Life-cycle assessment of urban transport business models

ITF Corporate Partnership Board workshop

October 1st, Paris, France

Preliminary analysis/results

LCA assessment file circulated prior to the workshop

- Developed for a selection of "urban mobility options", including "new" ones
- Developed only on a mode-by-mode basis, no trip chaining yet
- Includes estimates of energy use and GHG emissions per vehicle, vkm, pkm and network km
- Includes an assessment of all the LCA components already discussed
- Contains a wide number of assumptions, most backed up by actual data or logical/transparent justifications
- Heavily reliant on GREET2 for energy intensity and emission factors related with materials
- Has a simplified solution compared to dedicated LCA tools
- Enables a generalisation of the assessments possible with GREET (focused on cars) to other modes
- Also allows to include LCA component for infrastructure
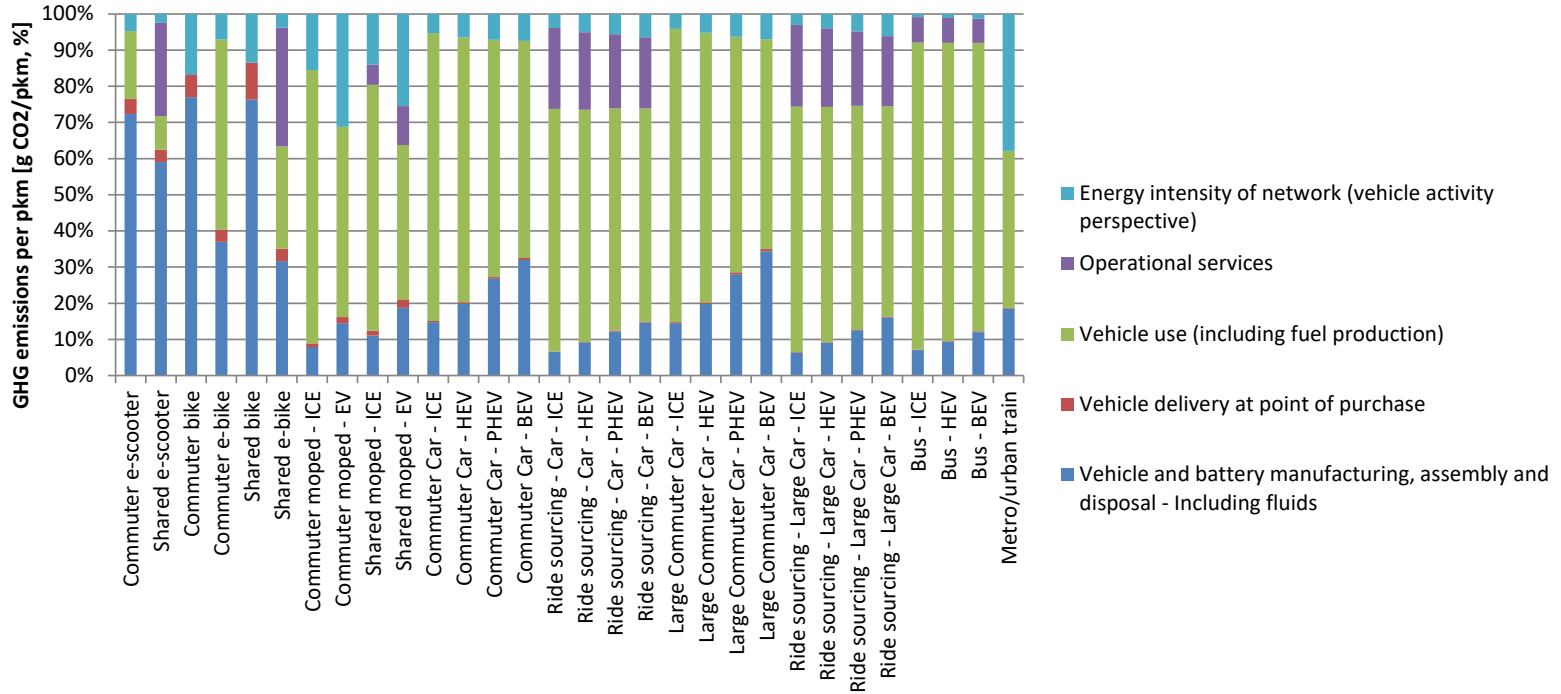- Does not cover well multiple alternative fuel options (focus on petroleum & electricity)

Preliminary analysis/results: energy
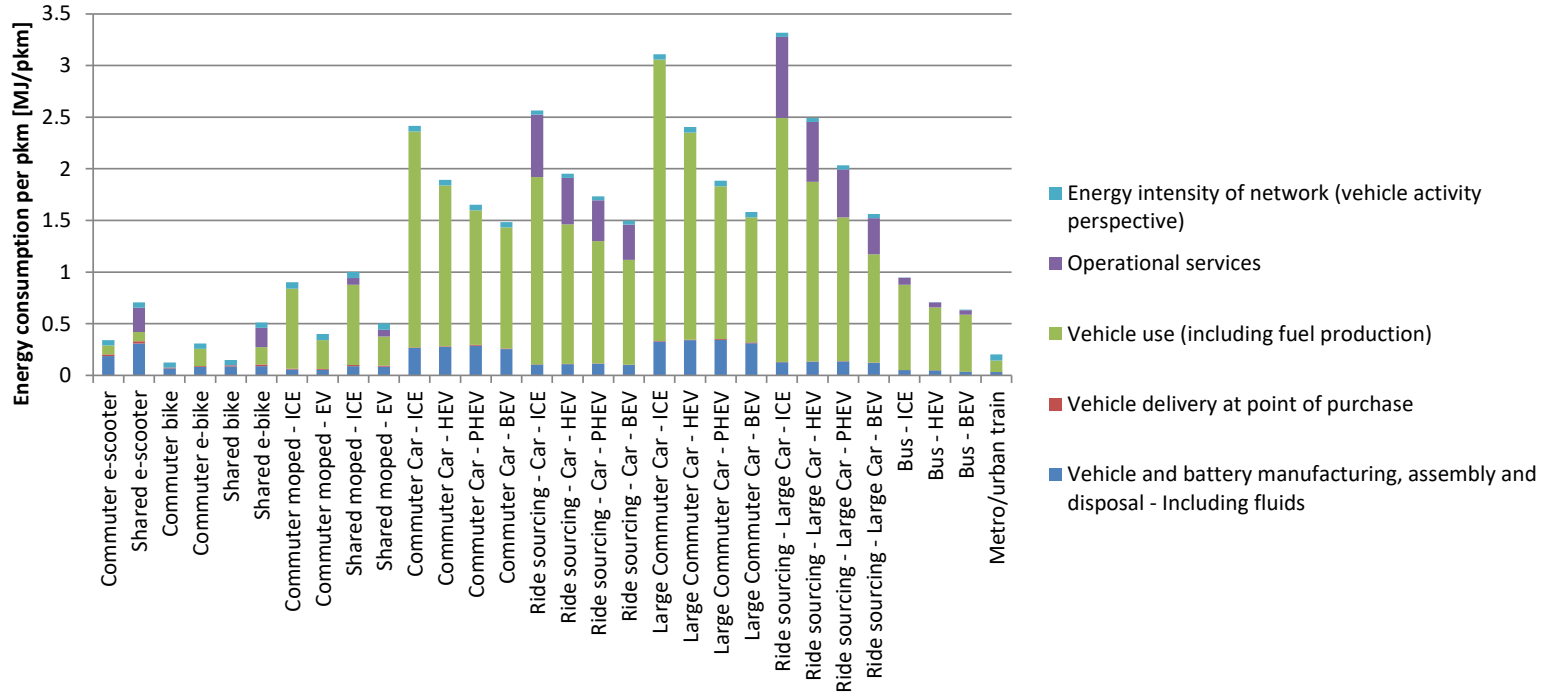
Preliminary analysis/results: GHG emissions
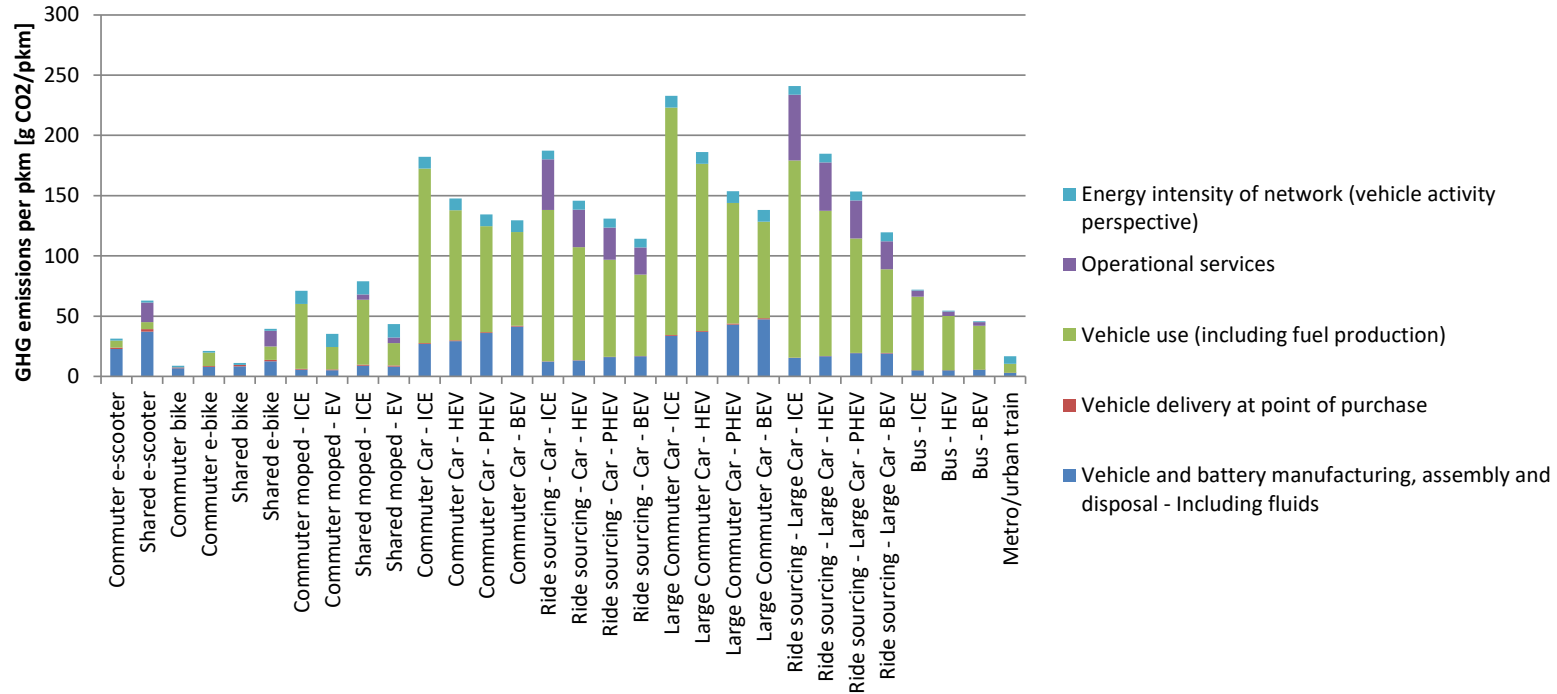
Preliminary analysis/results: GHG emission %

Session 2 (1/2)
Most relevant comparisons for urban mobility options?

Key questions for the breakout groups

What are the urban mobility options that we want to retain for this analysis, and why?

- Is the current selection sufficient? Shall we add other options? Which ones?

We have a desire to use trip distance clusters as the relevant

- Does this make sense for you?
- If yes, what are the trip distance clusters that we should consider?
- What do you think of the "up to 2 km" (average 1 km), "2 to 7 km" (average 5) and "7 to 20 km" (average 13.5 km) and > 20 km clusters that we cited in the background document for the workshop?
- Which types of trip chains shall we look at, for the different clusters? Why?

Do you want a greater coverage of powertrain and fuel options? If yes, what is still missing?

Session 2 (2/2)
Most relevant comparisons for urban mobility options?

Which modes to select?

Which combinations?

Shall we represent MaaS? How?

Trip clusters ok?

	Preliminary results	Trip distance			
		<2 km	2-7 km	7-20 km	>20 km
Bike sharing (docked)		Yes	Yes		No
Bike sharing (dockless)	Yes	Yes	Yes		No
P2P bike sharing					
E-scooter sharing	Yes	Yes	Yes		
E-moped sharing	Yes	Yes	Yes	Yes	
Car sharing			Yes	Yes	
P2P car sharing					
Ride sourcing/TNCs (conventional car)	Yes*		Yes	Yes	Yes
Ride sourcing/TNCs (large car)	Yes*		Yes	Yes	Yes
Taxi (e-hailing)					
Taxi (traditional)					
Commuter car		Yes	Yes	Yes	Yes
Commuter car (large)		Yes	Yes	Yes	Yes
Company shuttles					
Microtransit					
Paratransit					
Car pooling					
Van pooling					
Car rental					
Public transport (PT) - Bus			Yes	Yes	Yes
Public transport (PT) - BRT					
Public transport (PT) - Metro				Yes	Yes
Public transport (PT) - Suburban trains					
Pedicabs					
Liveries/Limos					
PT + bike (owned)			Yes	Yes	Yes
PT + bike (shared, docked)					
PT + bike (shared, dockless)			Yes	Yes	Yes
PT + e-scooter (owned)					
PT + e-scooter			Yes	Yes	Yes
PT + e-moped			Yes?	Yes?	Yes?
PT + ride sourcing/TNC					
...					

Session 3 (1/2)

Core assumptions to use?

Key questions for the breakout groups

Methodology

A preliminary assessment tool was circulated before the workshop: are you ok with the methodology adopted in it?

- LCA components
- Degree of simplifications adopted
- Implicit emphasis given with the development of this tool to the need to have a common set of energy and CO_2 intensities for the materials used to manufacture vehicles and infrastructure (GREET2)?

Do you think that the assumptions made on the assembly and disposal phases (generalization of GREET2 assumptions to non-cars) shall be improved? Can you help us improving them?

Do we need more cases for well-to-wheel emissions of ICE vehicles (both GREET and JEC analysis offer quite some diversity)? Methodological aspect (marginal vs. average) to take into account…

Session 3 (2/2)
Core assumptions to use?

Data

The preliminary assessment tool also includes a number of assumptions for several parameters

• Are these ok? Did you spot values that you do not agree with? Why?

Key data (by mode) →

Data required	Average	Top	Bottom
Trips per day per vehicle			
Trip distance			
Passengers/trip			
Empty running km (and on which vehicle) per km travelled carruing passengers			
Annual mileage			
Vehicle life			
Vehicle required to provide operational services (type)			
Travel requirement for vehicle providing operational services (round trip distance)			
Average number of vehicles taken care of by a single service vehicle every day			
For bi-modal trips, share of total distance per mode (mode 1)			
For bi-modal trips, share of total distance per mode (mode 2)			

+ data on frequency & distances of servicing/operations aspects (e.g. charging, relocation, ride searching)

Need to confirm central values assumed, complement with top and bottom of ranges if possible…

It would be great to have further differentiation, e.g. by size of metropolitan area, urban clusters (center vs. suburbs), global region… but each of these multiplies weight of data burden

Industry partners: are you ready to share data to inform this process?

Session 4 (1/2)
Core parameters to consider for sensitivity ranges?

Key questions for the breakout groups

Unanswered question so far…

- What should be the timeframe for the LCA assessments?

Important for example because the power generation mix is likely to evolve, and so are battery technologies…

But… do we even need a timeframe? Can we re-frame this question as…

- What are the time-related sensitivity parameters that we should consider?

Apart from the time element, what are the sensitivity parameters that could be interesting to look at?

If you had a look at the tool already circulated...

- Which inputs did you start playing with? Why?

- Which other inputs did you miss?

And if you are an industry partner… are you ready to share data to inform this process?

Session 4 (2/2)
Core parameters to consider for sensitivity ranges?

Suggestions…

Possible to adopt what-if approach for parameters that bring about important burdens

Trip frequency, distance and occupancy… (could be functions of size of metropolitan area and/or urban cluster: centre/suburb)

Possible to simulate technical aspects of different regions by changing material/energy/carbon intensities for vehicle manufacturing phases

Possible to discuss results based on region-specific modal substitution rates

Possible to account for different operational practices (again with what if approach)

What are the most interesting what-ifs?

Thank you

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