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

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International perspectives on PEV readiness and programs to accelerate vehicle adoption

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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 €

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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)

Source: R. L. POLK & Co. (2010-2011)

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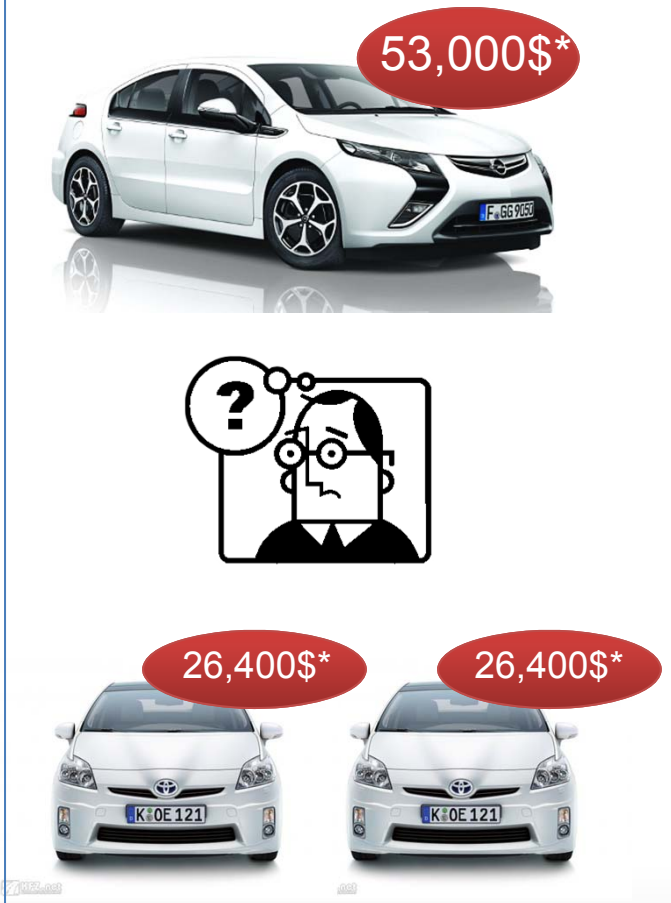
Introduction

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)

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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

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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

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2030 diffusion roadmap
(five-year steps)

Methodology

Modules of the calculation model

Scenario parameter

- Technology development
- Prices (fuel, battery, energy,…)
- Infrastructure deployment
- Policy measures
- O&M, insurance
- Leasing
- Future V2G income
- Resale value
- Tax savings

1.

2.

Travel surveys

MiD (private)

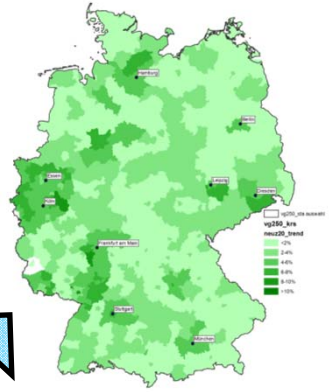
KiD (commercial)

3.

EV pioneers

sales data per area

4.



PostgreSQL

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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

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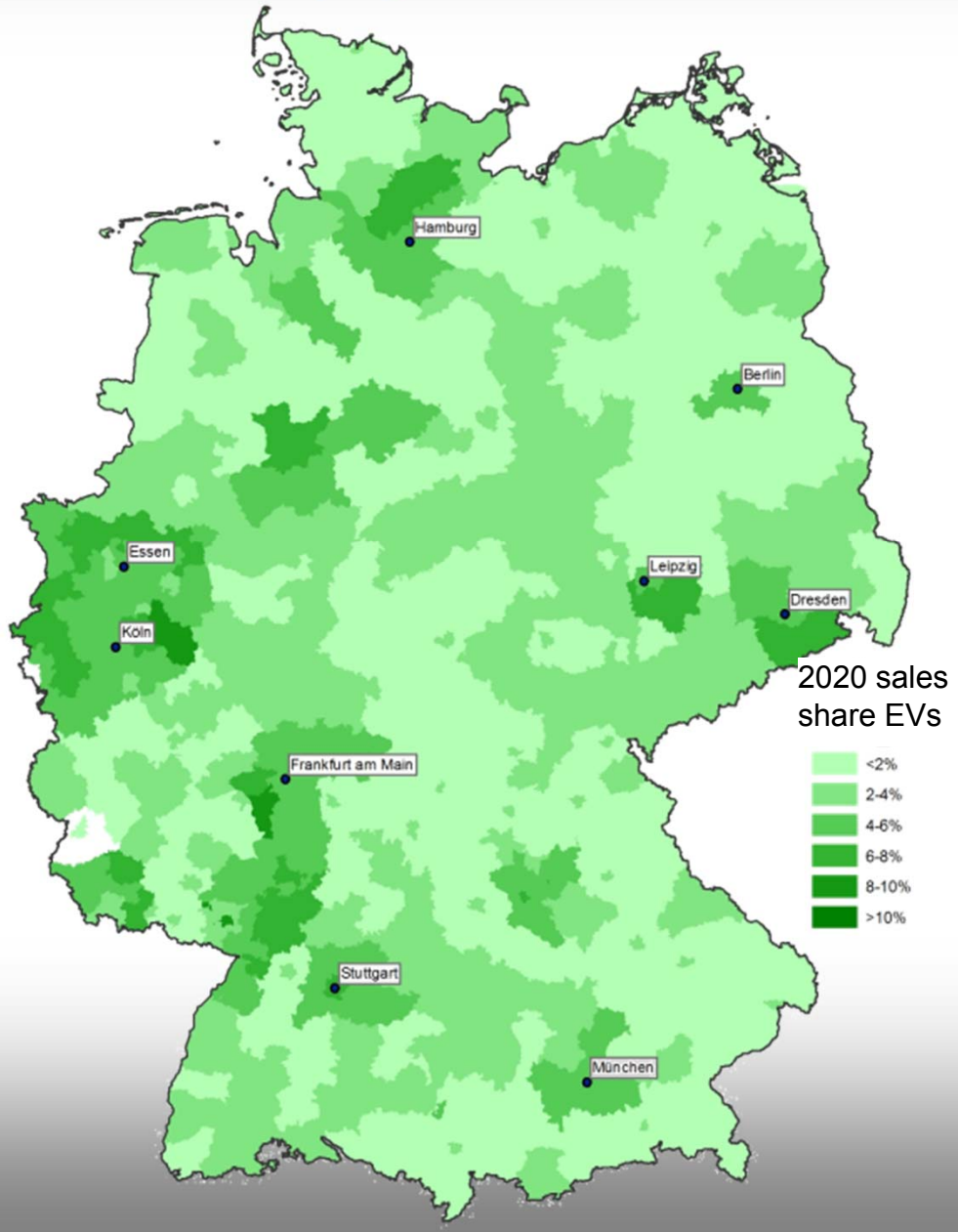

Results

Trend

- **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**

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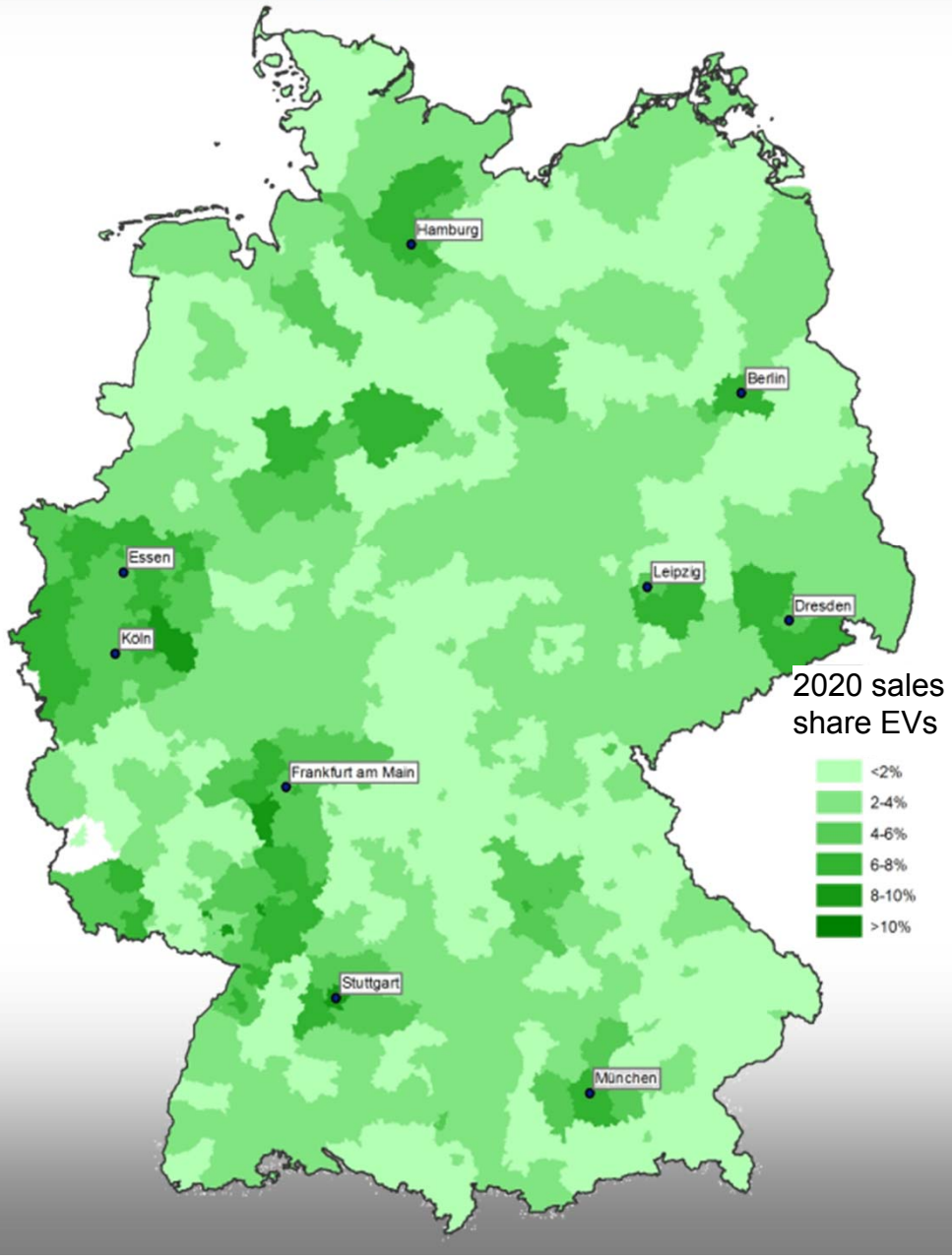
Results

Charging Infrastructure



- **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 communtes)**
- **Promoting especially BEVs → higher profitability, less restrictions in usage**
- **EVs less restricted to pioneers**

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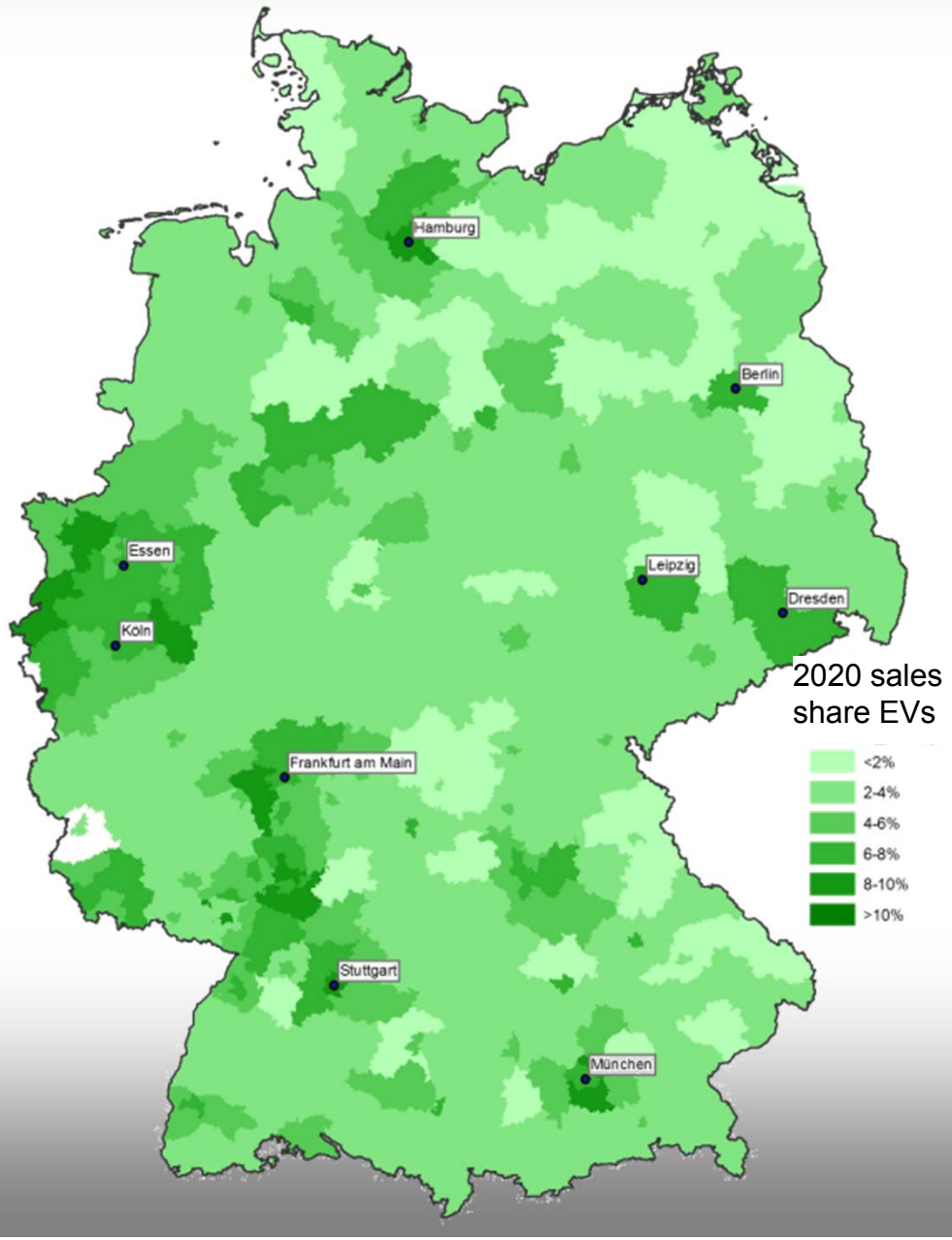

Results

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!**

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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!

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Thank you for your attention!

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