Prospects for the electrification of passenger cars

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93% oil products' share of final energy consumption for transport, making the sector the least-diversified.
GHG emissions in EU 28

ALL SECTORS

- Energy industries
- Commercial/institutional
- Other transport modes
- Industry
- Agriculture, forest, fisheries
- Cars
- Transport
- Other transport means
- Residential
- Road transportation

- 27.90%
- 19.30%
- 23.50%
- 8.90%
- 3.50%
- 11.60%
- 5.30%
The challenges for EU climate and energy policies

- Improve air quality
- Mitigate global warming
- Reduce energy consumption
- Effective policies and measures

Car passenger transport
Electric vehicles

Paris Declaration on Electro-Mobility and Climate Change & Call to Action:

- more than 100 million EVs
- 400 million two and three-wheelers
Electric vehicles

Development of the global stock of rechargeable EVs
World total final electricity consumption by sector

- Industry: 41.6%
- Residential: 27.1%
- Commercial and public services: 22.2%
- Other: 7.4%
- Transport: 1.7%
Challenges

• Costs
• Driving range
• Charging time
• Infrastructure

✓ If the destination is beyond the range of the electric vehicle, the driver will need to plan the journey.
Economic aspects

Total costs of service mobility of various types of EV in comparison to ICE cars
Scenario for development of investment costs

(Power: 80 kW)
Electric vehicles

Monetary measures
- road taxes
- annual circulation tax
- company car tax
- registration tax
- fuel consumption tax
- congestion charges

Non-monetary measures
- free parking spaces
- possibility for EVs drivers to use bus lanes
- wide availability of charging stations
- permission for EVs to enter city centers and zero emission zones
Environmental assessment

Well-to-Wheel (WTW)

Primary energy source → Fuel → Car → Mobility

Well-to-Tank (WTT) → Tank-to-Wheel (TTW)

TTW_car

TTW_fuel
Environmental assessment

CO₂ emissions per km driven for various types of EV in comparison to conventional cars (power of car: 80kW)
Electricity mix

Data source: tsp, 2014
Environmental assessment

CO₂ emissions per km driven for BEVs powered by grid electricity in different countries
Electricity generation in the EU 28

- Solid fuels
- Petroleum
- Gases
- Nuclear
- Renewables
The carbon intensity of electricity mix

CO2 per kWh electricity generated in different European countries, 2014
Conclusions

- EVs …cost reductions, improvement of battery characteristics as well as development of infrastructure

- New policy design….most of the policies implemented will be abolished with the increasing number of EVs

- Full environmental benefit – only if EVs are powered by electricity generated from renewable energy sources
Car-oriented mobility

- More cars
- More roads
- Congestion

The cycle: More cars lead to more roads which alleviates congestion, but more cars eventually lead to more congestion, which then leads to the need for more roads, and so on.
New mobility behavior

- **AVOID**
  unnecessary travel and reduce trip distances

- **SHIFT**
  towards more sustainable modes

- **IMPROVE**
  transport practices and technologies
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