Summary of Day 2
Q1: Critique the Framework

- Goal (focus on scale and purpose)
- System Boundary
- Functional Unit
- Assumptions
- Recommended models and data sources
Q1: Summary

• General agreement on the structure of the framework
• Goal should be clearly defined
• No clear consensus on the definition of the functional unit
• The issue of project versus network level needs to be resolved
Group 1
Handout & Functional Unit

• Agree with all items listed in handout with the following additions or discussion

• Functional unit
  – Shoulder to shoulder for highway and sq meter for parking lots, streets, and other uses
    • Minority: sq meter for all uses
  – Include at least one climate with freeze thaw and one climate without freeze thaw
Life Cycle Inventory

• Life cycle inventory
  – Include all criteria pollutants, greenhouse gases, hazardous materials
  – Include all aspects of water: inputs to all processes, runoff at plant, runoff of pavement, water transport
Materials

• Make sure to include
  – Recycling agents, soil stabilizer, fly ash, slag cement, silica fume, natural pozzolans, epoxy coated rebar
  – Equipment
    • use of oil and gas
    • fuel source data available in California
    • Wash out of trucks
  – Minority: consider architecture and construction office use
Materials

• Use: all listed plus
  – Effect of temperature on tire wear
  – Rolling resistance
  – Noise
  – Module for processes: construct in 24 hours a day for short period, or more 8 hour days

• End of life
  – Include carbon absorption at end of concrete life
  – In urban areas, construction materials are usually banned from landfills and recycled
Group 2
Question 1

- Critique of the framework
- General agreement on overall structure
- Add site design (i.e. where is the plant located, close or far)
- Pavement structure and material determine focus and purpose of framework
- Split material production into material extraction and material production
- Expand the End of Life box to include End of functional efficiency – allow for planned maintenance
- Need to add a normal operations block in the user phase for things like snow removal / vegetation cutting / cleaning storm water drainage channels etc
- ISO 12006 has life cycle phases, middle shows processing – maybe redraw the UC framework in this format. Also look at HEATCO framework focusing on life cycle costing for additional viewpoint
- Functional units - proposed to rather go towards standard m² of pavement for functional unit – need to divide into pavement and shoulder m²
- Define the performance requirements clearer (i.e. truck traffic, climate (how to measure) etc). Ancillary benefits with different strategies – how to measure these and compare the different strategies? How to decide on strategies based on required performance requirements? Allow to conduct performance based designs and not method based designs / requirements – do not confine to methods.
- Perception that these are not affecting functional unit – these are the boundaries around the project that are non-negotiables. Therefore the move to see this as performance requirements – maybe have CO₂ / m² multiplied by m² of functional unit.
Group 3
Framework

- Need goal and assessment as part of the cartoon
Goal - Purpose

• LCA is coming because of increasing environmental concerns
  – CO2 reduction

• Meeting a regulatory requirement
  – Start with accounting
  – Learn where to focus attention

• Decision support
  – Optimization of available resources?
  – Or meeting regulatory requirements?
  – Comparison of alternatives

• What can be done to reduce green house gasses
Goal - Scale

• Turning the big knobs
  – Speed, load, roughness

• Project level
  – Material and construction alternatives
System boundary

• Depends on
  – Goal – Why are we doing this?
  – Scale – What are we doing?
    • Large scale – include use
    • Small scale – use uncertainty may kill the process

• Some parts (like goods damage)
  – Can we do this at the moment?
Functional Unit

• Seems OK
  – For project level

• Shoulder?
  – Depends on the question you are asking

• Markings?
  – Knock on effects from pavement
Assumptions

• Use the best data available
• Uncertainty
  – Need to consider uncertainty
Recommended models and data sources

- On road models for materials transport
  - The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model
- Electricity in plants and on site
- Qualitative descriptions for data sources
- Hybrid vehicles
- Traffic models
- Black carbon (soot)
- Where did the pollution happen
- Recycling as a construction process
- What greenhouse gases
Group 4
Critique to the framework

• Goal definition
  – Clearly differentiate the scale: project or regional or network
  – Clearly identify if the LCA is applicable to an existing pavement or brand-new pavement
  – Create a decision-making chart (next page)

• Define “existing pavement”
  – E.g. Is it the pavement with wearing surface, or include lane expansion?
Example of decision-making chart

Goal

Network-level
- Network-level new pavement
  - Network-level existing pavement

Regional-level
- Regional-level new pavement
  - Regional-level existing pavement
Critique to the framework

• Understand your clients
  – Their Interest
  – Their approach

• Use at least the six basic impact categories
  – Global warming, eutrophication, etc...