoing outreach to companies. Under TURA, a comprehensive training program ensures that a cadre of Toxics Use Reduction Planners (TURPs) is on the ground holding continuous ongoing dialogue with companies to ensure they are aware of their responsibilities and able to complete comprehensive plans. This builds long-term relationships and ongoing networking of businesses. The lack of such a support service in Toronto and the designation of only one staff person with little resources further demonstrate the value of the Massachusetts TURA approach where company fees fund the program and three government entities are clearly and effectively involved.

The mandatory planning requirements within TURA became a key policy instrument for NGOs lobbying for the mandatory substitution of chemicals of very high concern within the European REACH legislation. The ability to demonstrate TURA's successes

through the mandatory planning requirement coupled with dogged campaigning and lobbying by NGOs, environmental health advocates and leading companies in support of substitution, resulted in a substitution planning requirement in the final regulation. This signals the first time substitution planning has been required in EU legislation. The challenge now is to operationalize this and the forthcoming Guidance document will be an important tool to advance the burgeoning field of alternatives assessment. It will no longer be sufficient to simply avoid a chemical of high concern on a designated list; rather the focus will be on assessing if the alternative is truly safer through comparative hazard assessment tools such as the Green Screen for Safer Chemicals.³³ Tools such as this can be applied not only for process chemicals but also for chemical ingredients in products and will help shift more company and supply chain attention to input substitution and product reformulation as part of the suite of toxics use reduction techniques.

Transferring key elements of TURA to China and Argentina and other countries will in large part be dependent on the political and economic structures that prevail. The Greenpeace China campaign is advancing three key elements of TURA: establishing targets and timelines for progressively reducing and ultimately eliminating the use of hazardous substances; conducting a full chemical accounting and a clean production/solutions audit; and creating well-funded technical resources and providing ongoing help to enable companies (especially small and medium-scale enterprises) to implement plans to eliminate their use of hazardous chemicals. China already has a Cleaner Production Promotion Law but this recommends voluntary actions and reliance on local authority implementation.³⁴ In comparison the NGO campaign is focusing on clear pragmatic action with specified timelines. To achieve this, the campaign is exposing the crisis situation that exists with water pollution and increase public awareness within a country known for its censorship controls. For this reason a complementary focus on solutions and strategies that advance clean production and green chemistry is an important part of the water pollution campaign. However the ongoing reality of the cheap cost of hazardous waste disposal, the perception that environmental controls will make production too costly, and the lack of regulations and enforcement will stymie any attempt to advance clean production strategies in this or any other region of the world. The Toxics Use Reduction Act came into force in 1989 with high environmental awareness, an engaged citizenry and a responsive government entity. Perhaps these are the same conditions that must exist for its successful transference to industrializing countries.

³¹ O'Rourke, Dara and Eungkyoon Lee (2004), "Mandatory Planning for Environmental Innovation: Evaluating Regulatory Mechanisms for Toxics Use Reduction," *Journal of Environmental Planning and Management*, vol. 47, no. 2, March.

³² Michael P. Wilson, Chia, D and Ehlers, B. *Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation*. California Research Policy Centre. University of California. (2006). Page71.

³³ Clean Production Action. The Green Screen for Safer Chemicals. Available at <http://cleanproduction.org/Greenscreen.php>.

³⁴ China Cleaner Production Promotion Law. 2003. Accessible at <http://www.chinacpm.com/EN/PolicyDetail.aspx?id=39>.