

Summary of Day 2

Q5: Surface Characteristics and Rolling Resistance

- Do we have the right models?
- Can we have the information to adequately include the use phase?
- Beyond direct fuel use, where should the system boundary be drawn regarding vehicle operating effects
- In the document, is the modeling approach outline adequate for consideration of traffic flow (i.e., congestion, acceleration, deceleration)

Q5: Summary

- HDM-4 (and other existing models) have promise, but mechanistic models are needed to take it to the next level
- Use phase needs to be included, but in the proper detail and needs to account for its uncertainty
- In theory, non-fuel vehicle operating effects should be included. However, these are probably secondary effects and add significant complexity
- We need to account for distribution of speeds, but there are no existing models

Group 2

Question 5

- **Do we have the right models?**
- In some cases we should be able to use existing models to determine the macro effects. Roughness and texture models exist to provide macro effects. Need to start and evaluate mechanistic models for this, currently mostly empirical. Update models for newer technologies in the interim. Important to ensure that models are linked to energy requirements (i.e. fuel consumption).
- **Can we have the information to adequately include in the use phase?**
- Yes for pavement related information (i.e. IRI, rut depth and texture depths). Instruments exist to measure this and it can be done if the will is there. Vehicle information is more difficult to obtain.

Question 5

- **Beyond direct fuel use, where should the system boundary be drawn regarding vehicle operating effects?**
- Uncertainty on this aspect, Caltrans feeling that it may become too complicated and that this is too far away from the direct effects.
- Maybe add as secondary level decision making level (i.e. outside of the pavement LCA but part of the information).
- Can be done and included at least as information in the LCA (i.e. noise, damage / cost to goods, damage / cost to vehicles)
- Carbon-tax type route may assist in evaluating other vehicle operating effects (i.e. Europe noise-prices).
- Do SWOT analysis on various types of parameters to determine level of importance.
- Boundary should be as far as can be controlled by the decision maker.

Question 5

- **In the document, is the modeling approach outline adequate for consideration of traffic flow (i.e. congestion, acceleration, deceleration)**
- Congestion need to be added to the LCA framework.
- A gap exists in terms of the effect of stop / start / decelerates / accelerates actions in the traffic as compared to average speeds that are lower during congestion. This should receive attention in the Miriam project, even (at least) if only an empirical model based on measurements on a test track.
- Look at HDMIV component and verify whether this is realistic and relevant.
- It is important to look at the reasons for congestion, if due to maintenance actions that differ between pavement surfacing options, it should be a major component.

Group 3

Do we have the right models?

- HDM4 is workable
 - Appropriate based on limited information available
 - Need continued calibration / validation
- Need a more complex model
 - Speed
- Can models be calibrated by back casting
 - Did the models predict total state-wide fuel use, etc.
- Rolling resistance?

Include the use phase?

- We can't really predict today
 - Can we predict in the (far) future
- We have to include use
 - Since it is so much of total
 - But it is uncertain
 - It swamps other phases
- Network vs project level
 - Tiered approach

System boundary beyond fuel use

- Can we count the saving until we fix all the roads
- Theoretically we should include everything
 - But what is the return on the research investment
 - Could get some for freight network / large scale
 - Vehicle damage
 - Tire wear

Traffic flow (congestion, accl., decl.)

- Need to account for a distribution of speeds
- No existing models