Alternatives Assessment's Past, Present and Future

Thursday, July 11th, 2019
9:00 AM - 10:00 AM PDT
12:00 PM - 1:00 PM ET

WELCOME!

- Official Launch of A4's Quarterly Webinar Series
- Today's webinar: *Alternatives Assessment's Past, Present and Future*
  - The origins of alternatives assessment and its recent history as well as successes
  - Overview on advances in the field's methods and practice as well as ongoing gaps
  - Introduction to A4 – developing professional excellence, enhancing capacity, and sharing best practices

Today's facilitator

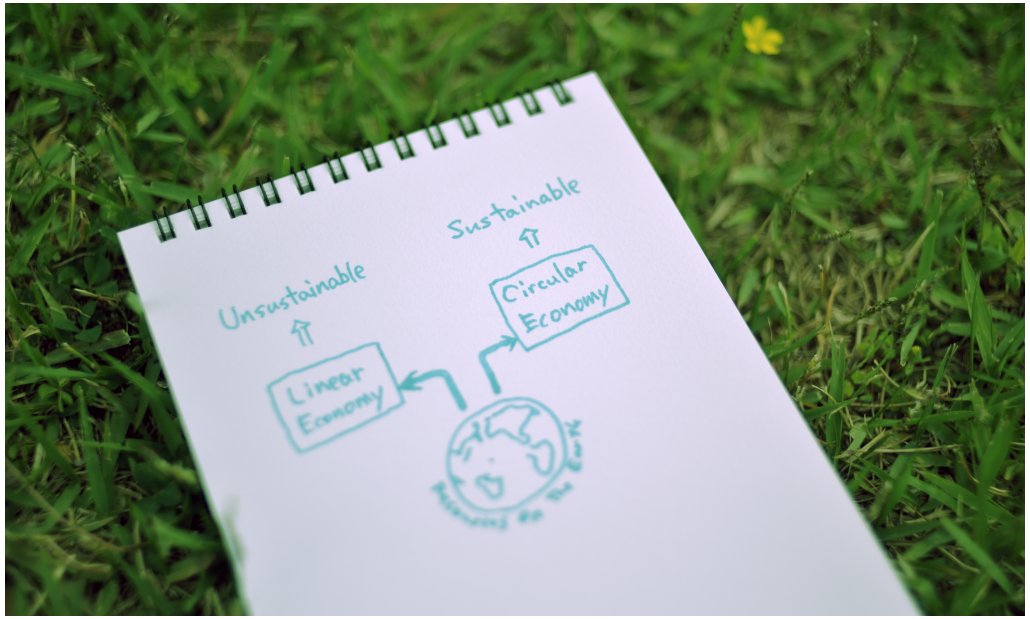
Dr. Margaret Whittaker

TOXSERVICES
TOXICOLOGY RISK ASSESSMENT CONSULTING

Co-Chair, A4 Program Committee

A4: A Critical Resource “4” You!

- A4 is a resource to learn, network, and share best practices
- The Ellen MacArthur Foundation estimates that 80% of a product’s environmental impacts--toxicity, waste, and pollution--are determined at the design stage!
  - Alternatives Assessment is a proven approach to avoid harm throughout the life cycle



Today's Speakers

Joel Tickner

Lowell Center for Sustainable Production
UNIVERSITY OF MASSACHUSETTS LOWELL

A4 Executive Director

Amelia Nestler

Northwest Green Chemistry

A4 Member

Molly Jacobs

Lowell Center for Sustainable Production
UNIVERSITY OF MASSACHUSETTS LOWELL

A4 Program Committee

Pamela Spencer

ANGUS® CHEMICAL COMPANY

A4 President

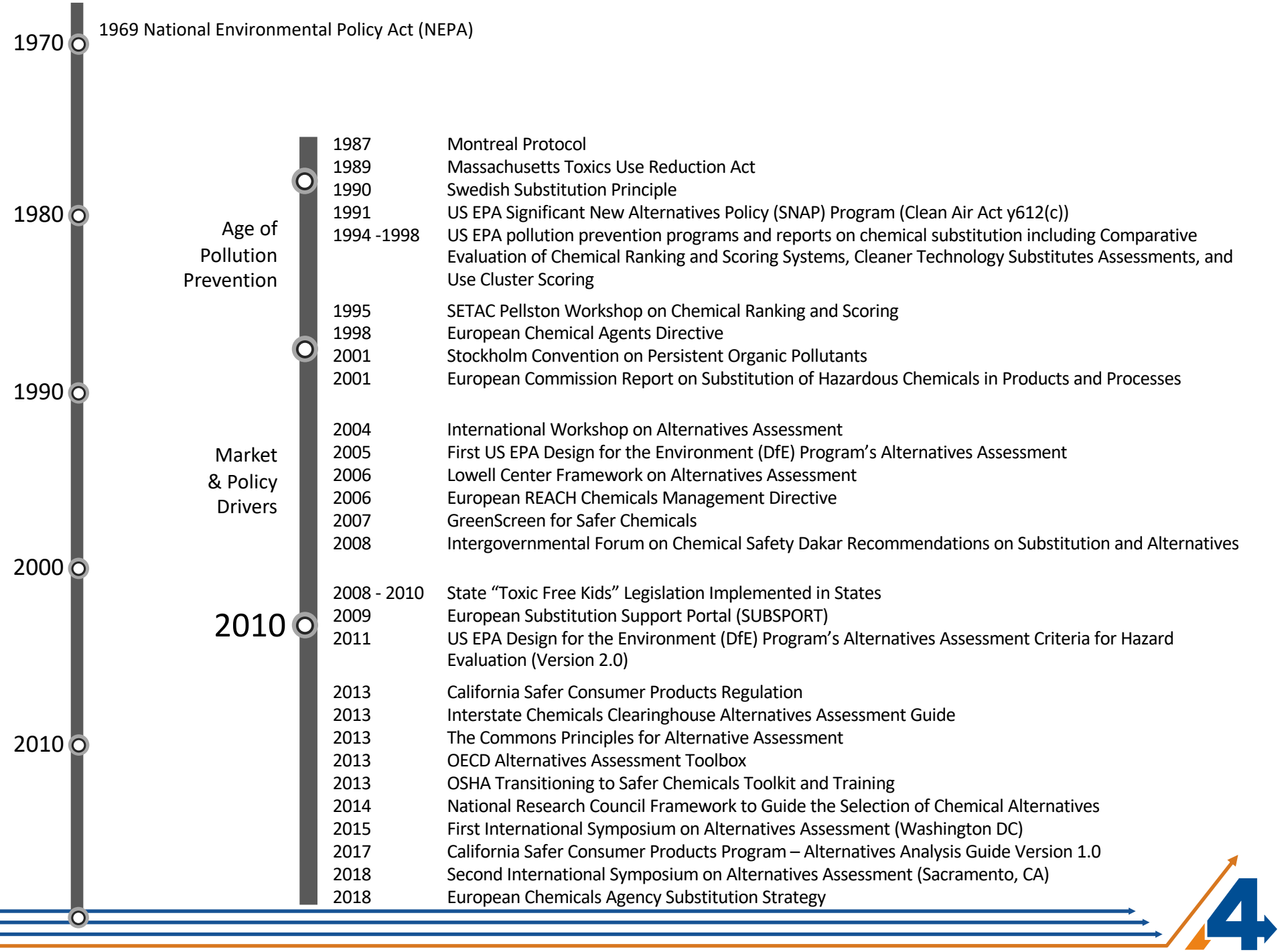
Webinar Logistics

- Due to the number of participants on the webinar, all lines will be muted
- If you wish to ask a question, please type your question in the Q&A box located in the drop down control panel at the top of the screen
- Questions will be answered at the end of the presentations
- Webinar is being recorded and will be posted along with the slide deck on the A4 website: www.saferalternatives.org
- At the end of the webinar, we will launch a short survey to get your input on future webinar topics and additional feedback

ORIGIN OF THE FIELD

Joel Tickner, University of Massachusetts Lowell

TOPICS IN
ALTERNATIVES ASSESSMENT

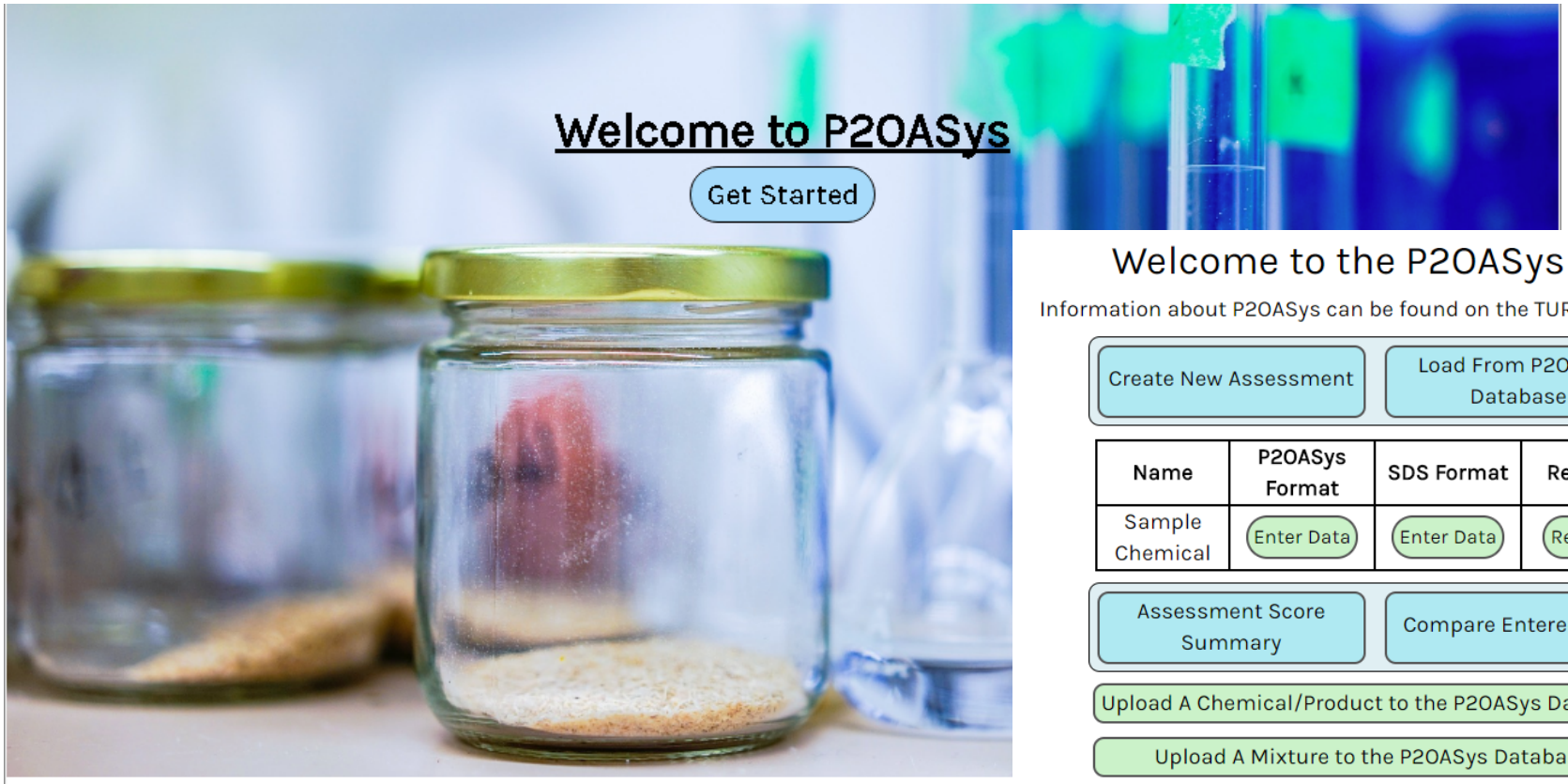

1970
1969 National Environmental Policy Act (NEPA)
1980
Age of Pollution Prevention
1987 Montreal Protocol
1989 Massachusetts Toxics Use Reduction Act
1990 Swedish Substitution Principle
1991 US EPA Significant New Alternatives Policy (SNAP) Program (Clean Air Act y612(c))
1994 -1998 US EPA pollution prevention programs and reports on chemical substitution including Comparative Evaluation of Chemical Ranking and Scoring Systems, Cleaner Technology Substitutes Assessments, and Use Cluster Scoring
1995 SETAC Pellston Workshop on Chemical Ranking and Scoring
1998 European Chemical Agents Directive
2001 Stockholm Convention on Persistent Organic Pollutants
2001 European Commission Report on Substitution of Hazardous Chemicals in Products and Processes
1990
Market & Policy Drivers
2004 International Workshop on Alternatives Assessment
2005 First US EPA Design for the Environment (DfE) Program's Alternatives Assessment
2006 Lowell Center Framework on Alternatives Assessment
2006 European REACH Chemicals Management Directive
2007 GreenScreen for Safer Chemicals
2008 Intergovernmental Forum on Chemical Safety Dakar Recommendations on Substitution and Alternatives
2000
2008 - 2010 State "Toxic Free Kids" Legislation Implemented in States
2010
2009 European Substitution Support Portal (SUBSPORT)
2011 US EPA Design for the Environment (DfE) Program's Alternatives Assessment Criteria for Hazard Evaluation (Version 2.0)
2013 California Safer Consumer Products Regulation
2013 Interstate Chemicals Clearinghouse Alternatives Assessment Guide
2010
2013 The Commons Principles for Alternative Assessment
2013 OECD Alternatives Assessment Toolbox
2013 OSHA Transitioning to Safer Chemicals Toolkit and Training
2014 National Research Council Framework to Guide the Selection of Chemical Alternatives
2015 First International Symposium on Alternatives Assessment (Washington DC)
2017 California Safer Consumer Products Program – Alternatives Analysis Guide Version 1.0
2018 Second International Symposium on Alternatives Assessment (Sacramento, CA)
2018 European Chemicals Agency Substitution Strategy

Some historical foundations…

- "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 alternatives assessment to chemicals – pollution prevention in the 1990s

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



Welcome to P2OASys

Get Started

Welcome to the P2OASys Tool!

Information about P2OASys can be found on the TURI webpage here.

Create New Assessment | Load From P2OASys Database

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

Assessment Score Summary | Compare Entered Data

Upload A Chemical/Product to the P2OASys Database

Upload A Mixture to the P2OASys Database

Export Data to CSV | Import Data from CSV

Hazard Score Matrix

What is P2OASys?

P2OASys allows companies to assess the potential environmental, worker, and public health impacts of alternative technologies aimed
systematic thinking about the potential hazards posed by current and alternative processes identified during the TUR planning proces

Systematically examine the potential environmental and worker impacts of options, examining the total impacts of process chan

Compare options with current processes based on quantitative and qualitative factors.

Embedded formulae in P2OASys provide a numerical hazard score for the company's current process and identified options, which car
expertise to make decisions on adoption of alternatives. Companies input both quantitative and qualitative data on the chemical toxicity, ecological effects, physical properties, and changes in work organization likely 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

https://p2oasys.turi.org/

This web site is maintained by the Toxics Use Reduction Institute at the University of Massachusetts, Lowell.

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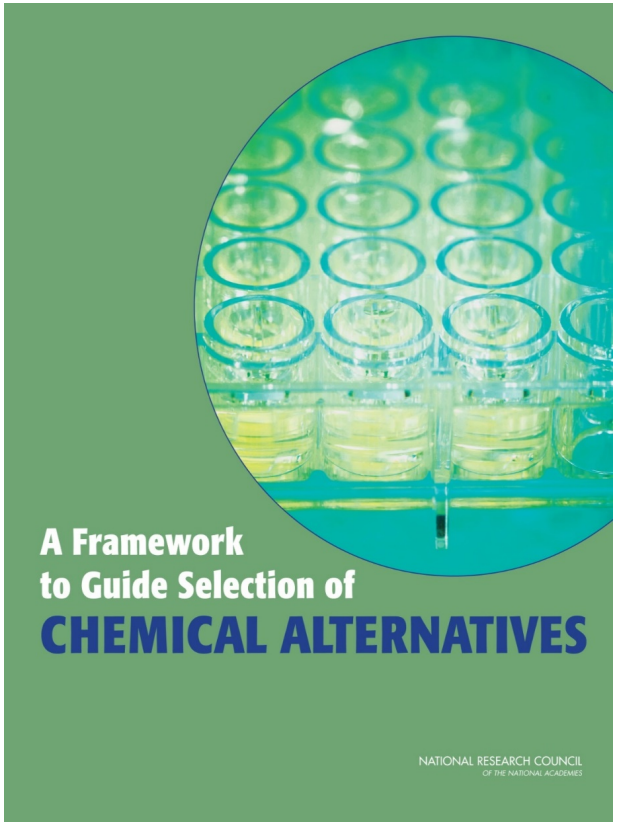
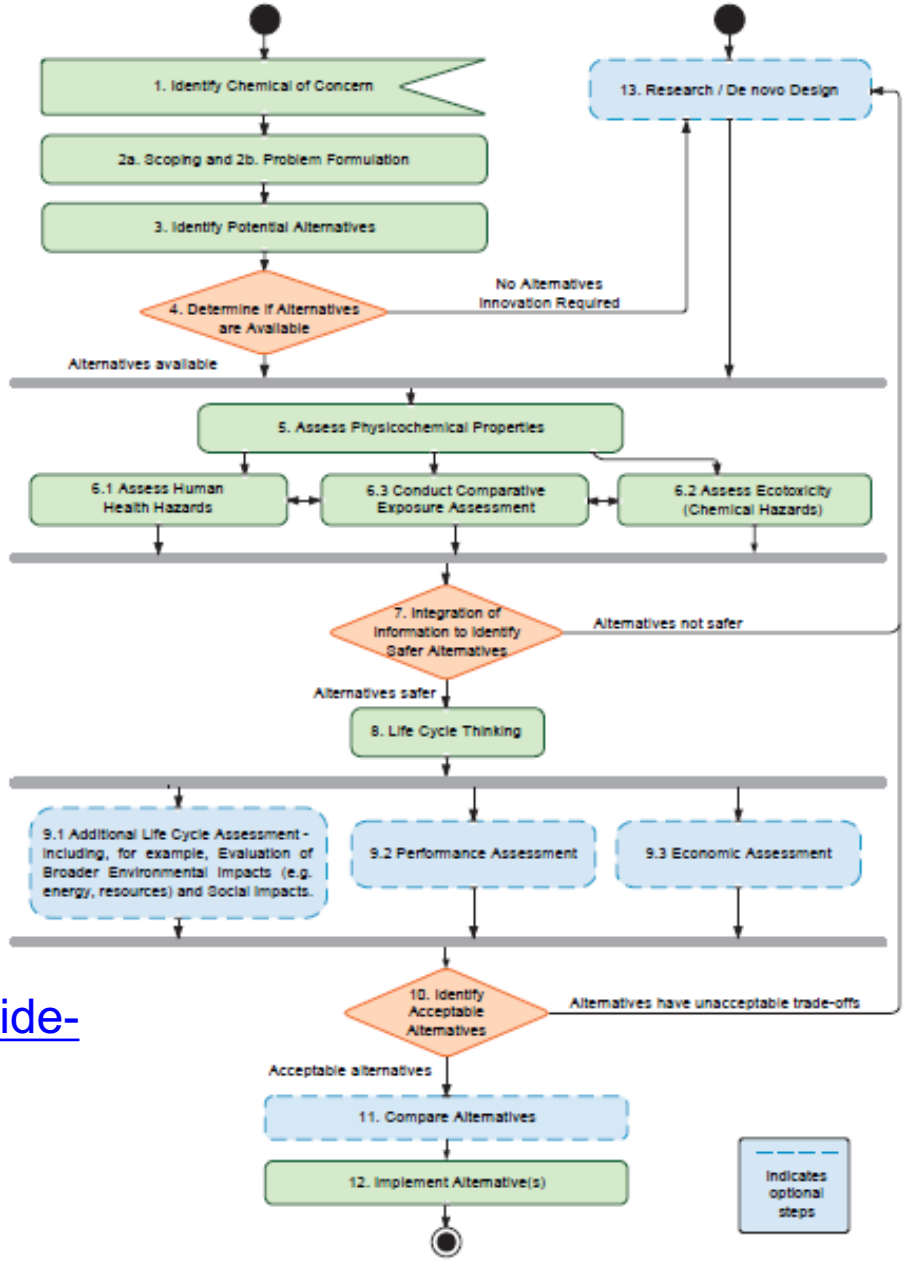
TURI
TOXICS USE REDUCTION INSTITUTE
UMASS LOWELL
CLEANING LABORATORY

2000s

- Increased attention to chemicals in products
- REACH, state chemicals policies in the U.S. (CA), EPA Design for Environment Program, 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





http://dels.nas.edu/Report/Framework-Guide-Selection/18872?bname=bcst

Building Some Common Understandings

- Focus on function – "functional substitution"
- 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 and flexibility are key

Needs moving forward

- Filling gaps in methods
- Undertaking and learning from case examples - practice
- Establishing best practices and alignment/consistency
- Securing funding for research, training, and support
- Ensuring alternatives assessment is flexible and iterative and adaptable to decision-contexts and different users
- Don’t forget: Goal is to drive positive actions towards safer, more sustainable chemicals, materials and products

ENHANCING METHODS AND PRACTICE

Molly Jacobs, University of Massachusetts Lowell
Amelia Nestler, Northwest Green Chemistry

TOPICS IN
ALTERNATIVES ASSESSMENT

Integrated Environmental Assessment and Management — Volume 9999, Number 9999—pp. 1–12
Received: 18 January 2018 | Returned for Revision: 29 May 2018 | Accepted: 13 August 2018

Decision Analysis

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

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‡Lowell Center for Sustainable Production, University of Massachusetts Lowell, Lowell, Massachusetts, USA
§University of California, Los Angeles, School of Law, Los Ange
‖Northeast Waste Management Officials' Association, Interstat
#Washington Department of Ecology, Lacey, Washington, USA
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ABSTRACT

Alternatives assessment has emerged as a science policy fiel
in manufacturing processes and consumer products. The re
assessment has revealed notable methodological challenges.
practice comprising industry experts, academics, and scienti
prioritize a research and practice agenda for the next 5 years
alternatives assessment. With input from over 40 experts, the a
guidance in 5 critical areas: hazard assessment, comparative
making, and professional practice. Fifteen research and practic
define a minimum hazard data set to the development of more

saferalternatives.org 90% Search

International Symposium on Alternatives Assessment

Building the Field

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY (CALEPA) | SACRAMENTO, CA | NOVEMBER 1-2, 2018

Organized by The Lowell Center for Sustainable Production at University of Massachusetts Lowell

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2nd International Symposium on Alternatives Assessment:

Building the Field

California Environmental Protection Agency (CalEPA)

Sacramento, California | November 1-2, 2018

Methods: Advances in Hazard and Exposure Assessment for AA

HAZARD

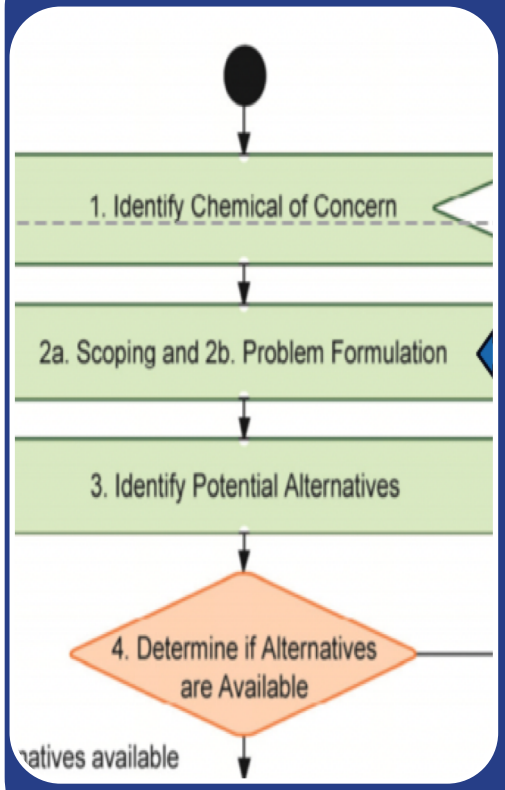
- New examples of using predictive toxicology to inform data gaps
  - Use of endocrine activity & skin sensitizing *in vitro* assays (Smith 2018*; Kim 2018*)
  - Guidance by Health and Environmental Sciences Institute*
- Greater focus on ecotoxicology endpoints beyond just aquatic toxicity (data permitting)
  - Evolution in guidance documents on this topic

EXPOSURE

- Assessing "intrinsic exposure" – before exposure controls (US NRC 2014)
  - Conditions of use, physicochemical properties, routes of exposure (Whittaker 2018*)
- Development of qualitative exposure methods (Greggs et al. IEAM 2017)
  - Use of comparative rating systems
  - Quantitative evaluations may still be needed

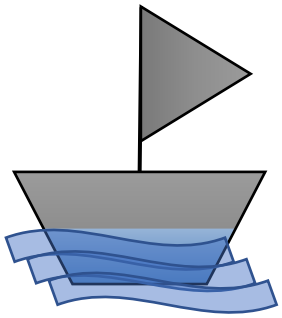
*talks featured at the 2018 Symposium – www.saferalternatives.org

Advances in Practice: Scope and Stakeholder Engagement

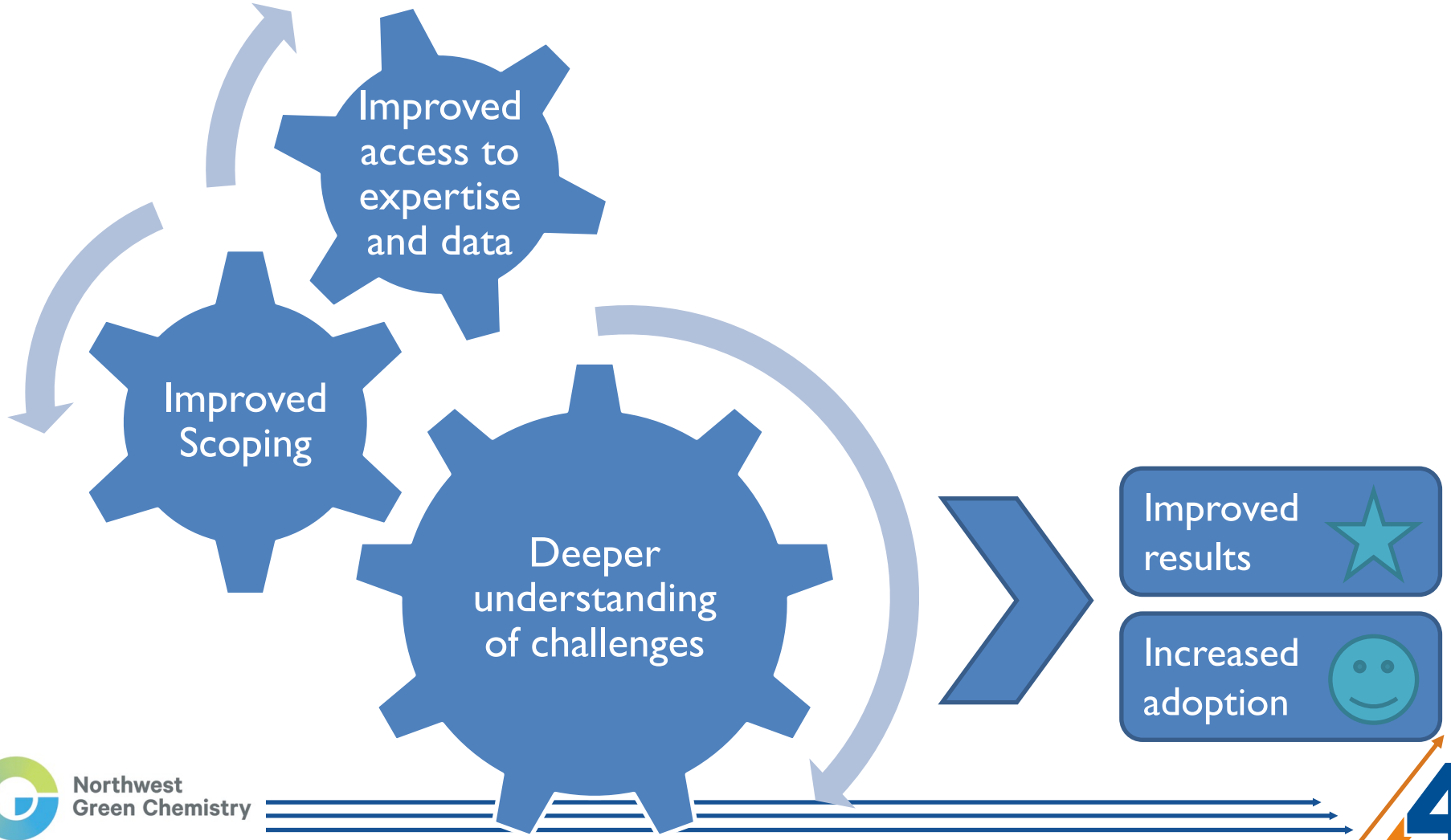


- Can help identify where streamlined vs. increased depth and rigor is needed
- Important for the inclusion of lifecycle considerations – which stages and impact categories are most significant?
- Engaging Stakeholders/ constituencies – help to broaden/narrow scope

Engage a diverse group of interested parties



Increased engagement drives improved results and adoption



Northwest Green Chemistry

Tips for engaging diverse participants

Active

Recursive

Open

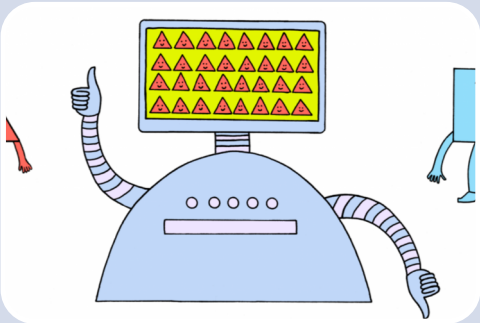
Recruit champions

Variety of opportunities for access

Decision Making Methods and Tools To Help Navigate Tradeoffs

Importance of **transparency throughout the assessment** – "decisions are everywhere"

(Heine 2018*, Malloy et al. 2017, Zhou 2018*).



Decision tools (e.g., MCDA) should be **used to support, NOT replace** deliberation

(Malloy et al. 2017, Environ Health Perspect*; Beaudrie et al. 2018*)

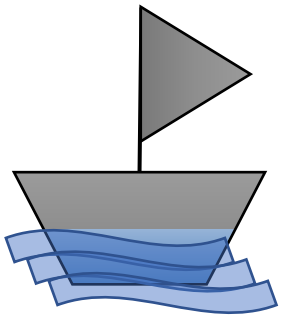
Importance of **decision aides** to display the advantages and disadvantages of various alternatives given organizational priorities

(Argiles 2018*; Heine 2018*)

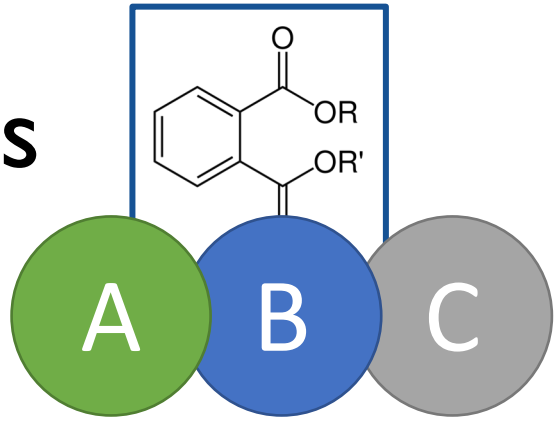
*talks featured at the 2018 Symposium – www.saferalternatives.org

Take action: Supporting informed decisions with AA

Selection Guide



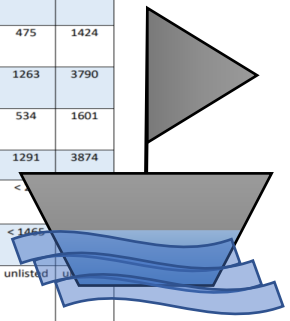
Categories



Winners and Losers

Selection Guide: Transparency

Product Information				Hazard									Cost			Performance		Exposure										
Product Identity			General	Human Hazard		Biocide				Environment			Regulatory			Initial/DIY		Cumulative	Assumes manufacturer longevity	Longevity		Gallons to cover 100 ft²			Grams Biocide to cover 100 ft²		Fate		Grams VOCs to cover 100 ft²	
Company	Product	Mechanism	Disclosure	Chronic human (CMRDE)	Neuro/ Resp	Biocide	Amount	Persistence	Bioaccumulation	PBTaq combos	Puget Sound CoCs	Boatyard CoCs (Zn)	VOC content (g/L)	Per gallon	Per 100 ft²	35' boat over 5 years	Overall Recommendation	Manufacturer longevity (years)	# of applications over 5 years	Initial (gallons)	5 year (gallons)	Biocide	Initial (grams)	5 years (grams)	Leach (Y/N)	Ablate (Y/N)	Initial (grams)	5 years (grams)
Coval	Marine and Hull Coat	Foul release, ceramic	Full	0%	0%	none	0%	-	-	0%	0%	0%	< 100	$512.33	$166.51	$6,019.44	Data Gap / further testing needed	5	1	0.3	0.3	N	0	0	N	N	< 123	< 123
CeRam-Kote	54 SST	Foul release, ceramic	SDS	26% - 53%	0%	none	0%	-	-	0%	0%	0%	< 197	$125.00	$125.00	$5,871.25	Data Gap / further testing needed	5	1	1.0	1.0	N	0	0	N	N	< 746	< 746
ePaint	EP-2000	Photoactive and Biocidal, ZnPy	Full	5% - 10%	5% - 5%	ZnPy	4.8%	*H*	**vL**	35% - 45%	29% - 38%	29% - 37%	< 100	$210.91	$301.30	$25,921.28	Likely to meet expectations	3	2	1.4	2.9	Y	6.9	13.7	Y	Y	< 541	< 1083
Sherwin Williams	Sea Voyage	Biocidal, ZnPy and Econea	Full	9% - 9%	37% - 37%	ZnPy / Econea	6.4% / 7.35%	*H / H*	**vL / vL**	27% - 27%	32% - 32%	23% - 23%	< 340	$225.00	$289.29	$25,835.49	Likely to meet expectations / further testing needed	3	2	1.3	2.6	Y	17.7	35.3	Y	Y	< 1654	< 3308
Interlux	Micron CF	Biocidal, ZnPy and Econea	SDS Plus	1% - 16%	9% - 18%	ZnPy / Econea	4.12% / 3.9%	*H / H*	**vL / vL**	21% - 61%	19% - 47%	9% - 21%	330	$267.95	$103.46	$24,508.67	Likely to NOT meet expectations	3	2	0.4	0.8	Y	3.1	6.3	Y	Y	487	974
ePaint	SN-1	Photoactive and Biocidal, Seanine	Full	11% - 34%	11% - 11%	Seanine	2.9%	**L**	*vL*	20% - 50%	17% - 41%	16% - 40%	< 400	$200.00	$222.22	$11,094.98	Meets expectations	2	3	1.1	3.3	Y	3.2	9.7	Y	Y	< 1681	< 5042
ePaint	ZO	Photoactive and Biocidal, ZnPy	Full	6% - 20%	16% - 16%	ZnPy	4.8%	*H*	**vL**	35% - 50%	32% - 51%	29% - 41%	< 400	$285.00	$275.81	$28,368.89	Borderline	2	3	1.0	2.9	Y	4.7	14.0	Y	Y	< 1469	< 4406
Pettit	Hydro-coat ECO	Biocidal, ZnPy and Econea	Full	<0.5%	11% - 11%	ZnPy / Econea	4.8% / 6%	*H / H*	**vL / vL**	9% - 14%	5% - 6%	5% - 6%	< 150	$268.99	$125.11	$26,754.93	Borderline	2	3	0.5	1.4	Y	5.1	15.2	Y	Y	< 267	< 801
Pettit	Ultima ECO	Biocidal, ZnPy and Econea	Full	14% - 27%	45% - 49%	ZnPy / Econea	4.8% / 6%	*H / H*	**vL / vL**	13% - 23%	13% - 28%	6% - 8%	320	$249.99	$149.99	$27,021.39	Likely to NOT meet expectations	2	3	0.6	1.8	Y	6.5	19.4	Y	Y	727	2180
Interlux	Pacifica Plus	Biocidal, ZnPy and Econea	SDS Plus	10% - 26%	8% - 8%	ZnPy / Econea	4.12% / 3.9%	*H / H*	**vL / vL**	11% - 41%	10% - 32%	9% - 21%	330	$223.59	$84.69	$26,322.03	Borderline	2	3	0.4	1.1	Y	3.0	9.1	Y	Y	475	1424
SeaHawk	Mission Bay	Biocidal, ZnPy	SDS	11% - 31%	14% - 24%	ZnPy	3.8%	*H*	**vL**	35% - 53%	39% - 68%	29% - 42%	298	$233.12	$261.93	$28,220.27	Likely to meet expectations	2	3	1.1	3.4	Y	4.3	12.8	Y	Y	1263	3790
SeaHawk	Mission Bay CSF	Biocidal, ZnPy	SDS	<0.5% - 3%	4% - 4%	ZnPy	4.02%	*H*	**vL**	35% - 52%	29% - 43%	29% - 42%	150	$270.21	$253.32	$28,128.06	Does NOT meet expectations	2	3	0.9	2.8	Y	3.8	11.3	Y	Y	534	1601
SeaHawk	Smart Solution	Biocidal, Econea	SDS	10% - 30%	18% - 28%	Econea	2.9%	*H*	**vL**	<0.5% - 2%	10% - 26%	0%	328	$224.18	$233.52	$27,915.95	Borderline	2	3	1.0	3.1	Y	3.0	9.0	Y	Y	1291	3874
ePaint	ECO-MINDER	Photoactive and Biocidal, ZnPy	Full	<0.5%	5% - 5%	ZnPy	4.8%	*H*	**vL**	20% - 50%	17% - 41%	17% - 41%	< 10	$145.45	$77.92	$30,095.87	Meets expectations	1	5	0.5	2.7	Y	2.6	12.8	Y	Y	< [illegible]	
ePaint	EP-21	Photoactive foul release	Full	15% - 17%	15% - 15%	none	0%	-	-	20% - 60%	19% - 27%	4% - 12%	< 399	$168.00	$162.58	$31,607.05	Likely to meet expectations	1	5	1.0	4.9	N	0	0	N	N	< 1466	
Aurora Marine	VS721	Foul release, polymer/wax	SDS	0%	0%	none	0%	0	0	0%	10% - 25%	0%	unlisted	$373.88	$186.94	$15,341.88	Likely to NOT meet expectations / further testing needed	1	5	0.5	2.5	N	0	0	N	Y	unlisted	[illegible]
Coatings for outdrives/running gear Coverage area calculations assume use of 1 kit per application																												
				10% -	0%	none	0%	-	-	0%	0%	0%		$529.99	-	-	Likely to	1	5	0.26	1.59	N	0	0	N	N	unlisted	unlisted



Northwest Green Chemistry

Categories Approach: Clear guidance

A

Less hazardous, public assessments. Viable performance.

Advance substitution with these chemicals

B

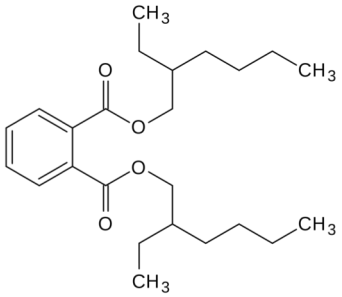
On a positive list, but no public assessment. Viable performance.

Prioritize for public assessments.

C

Not on a red list. Viable performance.

Prioritize for assessment. Fill in data gaps.



Research Gaps: Needs to address going forward

Hazard assessment

- Methods for mixtures and chemical to material comparisons
- Predictive toxicology data to support specific data gaps

Exposure/Life cycle considerations

- Methodological development to integrate with hazard assessment results

Implementation Research

- Evaluation of effectiveness, decision tradeoffs, need for training, etc.

Practice Gaps/Needs Going Forward

Standards of practice/best practices

Guidance for technical feasibility assessments & socio-economic assessments

Capacity Building

Deepen connections with green chemistry

The Role of A4
Pam Spencer, Angus Chemical Co.

TOPICS IN
ALTERNATIVES ASSESSMENT

Time is Right

Increasing policy & market demands to substitute chemicals of concern

- Regulatory requirements to evaluate safer alternatives
- Industry sustainability initiatives
- Consumers demanding safer, more environmentally friendly products
- World challenges (e.g., climate change)

No Suitable Fit to Build the Science of Alternatives Assessment!

Professional Societies Address Components of AA

- Society of Toxicology
  - chemical hazard ID and risk characterization
- Society for Risk Analysis
  - risk assessment
- Society of Environmental Toxicology & Chemistry
  - environmental hazard ID and risk characterization
- ACS
  - product innovation/green chemistry

Formalize/Build the Science

Current landscape is driving the need to …

1. Put meat on the bones of existing AA frameworks
2. Create robust, consistent approaches and tools
3. Accelerate pace of methods development
4. Promote high standards of quality
5. Identify gaps/needs that need to be addressed to move the science of AA forward

Community of Practice

- Over last decade loosely connected community of practice
- Formalize community
- Convene multi-disciplinary expertise
- Provide a forum to share best practices
- Develop professional excellence
- Enhance capacity

Accelerate Adoption

- Supports transition to substitute with safer alternatives
- Applied to product and process design (i.e. design for safety)

Develop & Promote Training

- Biennial Alternatives Assessment Symposium
- Webinars
- Workshops
- Training aides

Association for the Advancement of Alternatives Assessment (A4)

- New professional association solely dedicated to advancing the science, practice, and policy of alternatives assessment and informed substitution.
  - an interdisciplinary community of researchers and practitioners from government agencies, academia, industry, and non-profits working collaboratively to accelerate the transition to the use of safer chemicals, materials, processes, and products
  - broad range of scientific disciplines involved in alternatives assessment and informed substitution – toxicology, exposure science, engineering, chemistry, lifecycle assessment, law and policy, and economics, among others
  - drafted bylaws, developing program initiatives, promoting membership, and providing a forum for dialog on alternatives assessment

https://www.saferalternatives.org/about

ASSOCIATION FOR THE ADVANCEMENT OF ALTERNATIVES ASSESSMENT

JOIN THE A4!

A new professional association
solely dedicated to advancing the
science, practice, and policy of
alternatives assessment and informed substitution

Working collaboratively to accelerate the the use of safer chemicals, materials, processes, and products.

www.saferalternatives.org

QUESTIONS AND DISCUSSION

Next Webinar – October 2019

Different tools for different questions - What can alternatives assessment learn from risk assessment and life cycle assessment? Differences, overlaps and synergies

- *Registration – later in August*
- *Future Webinar topics – We want your input.*
  - *Please complete survey at the close of the webinar*

THANK YOU