Evolution of the Field: A Historical Perspective

Joel A. Tickner, ScD

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California Environmental Protection Agency

Sacramento, California

Foundations of alternatives assessment in NEPA

"NEPA's purpose is not to generate paperwork--even excellent paperwork--but to foster excellent action (National Environmental Policy Act, CEQ Regulations S. 1500)"

Section 1502.13 on EIA – "It should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options to the decision-maker and the public."

- Requires consideration of all reasonable alternatives including no action

Applying to chemicals – pollution prevention and the 1990s

- Montreal Protocol
- Toxics Use Reduction Act/pollution prevention planning
- Substitution policies in Europe
- Chemical hazard ranking and screening tools

What is P2OASys?

mpanies to assess the potential environmental, worker, and public health impacts of alternative technologies aimed at reducing toxics use. The go
g about the potential hazards posed by current and alternative processes identified during the TUR planning process. The tool can assist compani

y examine the potential environmental and worker impacts of options, examining the total impacts of process changes, rather than simply those o

ons with current processes based on quantitative and qualitative factors.
e in P2OASys provide a numerical hazard score for the company's current process and identified options, which can then be combined with other i
decisions on adoption of alternatives. Companies input both quantitative and qualitative data on the chemical toxicity, ecological effects, physical
as a result of the proposed option.

Any question or comments can be directed at Jason Marshall by phone or by email.

Jason Marshall:
Tel:(978) 934-3133
Email: Jason@turi.org

This web site is maintained by the Toxics Use Reduction Institute at the University of Massachusetts, Lowell.
The Massachusetts Toxics Use Reduction Institute
University of Massachusetts Lowell
600 Suffolk Street
Lowell, Massachusetts 01854-2866
Tel: 978-934-3275 Fax: 978-934-3050

Welcome to the P2OASys To

Information about P2OASys can be found on the TURI wel

Create New Assessment | Load From P2OASys Database

Name	P2OASys Format	SDS Format	Remov
Sample Chemical	Enter Data	Enter Data	Remov

Assessment Score Summary | Compare Entered Da

Upload A Chemical/Product to the P2OASys Databa

Upload A Mixture to the P2OASys Database

Export Data to CSV | Import Data from CS

Hazard Score Matrix

Purpose

https://p2oasys.turi.org/

2000s

Increased attention to chemicals in products

REACH, state chemicals policies in the U.S., Stockholm convention, market push from major retailers, brands, and purchasers

Acknowledgement that chemical deselection without consideration of alternatives can lead to regrettable substitutions

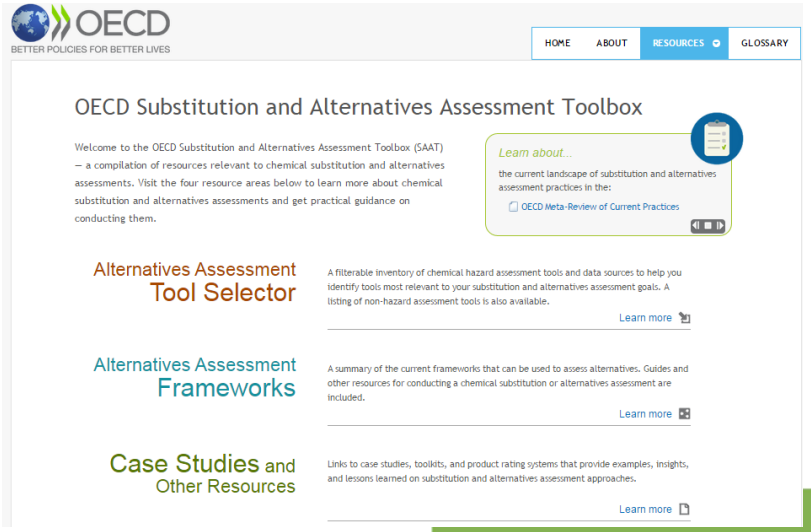
(re)Growth of programs, initiatives and tools focused on evaluating and supporting adoption of safer alternatives

A timeline of activities since 2004

2004 International Workshop on Alternatives Assessment
2006 Lowell Center Framework on Alternatives Assessment
2006-8 CA Green Chemistry Policy report, leading to AB1879
2009 GreenScreen for Safer Chemicals
2009 Subsport
2010 EPA DfE alternatives assessments
2010 Growth of government agencies, consultants, businesses, working on AA
2011 Interagency Dialogue on Alternatives Assessment
2012 Chemical Commons/Commons Principles
2013 Interstate Chemicals Clearinghouse Guide
2015 National Research Council Framework
2017 ECHA substitution strategy, Dutch Safe Chemicals Innovation Agenda, etc.


Transitioning to Safer Chemicals:
A Toolkit for Employers and Workers
Steps for Transitioning to Safer Chemicals
Engage
Inventory & Prioritize
Identify
Assess & Compare
Select
Test
Evaluate


Design for the Environment
An EPA Partnership Program
We're redesigning the DfE label.
Learn more >
Find Products with the DfE Label


OECD
BETTER POLICIES FOR BETTER LIVES
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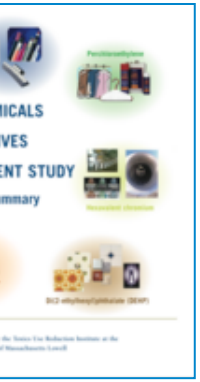
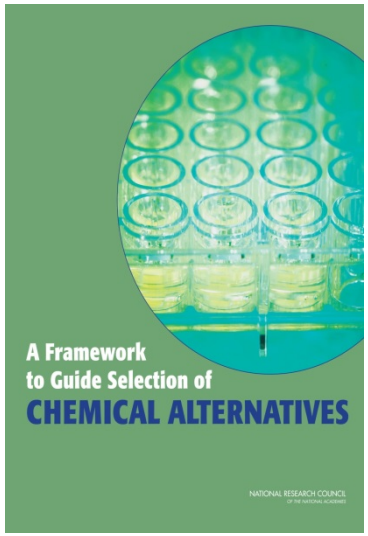
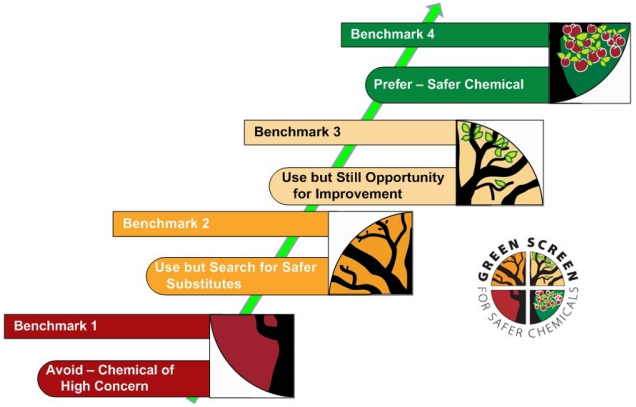
ABOUT
RESOURCES
GLOSSARY
OECD Substitution and Alternatives Assessment Toolbox
Alternatives Assessment Tool Selector
Alternatives Assessment Frameworks
Case Studies and Other Resources




A Framework to Guide Selection of
CHEMICAL ALTERNATIVES
NATIONAL RESEARCH COUNCIL


Benchmark 4
Prefer – Safer Chemical
Benchmark 3
Use but Still Opportunity for Improvement
Benchmark 2
Use but Search for Safer Substitutes
Benchmark 1
Avoid – Chemical of High Concern
GREEN SCREEN FOR SAFER CHEMICALS


Interstate Chemicals Clearinghou
Alternatives Assessment Gu
Version

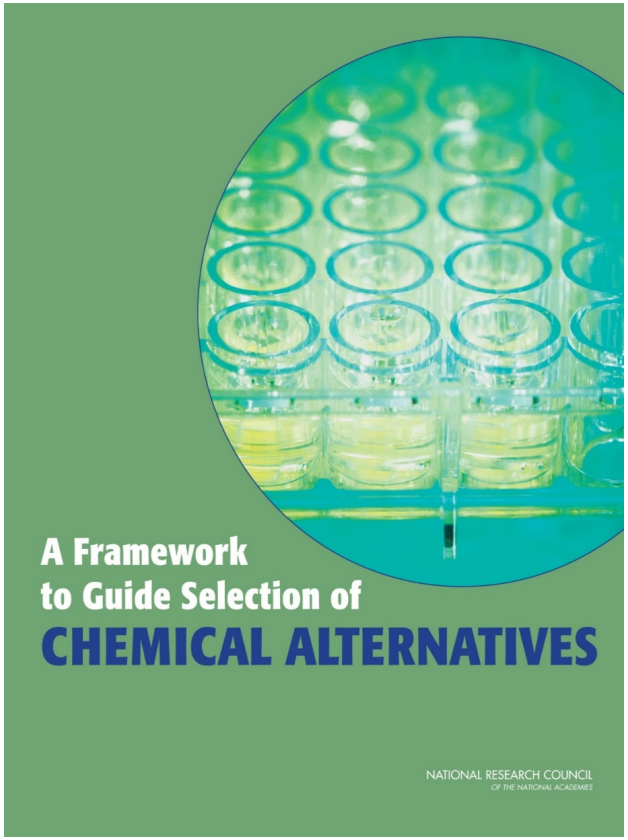
Building some common understandings

- Focus on function
- Focus is on evaluating options to substitute a chemical of "concern"
- Often there are trade-offs that have to be resolved – need to consider more than simply hazard
- Both assessment and adoption are critical
- Improving assessment needs to be married with capacity building and support
- Transparency is key

Alternatives Assessment

"A process for identifying, comparing, and selecting safer alternatives to chemicals of concern on the basis of their hazards, comparative exposure, performance, and economic viability"

- NAS 2014



NAS 2014: Alternatives assessment is not risk assessment

S

is a process for identifying, comparing and selecting safer alternatives to chemicals of concern.

has a goal of facilitating an informed consideration of the advantages and disadvantages of alternatives to a chemical of concern.

IS NOT

- a *safety assessment*, where the primary goal is to ensure that exposure is below a prescribed standard,
- a *risk assessment* where risk associated with a given level of exposure is calculated
- a *sustainability assessment* that considers all aspects of a chemicals' life cycle, including energy and material use.

Goal is Informed Substitution (EPA 2010)

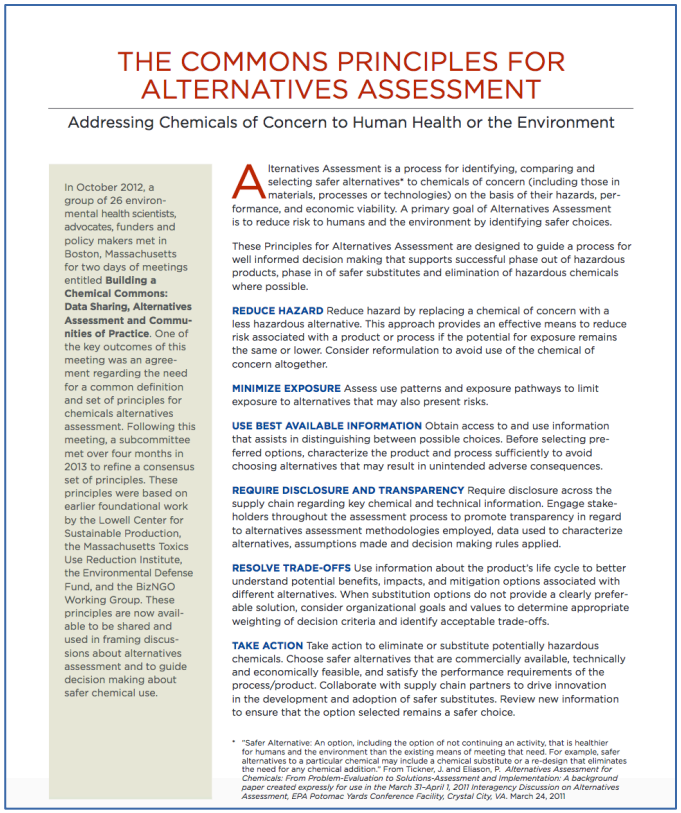
A considered transition from a chemical of particular concern to safer chemicals or non-chemical alternatives.

The goals of informed substitution are to:

- Minimize the likelihood of unintended consequences, which can result from a precautionary switch away from a chemical of concern without fully understanding the profile of potential alternatives, and
- Enable a course of action based on the best information - on the environment and human health - that is available or can be estimated.

Commons Principles for Alternatives Assessment

- Reduce Hazard
- Minimize Exposure
- Use Best Available Information
- Require Disclosure and Transparency
- Resolve Trade-Offs
- Take Action



THE COMMONS PRINCIPLES FOR ALTERNATIVES ASSESSMENT

Addressing Chemicals of Concern to Human Health or the Environment

In October 2012, a group of 26 environmental health scientists, advocates, funders and policy makers met in Boston, Massachusetts for two days of meetings entitled **Building a Chemical Commons: Data Sharing, Alternatives Assessment and Communities of Practice**. One of the key outcomes of this meeting was an agreement regarding the need for a common definition and set of principles for chemicals alternatives assessment. Following this meeting, a subcommittee met over four months in 2013 to refine a consensus set of principles. These principles were based on earlier foundational work by the Lowell Center for Sustainable Production, the Massachusetts Toxics Use Reduction Institute, the Environmental Defense Fund, and the BizNGO Working Group. These principles are now available to be shared and used in framing discussions about alternatives assessment and to guide decision making about safer chemical use.

Alternatives Assessment is a process for identifying, comparing and selecting safer alternatives* to chemicals of concern (including those in materials, processes or technologies) on the basis of their hazards, performance, and economic viability. A primary goal of Alternatives Assessment is to reduce risk to humans and the environment by identifying safer choices.

These Principles for Alternatives Assessment are designed to guide a process for well informed decision making that supports successful phase out of hazardous products, phase in of safer substitutes and elimination of hazardous chemicals where possible.

REDUCE HAZARD Reduce hazard by replacing a chemical of concern with a less hazardous alternative. This approach provides an effective means to reduce risk associated with a product or process if the potential for exposure remains the same or lower. Consider reformulation to avoid use of the chemical of concern altogether.

MINIMIZE EXPOSURE Assess use patterns and exposure pathways to limit exposure to alternatives that may also present risks.

USE BEST AVAILABLE INFORMATION Obtain access to and use information that assists in distinguishing between possible choices. Before selecting preferred options, characterize the product and process sufficiently to avoid choosing alternatives that may result in unintended adverse consequences.

REQUIRE DISCLOSURE AND TRANSPARENCY Require disclosure across the supply chain regarding key chemical and technical information. Engage stakeholders throughout the assessment process to promote transparency in regard to alternatives assessment methodologies employed, data used to characterize alternatives, assumptions made and decision making rules applied.

RESOLVE TRADE-OFFS Use information about the product's life cycle to better understand potential benefits, impacts, and mitigation options associated with different alternatives. When substitution options do not provide a clearly preferable solution, consider organizational goals and values to determine appropriate weighting of decision criteria and identify acceptable trade-offs.

TAKE ACTION Take action to eliminate or substitute potentially hazardous chemicals. Choose safer alternatives that are commercially available, technically and economically feasible, and satisfy the performance requirements of the process/product. Collaborate with supply chain partners to drive innovation in the development and adoption of safer substitutes. Review new information to ensure that the option selected remains a safer choice.

* "Safer Alternative: An option, including the option of not continuing an activity, that is healthier for humans and the environment than the existing means of meeting that need. For example, safer alternatives to a particular chemical may include a chemical substitute or a re-design that eliminates the need for any chemical addition." From Tickner, J. and Eliason, P. *Alternatives Assessment for Chemicals: From Problem-Evaluation to Solutions-Assessment and Implementation: A background paper created expressly for use in the March 31–April 1, 2011 Interagency Discussion on Alternatives Assessment, EPA Potomac Yards Conference Facility, Crystal City, VA.* March 24, 2011

www.biznngo.org/alternatives-assessment/commons-principles-alt-assessment

Table 1. Elements of AA—A snapshot

	Component	What it involves
Assessment	Scoping, problem formulation	– Establishes the scope and plan for the assessment – Identifies stakeholders to engage and the decision rules that will guide the assessment – Gathers data on the chemical of concern, its function and application
	Identify alternatives	– Identifies alternatives to be considered based on the functional needs in the application currently being performed by the chemical of concern
	Hazard assessment	– Evaluates the human health and ecological hazards for each alternative compared to the chemical of concern
	Exposure characterization	– Evaluates the intrinsic exposure potential for each alternative on the basis of boundaries established in the problem formulation step
	Technical feasibility assessment	– Assesses the performance of alternatives against the requirements established during the problem formulation step
	Comparative economic feasibility assessment	– Assesses the economic feasibility of alternatives against the requirements established during the problem formulation step
	Other life cycle considerations	– Addresses additional factors critical for characterizing effects to human health and the environment beyond those included in the hazard and exposure assessment component to avoid risk trade-offs (e.g., energy, climate change effects, etc.)
	Decision making	– Identifies acceptable alternatives on the basis of information compiled in previous steps – Addresses situations in which no alternatives are currently viable by initiating research and development to generate new alternatives or improve existing options – Establishes an implementation plan
Action	*Adoption*	– Implementation of the safer, feasible alternative and identification of any potential trade-offs and continuous improvement opportunities
	Link to safer chemistry and/or technology research and development	– When no safer, feasible alternative is identified, research and development should be initiated

Source: Expands on the NRC (2014) framework by including additional details on technical, economic assessment and decision making that is inclusive of other AA frameworks, such as the Interstate Chemicals Clearinghouse Alternatives Assessment Guidance, V. 1.1 (IC2 2017).

Source:
Tickner et al. IEAM 20

Last three years – building the policy and scientific foundations

- How can alternatives assessment and informed substitution requirements and support be effectively integrated into government and business policy programs?
- How do we fill gaps in methods and practice to enhance the field?
- How do we build a more coordinated community of practice that has its own identify but draws from other fields?
- Demands for substitution outpacing the science and coordinated activity

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Decision Analysis

Advancing Alternatives Assessment for Safer Chemical Substitution: A Research and Practice Agenda

Joel Tickner,†‡ Molly Jacobs,†‡ Tim Malloy,§ Topher Buck,‖ Alex Stone,# Ann Blake,†† and Sally Edwards‡*

†University of Massachusetts Lowell, Department of Public Health, Lowell, Massachusetts, USA
‡Lowell Center for Sustainable Production, University of Massachusetts Lowell, Lowell, Massachusetts, USA
§University of California, Los Angeles, School of Law, Los Angeles, California, USA
‖Northeast Waste Management Officials' Association, Interstate Chemicals Clearinghouse, Boston, Massachusetts, USA
#Washington Department of Ecology, Lacey, Washington, USA
††Environmental and Public Health Consulting, Alameda, California, USA

ABSTRACT

Alternatives assessment has emerged as a science policy field that supports the evaluation and adoption of safer chemistries in manufacturing processes and consumer products. The recent surge in the development and practice of alternatives assessment has revealed notable methodological challenges. Spurred by this need, we convened an informal community of practice comprising industry experts, academics, and scientists within government and nongovernmental organizations to prioritize a research and practice agenda for the next 5 years that, if implemented, would significantly advance the field of alternatives assessment. With input from over 40 experts, the agenda outlines specific needs to advance methods, tools, and guidance in 5 critical areas: hazard assessment, comparative exposure characterization, life cycle considerations, decision making, and professional practice. Fifteen research and practice needs were identified, ranging from relatively simple efforts to define a minimum hazard data set to the development of more complex performance and decision-analytic methods and data

Research Needs Moving Forward

Hazard Assessment

- Improve approaches for ecotox, integrating multiple data types, and addressing uncertainty
- Establish approaches for mixtures and chemical to material comparisons

Comparative exposure assessment

- Identify how results from a comparative exposure assessment should be integrated with hazard assessment results to identify trade-offs in the AA process

Life cycle assessment

- Streamline life cycle assessment needs during the initial scoping and problem formulation stage of an AA by targeting life cycle stages and impact categories that are most significant

Research Needs Moving Forward

Decision-Analysis

- Engage in method and tool development for different aspects of decision making (analysis and deliberation) for private and regulatory contexts

Professional Practice

- Develop best-practice guidance for components of AA
- Enhance AA professional capacity through training and education

Needs moving forward

- Filling gaps in methods
- Undertaking and learning from case examples
- Establishing best practices and alignment/consistency
- Developing capacity/”certification?”
- Supporting adoption
- Metrics for evaluating progress
- Establishing a more coordinated professional community to guide the field
- Securing funding for research, training, and support

Conclusions

Alternatives assessment is here to stay. We need an organized community to guide and expand the field.

Need to make sure alternatives assessment is flexible and iterative and adaptable to decision-contexts and different users.

Focus on both assessment and adoption

Goal is to drive positive actions towards safer, more sustainable chemicals, materials and products