

EVALUATING THE ENVIRONMENTAL IMPACTS OF TRANSPORTATION

Recitation 6

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ESD.00

ENVIRONMENTAL IMPACTS OF AVIATION AND HIGH-SPEED RAIL

- Discussion: what are some of the environmental impacts associated with the *operations* of aviation and high-speed rail?
 - Energy consumption.
 - Emissions – greenhouse gases, sulfur dioxide, carbon monoxide, nitrogen oxides, VOCs, particulate matter.
 - Health impacts (often linked to emissions).
 - Noise impacts.

EMISSIONS IMPACTS OF AVIATION AND HSR OPERATIONS

- Discussion: what are some of the factors that impact emissions from aviation and HSR? Emissions per what?
 - Emissions per passenger mile vs. per movement.
 - What is the energy mix?
 - What is the efficiency of the aircraft or train?
 - Take-off vs. cruise.

INTRODUCTION TO LIFE CYCLE ASSESSMENT

- According to ISO 14040, LCA is carried out in four main phases:
 - Goal and scope: what final results will be obtained? How much specificity? What methods?
 - Life cycle inventory: data collection and verification.
 - Life cycle assessment: evaluate contribution to impact categories.
 - Interpretation: analysis of major contributions, sensitivity analysis, and uncertainty analysis.

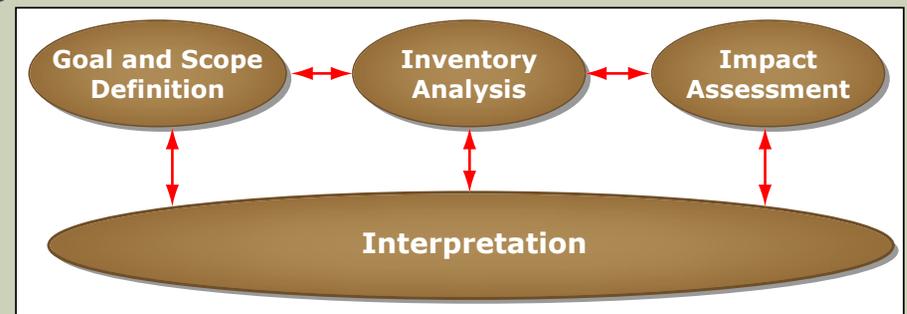


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Source: Wikipedia, ISO

APPROACHES TO LCA

- **Process-based LCA method.**
 - Itemized accounting.
- **Economic Input-Output method.**
 - Uses information about monetary transactions between sectors.

LIFE CYCLE ASSESSMENT OF TRANSPORTATION SYSTEMS

■ What components do we need to consider?

	Rail	Aviation
<i>Vehicle</i>	Manufacturing Operation Maintenance Insurance	Manufacturing Operation Maintenance Insurance
<i>Infrastructure</i>	Construction & Maintenance Operation Insurance	Construction & Maintenance Operation Insurance
<i>Fuel</i>	Production	Production

Adapted from Chester, "Life-cycle Environmental Inventory of Passenger Transportation in the United States," 2008.

PROJECT PLANNING

- Selecting components of the system that you want to research.
 - Next step: life cycle assessment project mini-assignment.
- Preparation for April 6 project mid-term presentation.
 - Focus on:
 - Overview of the system of interest.
 - The goals of the project.
 - Preliminary data collection.

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