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
  - Recyling 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 m^2 of pavement for functional unit – need to divide into pavement and shoulder m^2
- 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 CO_2 / m^2 multiplied by m^2 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

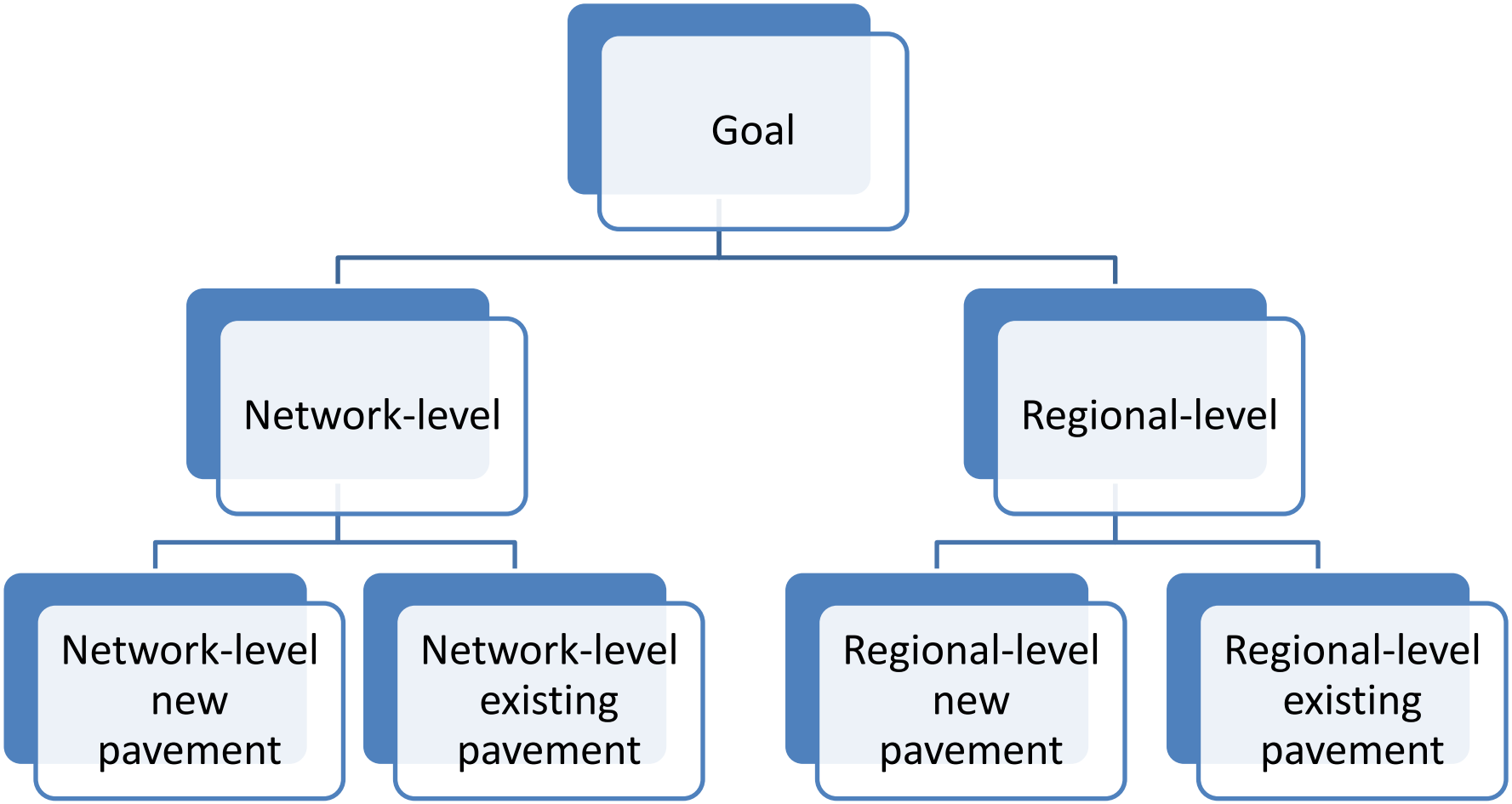
- On road models for materials transport
  - The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model
- Electricity in plants and on site
- Qualitative descriptions for data sources
- Hybrid vehicles
- Traffic models
- Black carbon (soot)
- Where did the pollution happen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



Critique to the framework

- Understand your clients
  - Their Interest
  - Their approach
- Use at least the six basic impact categories
  - Global warming, eutrophication, etc…