# Strategies for the transition to electric mobility

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Sources: VIVER Kozinski/Fraunhofer-ISI, private





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# Agenda

- GHG-TransPoRD findings on 2020 and 2050 transport GHG strategy
- German EV policy and findings on electric mobility
- Policies to support transition to electric mobility

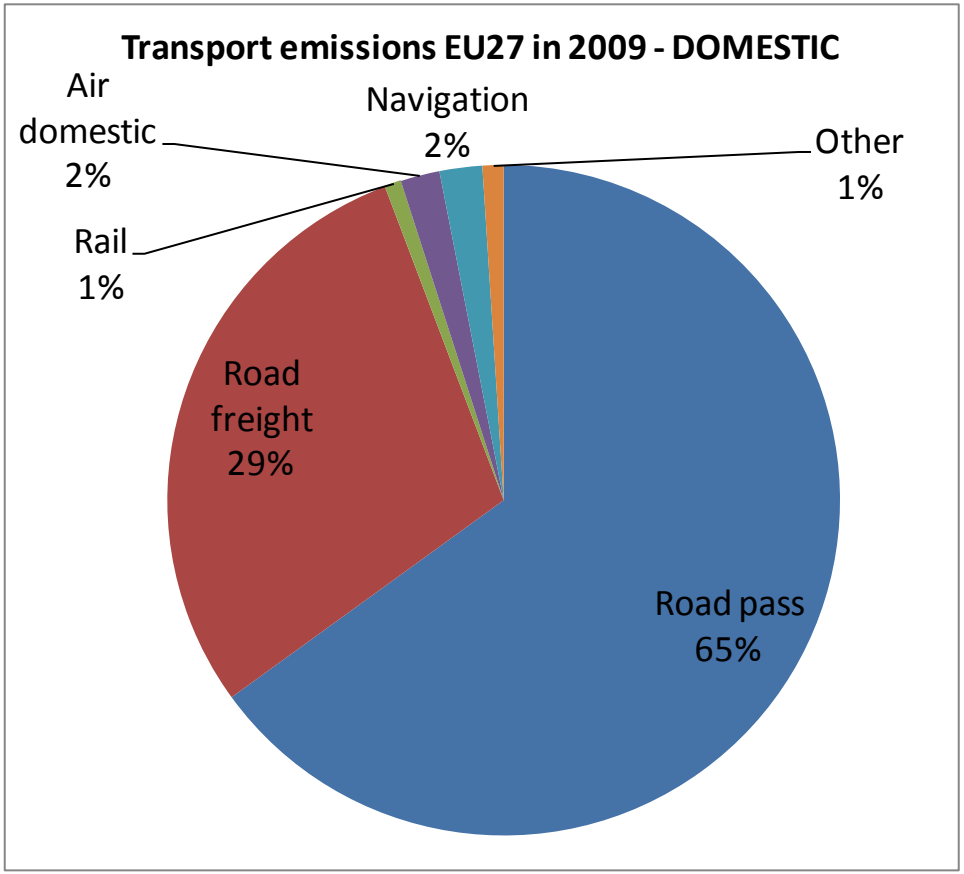
# GHG-TransPoRD findings on EU GHG reduction strategy

- Largest share of GHG reductions has to come from car transport
- Efficiency is most relevant for success of GHG rerductions in short- and medium-term
- In medium- to long-run alternative, carbon free fuels become more important

=> Electric mobility

- Time profiles of development matter!

- Push efficiency first , develop EVs continuously!




*Source: GHG-TransPoRD estimates, EEA TERM 2011*

# Objectives of German policy on electric mobility

- Become lead supplier and lead market for electric mobility

- Fleet of 1 million EVs in Germany in 2020 (BEV and PHEV, incl. LDV)
- 6 million in 2030 (out of more than 40 million vehicles)

- 2010-2012: eight model regions with field trials of electric vehicles

- 2013 – today: four large regional field trials of electric vehicles

- Field trials include bikes, scooters, cars, vans, buses (fleet and private users)
- Accompanying sociological and psychological research (Fraunhofer-ISI)

**=> Green image necessary – combination with renewables very important!**

**=> Focus EV sales on promising markets!**

# Analysis of potential electric vehicle markets

- Even today many car users would be in a position to easily shift to EVs
- Economically: today EVs are beneficial with high annual mileage and with high share of electric driving (despite high upfront cost!)
- Private customers in urban areas are no suitable early adopters (low annual mileage). Exception: new type of micro vehicles.
- Private customers in urban areas should be addressed by new mobility concepts including car-sharing


*Quelle: privat*

# What are the promising markets ?

- **Commercial vehicles**
  - Planned and regular routes
  - Shorter distances, often in urban areas and surrounding
  - TCO basis for decisions (i.e. monetary incentives will work!)
  - May also include fleet operators (e.g. social services, car-sharing)

- **LDV**s for urban delivery

- **Early adopters** for private usage (male, well-off, educated, openness for new technologies, suburbs or even rural areas), or very well-off rather in metropolitan areas

- Company cars are overestimated as early markets (often long distance trips!)

# Discussion of specific issues for transition to EVs

# Discussion of direct subsidies by government

- Direct payments did not have much effect – as long as they do not address the promising markets
- Government budgets are tied
- Nevertheless, one may justify subsidies with savings of external cost of EVs (1000-3000 € per car, today)
- There are better options than subsidies (or premiums) paid by government
- **Incentives for promising markets!**
  - Commercial vehicles e.g. accelerated depreciation of vehicles, low interest rate loans
  - Support to fund EVs in car-sharing systems (experience!)

# Charging infrastructure for promising markets

- Commercial vehicles and fleet operators will charge at their home base (in compliance with their route planning requirements – drivers time is expensive cost component)
- Early adopters will charge at home (if possible, also at work place)
- No build-up of comprehensive public charging infrastructure required (yet)
- Useful: implementing a few highly visible public charging points (psychology!)


Source: private

# Fifth Mode: multi-modal, integrated, seamless transport

**New electric personal transporters (PT)**

**SmartPhone Tablet-PC**

**Mobility Card**

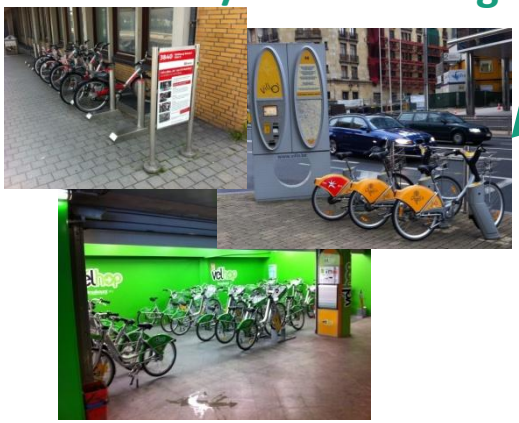
Reservation Usage Information Billing

Roaming between providers


**Car-sharing**

**Ride-sharing**


**PT / Bike-sharing**



**Electric city vehicles**


**Modern public transport**

*Quellen: privat, Unternehmens-Website*

# Other support for transition to e-mobility: Research

- Basic research funding for next generation battery cell technology (e.g. Li-S, Li-Air)
- R&D and production know-how for large scale battery systems
- Research in safety technology (ICT) and accident risk of low-noise emitting vehicles
- Integration of e-mobility and renewables as part of smart grids (a lot ICT)

# Other support for transition to e-mobility: Regulation

- Standardisation of charging systems (plugs!)
- Non-discriminating access to charging systems (roaming)
- Transparent system of green electricity provision (100% carbon free electricity)
- Urban environmental zones and delivery time windows in favor of EVs
- Support of car-sharing and new mobility concepts (parking spaces, roaming)
- Strategy for supply of sustainable resources (lithium, rare earths, etc.)

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# Diversification of engines and fuels

| Type of car | Use of combustion engine | Use of battery | Energy carrier |
|---|---|---|---|
| Car with crude oil based fuel (ICE) | Propulsion | Auxiliary units | Crude based fuels (gasoline, diesel, LPG) |
| Car with gaseous fuel combustion (ICE) | Propulsion | Auxiliary units | Biogas, CNG (option flex-fuel) |
| Hybrid electric vehicle (HEV) | Propulsion | Auxiliary units, Brake energy recovery, Acceleration | Crude and gas based fuels, electricity |
| Plug-in-hybrid electric vehicle (PHEV) | Propulsion | Auxiliary units, Brake energy recovery, Acceleration | Crude and gas based fuels, electricity |
| Range Extender | Battery charging | Propulsion<br>Auxiliary units | Electricity, crude, gas |
| Battery electric vehicle (BEV) | --- | Propulsion<br>Auxiliary units | Electricity |
| Fuel-cell electric vehicle (FCEV) | --- | Auxiliary units, Brake energy recovery, Propulsion | Hydrogen, electricity |