Market shares and prospects of electric vehicles in Europe: The case Germany

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Introduction

Electric vehicles – Goals and efforts of Germany

• Germany aims to have 1M EVs on the road by 2020 (Chancellor Angela Merkel, 2009)
  – Accomplishment of European CO2 reduction goals
  – Reducing the dependency on (foreign) fossil fuels (today ≈ 100%)
  – Technology leadership for key components
• No support schemes announced so far, trust in market regulation
• Several research programs in place:
  – Battery technology & electric drivetrains
  – Integration of electric vehicles into the grid
  – Business models & user acceptance

Funding volume 2012-2013 ≈ 1.5 billion €
Introduction

Sales of electric vehicles in 1/2010 – 6/2012

- US: 34,456 of 29.4M → 0.12% (partially limited to selected states)

- Europe:
  - France: 6,210 of 6.5M → 0.10% (5000€ refund)
  - UK: 2,323 of 5.6M → 0.04% (5000£ refund)
  - Germany: 4,224 of 8.1M → 0.05% (5 year vehicle tax exception)

Introduction

Reasons NOT to buy an EV today

• Tax credit, fee bate or other schemes of limited impact in Europe so far - Funding not used

• What are the reasons?
  – Pricing, people pay a (small) surcharge but not the price of two cars
  – Debate about environmental impact – are EVs really “green”
  – No charging possibilities – less residential living (garages or car ports)
  – Limited choice of vehicle models
    • Private households have a specific budget
    • Purchase also an emotional decision

*purchase price in Germany converted to US dollars (07/23/2015)
Market shares and prospects of electric vehicles in Germany

Objective

Analyzing the German car market’s potential of electric vehicles until 2020 illustrating:

• The impact of different policy measures on sales figures
• The specific sales potential for private and commercial vehicles differentiating BEVs and PHEVs
• Regional differences in potential sales of electric vehicles
Methodology

Data basis and aggregation level

- **NHTS describing the mobility of households and use of commercial vehicles**
  - Mobility in Germany 2008 (MiD) ~ 60,000 persons
  - Motor Vehicle Traffic in Germany 2002 (KiD) ~ 77,000 vehicles

- **Comparison of TCO** (replacing vehicles of the same size and value, no compromises) -> only new car buyers considered

- **Suitability of trip profile** (e.g. no distances above range for BEVs)

- **Availability of home recharging location** (garage, driveway)

- **54 data subsets**: 9 area types (urban…rural), replaced engine types (gasoline, diesel), 3 sizes of cars (S, M, L) and resp. light duty vehicles

- **Spatial distribution** of results to 442 German regions
Methodology

Modules of the calculation model

Scenario parameter

1. Technology development
2. Prices (fuel, battery, energy, ...)
3. Infrastructure deployment
4. Policy measures
5. O&M, insurance
6. Leasing
7. Future V2G income
8. Resale value
9. Tax savings

Travel surveys

MiD (private)
KiD (commercial)

sales data
per area

2030 diffusion roadmap
(five-year steps)

EV pioneers
Methodology

Scenario configuration

| Trend | • charging at home & from 2015 on at work too  
      | • from 2015 on slow introduction of public 10kW DC charging stations |
|---|---|
| Charging Infrastructure | • from 2015 on charging at shopping locations  
                          | • faster introduction of 10kW DC option |
| Incentives | • from 2015 on incentives of 160$\!/kWh, linear declining until 2020 to 0$\!/kWh |
• Total predicted fleet in 2020:
  ~ 440,000 electric vehicles
  – 160,000 BEVs
  – 280,000 PHEVs
• Visible in agglomerations & suburbia
  – demand mainly driven by pioneers and user-chooser company cars
  – higher incomes & faster renewal rate of vehicles in metropolises
• BEVs will lead the market until 2015 → many PHEV announced
• BEVs good choice as light duty vehicles
• Government target of 1M failed
• Total predicted fleet 2020: ~600,000 electric vehicles
  – 330,000 BEVs
  – 270,000 PHEVs
• In 2020 EV registrations 25% higher than in the Trend scenario
• Diffusion of public recharging points and quick chargers helps overcoming range restrictions
• Visible impact also in rural areas (longer commutes)
• Promoting especially BEVs \(ightarrow\) higher profitability, less restrictions in usage
• EVs less restricted to pioneers
Results

Incentives

• Total predicted fleet 2020:
  - ~ 800,000 electric vehicles
  - 270,000 BEVs
  - 530,000 PHEVs

• Incentives starting 2015 when vehicles are expected, linear fadeout until 2020

• PHEVs are the more economical choice – faster return of investment

• Costs of such a program needs to be taken into account

• A combination with infrastructure deployment is promising

• Goal of 1M close!
Conclusions

• Most people don’t do a full lifetime TCO but have a certain budget and within this the EV competes with conventional vehicles → majority needs more choice → limited compromises in size, quality & manufacturer than early adopters

• EV fleet predictions are an important instrument to demonstrate the possible impact of future developments and policy measures

• Charging infrastructure supports above all the spatial diffusion of EVs

• (well planned) subsidies initiate sales of EVs in the short term and can significantly foster the introduction of electric vehicles mid term

• Mediated package of measures can have a high impact on the success of electric vehicles → Germany needs to define such a package!
Thank you for your attention!

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