

TOXICS USE REDUCTION in Massachusetts

What is their approach?

Does it work?

Can we use it in the UK?

Andy Watterson

Stirling University

aew1@stir.ac.uk

twitter @aew1aew1

Massachusetts Toxics Use Reduction Act (TURA) 1989

Goals of the Massachusetts Law in 1989:

- Achieve 50% reduction in byproduct (waste) by 1998 through required company plans
- Establish toxics use reduction as the preferred means of compliance (OHSE regulation is covered by other agencies)
- Promote the competitive advantage of Massachusetts Industry
- Reduce the production and use of toxic chemicals

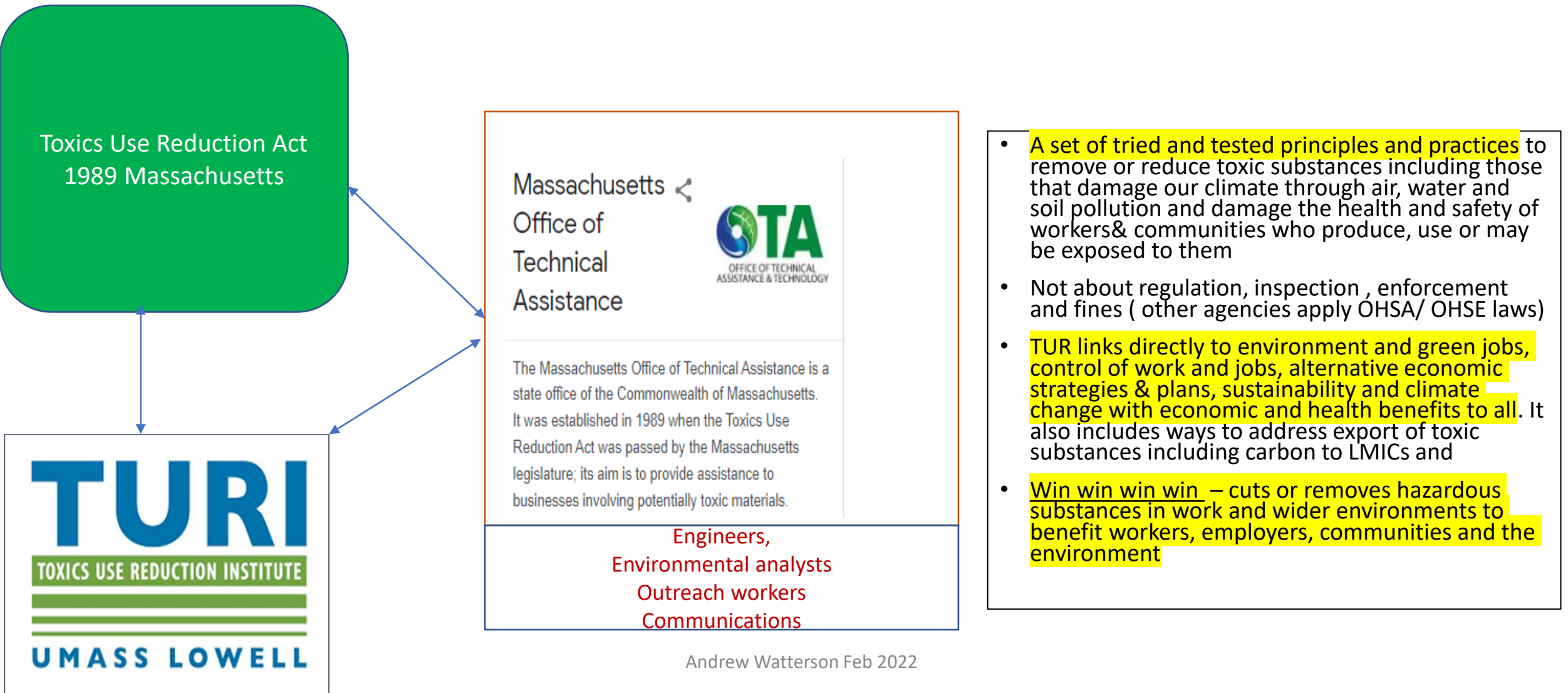
Mechanisms

- Firms manufacturing or processing 25,000 pounds per year of a listed chemical or using 10,000 pounds per year of a listed chemical must report annually on toxic chemicals used and toxic by-products produced
- 1400 chemicals now covered by reporting requirement (only 250 used) & subject to reporting in the state. Currently 500 companies registered

Results

- 1990 – 2016. Companies in Massachusetts reduced:
- toxic chemical use by 66%
 - by-product production by 72%
 - onsite releases by 92%.

TURA structure and organisation



US Massachusetts Toxics Use Reduction Act Data Base - TURADData

Under the Toxics Use Reduction Act, the information collected since its inception in 1989 has been put in a database called "TURADData" which can be accessed outwith the state and USA

<https://turadata.turi.org/>

TURI Pollution Prevention Options Assessment System (P2OASys) tool 2018.

tool to help companies determine whether the toxics use reduction (TUR) options they are considering improve upon their existing process when looking at environmental, health and safety topics. By using P2OASys,

New Assessment		Load From Database	
Name	P2OASys Format	SDS Format	Remove
Sample Chemical	<input type="button" value="Enter Data"/>	<input type="button" value="Enter Data"/>	<input type="button" value="Remove"/>
Score Summary		Compare Raw Data	
<input type="button" value="Upload A Chemical/Product to the P2OASys Database"/>			
<input type="button" value="Export Data to CSV"/>		<input type="button" value="Import Data from CSV"/>	
<input type="button" value="Hazard Score Matrix"/>			

Supply Chain Work Groups & Peer Mentoring

Lead-free Electronics Consortium
- Collaborative performance testing

Wire & Cable Work Group
- Reducing use of phthalates, heavy metals

Military & Aerospace Work Group
- Addressing barriers to replacing hexavalent chromium and halogenated solvents

Industry Peer Mentoring Work Group
- Hosted by Siemens; 6 other companies currently participating



Immediate transferability to UK?

TURI developed the Pollution Prevention Options Analysis System (P2OASys) tool to help companies determine whether the toxics use reduction (TUR) options they are considering improve upon their existing process when looking at environmental, health and safety endpoints. P2OASys can help identify potentially negative environmental, worker or public health impacts and avoid making regrettable substitutions.

Potential hazards are compared using data endpoints for eight main categories that encompass chemical, physical, workplace and environmental hazards. Scores range from 2 to 10 with the lower score being more desirable. Those scores have been translated to a ranking as noted in the table key.



TURI Case studies

- **Industrial Cleaning** BioBased Floor Stripping.
- Energy Conservation** Woodworking. Paper Texas Instruments
- Water Conservation** GKN Analog Devices - Innovative Solutions to Water Conservation. 2015
- Waste Reduction** Mark Richey Woodworking
- VOC Reduction** Ophir Optics LLC - Lean Manufacturing. 2011
- Process Efficiency** Print Works
- Metal Finish/Plating** Trivalent Chromium Plating Conversion. 2012
- Coatings** Curing of Inks & Coatings. Stainless Steel Coatings, Paints, Textiles
- Printing** Print Advertising, VOC Emissions, acid substitution with Carbon Dioxide
- Life Sciences** Solvent Recovery and Recycling. 2013
- Microbreweries** Safer Cleaning and Sanitizing Technology. 2018
- Food and Beverage** Cape Cod Potato Chips - Food Manufacturer Shrinks Chemical Use. 2018
- Autobody/Auto Repair** Mike's Autobody - Safer Alternatives to Toxic Chemicals. 2016
- Miscellaneous** Acushnet Rubber Company - ISO Certification through TUR. OTA 1997

https://www.turi.org/TURI_Publications/Case_Studies

CASE STUDY ONE - Removal



BPA/BPS used in Cash Register Thermal Printing, Receipts:
Hazards:-

- Developers: Bisphenol A (BPA), BPS
- Leuco dyes
- Stabilizers: phenols



Safer alternatives to thermal cash receipts:

- Electronic (email) receipt

Check out this TURI funded public service video and related resources at
<https://www.bpa-free.me/>

SUBS PORT on BPS – no entry but information on BPA

(SUBSPORT is a European substitution e-tool to reduce the risks of hazardous chemicals safely operated by EASHW)



MOVING TOWARDS SAFER ALTERNATIVES



BPS as a substitute for BPA. www.ChemHat.org source

Chem HAT was started by Industrial Division of the Communications Workers of America and the Blue Green Alliance

Bisphenol s

CAS: 80-09-1

Stronger effect /
evidence



Weaker effect /
evidence

How can this chemical affect my health?

■ Acute (Short Term) Effects [Data sources](#)



Irritates the Eyes – Can cause irritation or serious damage to the eye.



Irritates the Skin – Can cause irritation or serious damage to the skin.



Toxic to Humans & Animals – Can be fatal on contact, ingestion or inhalation for humans and other mammals.

■ Chronic (Long Term) Effects [Data sources](#)



Reproductive Harm – Can disrupt the male or female reproductive systems, changing sexual development, behavior or functions, decreasing fertility, or resulting in loss of the fetus during pregnancy.



Endocrine Disruption – Can interfere with hormone communication between cells which controls metabolism, development, growth, reproduction and behavior (the endocrine system).



Birth Defects – Can cause harm to the developing child including birth defects, low birth weight and biological or behavioral problems that appear as the child grows.



ChemHAT.org

Chemical Hazard and Alternatives Toolbox

ABOUT CHEMHAT












SAFER CHEMICALS

FOR WORKERS

BREAST CANCER

SAFER FAMILIES

ChemHAT.org Designed *for* workers *by* workers. |

	<p>Decaffeinate coffee with benzene</p>   <p>In 1970s benzene replaced with dichloromethane</p> 	<p>Decaffeinate coffee with water or carbon dioxide</p> 
	<p>Manufacture IV bags and tubes using polyvinyl chloride and DEHP</p>  	<p>Switch production to lighter, stronger polypropylene plastic that do not contain chemicals of concern and does not need a moisture overwrap</p>
	<p>Produce glass for electronics using arsenic to remove air bubbles</p>  	<p>Maintain liquid glass at higher temperature for longer periods</p>

CASE STUDY TWO – degreaser substitution. CD Aero. 2021 (1)

Supplies capacitors to original equipment manufacturers for use in defibrillators, laser hair removal devices etc. 80 employees. Using TURI's Cleaner Solutions database, the TURI lab identified a number of aqueous products suitable for CD Aero's process

Environmental Health and Safety Comparison of nPB and Alternatives

Category	Original Solvent: n-propyl bromide	Identified Alternative: Aquaase PL 732	SC Aircraft & Metal Cleaner	LF 2100	Aquavantage 3800 GD
Acute Human Effects	VH	H	H	M	H
Chronic Human Effects	VH	L	M	M	L
Ecological Hazards	H	M	M	L	M
Environmental Fate & Transport	VH	M	L	M	M
Atmospheric Hazard	H	L	L	M	M
Physical Properties	VH	M	M	M	M

Key: L = Low M = Medium H = High VH = Very High

CASE STUDY TWO : CD Aero 2021 (2)

Aquaease PL 732 alkaline aqueous phosphate-based cleaner selected as the best alternative. It has mild skin and eye irritation effects

Some of the benefits included:-

- Removing the old degreaser freed up 1,920 square feet on the shop floor, which can now be used for manufacturing space. This equates to an additional \$16,000/year cost benefit.
- The new equipment eliminated the need for a carbon adsorption system as CD Aero no longer has to control potentially hazardous air emissions.
- The workers appreciate the health and safety improvements in their work environment.
- The newer equipment is significantly easier to use, and labour time was reduced from cleaning on all three shifts to cleaning on fewer than two shifts.
- Equipment manufacturer wants to use CD Aero site to demonstrate its equipment because it is operating so well.

CASE STUDY THREE – reduction River Street Filters 2021

- Company anodizes aluminum parts for the electronics, medical, military and defense, automotive and marine, firearms, and aerospace industries since 1991. By installing an acid filtration system on their 3 anodizing tanks, the company has been able:
- to maintain a more consistent quality of its acid bath
- to reduce its use of sulfuric acid by 300 to 450 gallons per year
- to reduce its waste generation by 1,000 to 1,500 gallons per year
- to save an average of \$4,555 per year on material and disposal costs
- to improve worker health and safety

Using TURI information for example to go upstream on manufacturing : endocrine disruptors & substitutes. Pam Eliason 2018

Upholstered furniture

- PFAS (per- and polyfluoroalkyl substances) in stain repellent coatings
- Flame Retardants in polyurethane foam cushions
- Anti-microbial additives

Carpet

- PFAS (per- and polyfluoroalkyl substances) in stain repellent coatings
- Flame Retardants in recycled polyurethane foam carpet pads
- Antimicrobials, biocides
- PVC, phthalate esters, fly ash in backing

Safer alternatives for furniture:

- Look for “TB117–2013” on tags, and no added flame retardants label
- EPP databases for office furniture
- Ask for no stain repellent treatment

Resources:

- Green Science Policy Institute
- Center for Environmental Health (CEH)
- National Resources Defense Council (NRDC)
- Silent Spring Institute
- Mass Environmentally Preferable Purchasing Program
- Healthy Building Network

THE UPHOLSTERY MATERIALS IN THIS PRODUCT:

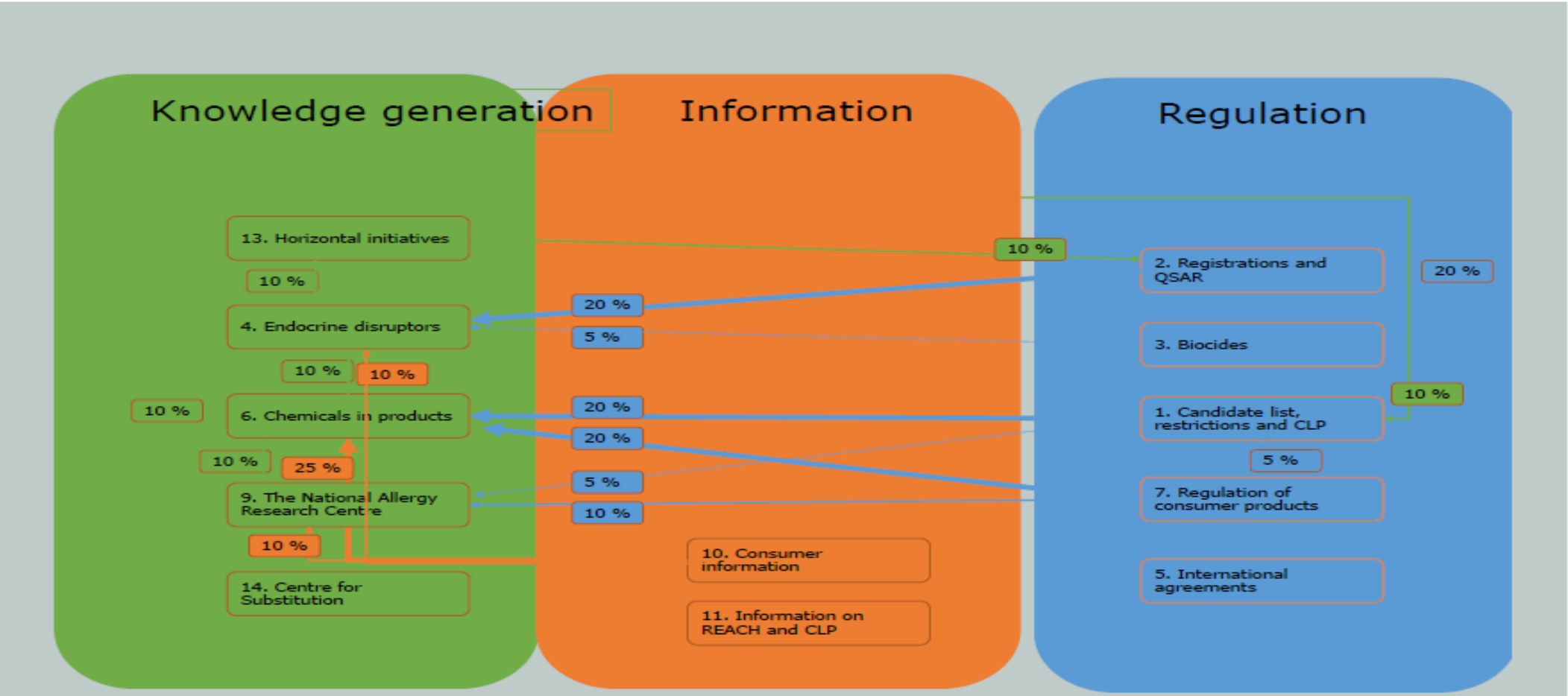
CONTAIN ADDED FLAME
RETARDANT CHEMICALS

X CONTAIN NO ADDED
FLAME RETARDANT CHEMICALS



Danish Toxics Policy linking knowledge, information and regulation

Figure 5-4 Overview of the relationship between the action areas





[Int J Environ Res Public Health](#). 2018 Jun; 15(6): 1229.

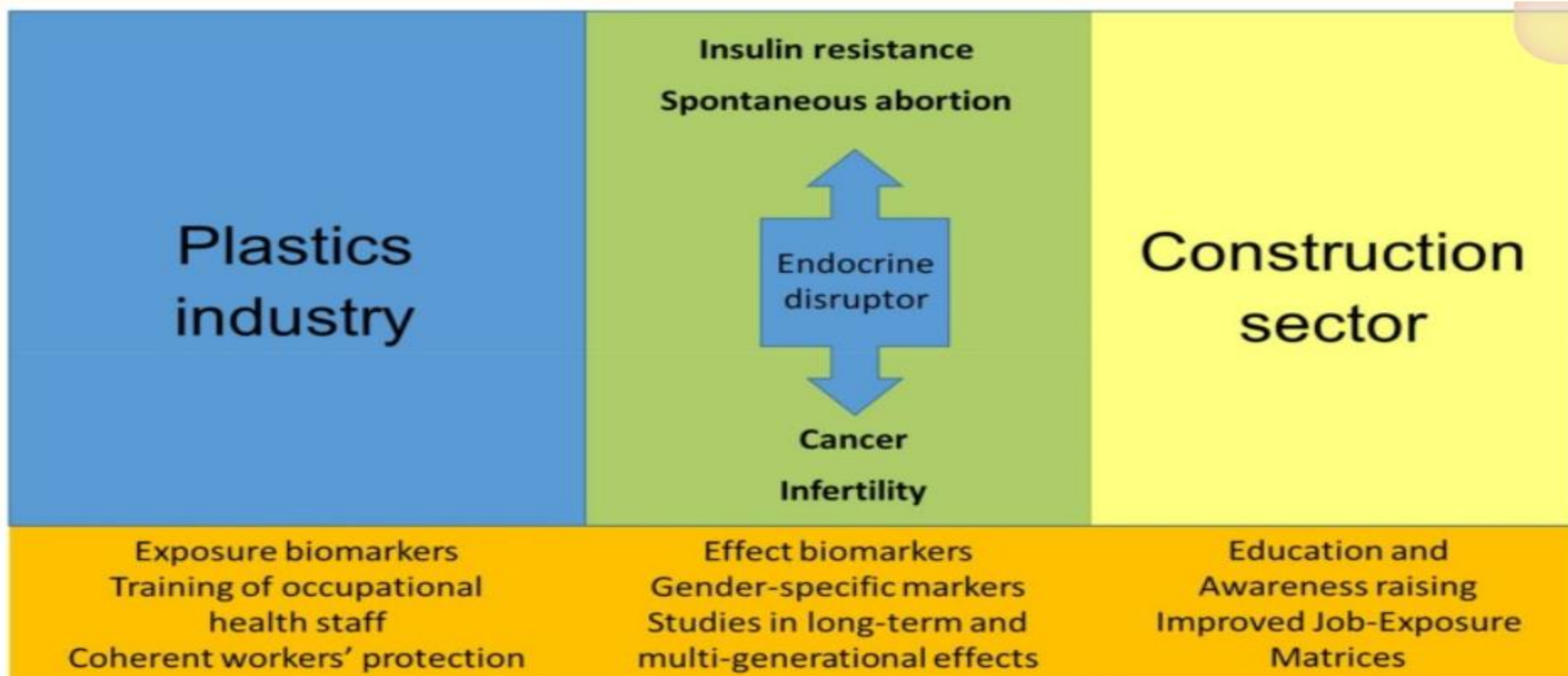
Published online 2018 Jun 11. doi: [10.3390/ijerph15061229](#)

PMCID: PMC6025531

PMID: [29891786](#)

Potential Health Risk of Endocrine Disruptors in Construction Sector and Plastics Industry: A New Paradigm in Occupational Health

[Aleksandra Fucic](#),¹ [Karen S. Galea](#),² [Radu Corneliu Duca](#),³ [Mounia El Yamani](#),⁴ [Nadine Frery](#),⁴ [Lode Godderis](#),^{3,5}



For more TUR information, see:-

Toxics Use Reduction: beyond analysis to action. Linking public health, occupational health and safety, environmental sustainability and new or better employment: a position paper. Watterson, Tasker, Jenkins and Palmer January 2021
DOI: 10.13140/RG.2.2.12814.59204

[https://www.researchgate.net/publication/348564404 Toxics Use Reduction beyond analysis to action Linking public health occupational health and safety environmental sustainability and new or better employment a position paper](https://www.researchgate.net/publication/348564404_Toxics_Use_Reduction_beyond_analysis_to_action_Linking_public_health_occupational_health_and_safety_environmental_sustainability_and_new_or_better_employment_a_position_paper)