

Topic 4
Alternatives Assessment with
Life Cycle Thinking

Green Ribbon Science Panel
April 29-30, 2009

Regulations for Choosing Safer Alternatives

COCs & priorities

Identify and prioritize chemicals

Identify & prioritize end uses

Alternatives Assessment w/LCA

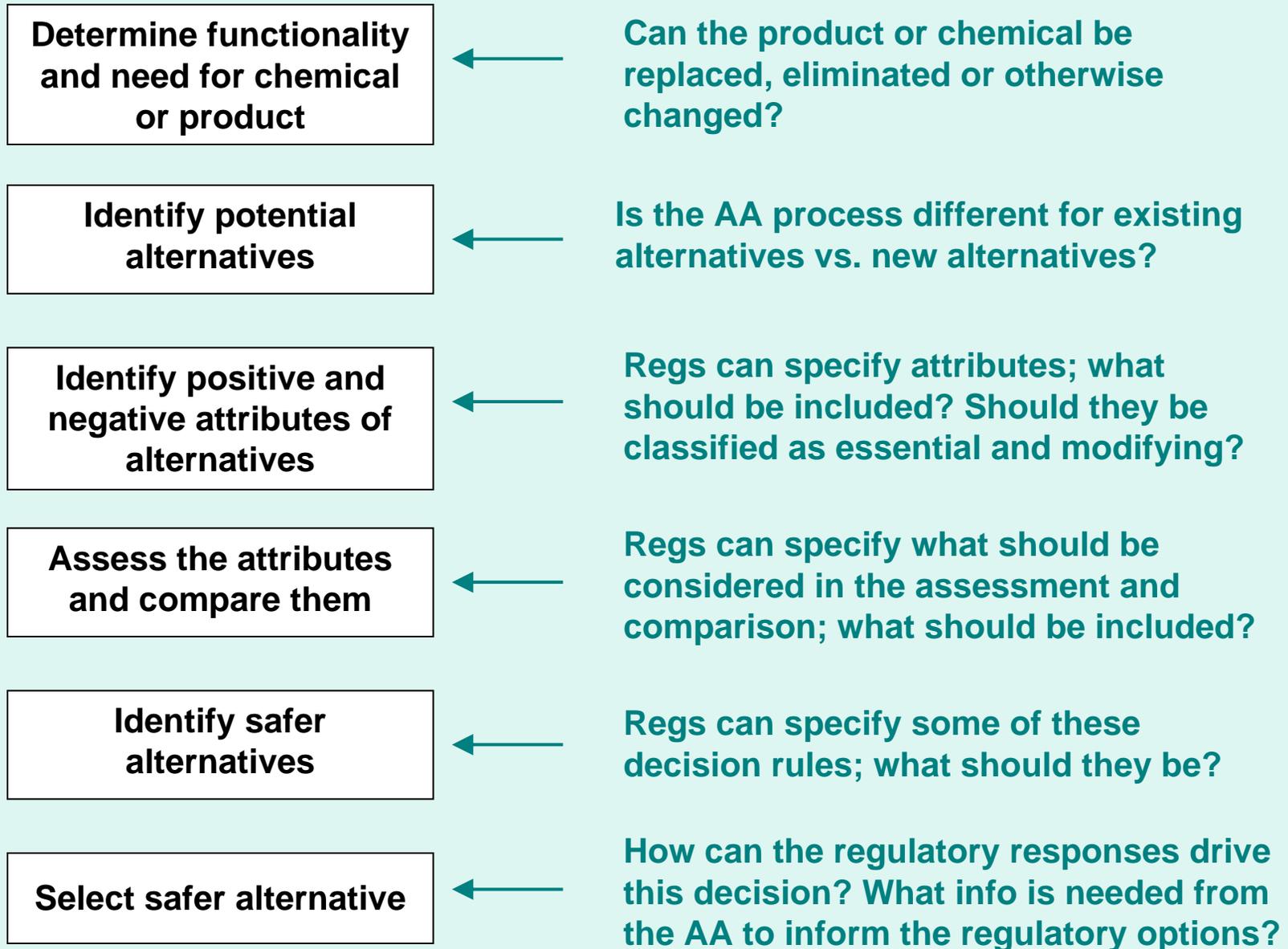
Identify, evaluate and compare alternatives

Select and review preferred alternative

Regulatory Responses

Implement preferred alternative

Alternatives Assessment and Considerations



Alternatives Analysis

- Performed for consumer products that contain one or more high priority chemical of concern
- Ideally performed by “manufacturer”
- Submit to DTSC electronically and post to website for public review and comment
- Ongoing updates

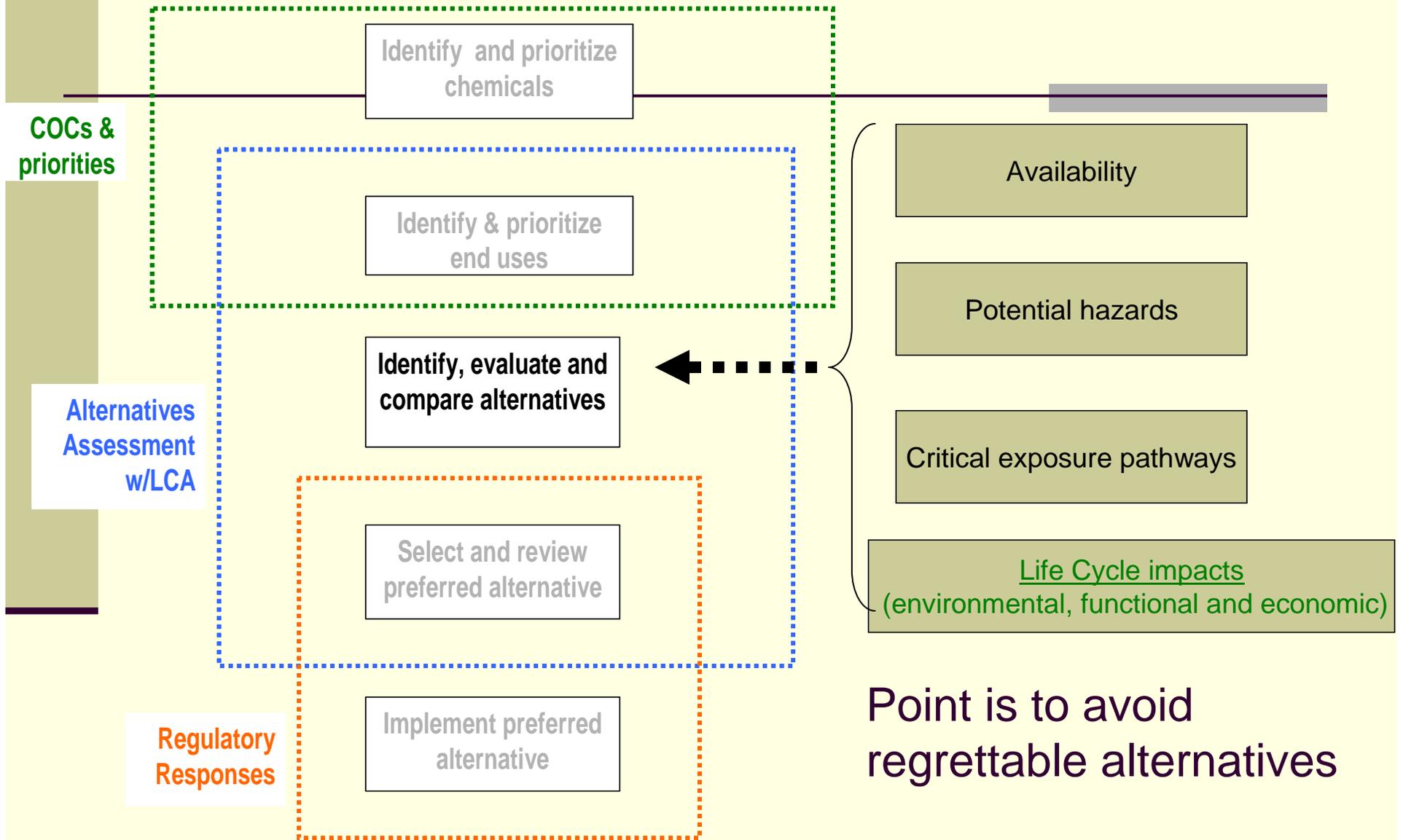
Evaluation Attributes

- Health Impacts
 - Acute and chronic toxicity, carcinogenicity, reproductive hazard, mutagenicity, teratogenicity, endocrine disruption
- Ecological Impacts
 - Aquatic toxicity, persistence, bioaccumulation, mobility
- Potential for Exposure
- Lifecycle Impacts:
 - Product function, useful life, materials/resource consumption, water conservation/quality impacts, air emissions, energy inputs & efficiency, GHG emissions, waste/EOL, public health impacts, environmental impacts, economic impacts

Life Cycle Assessment Guidelines

Within the Framework of Alternative
Assessment

Regulations for Choosing Safer Alternatives



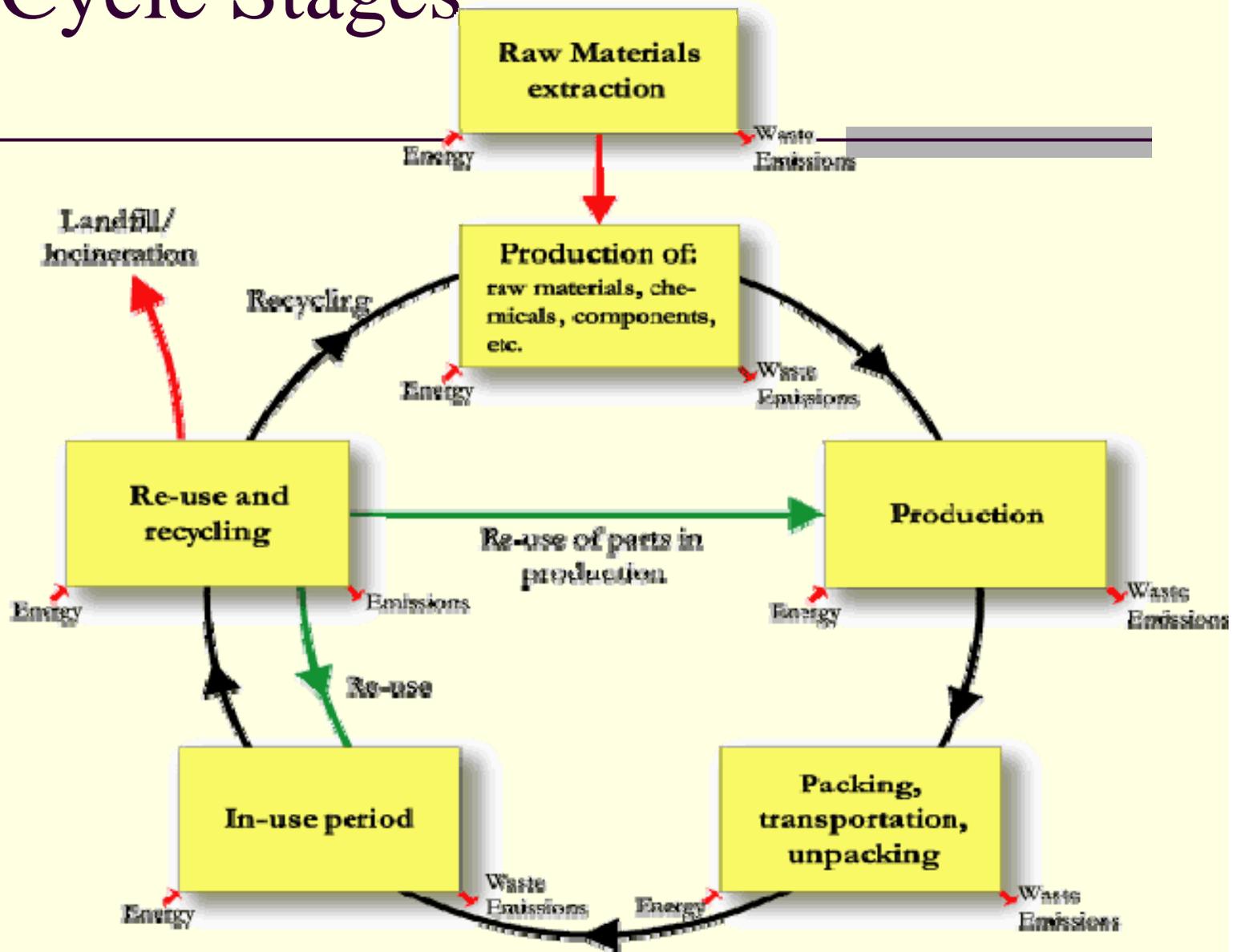
Point is to avoid regrettable alternatives

How to do LCA- Guidelines

1. Determine scope and system boundaries
 - Functional unit
 - Life-cycle stages
 - Define “unit processes” or process description
2. Information collection
3. Assessment of numerous environmental and economic issues/impacts

Note: LCA principles and framework are standardized by the Organization for International Standardization's 14040 series of standards (ISO 14040)

Life Cycle Stages



Product manufacturer shall conduct LCA, require info from supply chain, and inform retailers, importers, distributors and consumers.

Life Cycle Impacts

- §25253 (a) (2) ... life cycle assessment tools take into consideration, but shall not be limited to, all of the following:
 - (A) Product function or performance.
 - (B) Useful life.
 - (C) Materials and resource consumption.
 - (D) Water conservation.
 - (E) Water quality impacts.
 - (F) Air emissions.
 - (G) Production, in-use, and transportation energy inputs.
 - (H) Energy efficiency.
 - (I) Greenhouse gas emissions.
 - (J) Waste and end-of-life disposal.
 - (K) Public health impacts, including potential impacts to sensitive subpopulations, including infants and children.
 - (L) Environmental impacts.
 - (M) Economic impacts.

Level of Analysis: Qualitative Life Cycle Thinking vs. Quantitative Full LCA

Options	Pros	Cons
Qualitative life-cycle framework approach	<ul style="list-style-type: none"> ■ Most expedient and ■ Lowest skill needed ■ Protects confidential data ■ Use data publically available 	<ul style="list-style-type: none"> ■ Reliant on the practitioner's judgment ■ Least informative ■ Difficult to verify/validate ■ Difficult to ensure consistency and comparability
Conventionally full quantitative LCA	<ul style="list-style-type: none"> ■ Best method to assure goals ■ Most informative 	<ul style="list-style-type: none"> ■ Most resource intensive and costly; require highest skill ■ Time consuming, may delay implementation ■ Data may not available; assumptions need to be valid
<p style="color: green;">Semi-quantitative / qualitative LCA (hybrid)</p> <p style="color: green;">(Recommended approach with certain QA/QC measures)</p>	<ul style="list-style-type: none"> ■ Assure goals in most circumstances ■ 	<ul style="list-style-type: none"> ■ Less resource intensive and costly; require less skill ■ May be difficult to establish mechanism/criteria ■ Reasonable data quality remains

Our approach -

- **“Guideline for application of life-cycle methodology to alternatives assessment”**
 - to provide a flexible integrated framework

- **How are LCA results informative**
 - identify life cycle “hot spots” and lead to improvements
 - support to determine feasibility of alternatives

Conduct Evaluation

- Identify availability of potential alternatives
- Collect info for specified attributes
- Conduct LCA
- Stepwise comparison
 - 1) Compare according to prioritization criteria
 - 2) Compare according to health & eco criteria
 - 3) Compare using other lifecycle impact criteria and principles of green chemistry

Questions

- Functional equivalency & feasibility of alternatives?
 - Criteria to determine functional equivalency and feasibility?
- Third party involvement or role?
 - How could this work, for preparing/reviewing?
 - Ideas for choosing, screening, evaluating, qualifying, training third parties?
- Choosing an alternatives analysis model?
 - Criteria to choose a model?
- Comparing dissimilar attributes?
 - Ideas for decision rules/preferences?
 - Ideas for conducting expedited comparisons?