Innovative Transport Solutions.

The Reality of Electric Driving.
Cooperations and key learnings.

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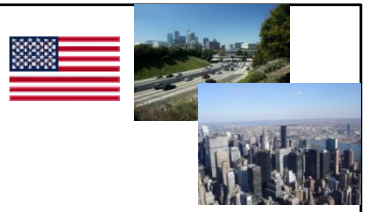
BMW Group

Rolls-Royce Motor Cars Limited

MINI E – the first step on a longer journey.
Performance Data.

Curb Weight	1.465 kg
Acceleration	0-100km/h in 8,5 sec
Max. Output	150 kW / 204 hp
Max. RPM (cut off)	13.000 U/min
Consumption	0.14 kWh/km (at 200km range)
Torque	220 Nm
Top Speed	152 km/h, electronically regulated
Range	depending on profile: 250 km/ 150mls (FTP 72); eff. 150 -160 km

Global E-Mobility Projects.
Organisational Structure.

Government Support	 Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit *	 Technology Strategy Board ** SEEDA OXFORD CITY COUNCIL	 CA.GOV California Environmental Protection Agency AIR RESOURCES BOARD **	 中华人民共和国国家发展和改革委员会 National Development and Reform Commission 中华人民共和国科学技术部 NDRC MOST MIIT
Scientific and technical partners	CHEMNITZ UNIVERSITY OF TECHNOLOGY Öko-Institut e.V. Institut für angewandte Ökologie Institute for Applied Ecology Technische Universität Berlin	OXFORD BROOKES UNIVERSITY	UCDAVIS UNIVERSITY OF CALIFORNIA	CATARC China Automotive Technology and Research Center
Field trial	 50 units use by customers since 2009	 40 units use by customers since 2009	 500 units for lease on the market since 2009 50 units in field trial	 50 units use by customer in 2010
Infrastructure and Energy partners	VATTENFALL	Scottish and Southern Energy	Various regional utility companies	STATE GRID CORPORATION OF CHINA State Grid

* co-funded by governmental authorithies

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* ** regular full reports to CARB

Initial results of the field trial in Berlin.

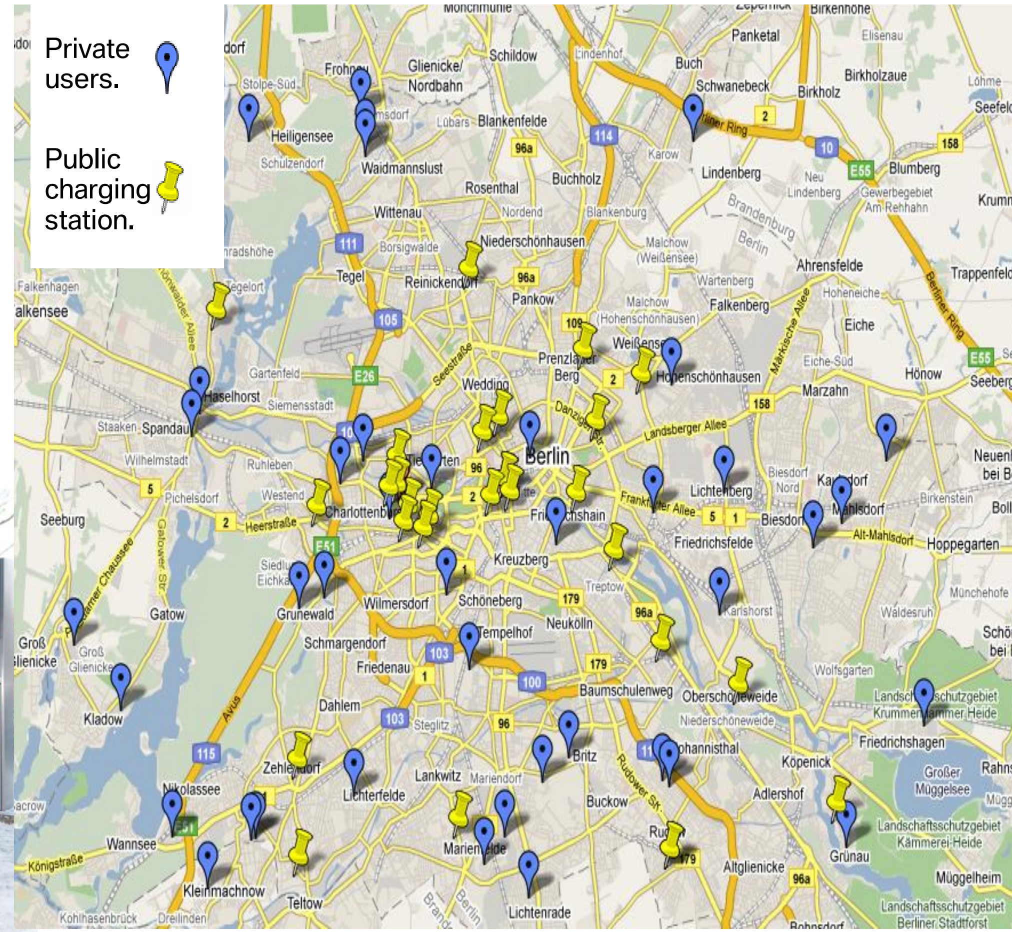
These guiding questions were put at the start of the study.

User profile.	Who applied? - Applicant profile - Who uses the MINI E?
Expectations.	What expectations do users have of the technology?
User behaviour.	How is the MINI E actually used on an everyday basis?
Charging.	What has to be addressed in future in relation to charging and infrastructure?
Ecological relevance.	How important is the ecological added value of an e-vehicle to MINI E users?

Initial results of the field trial in Berlin.
MINI E users and Autostrom sites in Berlin.

Up to 50 Vattenfall
charging stations in Berlin.

- 33 stations have already been set up.
- 27 on private land (private premises but accessible 24/7).
- 6 on public premises.

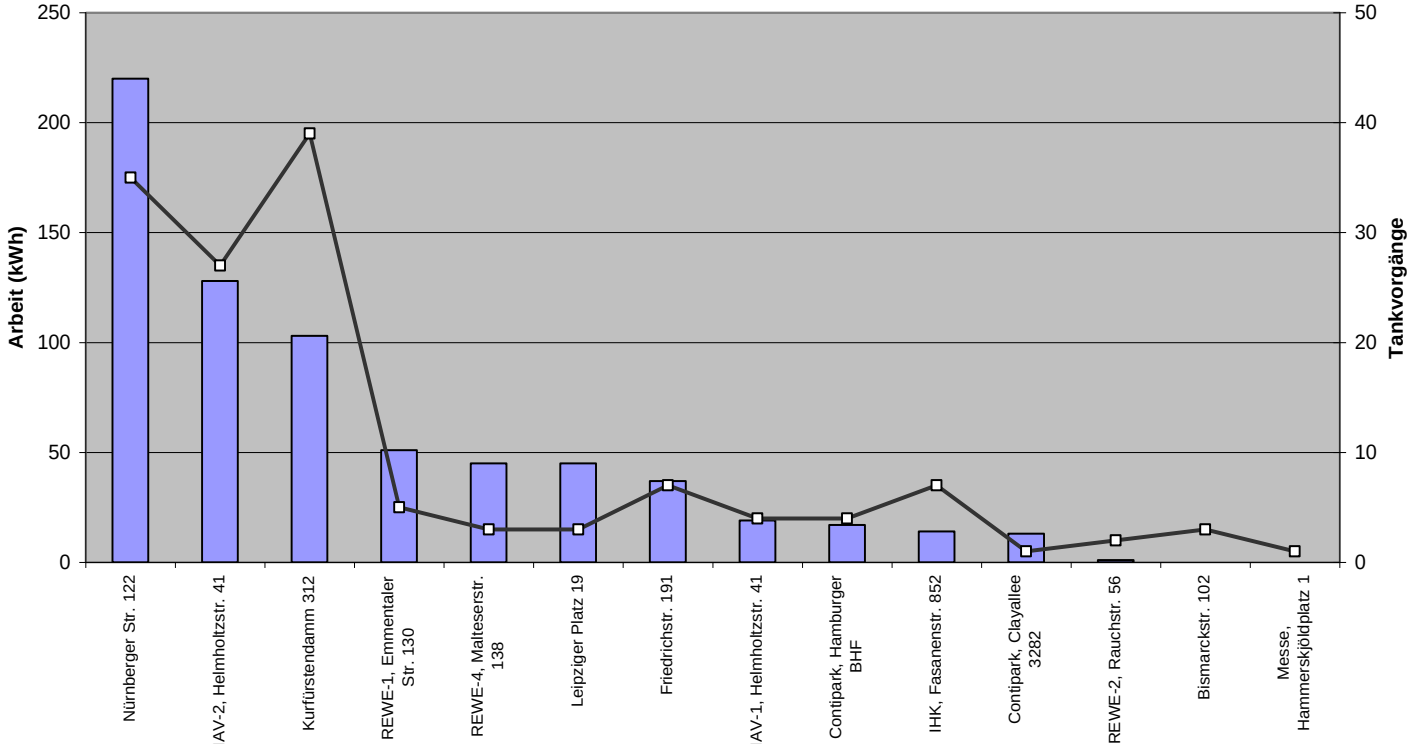


Berlin

MINI E Charging & Infrastructure.

Charging on public infrastructure – by charging spot.

Source:
Vattenfall



Quelle: Vattenfall

Result :
Only 3 of the 30 public charging spots have been used more than rarely.

MINI E Charging & Infrastructure.

Do users need a public charging infrastructure?

Source: User feedback

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After three months of driving:

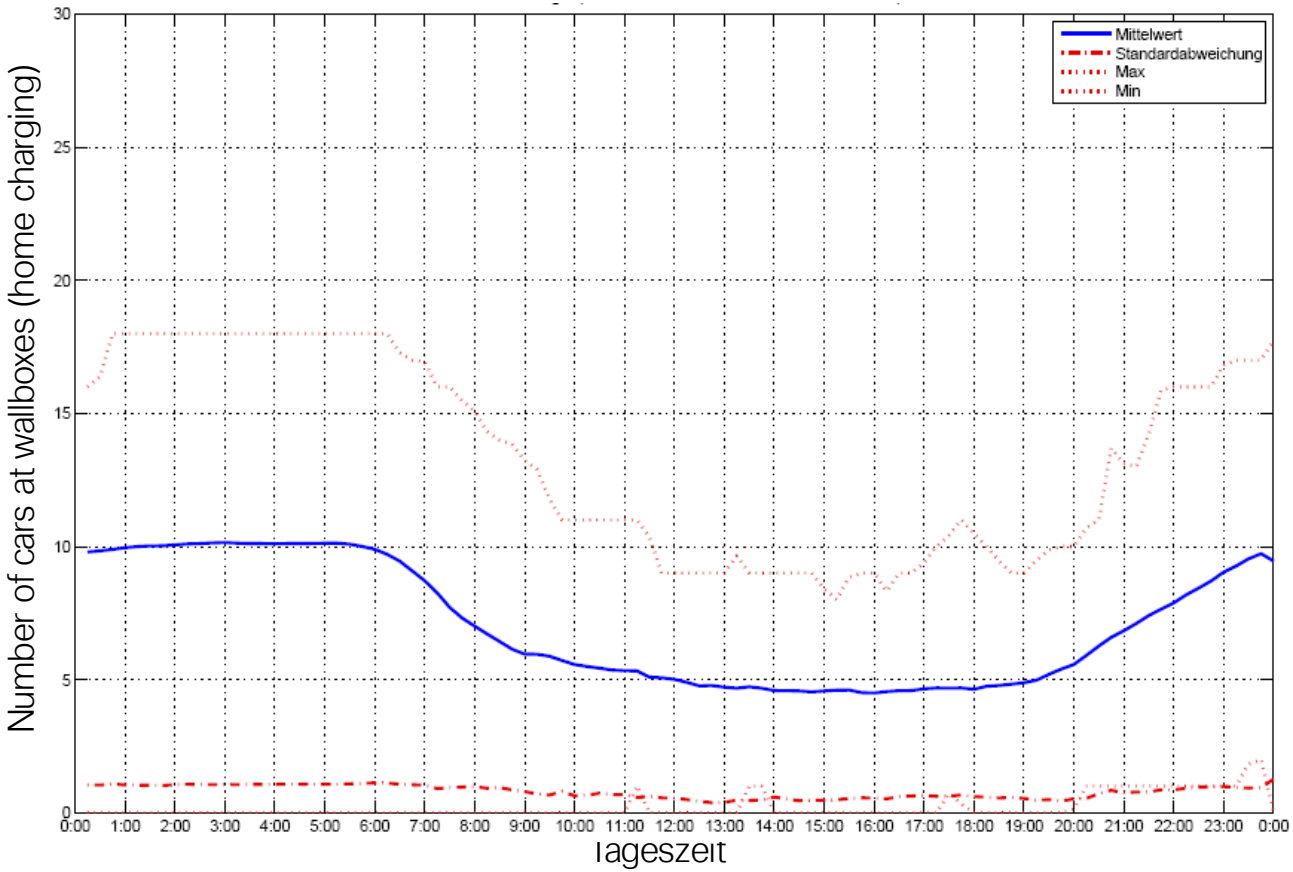
- ideal places for charging stations:
  1. **Parking lots of companies: 92% agree**
  2. **Parking garages: 91% agree**
  3. **Transfer places (airports/ railroad stations/ Park&Ride): 86% agree**
  4. Shopping Center, supermarkets: 74% agree
  5. Museums, cinemas/ sports center: 74% agree
  6. Local recreation area: 63% agree

Important factor for ideal spots for charging stations:
-Where is the car usually located, if users are not at home/ near the wallbox (e.g. transfer places, parking garages, parking lots of companies)
-For some (26%) important: Anxiety, that others could disrupt the charging process (e.g. removal of the cable)

MINI E Charging & Infrastructure.

Time of charging at wallbox (at home).

Source:
TU Ilmenau



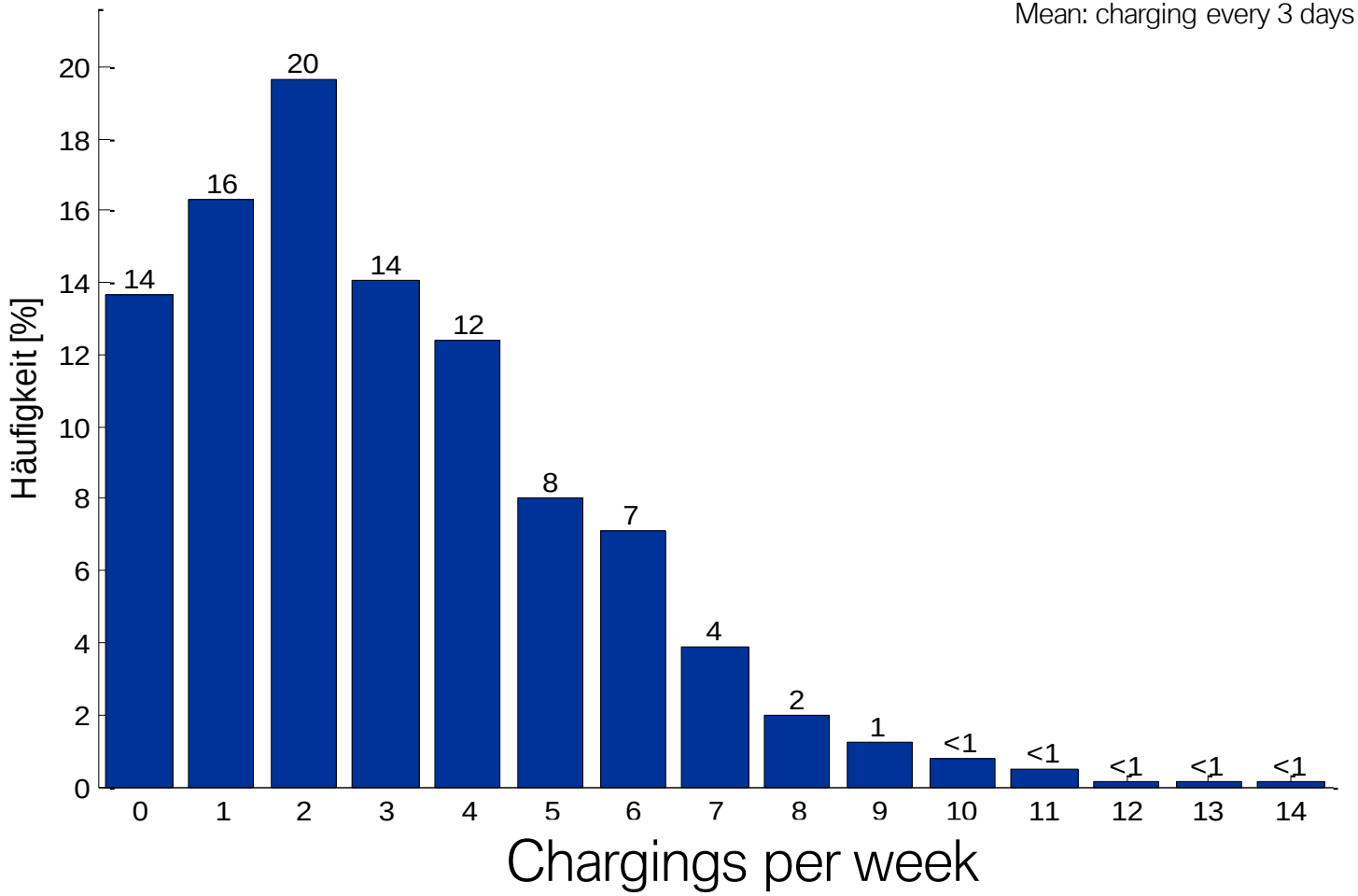
N = 40
Source: TU Ilmenau

Results:
On avarage only ¼ of the MINI E are connected to a wall box during the night
- Implication for using wind energy and perform scheduled charging – wind2grid

MINI E Charging & Infrastructure.
Chargings per week.

Source:
Berlin Data
loggers

Mean: charging every 3 days



2009-11-10

Results:
Users charge the MINI E approx. only every 3 days.

MINI E Charging & Infrastructure.
Charging – Where do users charge.

Source:
User
feedback

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Charing at home clearly dominates user behavior:

•56% of the users have never used public charging stations

• Reasons for not using public charging stations:
  1. **94% say wallbox at home is sufficient**
  2. Charging stations are not at places where users usually spend their time: 56%
  3. There are too few charging stations: 46%
  4. MINI E would have to be parked for too long at the charging station due to long charging time: 40%

Possible factors to increase usage:
- Density and right locations of charging stations
- Information about location e.g. demand for navigation system
- Information about availability
- Keep parking privileges
- Shorter charging duration

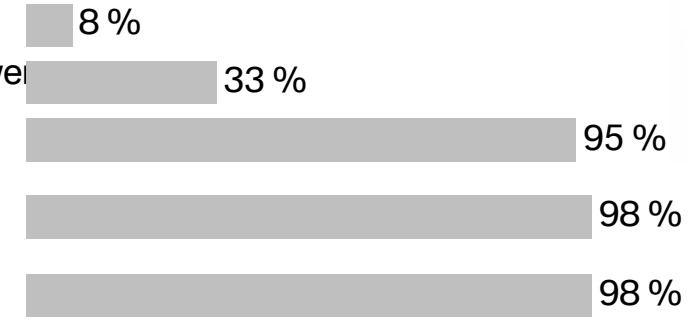
Initial results of the field trial in Berlin.
Ecological relevance.

Only 18 % of users rate energy from the German “energy mix” as environmentally compatible.

93 % of users rate electrical energy from renewable sources as environmentally compatible.

Share of MINI E users who regard renewable energy for charging electric vehicles as important.

How should energy for electric cars be generated?



Source: Berlin user survey.

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Preliminary Conclusions.
The role for Government.

Define the overall rules of the Game.

1. Enable full competition and customer choice on all stages of the e-mobility chain
2. Ensure transparency on the carbon impact of all fuels (fossil, Biofuels, electricity, hydrogen etc.)
3. Define responsibilities and incentives between car-makers and energy utilities

Spend public money right.

1. Create new instruments where they are really needed. Check all existing taxes and incentives around electric driving for possible readjustment
2. Lower the cost threshold for consumers in the initial phase of technology
3. Ensure public charging is sufficient but support charging infrastructure at home and at the workplace as strongly as possible.

International Cooperation is key

1. Avoid the divergence of technical standards that occurred for conventional driving from the outset.
2. Consider new additional instruments for road transport (like Low Carbon Fuel Standards, Cap and Trade etc.) in shaping the overall legislative framework.
3. EU, USA and China should take the lead together.

Thank you very much for your attention.

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