Energy Perspectives in Transportation

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Energy Consumption and Transportation

The Current State
The Current State

- 80% of Swiss households own a private car
- it is driven 22 km per day
- usually 1 occupant (Avg.: 1.5)
- Private cars are used for only 1 h per day
- 26% of the total energy is consumed as fuel
The Role of Shared Mobility

Estimating the potential impact
What is Shared Mobility?

- Transportation services that are shared among users
  - (public transportation)
  - car-sharing
  - ride-sharing
  - bike-sharing
  - Car pooling

- Variety of implementations
  - access/egress distance
  - fixed or dynamic routes
  - station-based or flexible
  - pre-booking or on-demand
  - ...
Potential Impact

- 1 car-sharing vehicle replaces 10 private vehicles [Millard-Ball et al., 2005]
- One third of urban car or taxi trips can potentially be merged [Song et al., 2014]
- (E)-bike-sharing as alternative to motorized urban transportation
Understanding the Impact

Car-Sharing acts as «Enabler»

- Example:
  Having a car available on an as-needed-basis, car-sharing-members do not need to own a car. Without the sunk-costs, they may stop driving to work.

Bike-/Ride-Sharing offer direct savings

- Example:
  - Riding a bike is a highly energy- and space-efficient way of transportation.
  - Sharing a ride may save energy and space.
Use Cases

Shared E-Bikes

Idea: Look at trips within the canton of Zurich. What if the mode had been changed to E-Bike?

Result: Shared E-Bikes are
- much more convenient than walk or bike.
- a possible substitute for short car and public transportation trips.
Use Cases

Shared Cars

• Idea: Look at all car trips within the canton of Zurich. What if they had been served by shared vehicles?

• Result:
  • if shared, only 25% of today’s vehicles could serve today’s demand
  • Sharing rides allows even further savings
Policy Measures

Free-at-the-point-of-use infrastructure (roads, parking, ...) creates excess usage.

- Pricing and other measures can help to move towards a system optimum.
- Possible measures are:
  - limiting parking supply
  - limiting private vehicle ownership
  - (dynamic) pricing on parking
  - (dynamic) road pricing
  - express lanes for certain vehicles
  - ...
Mobility Visions

Possible development paths
NFP71-Project: Sharing is Saving

Generate scenarios with different combinations of services and policies

Test the impact on energy consumption and public acceptance using agent-based modelling and a stated-preference survey

Provide visions and tools for a new and shared mobility system
Outlook

Shared Mobility ...

- allows a more efficient use of energy and transportation infrastructure.
- supports transit-oriented lifestyles.
- may become even more important with the introduction of autonomous vehicles.
Questions?

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