Thinking about Comprehensive Chemicals Policy

Joel A. Tickner, ScD
University of Massachusetts Lowell
Working Group on Toxic Chemical Use in Vermont
August 23, 2016

Core questions

- How do achieve the benefits/functionality of chemical substances while minimizing the potential impacts?
- How do we maximize protection of health and ecosystems while fostering innovation?

Chemicals Policy System Challenges

- Data Gap
- Safety Gap
- Technology Gap
- Science Gap
- Jurisdiction gap

- Together these inhibit the ability of the system to identify and act on early warnings and support transition to safer chemistries. It is reactionary and disjointed in nature.

Data gap

- Limited data on chemical use, toxicity and exposure on most chemicals in commerce
- Exacerbated by the problem of tracking 1000s of chemicals in 1000s of products in complex supply chains
- Makes management and shift to safer chemicals difficult
- Lack of information often mis-interpreted as evidence of safety

Safety Gap

- High standards of evidence required before action is taken
- Many chemicals considered “safe” until demonstrated dangerous
- Significant resources spent characterizing detailed risks for each hazard and identifying “safe” exposures
- Default assumption is often “no hazard” until risks characterized.

Selected OSHA Risk Estimates for Prior and Current PELs

Standard	Risk at Prior PEL	Risk at Current PEL	Federal Register Date
Ethylene Oxide	**63-109 per 1000**	**1.2-2.3 per 1000**	**June 22, 1984**
Asbestos	**64 per 1000**	**6.7 per 1000**	**June 20, 1986**
Benzene	**95 per 1000**	**10 per 1000**	**September 11, 1987**
Formaldehyde	**0.4-6.2 per 1000**	**0.0056 per 1000**	**December 4, 1987**
Methylenedianiline	***6-30 per 1000**	**0.8 per 1000**	**August 10, 1992**
Cadmium	**58-157 per 1000**	**3-15 per 1000**	**September 14, 1992**
1,3-Butadiene	**11.2-59.4 per 1000**	**1.3-8.1 per 1000**	**November 4, 1996**
Methylene Chloride	**126 per 1000**	**3.6 per 1000**	**January 10, 1997**
Chromium VI	**101-351 per 1000**	**10-45 per 1000**	**February 28, 2006**

Technology gap

- Few incentives to invest in safer chemistry
- Little funding dedicated to prevention
- Lack of focus on alternatives can lead to substitutions that are also problematic example: solvents
- Opportunities to support development and adoption of safer chemistry when particular legislation or regulatory powers do not exist.

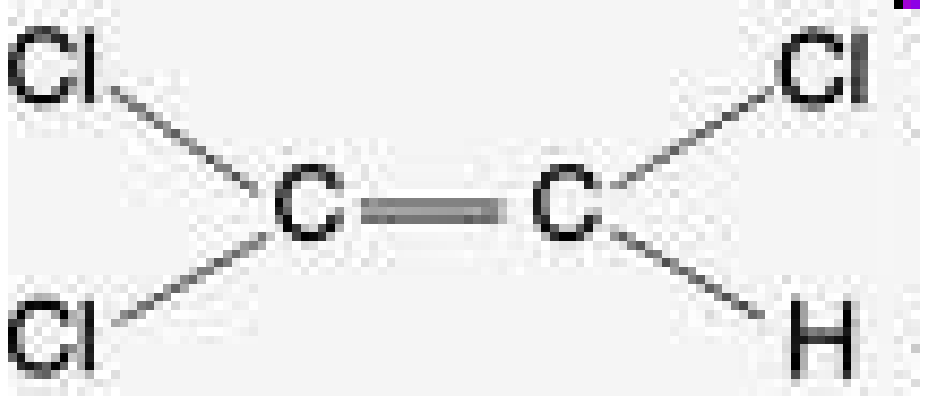
Science Gap

- Increasing understanding of exposure to many chemicals at low doses in a dispersive, non-point manner
- Exposure to multiple chemicals but little understanding of cumulative effects
- Problem focus: detailed characterization of problem as a prerequisite for action. “Right knowledge” will motivate right action
- Separation of research from preventive action

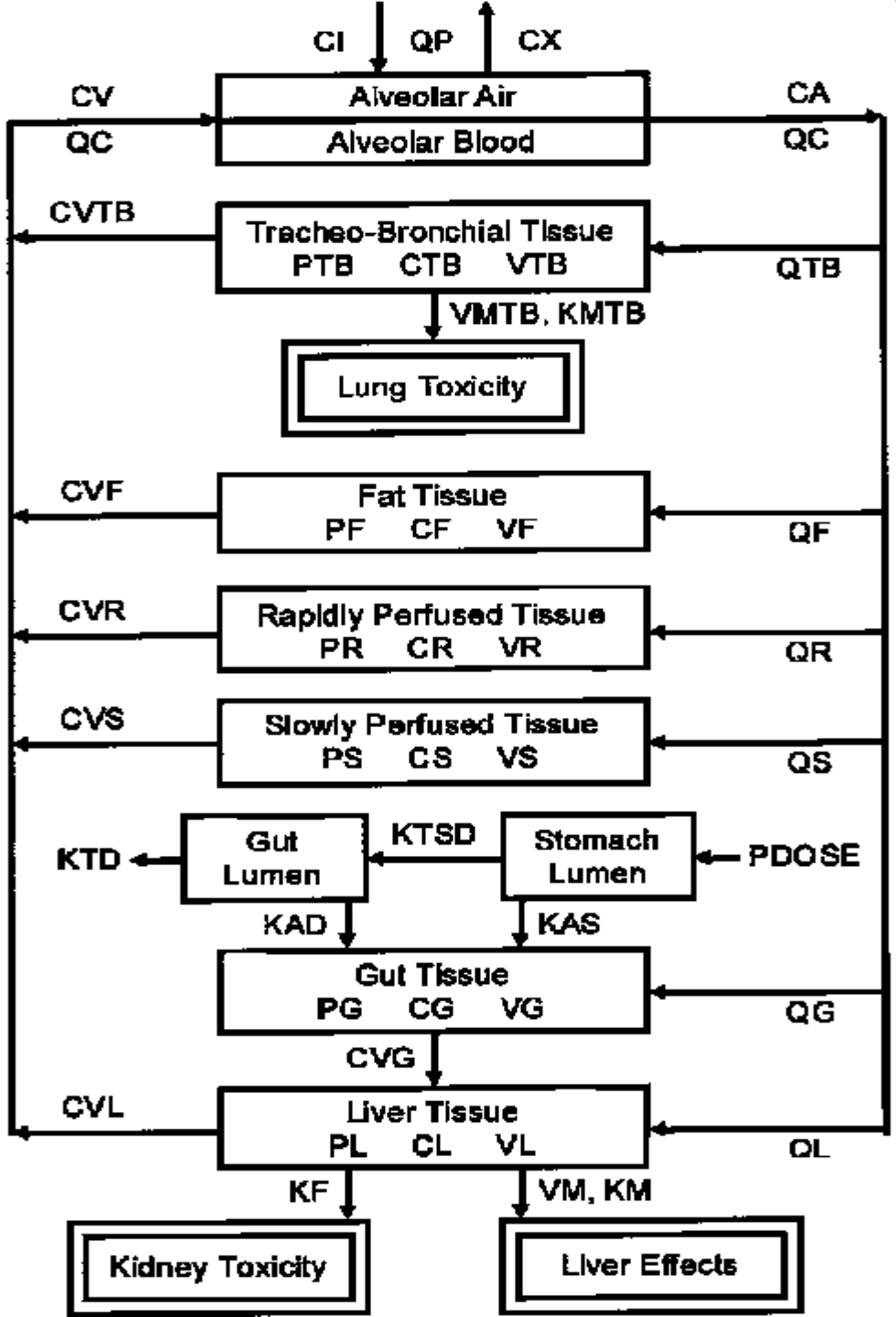
From larger exposures to smaller, multiple exposures

- **From Large Industrial Emissions…**
  - Point sources, facility specific, media specific (air, water, waste)
  - Few identified chemicals of concern
  - Policy tools: End-of-pipe controls, permitting, monitoring, risk-based standards

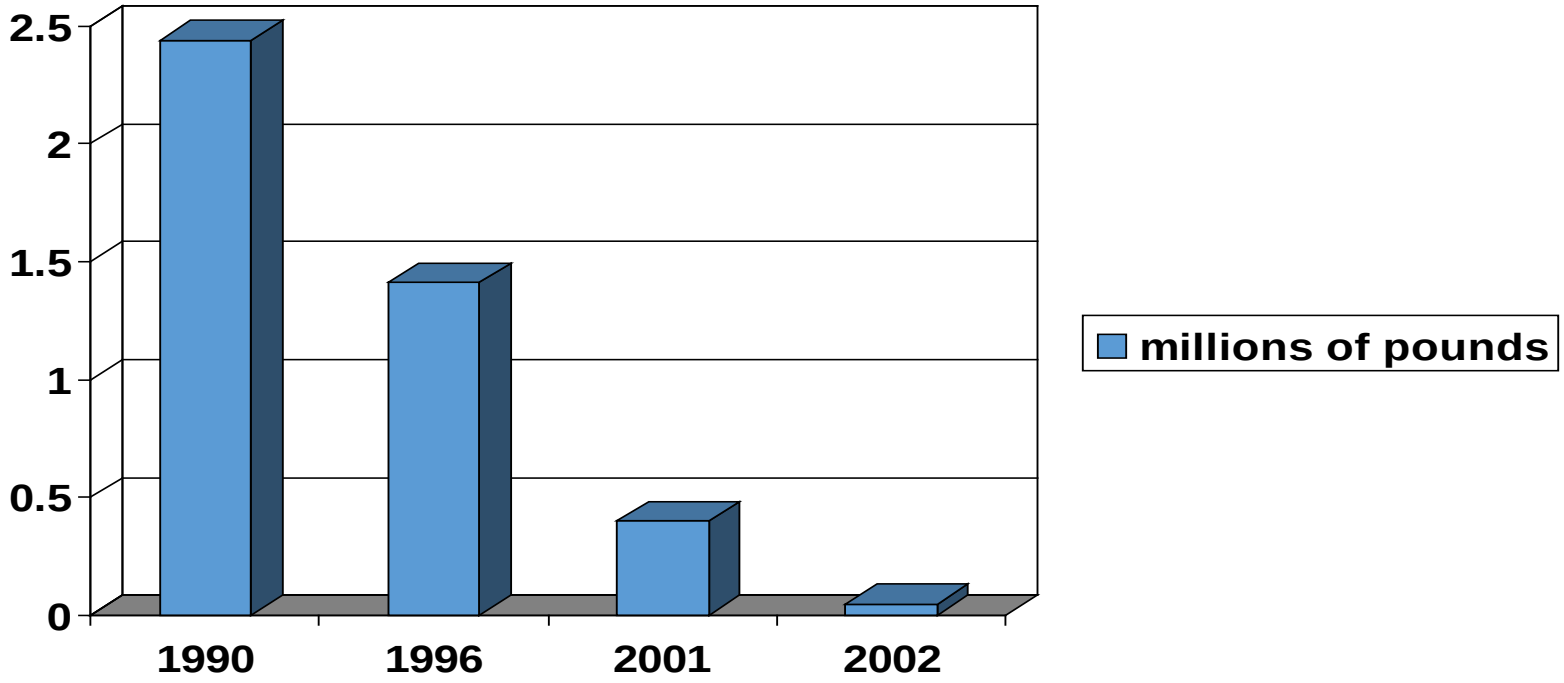
- **To a Broad Range of Product-Based Emissions.**
  - Smaller, disperse, non-point, difficult to control, different toxicological mechanisms
  - Many identified chemicals of concern
  - Policy tools: Redesign, green chemistry, substitution, safer alternatives


Cl
Cl
C
C
Cl
H

Example: TCE


CI
QP
CX
CV
QC
Alveolar Air
Alveolar Blood
CA
QC
CVTB
Tracheo-Bronchial Tissue
PTB CTB VTB
QTB
VMTB, KMTB
Lung Toxicity
CVF
Fat Tissue
PF CF VF
QF
CVR
Rapidly Perfused Tissue
PR CR VR
QR
CVS
Slowly Perfused Tissue
PS CS VS
QS
KTD
Gut Lumen
KTSD
Stomach Lumen
PDOSE
KAD
KAS
Gut Tissue
PG CG VG
QG
CVG
CVL
Liver Tissue
PL CL VL
QL
KF
VM, KM
Kidney Toxicity
Liver Effects

MA TCE Cleaning Use Data



The Result of the MA Toxics Use Reduction Planning and Technical Support Process

Jurisdiction Gap

- Chemicals assessed, regulated and managed differently depending on end use.
- But chemicals of concern span product types and jurisdictional boundaries
- Artificial legal and jurisdictional boundaries that can lead to unintended consequences
- Examples: n-propyl bromide, diacetyl, others

Federal laws regulating toxic chemicals

Chemical Type/Use	Law	Implementing Agency
Pharmaceutical/Medical device	Federal Food Drug and Cosmetics Act	Food and Drug Administration
Cosmetics	Federal Food Drug and Cosmetics Act	Food and Drug Administration
Food additive/food contact article	Federal Food Drug and Cosmetics Act	Food and Drug Administration
Toys	Consumer Product Safety Improvement Act and Federal Hazardous Substances Act	Consumer Product Safety Commission
Other types of products and manufacturing processes	Toxic Substances Control Act	Environmental Protection Agency
Pesticides	Federal Fungicide Rodenticide and Insecticide Act and Food Quality Protection Act	Environmental Protection Agency
Nanomaterials	Depends	Depends
Workplace exposures	Occupational Safety and Health Act	Occupational Safety and Health Administration

Challenges at a state level

- Resources
- Chemicals manufactured and used in state versus “imported”
- Chemicals that come in through
- Jurisdiction
- Ability to affect production decisions/approaches outside of the state (e.g., CA Safer Consumer Products

Moving towards solutions – Comprehensive Chemicals Policy

- *Integrated*. They regulate all chemicals as chemicals and not by product use or media. Lifecycle focus
- *Transparent and information rich*. They ensure the transparent flow of good information through supply chains and to the public.
- *Efficient*. They establish robust processes that use the best available science to allow rapid chemical assessment, prioritization, and decision
- *Proactive, preventive, and innovative*. They focus on eliminating intrinsic impacts at the source and support innovation in the transition to safer chemistries.

Three fundamental transformations needed to achieve this

- Policy Transformation – Integrated policies
- Science Transformation – focus on function, alternatives assessment, rapid screening approaches; green chemistry (impacts as a failure in design)
- Market Transformation – engage supply chain actors, chemical enterprise, incentivize change

Designing Policies to Support Innovation in Safer Chemistry – sticks and carrots

- Core Elements
  - Willingness
    - Restrictions, information requirements, planning requirements, purchasing policies, recognition
  - Capacity
    - Technical assistance, information requirements, R&D support, Education
  - Opportunity
    - Education, tax incentives, grants

- *Ashford, Nicholas. 1999. An innovation-based strategy for a sustainable environment. In Innovation-Oriented Environmental Regulation: Theoretical Approach and Empirical Analysis. Potsdam, Germany: European Commission Joint Research Centre.*

Example – Toxics Use Reduction in MA

- Goals and definitions
- Requirement to characterize and report on chemical use (metrics)
- Requirement to conduct planning and evaluate alternatives
- Fees that fund technical, research, and education support, demonstration and partnerships

Types of regulatory government policy options for chemicals

- Standards – pre-market/manufacture requirements, exposure limits, permits, performance standards
- Restrictions
- Assessment requirements
- Testing requirements
- Information disclosure – on toxicity, ingredients, emissions, planning

Discretionary types of policies affecting chemicals

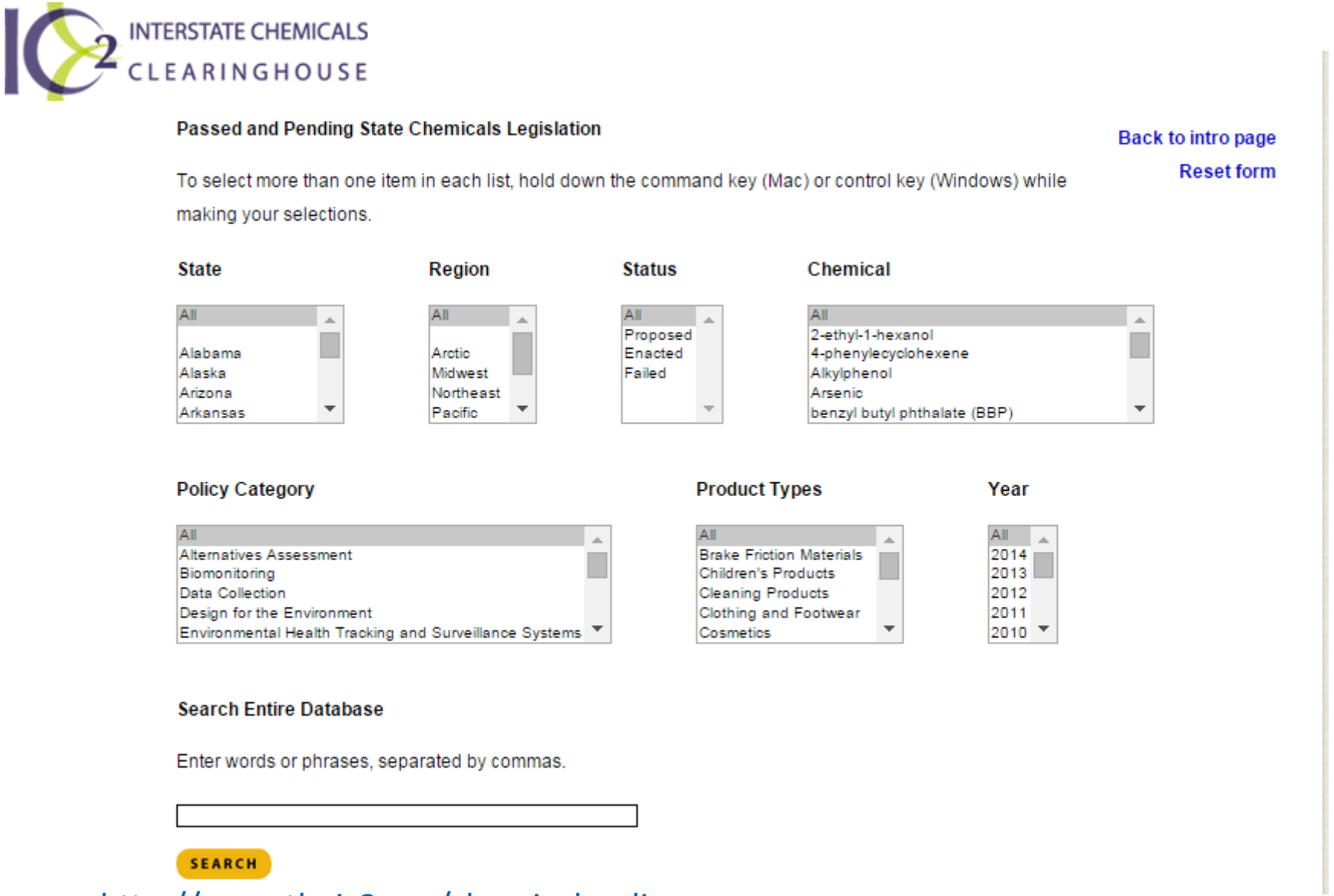
- Purchasing/procurement policy
- Recognition programs
- Economic policies – technical support, liability, financing, tax incentives, subsidies
- Guidance documents
- Loan/grant programs
- R&D/Research Support Programs
- Innovation Programs
- Education policy

Encouraging Market Policies

- Corporate goals/metrics
- Requirements for use of particular standards, tools, or certifications
- Disclosure requirements
- Restricted Substances Lists/chemical restrictions
- Chemical Testing Programs
- Incentives – preferable purchasing, etc

Look at models elsewhere

- States – MA Toxics Use Reduction; CA Air Toxics
- Local governments – SF Precautionary Principle Ordinance
- International
  - REACH/Non-toxic environment initiative in Europe
  - Canadian Chemicals Management Program
  - Sweden – Chemicals Inspectorate
- Best corporate models



http://www.theic2.org/chemical-policy

Schifano, et al, 2009:
http://www.chemicalspolicy.org/downloads/StateLeadership.pdf

Categories of policies

- pollution prevention and toxics use reduction
- single and multiple chemical restrictions
- regulation of product categories;
- biomonitoring and environmental health tracking
- data collection
- right-to-know
- prioritization
- alternatives assessment
- green chemistry and design for the environment
- product stewardship
- environmentally preferable purchasing

Other resources

- LSCP Chemicals Policy and Science Initiative Reports
  - http://www.chemicalspolicy.org/Publications.Reports.NewSolutions.php
  - http://www.chemicalspolicy.org/downloads/IJC_FINAL92009.pdf
  - http://www.chemicalspolicy.org/downloads/StateLeadership.pdf
  - http://www.chemicalspolicy.org/downloads/OptionsforStateChemicalsPolicyReform.pdf
- Geiser, K. Chemicals without Harm - https://mitpress.mit.edu/books/chemicals-without-harm
- Green Chemistry and Commerce Council – www.greenchemistryandcommerce.org