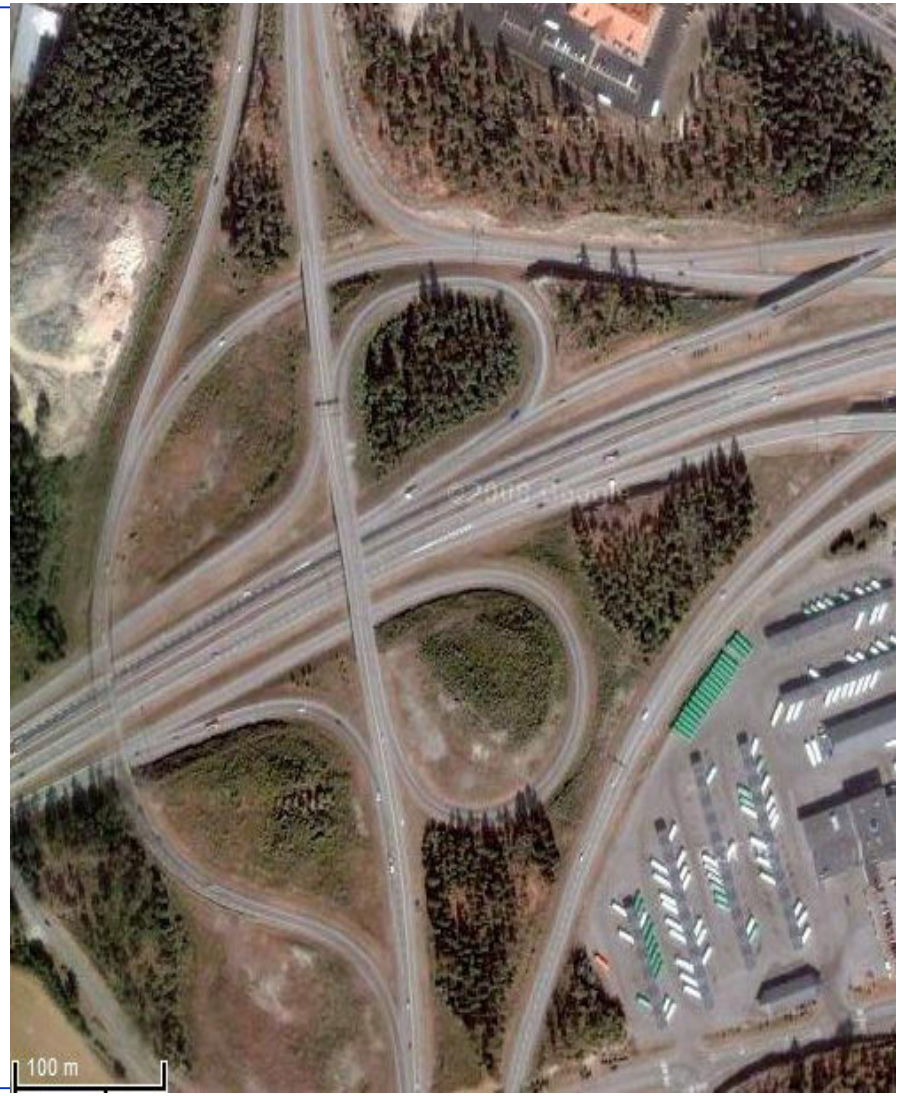
M10

New Transport Models and Urban and Inter-City Mobility



INTELLIGENT ENERGY EUROPE

UP-RES
Urban Planners with Renewable Energy Skills

Content

1. Transportation Needs

1.1. Primary and Structural Perspective

Primary Needs

- Mobility

  Between home and:

  – Education sites

  – Work

  – Shops

  – Public offices

  – Hobbies

- The above results in the quantitative measures of transportation.

Structural Needs

- Compact urban structure
  – Length of trips
- Scattered urban structure:
  – Length of trips
  – Quantity of trips
  – Means of transportation
- Impacts of traffic:
  – Barrier effect
  – Need of space

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

1. Transportation Needs

1.1. Human and Structural Perspective

- **Need for mobility does not coincide with an innate need for a human being to move**
- Mobility is not important *per se* but as a means to reach locations and things, because:
  - Home and work are not located near to each other ➔Trip to work, and to other sites to deliver work services
  - Meetings with clients or partners ➔ Business trips
  - Hobbies and living are not near to each other either ➔ Free-time trips
- **Travelling may be reduced if needs are met otherwise:**
  - Trip to work ➔ Distant work, home work, work near to home
  - Business trips ➔ Teleconferencing, skype, video meetings
  - Free-time trips ➔ hobbies nearby, hobbies at home, web discussions

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

1. Transportation Needs

1.2. Trip and Trip Yield

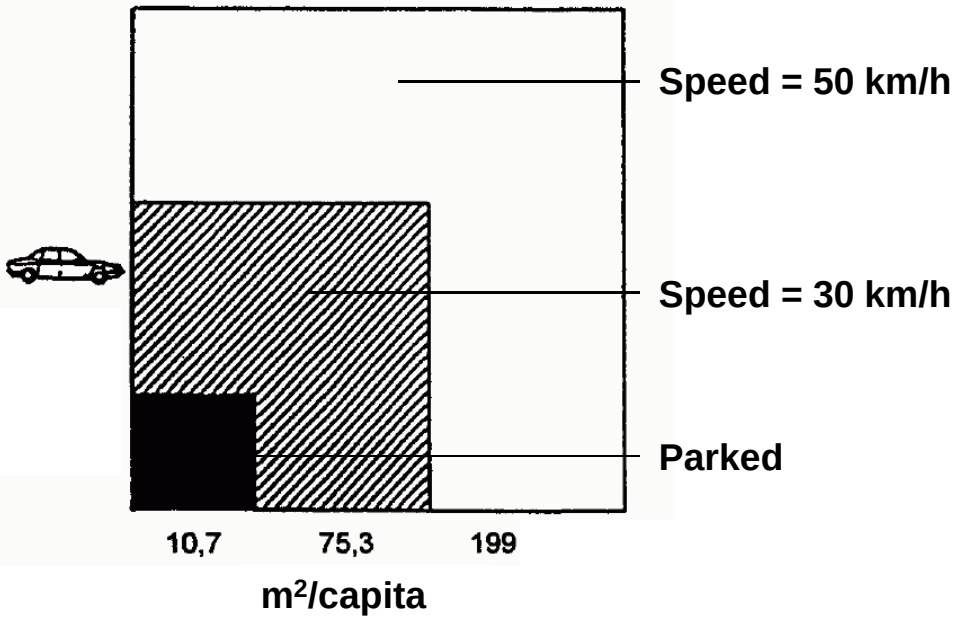
- **Trip**
  - Moving from one place to another
  - In the same trip, various means may be used
  - Forward and return trips are different trips
- **Trip yield**
  - The number of trips to the goal
  - One traveller makes both forward and return
  - Yield expressed in relative terms, for example:
    - Travellers / (floor m^2)
    - Travellers / (customer lot)

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

1. Transportation Needs

1.3. Traffic Needs Space (1)

- A pedestrian, a bike or mass transportation per unit needs **3–7 m²**
- A car needs **75 m²** – at low speed
- A parked car needs **10,7 m²** at least in two locations
  - At home, work or shop
  - Parking place area **35 m²** per car
- A human being uses a land area of **35 m²** – that can include space on more than one floor.



Note: Average number of people/vehicle =1,4

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

1. Transportation Needs

1.3. Traffic Needs Space (2)

Area use:

- Only for traffic

- Multifunctional

Sources: Pictures from maps.google.com

1. Transportation Needs

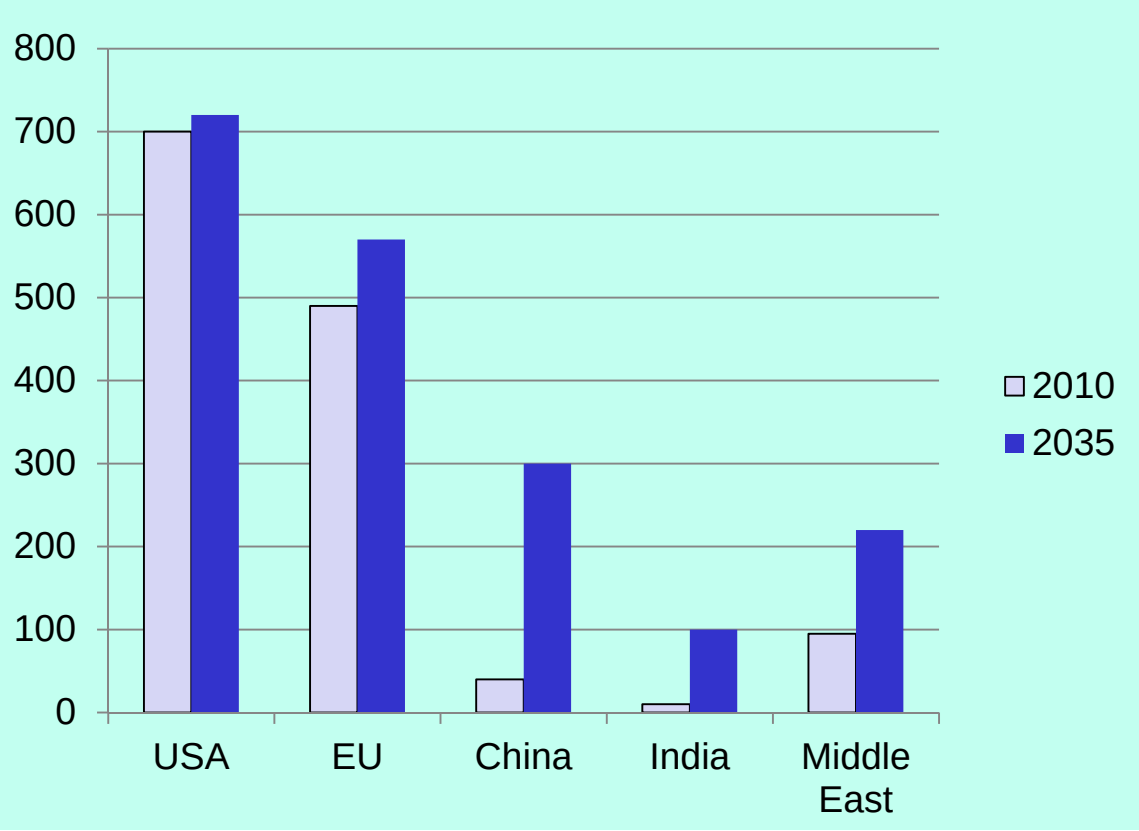
1.3. Traffic Needs Space (3)

Soaring car ownership contributes to rising oil demand.

Increase in car ownership is predicted to mostly occur in non-OECD countries.

Non-OECD policies will play a key role in driving global oil demand and in reducing emissions.

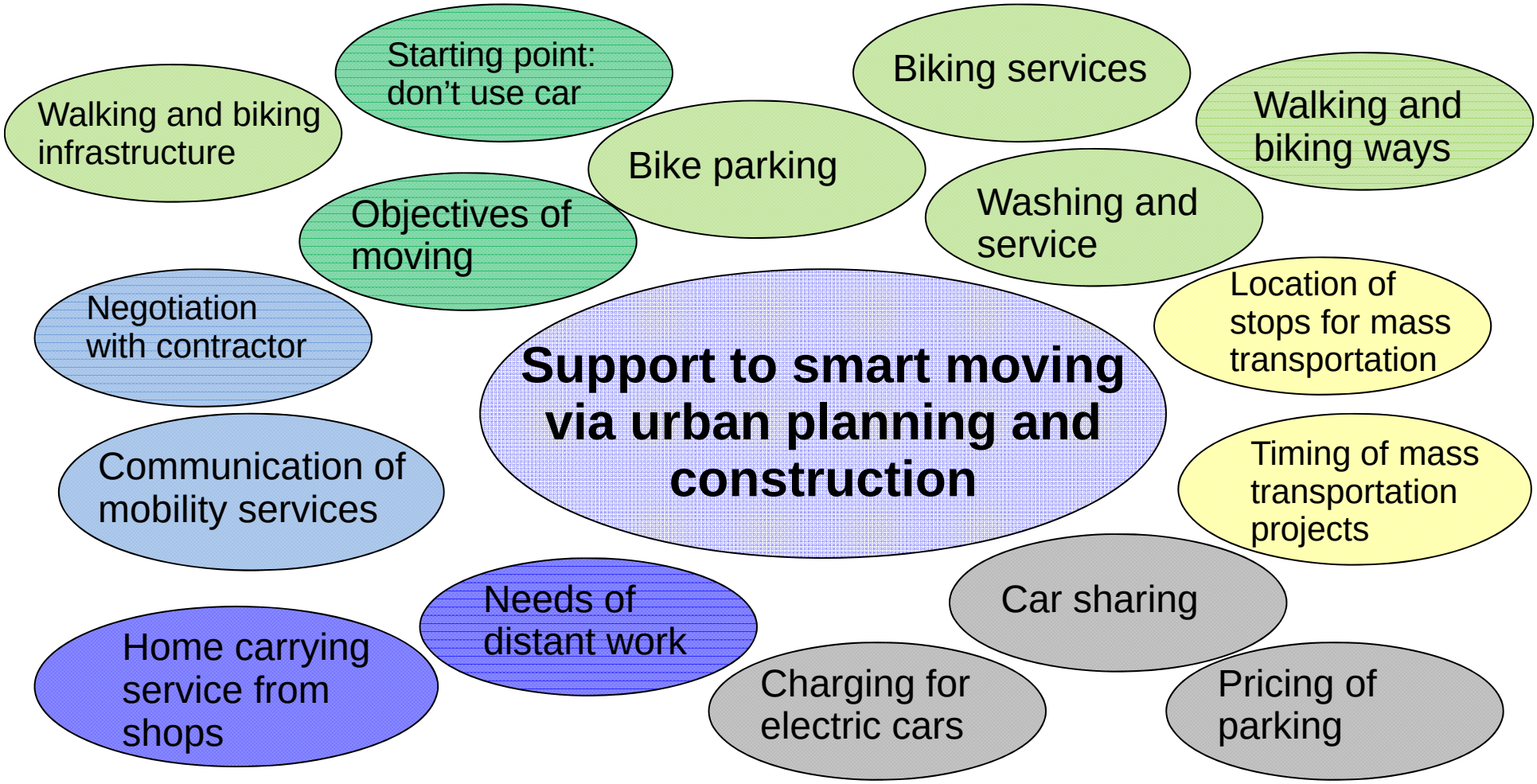
Number of Vehicles per 1000 People in Selected Markets



Source:
International Energy Agency – World Energy Outlook 2011 - Presentation to Press, Nov 2011, www.iea.org

2. Mobility and Urban Planning

2.1. Institutional Framework



Sources: Okariina Rauta, Motiva Oy, Aalto University at UP-RES course on 21.5.2012.

2. Mobility and Urban Planning

2.2. Technology development

2. Mobility and Urban Planning

2.2. Technology development

- Electric cars DO:
  - Remove emissions locally
  - Offer opportunity for RES deployment

- Electric cars DO NOT:
  - Solve problems of space
  - Reduce energy consumption
  - Change travelling habits
  - Remove risks related to cars in traffic

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

Electric cars

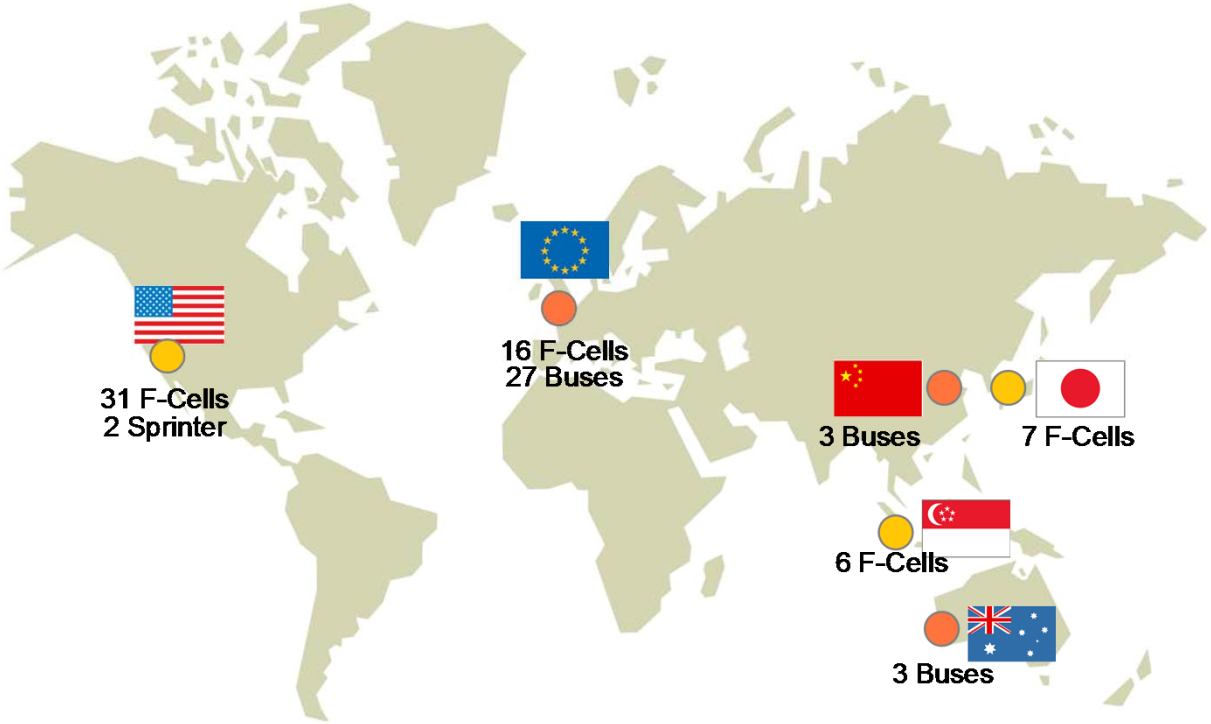
Type	Features	Example	CO_2 g/km
Full electric	Power only based on batteries	Peugeot iOn	0
Full electric with replaceable batteries	Power only based on batteries that can be changed	Renault Fluence	0
Serial hybrid	Primarily electric motor	Opel Almera	27
Parallel hybrid	Primarily fuel engines, secondarily electric motor	Toyota Prius	85

Fuel cell driven cars

The fuel cell is a device that converts directly the chemical energy of the fuel to electricity.

Sources: P. Malinen, Aalto University at UP-RES course on 22.5.2012.

Fuel Cell Vehicles in Germany



DaimlerChrysler

Sources: R. Rosenberg, VTT Finland,

Car development trends

1400 kg
35 kW

100 kg
0,35 kW

Segway PUMA

Segway

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

2. Mobility and Urban Planning

2.3. Selections of Urban Planning

- The best traffic is **removed traffic!**
  - A key objective of traffic planning is to reduce traffic
- The amount of traffic will be determined in urban planning by:
  - Compactness of the plan
  - Transportation modes (car or mass)
  - Transportation preferences:
    - Walking or biking against machine based transportation

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

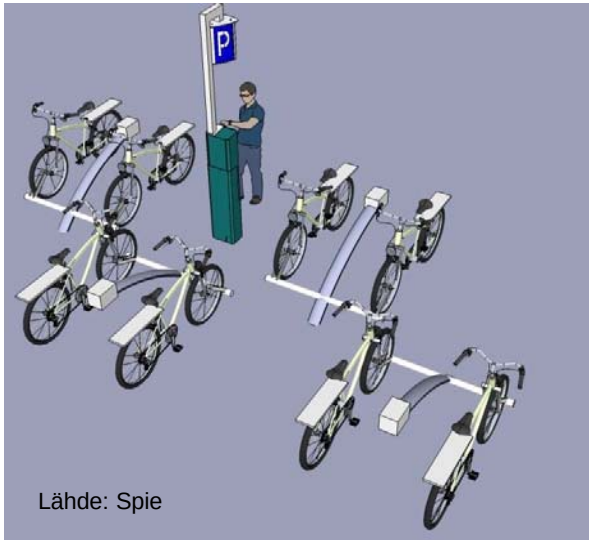
2. Mobility and Urban Planning

2.3. Selections of Urban Planning

Biking

- Biking routes
- Bike parking
- City bikes
- Charging points integrated with electric car charging infrastructure


Lähde: Spie



Lähde: Spie

Sources: P. Malinen, Aalto University at UP-RES course on 22.5.2012.

2. Mobility and Urban Planning

2.3. Selections of Urban Planning

Transportation drawbacks:

- Emissions
- Space requirement
- Accidents
- Costs

Drawbacks can be mitigated by:

- Reducing the need to transportation
  - Urban structure
- Technical development
- Effective traffic solutions
- Transforming machine based transportation to walking and biking

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

2. Mobility and Urban Planning

2.3. Selections of Urban Planning

Charging stations for electric cars can be at:

- Taxi stations
- Shopping malls
- Train stations
- Public parking areas
- Fuel stations
- Homes and home districts
- Work places
- Car share stations
- Logistics plants

Electric car of Helsinki Energy at charging station

Sources: P. Malinen, Aalto University at UP-RES course on 22.5.2012.

2. Mobility and Urban Planning

2.3. Selections of Urban Planning

- Everyday needs may be met without cars depending on:
  - Location of needs relative to home
  - Walking distance (5–10 min)
  - Moving actors (people, goods and information)
- Different economies may be optimised:
  - Society
  - Municipality
  - Industry and business
  - Construction sector
  - Family/individuals

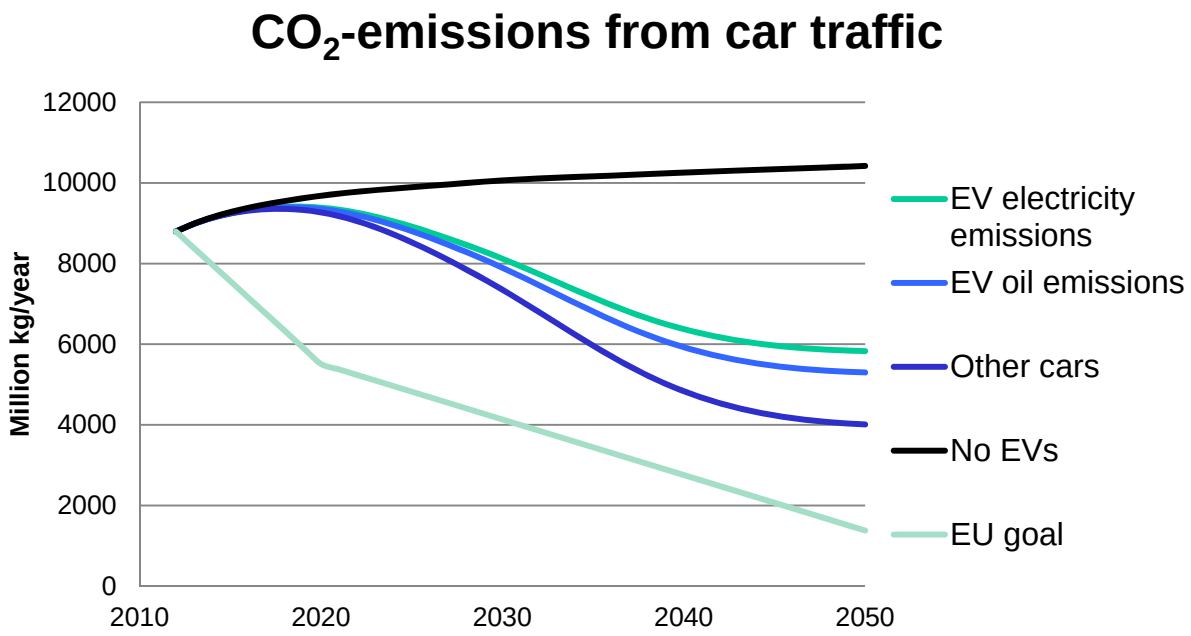
Karlsruhe, Germany, 2005

Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

3. Emissions of Transportation

3.1.Emissions of Vehicles (1)

- Cars are not renewed fast enough.
- Inadequate battery capacity is a problem with cars of current size.
- Actual battery capacity reduces in winter.
- Globally, availability of key raw materials for battery manufacture is limited.



Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

3. Emissions of Transportation

3.1.Emissions of Vehicles (2)

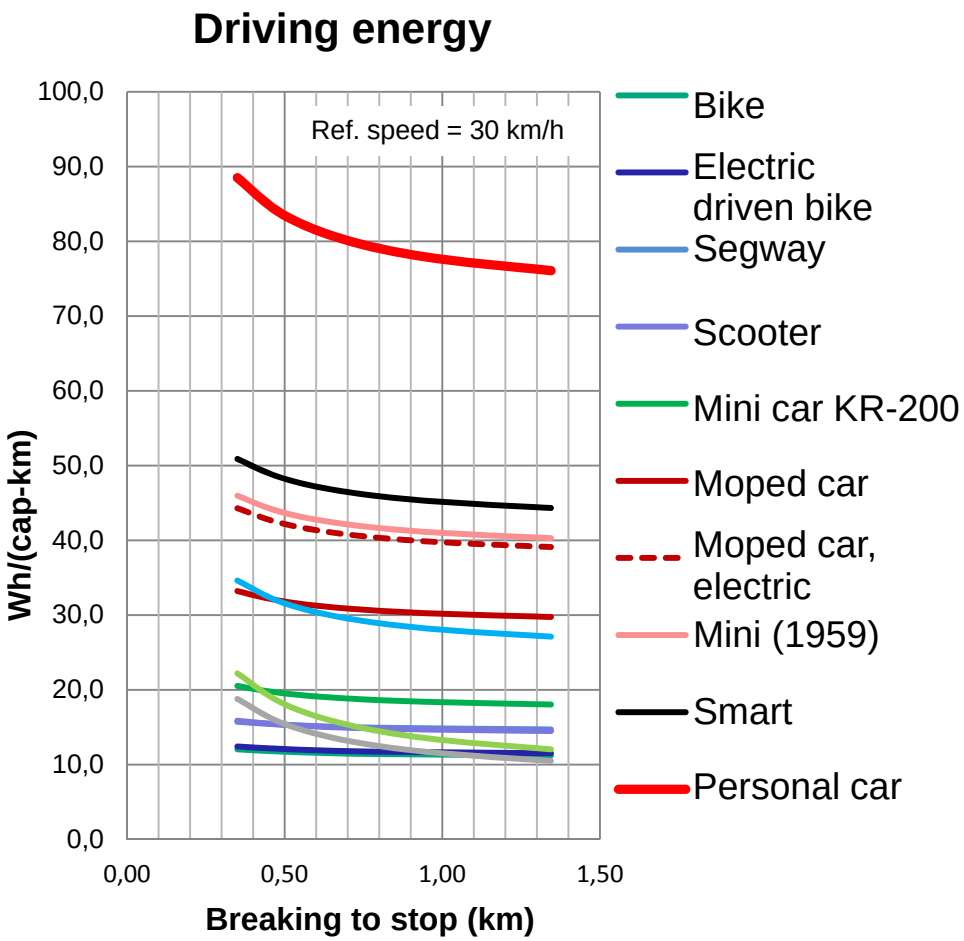
- In Finland, CO_2 emissions from transportation are mainly produced by road transportation.
- Road transportation comprises of:
  - Personal cars: 60%,
  - Trucks: 25%
  - Others (buses, vans, motorbikes) :15%
- There is more transportation per capita than in many other EU countries (due to long distances per capita).
- In other countries, the allocation between the means may be similar.

CO_2 Emissions of Transportation (Finland) kg/capita in 2008	
Roads	**2204**
Raiways	**56**
Water	**611**
Air flights	**167**
Total	**3037**

3. Emissions of Transportation

3.1.Emissions of Vehicles (3)

- Primarily the emissions originate from energy consumption.
- Energy can be recovered (e.g. regenerative braking)
- Mass transportation on rails reaches almost the energy consumption level of biking.
- Personal car energy consumption is higher than the other ones examined
  - No energy recovery braking in internal combustion engines
  - A car with two passengers consumes as much as a Mini (1959)



Sources: A. Alku, Aalto University at UP-RES course on 21.5.2012.

4. Car Sharing

4.1. What Does Car Sharing Offer to Urban Planning?

Car Sharing means an activity according to which a number of individuals share the usage of one or several cars together.

Car Sharing Service is a system in which the customer of the Service (an individual or an organisation) signs a membership agreement and for a fee becomes entitled to use the cars that are covered by the Service. No further arrangements are needed. The customer has easy access to a car either near to home, work or at major intersections of traffic (booking by phone or internet) at any time and for any period of time. The fee is based on use of the car, and the fees include all car related costs such as insurance, taxes, fuels, maintenance, capital, tyres,etc.

Sources: Okariina Rauta, Motiva Oy, Aalto University at UP-RES course on 21.5.2012.

Just imagine that…

4. Car Sharing

4.2. Just imagine that ...

GREAT OFFER:

Top quality trolley

Model 2012, Special chrome steel, little used, high carrying capacity

Source:: Michael Glotz-Richter, Free Hanseatic City of Bremen, 2009

4. Car Sharing

4.2. Just imagine that ...

Source:: Michael Glotz-Richter, Free Hanseatic City of Bremen, 2009

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4. Car Sharing

4.3. What a Miracle if...

Source:: Michael Glotz-Richter, Free Hanseatic City of Bremen, 2009

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4. Car Sharing

4.3. What a Miracle if ...

…we could do the same with the cars…

Source:: Michael Glotz-Richter, Free Hanseatic City of Bremen, 2009

4. Car Sharing

4.3. What a Miracle if ...

… we could use cars as we use trolleys...

Source:: Michael Glotz-Richter, Free Hanseatic City of Bremen, 2009

4. Car Sharing

4.3. What a Miracle if ...

…how much space we might save in our cities !

Source:: Michael Glotz-Richter, Free Hanseatic City of Bremen, 2009

4. Car Sharing

4.4. Status in 2012

- Germany: 309 cities, 2700 stations, 220 000 users
- United Kingdom: 34 cities, 10 000 users
- Finland: 5 cities, 4 000 users
- Sweden: 10 cities, 3 000 users
- Switzerland: 400 cities, 1340 stations, 64 000 users
- United States: 102 000 users
- Canada: 16 000 users

Sources:
www.mobility.ch
Michael Glotz-Richter, Free Hanseatic City of Bremen, 21.9.2012
Okariina Rauta, Motiva Oy, Aalto University at UP-RES course on 21.5.2012.

The UP-RES Consortium

Contact institutions for this module: **Aalto University**

- **Finland : Aalto University School of Science and Technology**
  www.aalto.fi/en/school/technology/
- **Spain : SaAS Sabaté associats Arquitectura i Sostenibilitat**
  www.saas.cat
- **United Kingdom: BRE Building Research Establishment Ltd.**
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