

IC2 AA Guide

Optional Modules

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Optional Modules

- Materials Management
 - How do materials used impact natural resources and waste generation and achieve sustainability.?
- Social Impact
 - Prevents shifting of burden from one community to another.
- Life Cycle Module
 - Supports informed decisions about and avoids alternatives with undesirable life cycle impacts.



Materials Management Module

Pam Eliason

State of Massachusetts

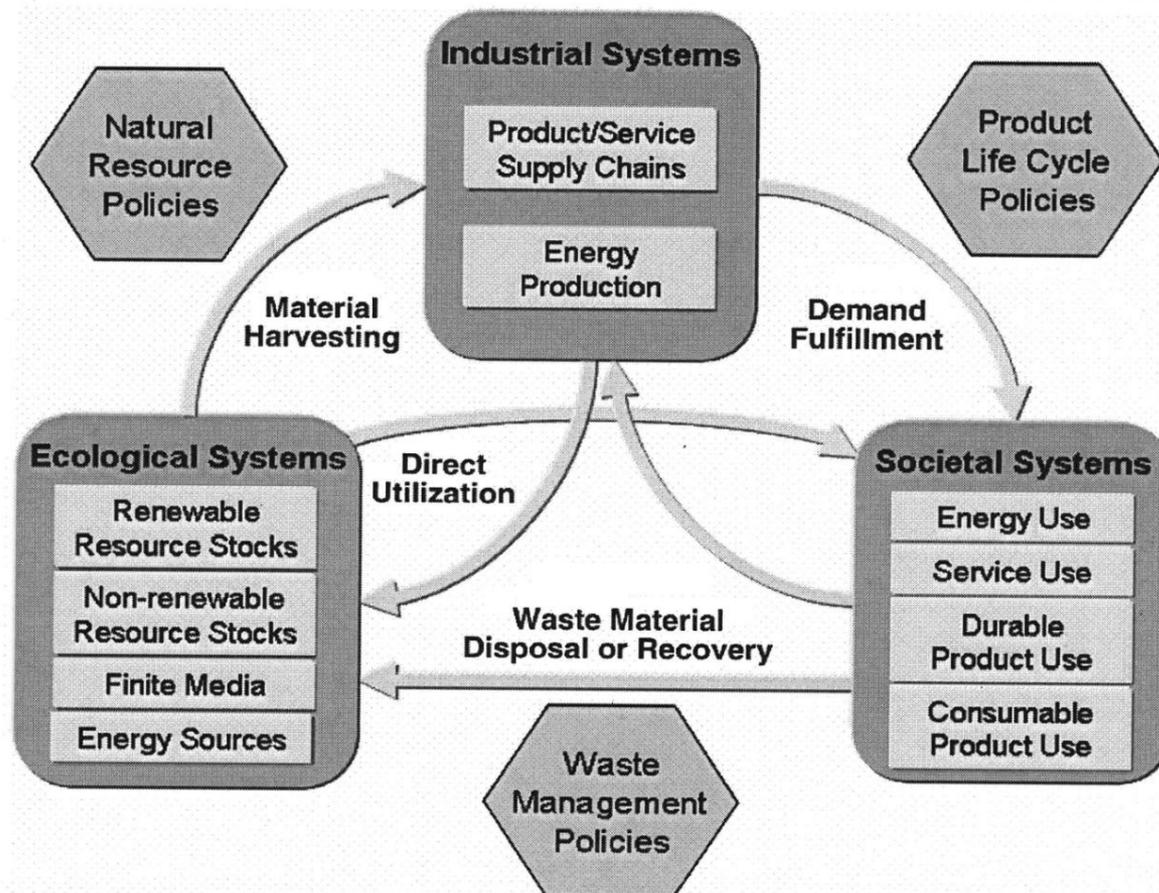


Materials Management Module

- Recommended for comparing alternatives for whole product or products containing materials derived from very different sources.
- Evaluates how different alternatives can:
 - Impact natural resources.
 - Generate hazardous and non-hazardous waste.
 - Mitigate impacts to achieve sustainable materials management.
- Systemic solutions to design or re-design products for:
 - Material recovery.
 - Benign release into environment.

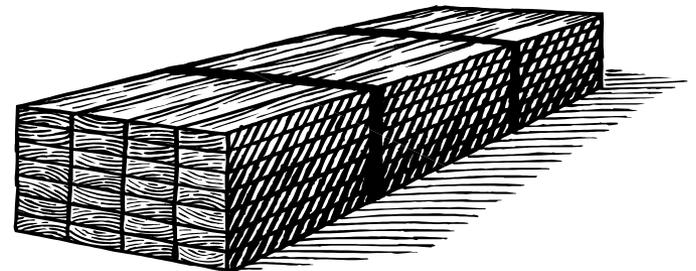
Materials Management Module (cont.)

- Directly connected to industrial, ecological and societal systems.



Materials Management Module (cont.)

- Incorporates Sustainable Materials Management (SMM) into AA process.
- SMM: ‘... an approach to promote sustainable materials use, integrating actions targeted at reducing negative environmental impacts and preserving natural capital throughout the life cycle of materials, taking into account economic efficiency and social equity.’



Materials Management Module (cont.)

- Builds upon work of EPA & OECD.
- Materials Management Goals:
 1. Use sustainable raw materials.
 - a) Use less resource intensive materials.
 - b) Use sustainably renewable or recyclable materials.
 2. Use fewer materials in products.
 3. Design for value recovery.
- Includes two levels & advanced option.



Materials Management Module (cont.)

Level 1	<i>Basic Materials Management Evaluation:</i> Identify raw materials used and wastes generated after use by the baseline product and compare to those for the alternative(s). Consider opportunities to mitigate impacts to achieve sustainable materials management.
Level 2	<i>Extended Materials Management Evaluation:</i> Quantify raw materials used and wastes generated after use for the baseline product and compare to those for the alternative(s). Evaluate the impacts to prioritize those that may be mitigated. Consider and evaluate opportunities to mitigate impacts to achieve sustainable materials management.
Advanced (See LCM, Level 3)	<i>Advanced Materials Management Evaluation:</i> Material Flow Analysis or best practices 1) from the International Organization for Standardization (ISO) 14040 guidelines with a focus on material inputs and outputs and 2) for product optimization from “Cradle to Cradle” design.

Materials Management Module (cont.)

Level 1

Basic Materials Management Evaluation: Identify raw materials used and wastes generated after use by the baseline product and compare to those for the alternative(s). Consider opportunities to mitigate impacts to achieve sustainable materials management.

- Level 1 Objectives:
 - Inventory raw materials used.
 - Inventory wastes after use
 - Look for opportunities to mitigate and achieve sustainable materials management.



Materials Management Module (cont.)

Level 2

Extended Materials Management Evaluation: Quantify raw materials used and wastes generated after use for the baseline product and compare to those for the alternative(s). Evaluate the impacts to prioritize those that may be mitigated. Consider and evaluate opportunities to mitigate impacts to achieve sustainable materials management.

- Level 2 Objectives:
 - Increased data requirements and detailed review.
 - Quantify raw materials used.
 - Quantifies wastes after use
 - Look for opportunities to mitigate & achieve sustainable materials management.



Materials Management Module (cont.)

**Advanced
(See LCM,
Level 3)**

Advanced Materials Management Evaluation: Material Flow Analysis or best practices 1) from the International Organization for Standardization (ISO) 14040 guidelines with a focus on material inputs and outputs and 2) for product optimization from “Cradle to Cradle” design.

- Advanced Option Objectives:
 - Conduct Material Flow Accounting (MFA) or Life Cycle Assessment (LCA) focused on material inputs and outputs and associated impacts.
 - Design or re-design products for material recovery and/or benign release into the environment.
 - ‘Cradle to Cradle’ or equivalent approach can be used
 - Recommended as part of more detailed LCA evaluation.

Optional Modules

- Materials Management
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- Social Impact
 - Prevents shifting of burden from one community to another.
- Life Cycle Module
 - Supports informed decisions about and avoids alternatives with undesirable life cycle impacts.



Social Impact Module

Alex Stone
State of Washington



Social Impact Module

- Ensures AA does not shift burden from one community of people to another
- Evaluates impacts upon workers, communities and societies involved in extraction, manufacture, transport, use & disposal.
- Draws attention to specific communities and includes concerns such as environmental justice.
- Crossover with other modules (ex. Stakeholder) & if concerns addressed previously, no need to include a second time.

Social Impact Module (cont.)

Worker considerations across life cycle (*not exhaustive*)

Demographics	
• Sex	• Literacy
• Age	• Gender equality
• Culture	• Human rights
• Language or cultural issues	• Disability issues
Health	
• Physical or social impacts such as ergonomics, noise, culture, etc.	• Body burden of chemicals with unknown individual, synergistic or other impacts
• Health care	• Life expectancy
• Sensitive populations such as pregnant women, children, the elderly, etc.	• Sanitary facilities including toilet, potable water, food storage, etc.
• Treatment with dignity and respect	• Non-abusive work conditions and hours
Environment	
• Generation of toxic wastes	• Use of hazardous chemicals
• Product recycling, extraction of valuable resources & final disposition of wastes generated	• Adequate training and hazard communication training
Financial	
• Compensation: overtime, lost time and wages	• Pay equality
	• Part-time workers
• Number and quality of jobs	• Educational level of workers

Social Impact Module (cont.)

Community considerations across life cycle (*not exhaustive*)

Demographics	
<ul style="list-style-type: none"> Quality of life including historical, cultural or religious priorities, etc. 	<ul style="list-style-type: none"> Use of forced or child labor
Health	
<ul style="list-style-type: none"> Quality of life including recreational activities 	<ul style="list-style-type: none"> Communities over-burdened by pollution
<ul style="list-style-type: none"> Sale of products banned in other, regulated areas in unregulated markets 	
Environment	
<ul style="list-style-type: none"> Disproportionate impacts on ‘fenceline’ communities 	<ul style="list-style-type: none"> Potential generation of toxic wastes or use of hazardous chemicals
<ul style="list-style-type: none"> Impacts upon local water, air, land, etc. 	<ul style="list-style-type: none"> Product recycling, extraction of valuable resources and final disposition of remains
Financial	
<ul style="list-style-type: none"> Quality and type of jobs 	<ul style="list-style-type: none"> Corruption
<ul style="list-style-type: none"> Crime 	
Community	
<ul style="list-style-type: none"> Establishment of partnerships with local, state, tribal & federal organizations to achieve healthy & sustainable communities Product availability 	<ul style="list-style-type: none"> Empowerment of communities to take action to improve their health and environment Discrimination, harassment, intimidation or retaliation

Social Impact Module (cont.)

Global considerations across life cycle (*not exhaustive*)

Demographics	
<ul style="list-style-type: none">• Use of forced or child labor	
Health	
<ul style="list-style-type: none">• Sale of products banned in other, regulated areas in unregulated markets	<ul style="list-style-type: none">• Changes to quality of life
Environment	
<ul style="list-style-type: none">• Product recycling, extraction of valuable resources and final disposition of remains	<ul style="list-style-type: none">• Body burden of chemicals with unknown individual, synergistic or other impacts
Financial	
<ul style="list-style-type: none">• Wealth of society	
Global	
<ul style="list-style-type: none">• Discrimination, harassment, intimidation or retaliation• Product availability	<ul style="list-style-type: none">• Contributes to unhealthy societies such as support of military actions, genocide, etc.

Social Impact Module (cont.)

Three levels & advanced option

Level 1	<i>Basic Social Impact Evaluation:</i> <u>Emphasizes impacts on a local level</u> and includes an evaluation of social impacts on a broader scale using a qualitative approach based upon readily available information and a limited appraisal scope.
Level 2	<i>Extended Social Impact Evaluation:</i> Builds upon Level 1 and broadens the evaluation to require <u>more detailed review of social impacts upon manufacturers in the supply chain</u> . It also expands upon the evaluation of global societal impacts.
Level 3	<i>Detailed Social Impact Evaluation:</i> Builds upon Level 2 and broadens the evaluation to require <u>more detailed review of all social impacts including local, supply chain, and global concerns</u> .
Advanced (see LCM, Level 3)	<i>Full Social Life cycle Assessment Evaluation:</i> Conducts a full social life cycle assessment (SLCA) related to the alternative.

Social Impact Module (cont.)

Level 1:

Level 1

Basic Social Impact Evaluation: Emphasizes impacts on a local level and includes an evaluation of social impacts on a broader scale using a qualitative approach based upon readily available information and a limited appraisal scope.

- Evaluates impacts to **local** workers, affected communities and societies.
- Includes ‘fenceline’ communities & product users.
- Local level ‘area surrounding factory or factory producing product containing COC.
- Includes qualitative review of impacts outside local communities.
- Includes mitigation review.

Social Impact Module (cont.)

Level 2:

Level 2

Extended Social Impact Evaluation: Builds upon Level 1 and broadens the evaluation to require more detailed review of social impacts upon manufacturers in the supply chain. It also expands upon the evaluation of global societal impacts.

- Builds upon Level 1.
- Expands to include a more detailed review of impacts along the supply chain.
- Requires some quantitative data.
- Includes a more detailed review of potential global concerns.

Social Impact Module (cont.)

Level 3:

Level 3

Detailed Social Impact Evaluation: Builds upon Level 2 and broadens the evaluation to require more detailed review of all social impacts including local, supply chain, and global concerns.

- Builds upon Level 2.
- Includes detailed evaluation of all local, community and global concerns.
- More detailed quantitative data required.



Social Impact Module (cont.)

Advanced Option:

Advanced (see LCM, Level 3)	<i>Full Social Life cycle Assessment Evaluation:</i> Conducts a full social life cycle assessment (SLCA) related to the alternative.
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- UNEP defines SLCA as ‘... a social impact (and potential impact) assessment technique that aims to assess the social and socio-economic aspects of products and their potential positive and negative impacts along their life cycle’.
- SLCA concerns can be complicated.
- Recommended address as part of detailed LCA.

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Life Cycle Module

**Bob Boughton
State of California**



Life Cycle Module

- Further discriminates between safer alternatives by comparing life cycle tradeoffs.
- Identifies opportunities to mitigate any undesirable impacts.
- Avoids alternatives with undesirable impacts that cannot be mitigated.
- Life cycle issues covered in other modules & LCA provides opportunity for more in depth review.

Life Cycle Module (cont)

- LCA Module also addresses issues or impacts not included in other modules.
- Evaluates impacts from the product level rather than from individual chemical perspective.
- Ultimate aim is to prevent the shift of negative impacts from one part of an AA to another.
- Reduces chances of a ‘regrettable substitution’.



Life Cycle Module (cont)

LCT versus LCA.

Life Cycle Thinking (LCT): Use of a holistic life cycle perspective to help manufacturers and policy makers identify possible improvements across the industrial system and through all the product's life cycle stages.

Life Cycle Assessment (LCA): Technique (ISO 14040) to assess environmental aspects & potential impacts associated with a product, process, or service, by:

- Compiling an inventory of relevant energy and material inputs and environmental releases for studied life cycle phases.
 - Evaluating the potential environmental and human health impacts associated with identified inputs and releases from processes within studied phases.
 - Interpreting the results to help make an informed decision.
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- LCT less detailed and more qualitative evaluation compared with the quantitative LCA approach.
 - Narrows focus on LC differences that discriminate between options.

Life Cycle Module (cont)

- Consists of a Preliminary Step and 3 Levels:

Preliminary Steps	<i>Preliminary Steps.</i> Identifying potential differences between unit processes at each life cycle stage that could result in discriminating differences between the baseline product and the alternative(s). The Preliminary Steps determines whether a deeper analysis is needed or if no further analysis is necessary.
Level 1	<i>Basic Life Cycle Evaluation.</i> Assessing the life cycle impacts based on readily available data and identifying what further information is needed to assess the impacts sufficiently to inform decision making.
Level 2	<i>Extended Life Cycle Evaluation.</i> Conducting a more detailed LCT analysis in order to better inform decision making concentrating solely on those factors identified in Preliminary Steps as discriminating for chemical, product or process under evaluation. Determining extent to which impacts can be mitigated and the product design optimized for life cycle benefits.
Level 3	<i>Detailed Life Cycle Evaluation.</i> Conduct a life cycle evaluation of the chemical, product or process using standard ISO 14040 and social life cycle assessment (SLCA), cost benefit analysis (CBA) and materials management evaluations. Better understanding of life cycle “hot spots” can support more informed mitigation and optimization of products and determine what is relevant to the comparison using a complete evaluation of the chemical, product or process.

Life Cycle Module (cont)

Preliminary Step:

Preliminary Steps

Preliminary Steps. Identifying potential differences between unit processes at each life cycle stage that could result in discriminating differences between the baseline product and the alternative(s). The Preliminary Steps determines whether a deeper analysis is needed or if no further analysis is necessary.

- Determines important life cycle attributes that will affect selection of safer alternative.
- Roughly analogous to the goal definition and scoping phase of a traditional LCA.
- Previous modules scope impact. For example, Social Impact Module can inform social LC impacts.
- First step for impacts not covered in other modules.

Life Cycle Module (cont)

Life cycle Impact Assessment:

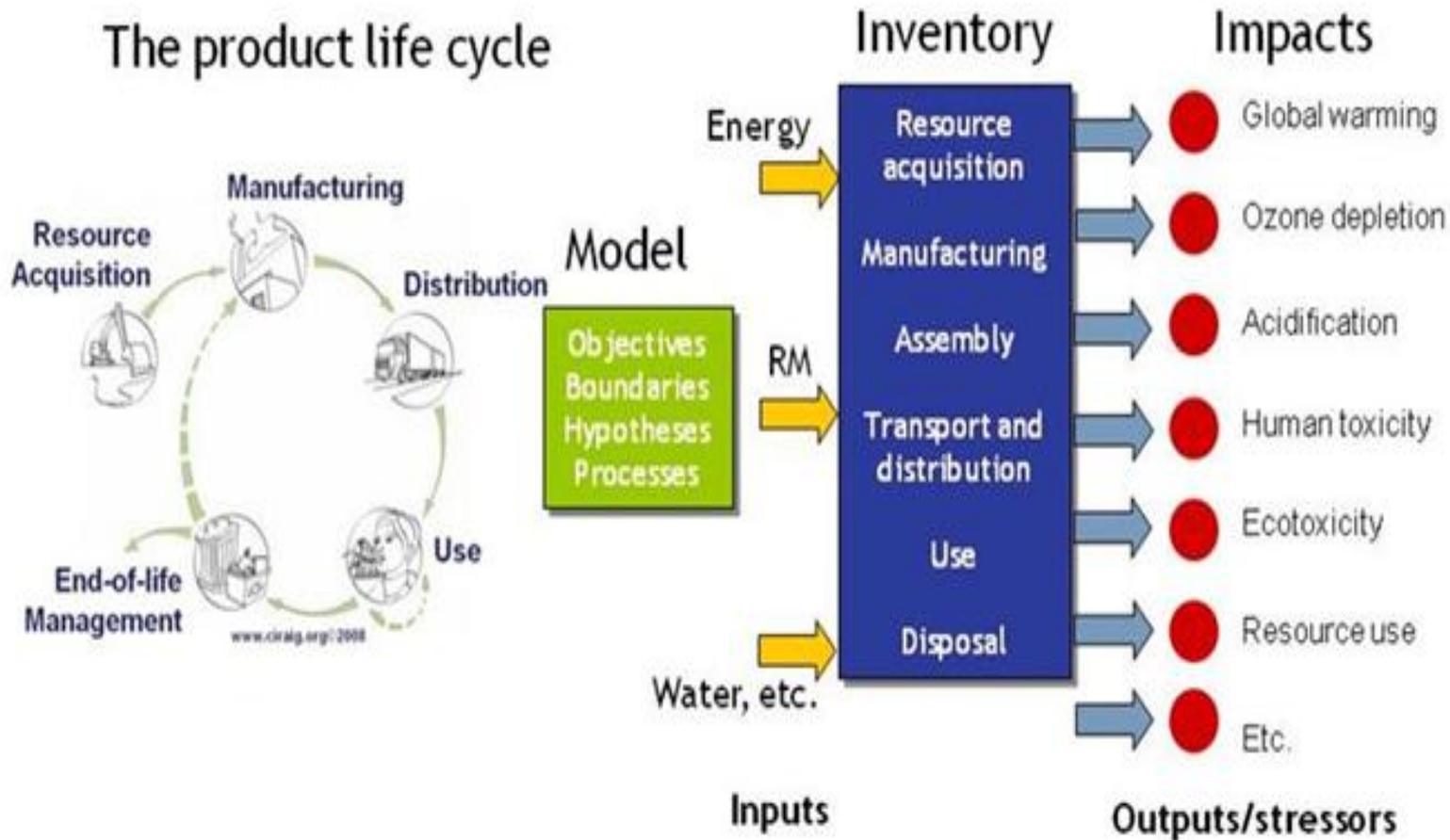


Figure 1. Life Cycle Impact Assessment translates the inventory of emissions from a product's life cycle into an environmental profile of the product representing its potential contributions to a wide range of environmental impacts

Life Cycle Module (cont)

Level 1: Basic Life Cycle Evaluation:

Level 1 *Basic Life Cycle Evaluation.* Assessing the life cycle impacts based on readily available data and identifying what further information is needed to assess the impacts sufficiently to inform decision making.

- Assesses impacts in factors identified in Preliminary Step.
- Uses readily available information to evaluate impacts.
- Determines if information sufficient to make decision or if more data is needed.
- Additional data gathered only when needed.

Life Cycle Module (cont)

Level 2: Extended Life Cycle Evaluation:

Level 2	<i>Extended Life Cycle Evaluation.</i> Conducting a more detailed LCT analysis in order to better inform decision making concentrating solely on those factors identified in Preliminary Steps as discriminating for chemical, product or process under evaluation. Determining extent to which impacts can be mitigated and the product design optimized for life cycle benefits.
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- More detailed and quantitative data gathering and analysis.
- Includes partial LCA informed by best practices & ISO 14040.
- Additional technical expertise may be warranted.
- Requires:
 - Detailed life cycle inventory data.
 - Impact assessment results associated with inventory.
 - Summary of inventory and impact assessment.

Life Cycle Module (cont)

Level 3: Extended Life Cycle Evaluation:

Level 3	<i>Detailed Life Cycle Evaluation.</i> Conduct a life cycle evaluation of the chemical, product or process using standard ISO 14040 and social life cycle assessment (SLCA), cost benefit analysis (CBA) and materials management evaluations. Better understanding of life cycle “hot spots” can support more informed mitigation and optimization of products and determine what is relevant to the comparison using a complete evaluation of the chemical, product or process.
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- Full LCA meets ISO 14040 requirements.
- Includes:
 - Social life cycle assessment.
 - Materials flow analysis.
 - Cost benefit analysis.
 - Other pertinent considerations.
- Guide directs user to ISO 14040 for details

Questions?

Comments?

