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# Substitution and Alternatives

The Better is the Enemy of the Good

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Alternatives  
at the

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## Plenary session on Substitution and Alternatives

- Discuss Substitution in a generic way
- Broad definition of Substitution and Alternatives
- Focus on practical, not legal issues
- Multi-perspective, multi-stakeholder
- recommendations

# Eight presentations



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## **Substitution and Alternative Assessment: Framing, Practice and Opportunities**

**Ken Geiser, USA**

## **How to promote substitution effectively – practical lessons from case studies**

**Lothar Lissner, Germany**

## **Dependency syndrome as the underlying challenge to substitution of toxic chemicals in developing countries and economies**

**Richard Kiaka, iLima, Kenya**

## **Chemical Leasing Business Model: a strategic approach for sustainable management of chemicals**

**Jorge Pérez, Mexico**

## **Workers promoting substitution – case studies, tools, databases**

**Dolores Romano, ISTAS, Spain**

## **Substitution strategy of a manufacturer of disinfectants**

**Michael Streek, Schülke & Mayr GmbH, Germany**

## **Lessons learned to phase out DDT from Mexican Malaria Programme**

**Jorge Méndez, Ministry of Health, Mexico**

## **Establishing tools and criteria for facilitating application of substitutes: opportunities and challenges**

**Joel Tickner, University of Massachusetts Lowell, USA**

# Substitution and Innovation



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A substitution strategy encourages research, innovation and the adoption of new and safer chemicals

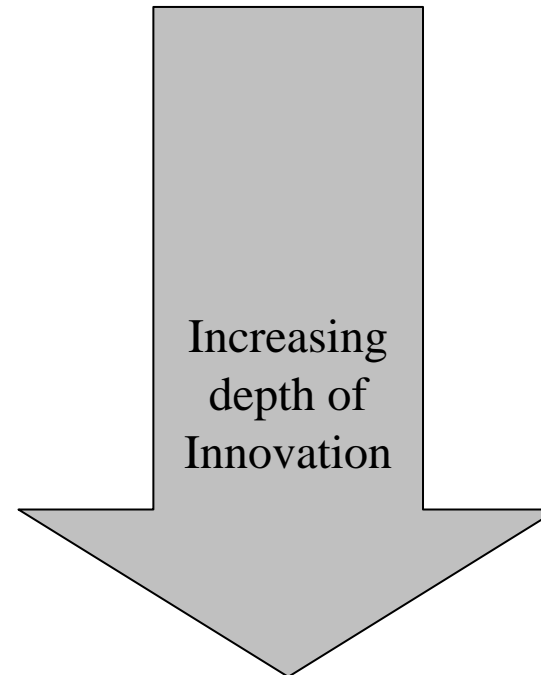
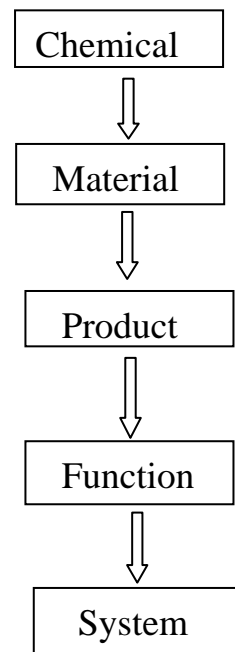
Substitution opens up opportunities for Green Chemistry and Green Engineering

However, substitution also promotes the diffusion of safer chemicals in products, workplaces and waste streams

# Substitution Strategies



Substitution Strategies are defined by the points of intervention where an alternative is considered



# Alternative Assessment in Environmental Policy



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## U.S. Clean Air Act

Requires substitution analysis in replacing CFCs

## European Union REACH

May require alternatives assessment where appropriate controls in Authorization considerations cannot be established

## Stockholm Convention

Requires alternatives assessment for listing new substances by the POP Review Committee



# TURI Five Chemicals Study



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2005– Massachusetts Legislative sought a one year Alternatives Assessment on five chemicals of high concern

lead

Perchloroethylene

Formaldehyde

di (2-ethylhexyl) phthalate

hexavalent chromium

The goal was to identify and assess the alternatives in terms of cost, performance and health and environmental attributes



# Steps in TURI Five Chemicals Alternatives Assessment Study



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- Step 1: Identify chemical uses
- Step 2: Prioritize chemical uses
- Step 3: Identify full range of alternatives
- Step 4: Screen alternatives
- Step 5: Prioritize alternatives for study
- Step 6: Conduct assessments
  - technical (performance)
  - financial (costs)
  - environmental and health effects
- Step 7: Display results

# Developing a Substitution Strategy



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1. Substitution processes need formal, replicable Procedures and Methods
2. Substitution processes need sufficient Scientific Information
3. Substitution processes need to take place within a Comprehensive Chemicals Framework
4. Substitution needs to respond to long term societal goals
5. Substitution processes need to engage a broad range of Stakeholders



# 1 Alternatives Assessment Foundation

**Goals and Measurable Objectives**  
For example:

- Achieve non-toxic environment by 2020
- Use materials that can be closed loop recycled or composted into healthy nutrients
- Use renewable feed-stocks and energy

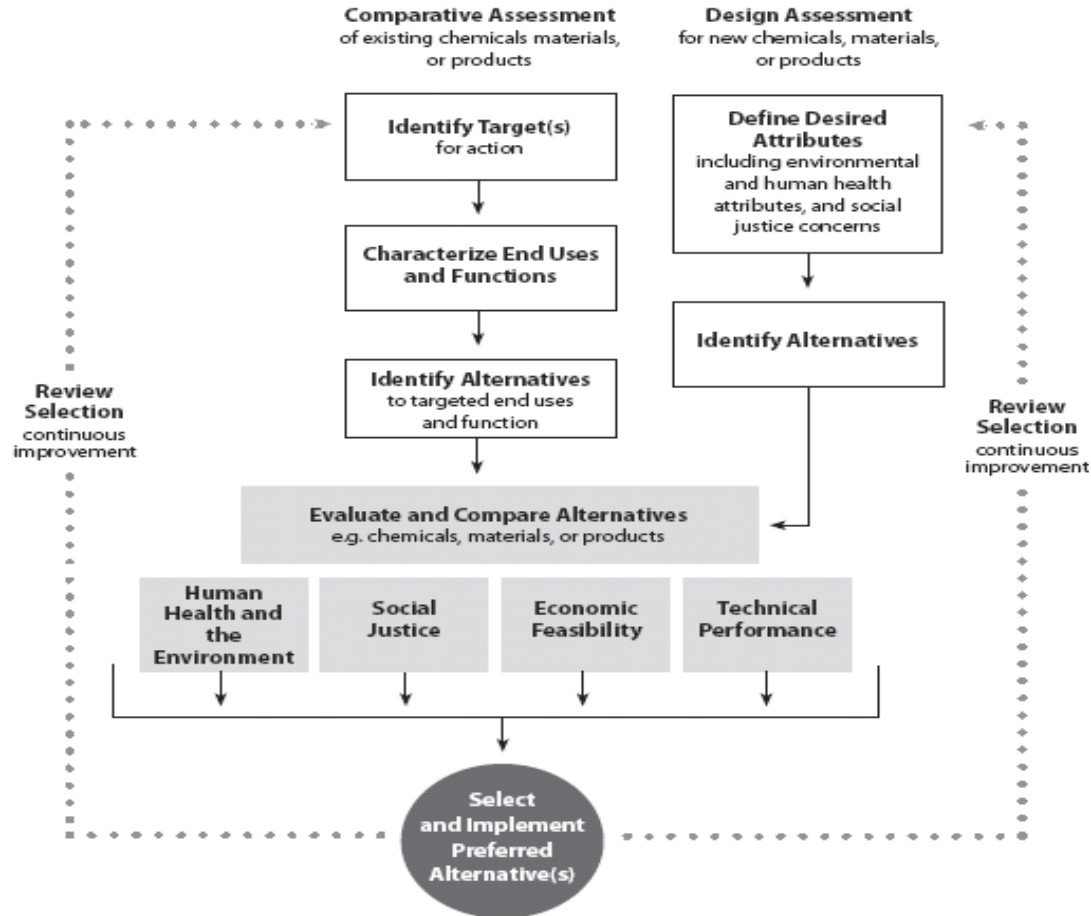
**Guiding Principles**  
For example:

- Prevention
- Precaution
- Substitution
- Life cycle perspective

**Decisionmaking Rules**  
For example:

- Prefer solutions that eliminate the function of problematic chemicals
- Prefer methods that present disaggregated data

# 2 Alternatives Assessment Processes



# 3 Evaluation Modules

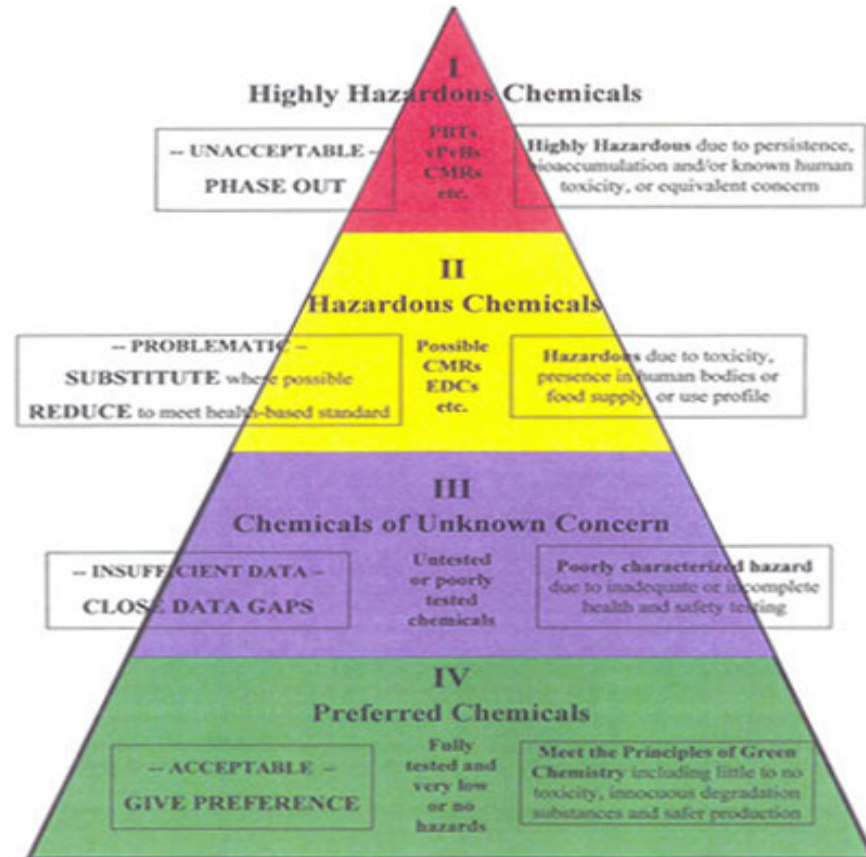
# Lowell Center Alternatives Assessment Framework

# A Comprehensive Classification of Chemical Preferences



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## SAFER's taxonomy of chemicals based on hazard



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# Ken Geiser's Conclusions



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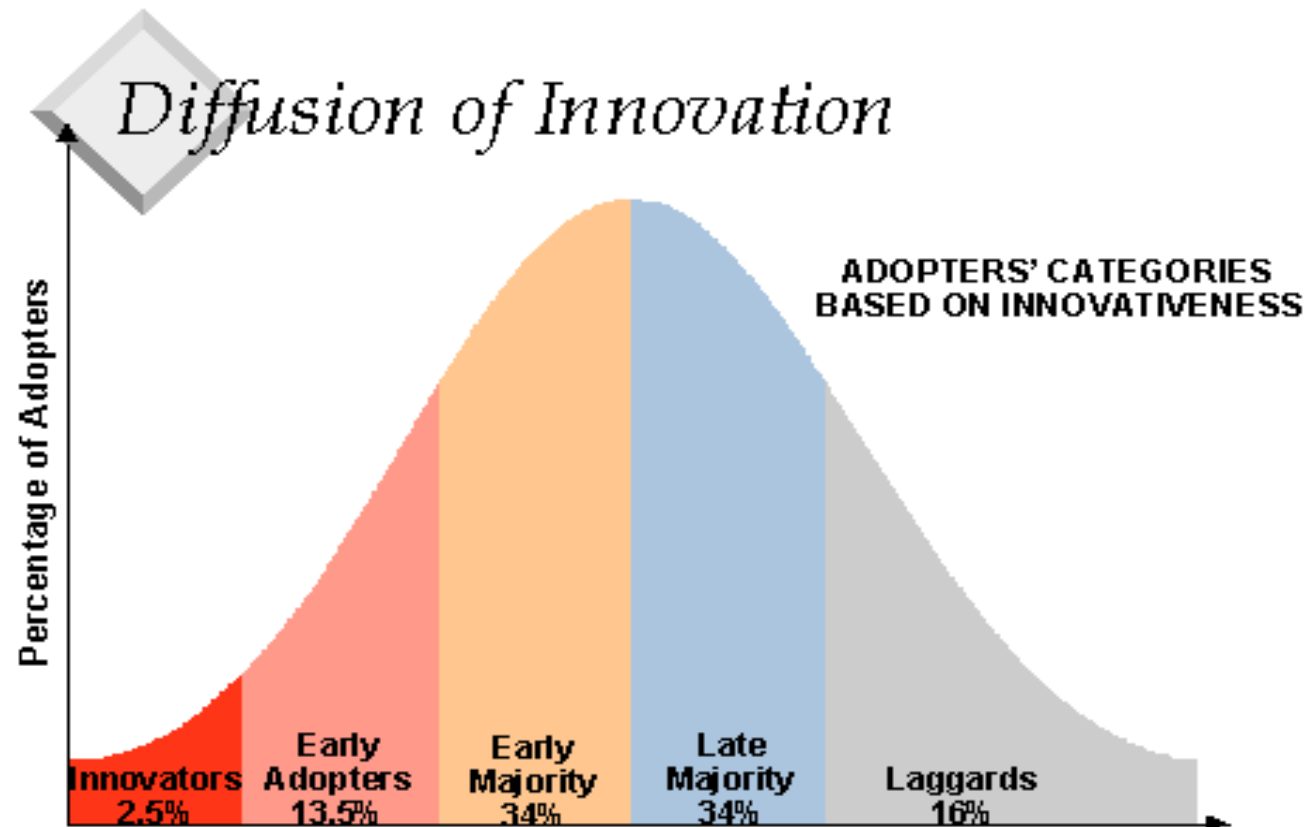
We need to re-frame the chemicals issue in positive terms of innovation and change

We need to move from a “Ban and Phase Out Strategy” to a “Substitution Strategy”

Substitution provides a means for moving towards sustainable forms of production and consumption

Alternatives Assessment provides the tools for assuring that we are moving in the right direction

# Rate of Adoption of Substitutes



# Types of substitution problems, regulatory options and possible results



<i>Efforts dep. on the type of the substitution problem</i>	<i>Regulatory Option In general / under REACH</i>	<i>Intended result</i>
1. Open innovative and demanding technological questions: R&D	Support, incentives, research; REACH – 6 years time limited authorisation	Development of a new preparation or of a completely redesigned process
2. Adaptation of existing technologies necessary: DEVELOPMENT	Mixtures of incentives and command-and-control; REACH: detailed substitution plan and time limit	Adaptation of processes Medium-Term implementation
3. Implementation of reference processes that are already widespread: INFORMATION	Substitution must be applied – exceptions only for certain applications	Introduction of a solution that has undergone practical testing

# Challenges in developing countries



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Weaker capacity in research & development

Public awareness and education gaps

Weaker technical capacity

Low financial capacity

Policy formulation and implementation

Biased or skewed economic investment priorities



## Overcoming the challenges

Strategic funding to NGOs to build for

Institutional capacity building for public awareness and education and advocacy on policy

Research and development of alternatives locally NCPCs

Micro-credit schemes to aid access to alternatives and substitutes

Promote technical capacity building to individuals, NGOs and Govts through trainings

Strategic information sharing –support participation of NGOs & Govts in forums and meetings e.g. IFCS, SAICM etc.

# Safer Alternatives Databases



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**CLEANTOOL** (<http://www.cleantool.org>)

**PPGEMS & CleanerSolutions Database** (<http://www.turi.org>)

**PESTICIDES** (<http://www.pesticideinfo.org>)

**USEPA Pollution Prevention Programs** (<http://www.epa.gov>)

**IFCS substitution and alternatives tools** (<http://www.who.int/ifcs/en/>)

# Tools for substitute comparison



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Numerous public/private tools available – some focus on hazard comparison, some include use hazard/use comparison

Green Screen – Clean Production Action

Column Model - Germany

Dutch Quick Scan

COSHH Essentials – UK HSE

McDonough Braungardt Materials Protocol

Swedish PRIO

CleanGredients

Many firms developing own protocols – eg, SC Johnson Greenlist

## Implementation of safer alternatives is not always easy



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Need for tools/mechanisms for getting good data for analysis

Need for research, development, and application support to firms

Training in planning/application of alternatives

Demonstration projects/sites

Networking of firms

Research support

Technical assistance to firms

Need government/academic institution support for advancing development and implementation of alternatives

# Joel Tickner's Conclusions



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Substitution is rarely simple but it is doable with the right tools and support.

Substitution processes must go beyond single chemical bans to consider a broader range of substances (higher/lower concern) and the process of evaluating and implementing alternatives.

Governments have a critical role in providing tools and support to facilitate substitution processes.

# Dakar recommendations on Substitution and Alternatives



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- For all stakeholders to inform, increase awareness and educate the public, media, enterprises, workers, regulators and administrations about alternative substances and technologies;
- For governments to support international regulatory frameworks to promote the substitution of dangerous substances, with clear objectives and timelines, supported by national plans;
- For governments and international organizations to support culturally and economically appropriate tools, technical and administrative capacity of developing countries and countries with economies in transition to develop and adopt alternative substances and technologies;

# Dakar recommendations on Substitution and Alternatives 2



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For governments and international organizations to implement a transparent alternatives assessment process in considering exemptions for substances nominated for substitution in national and international chemicals agreements;

(Description of functionality and use  
Explain why technically or scientifically necessary  
List of authoritative sources researched  
Describe potential processes, products, materials or systems that might eliminate need for the substance)

# Dakar recommendations on Substitution and Alternatives 3



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Global substitution

Database on hazardous properties of existing substances

International portal on substitution

Information sharing and dialogue along the supply chain

Research and development

Responsible care

Strengthen civil society and workers



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# Thank you

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