A new challenge for the energy efficiency evaluation community: energy savings and emissions reductions from urban transportation policies

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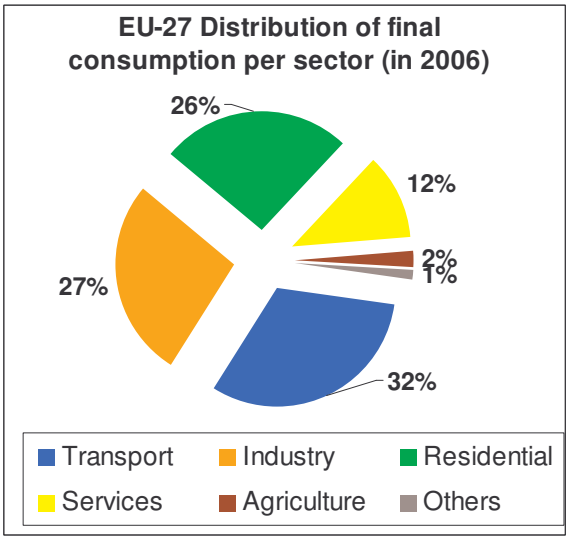
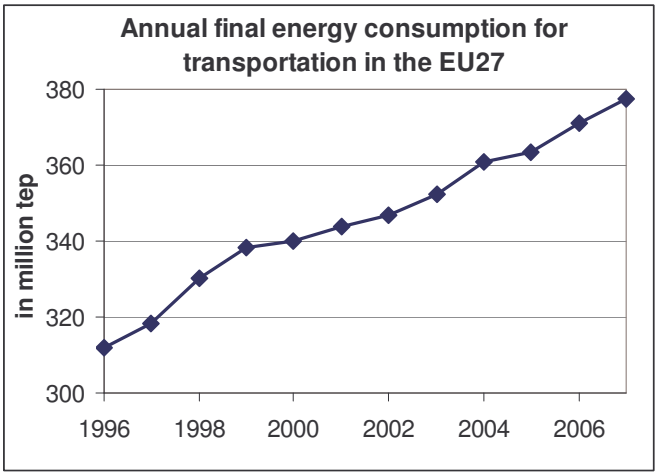
Context: introductive figures

Transportation = 25% of the total EU GHG emissions (2006)

Biggest growth: +26% between 1990 and 2004 (UE15)

Relying on fossil fuels at 98%





Source: Eurostat data

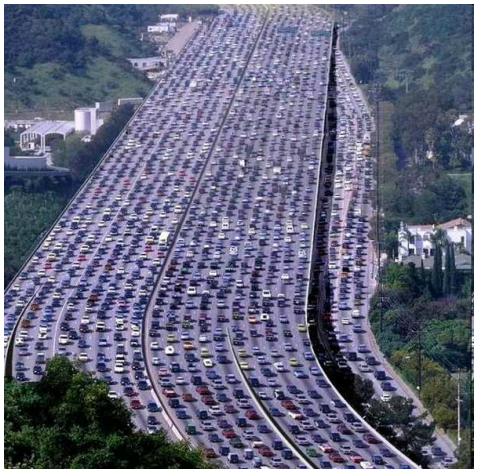
Context: introductive figures (2)

Road transport = 83% energy consumption (in 2004)

= 93% CO2 emissions (in 2004)

Urban traffic = 40% CO2 emissions of road transport

(source European Commission, 2009)



Context: what are the current answers?

- **technological improvements** (ACEA-JAMA-KAMA):

Unit consumption → -9% between 1990 and 2004 (EU15, ODYSSEE data)

But offset by trends to buy larger and more powerful cars + increase in intensity of use (passenger.km)

- **promotion of public transportation**:

Significant investments and improvements of the offer

But almost no changes in modal shares (or even worsening)

- **other instruments**:

congestion charge schemes, parking policies, favoring "soft" modes, etc.

→ *recognized need for integrated policies:*
urban mobility plans

Transportation & Buildings: common points

- **energy consumption = unit consumption * quantity**
- **technological & behavioral factors**

General need	**Mobility**	**Housing**
Main service delivered	Going from a point A to a point B	Keeping home warm
Main parameters related to the **unit consumption effect** *(e.g., expressed in l/km or l/ passenger-km for mobility, or in kWh/m² for housing)*	Mode (e.g., car, bus, bike)	Housing type (e.g., collective dwelling, individual housing)
	Car design (e.g., aerodynamics)	Building design (e.g., form, orientation)
	Car components (e.g., tyres)	Building components (e.g., wall insulation)
	Motor	Heating system
	Fuel	Energy carrier
	Speed	Internal and external temperatures
Main parameter related to the **quantity effect**:	Distances traveled	Surfaces

Transportation & Buildings: differences

- **set (located) vs. mobile**

→ cf. quantity effect: surfaces vs. distances traveled

- **relative influences of short-term (behavioral) and long-term (stock) variables**

→ e.g., modal shares vs. housing types, increasing share of leisure trips

- **different opportunities for policy instruments**

→ short term (e.g., congestion charge schemes) vs. long term (e.g., renovation plans) actions

Transportation & Buildings: differences (2)

- **comparing calculation formula highlights potentially "hidden" factors:**

  - ✓ speed profiles and "cold engine" share of distances traveled vs. heating load
  - ✓ vehicles (mass products) vs. dwellings (specific design)
  - ✓ scenarios approach vs. "easy-to-compare" before/after situations

Available evaluation tools: what answers?

- top-down statistics
  - ~~local data~~
  - ~~energy bills~~
- bottom-up calculations
  - ~~interactions~~
  - portfolio approach
- behavior surveys
  - diagnosis
  - qualitative analysis
  - ~~quantifying energy savings & avoided emissions~~

Available evaluation tools: what answers?

- **traffic modeling**

from infrastructure design to policy evaluation = new issues

- is the road large enough? → how much emissions?
- peak hour, typical day work → 24 hours, 365 days
- traffic flows → speed profiles

→ *feeding a "modeling chain" (or add-in software)*

+ how to integrate policy measures (in the modeling)?

Issues already addressed in case studies, but far from being closed !

Available evaluation tools: what answers?

- **traffic modeling**

+	• taking into account interactions • all trips within a given territory • spatialized results
-	• costly (large amount of data, complex modeling) • methodological limitations

➔ **an option, but still a large room for improvements**

Conclusions and perspectives

- **key differences between building and transportation**

➔ limitations in the use of “classical” methods

- **two recurrent issues: interactions and causality**

➔budget intensive measures = choosing between options

- **two interesting tracks**

➔ portfolio approach for process evaluations

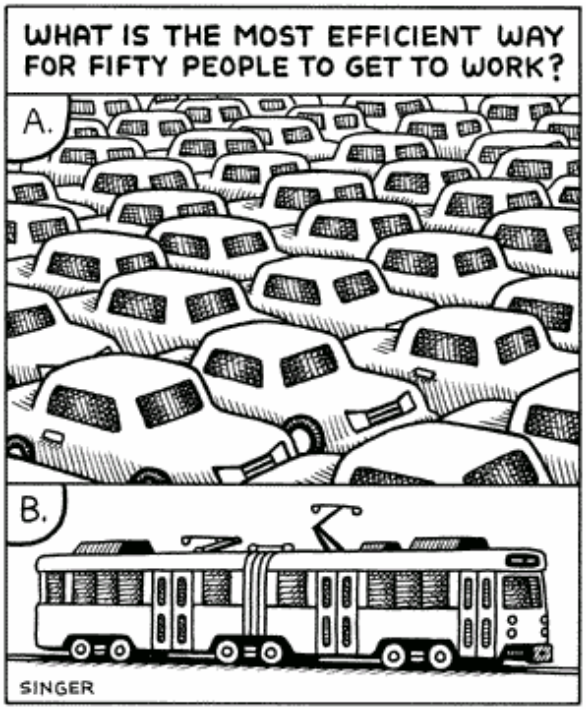
➔ adapting traffic modeling methods

Both are complementary !

Improvements/innovations could be achieved by crossing transportation & evaluation communities.

Thank you for your attention.

Hoping there is still some time for discussions



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