



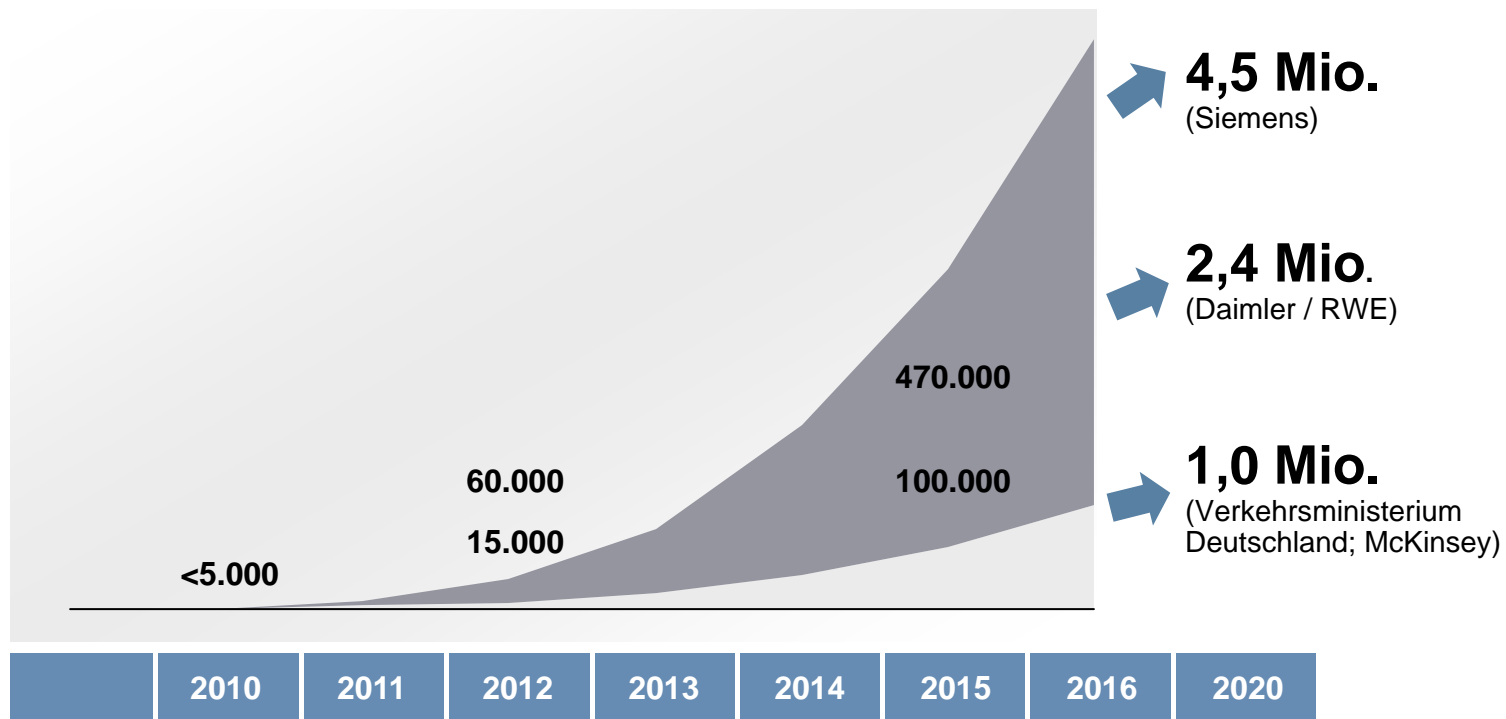
ICT Solutions for Intelligent Mobility

Ludwig Karg, B.A.U.M.,
Head of Ancillary Research

www.ikt-em.de/en



Electric Mobility will become true



source: RWE



Electric Mobility will become true

Audi entwickelt Elektrofahrzeuge und ich arbeite mit. Das werde ich noch meinen Enkeln erzählen.

Das Internationale Traineeprogramm läuft ein Jahr. Von meinen Erfahrungen werde ich aber noch lange profitieren. Ich habe z. B. an der Entwicklung der Leistungselektronik des Audi Q5 hybrid quattro mitgearbeitet. Das bringt mich nicht nur beruflich voran – es wird auch noch in Jahrzehnten ein persönliches Highlight sein.

Michael Ptacek, Teilnehmer Internationales Traineeprogramm
Studium: Elektrotechnik

Alle reden von der Zukunft. Sie entwickeln sie mit.

Entdecken Sie interessante Themen im Bereich Elektromobilität – im Team der BMW Group.

Wir freuen uns auf Sie als:

- Entwicklungsingenieur Diagnose E-Mobilität (m/w)**
Stellenreferenzen: 60631, 60839
- Entwicklungsingenieur elektrifizierte/hybridisierte Lösungen (m/w)**
Stellenreferenz: 58879
- Entwicklungsingenieur Leistungselektronik (m/w)**
Stellenreferenz: 60245

BMW Group

DAIMLER

Onlinebewerbung

Ingenieur (m/w) als Trainee für die Entwicklung von elektrischen Maschinen (E-Maschine), Motoren für Hybride und Elektrofahrzeuge (Erprobung und Qualifizierung) Mercedes-Benz



National Platform for Electric Mobility

Regierung

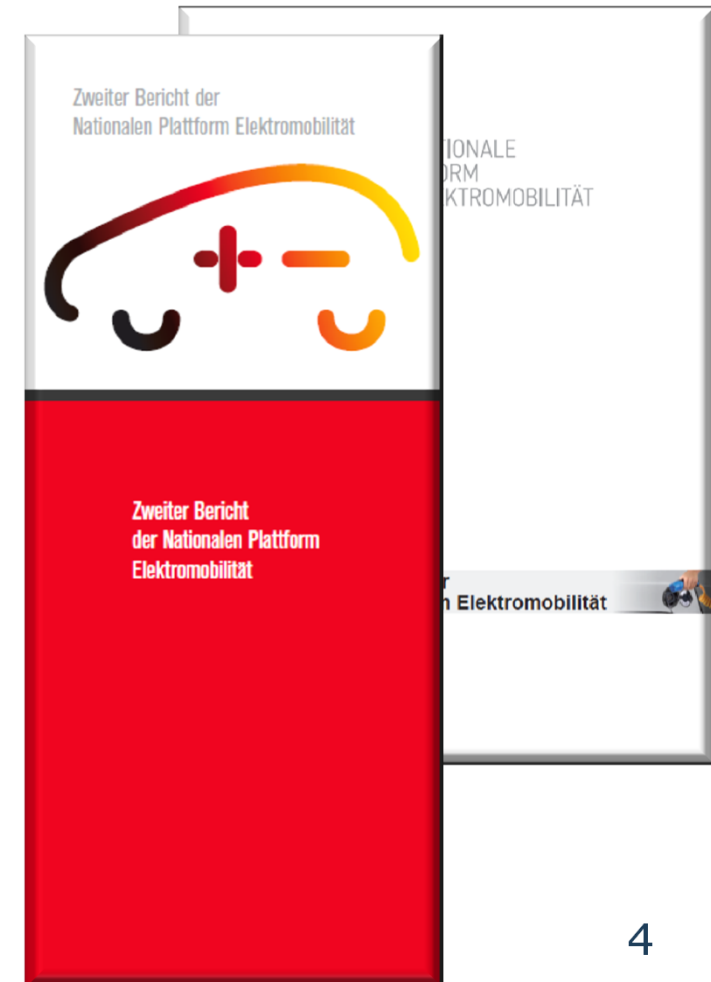
Bundesministerium für Wirtschaft und Technologie
Bundesministerium für Verkehr, Bau und Stadtentwicklung
Bundesministerium für Bildung und Forschung
Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
GGEMO

Industrie

DAIMLER, EVONIK, ABB, Continental, Audi, Ford, Alcatel-Lucent, AEROTEC, Chemetal, EADS, ENBW, GRILLO, hager Group, BEE, SUMITOMO, FRAGER, juwi, GÖRLITZ, KAPP, KIRCHHOFF, Heraeus, Lenze, HOPPECKE, infineon, Deutsche Bank, MAN, MENNEKES, MERCK, N-ERGIE, Nexans, i-Tec, SAP, BASF, GAIA, SOL GROUP, SIEMENS, VAHLE, MAGNA, SAERTEX, e-on, sona, BOSCH, WACKER, STAWAG, VATTENFALL, SW/M, VARTA, umicore, VORWEG GEHEN, DEKRA, Accurec, WITTENSTEIN.

Verbände und Wissenschaften

acatech, DSTGB, ifu, EVA, ifeu, ZfH, best, ADAC, VCD, VDE, ZVEI, WZB, BAM, WWF, VDA, Deutscher Städtetag, esmit, DIHK, VDI, VDMA, HELMHOLTZ GEMEINSCHAFT, Fraunhofer, Gesellschaft, Klima-Bündnis, Verbraucherzentrale, VdTUV, BDI, uulm, TU Clausthal.



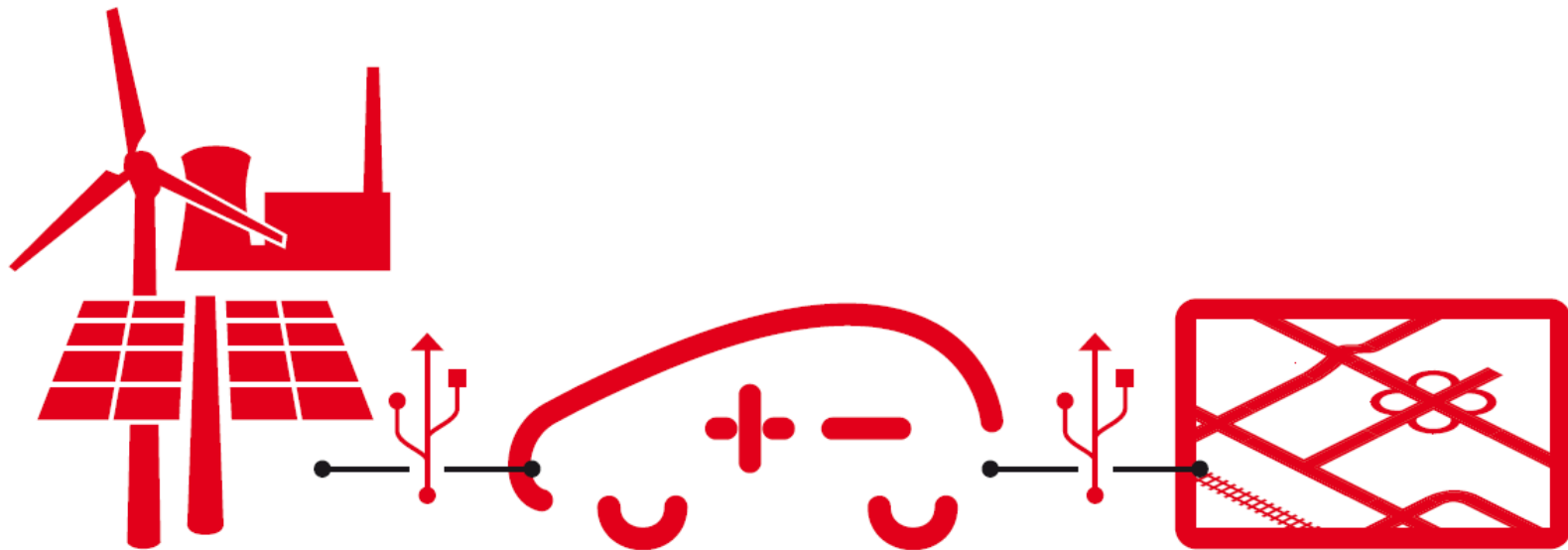


Electric Mobility: a Holistic Approach

Smart Grid

Smart Car

Smart Traffic

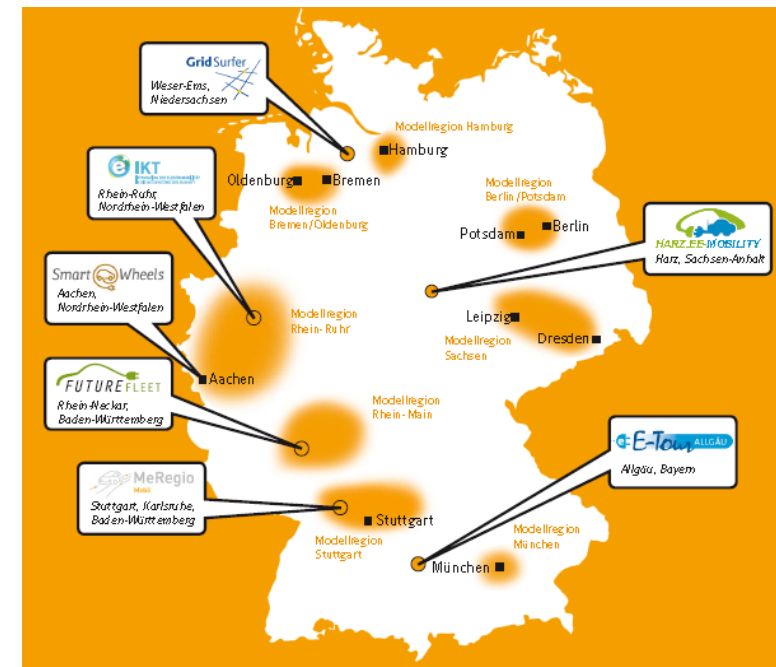


ICT are key for the success.



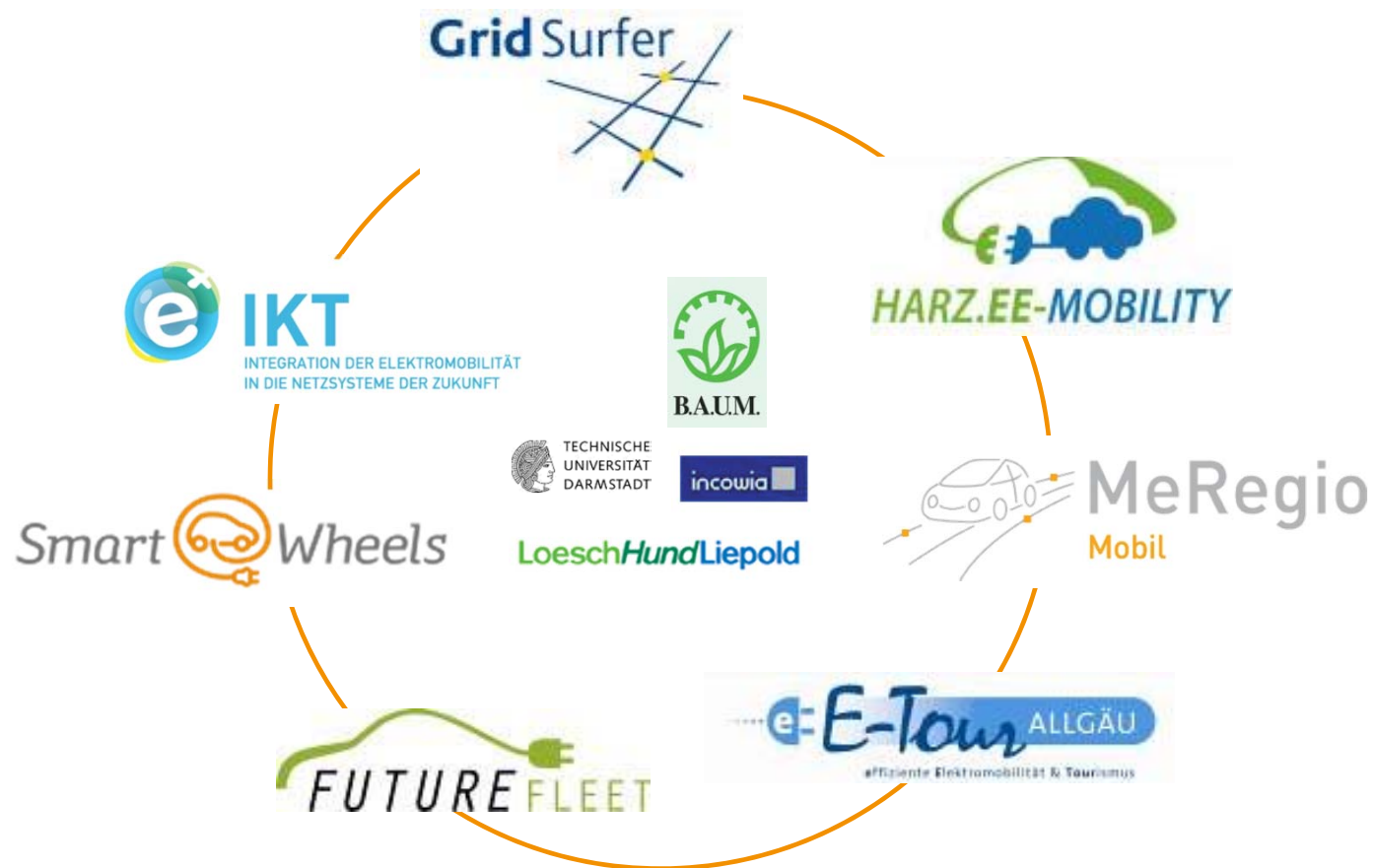
Research and Demonstration

- ▶ “ICT for Electric Mobility” (ICT-EM):
 - ▶ 7 pilot projects
 - ▶ Cooperation of BMWi and BMU
 - ▶ more than 47 companies and scientific institutes
 - ▶ 18 months run time
 - ▶ ca. 60 Mio. EUR funding
- ▶ ICT-EM II started mid of 2011
- ▶ Other activities:
 - ▶ 8 model regions
 - ▶ total of 500 Mio EUR funding for R&D and demonstration





7 Projects plus Ancillary Research



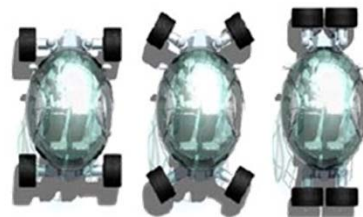


The car will change

Smart Grid

Smart Car

Smart Traffic



SIEMENS

- new car concepts
- automotive control
- charging processes:
 - battery management
 - authentication
 - billing and roaming
- driver assistance
 - navigation
 - infotainment
 - autonomous driving

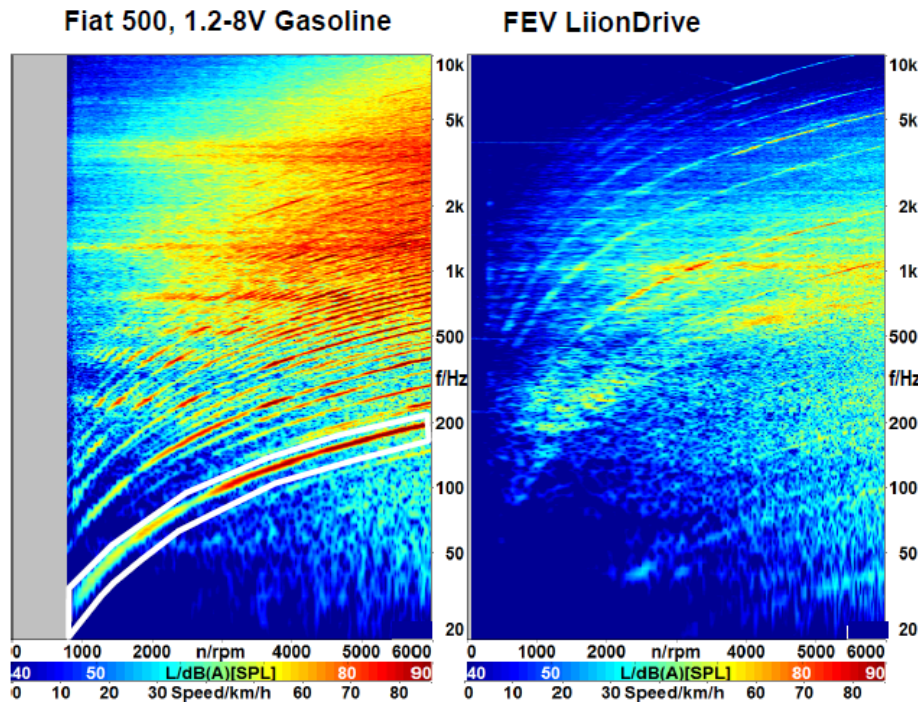


New challenges for future cars

Smart Grid

Smart Car

Smart Traffic



new car concepts

automotive control

charging processes:

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driver assistance

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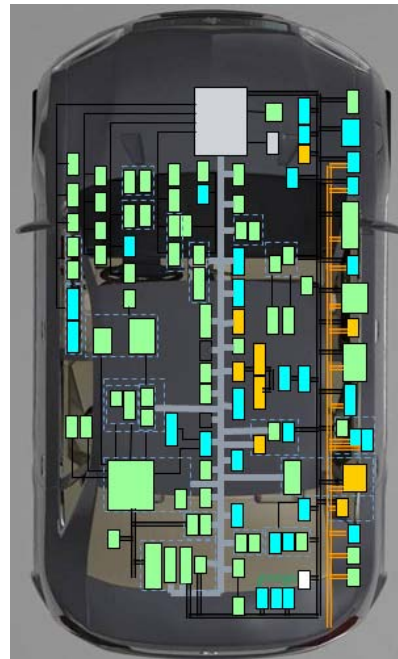


More electronics for the car

Smart Grid

Smart Car

Smart Traffic



R&D Project „eCar-IKT-Systemarchitektur
für Elektromobilität“ (FORTISS)

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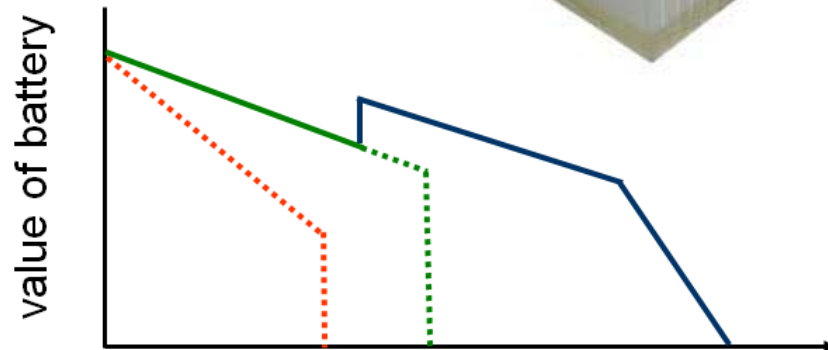


Treat the core well!

Smart Grid

Smart Car

Smart Traffic



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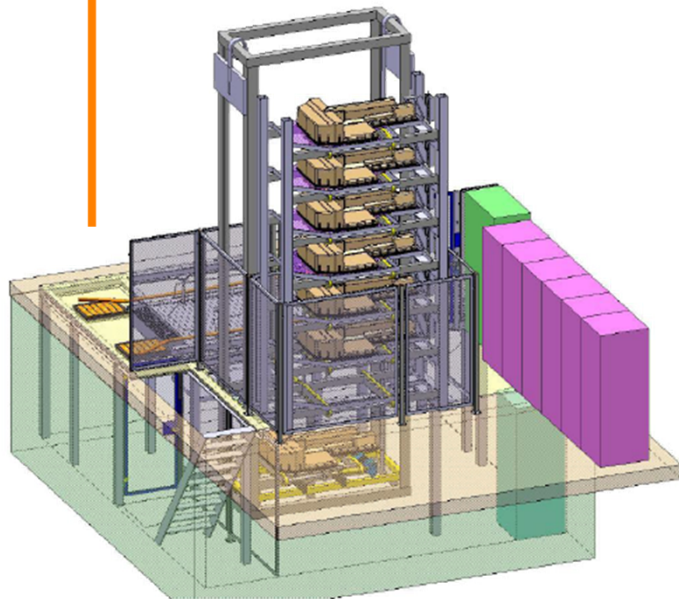


Charging or Swapping?

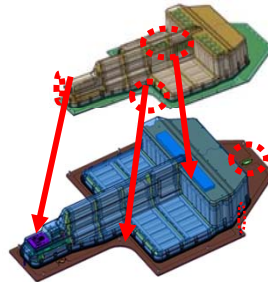
Smart Grid

Smart Car

Smart Traffic



NEXT|ENERGY: battery swap station



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Charge where you want



Smart Grid

Smart Car

Smart Traffic

DE – AAA – 123456 - P
country provider customer check

- ✓ tested in projects (RFID-cards, charge-plug, mobile phone)
- ✓ proposed as **DINSPEC 91286**
- ✓ German proposal for work group **ISO/IEC JWG1 V2G CI**

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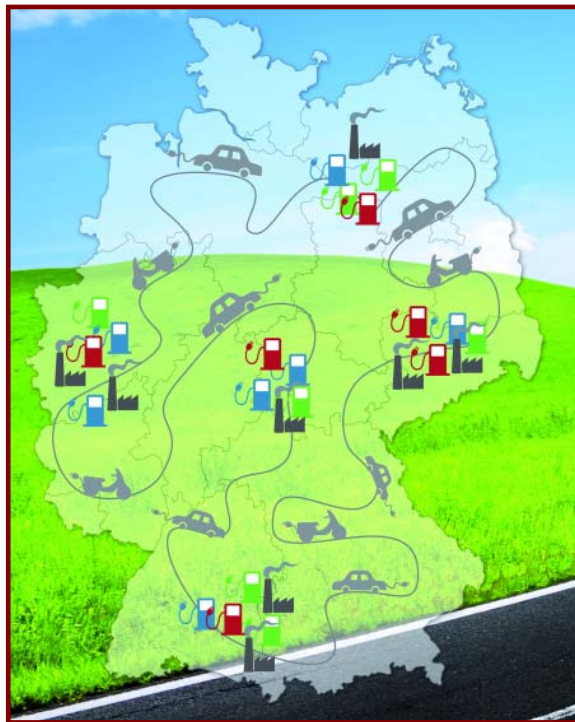
Charge where you want



Smart Grid

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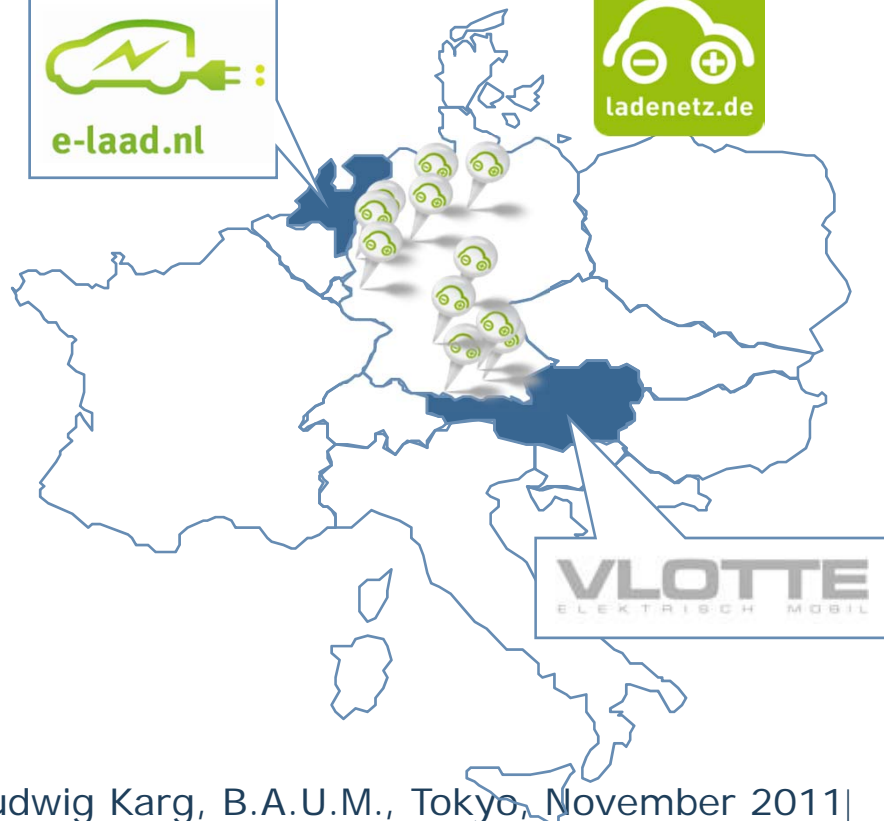
Charge where you want



Smart Grid

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Smart Traffic



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Reaching Home



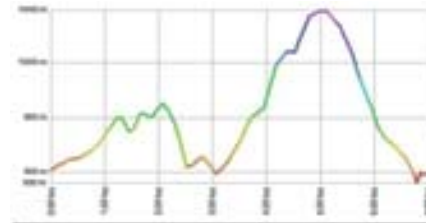
Smart Grid

Smart Car

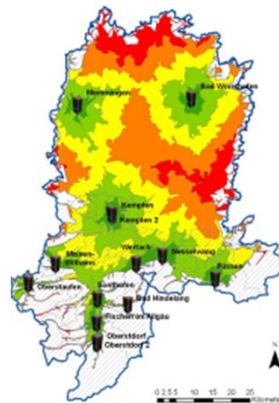
Smart Traffic



+



=



- new car concepts
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Riding safe and cosy

Smart Grid

Smart Car

Smart Traffic



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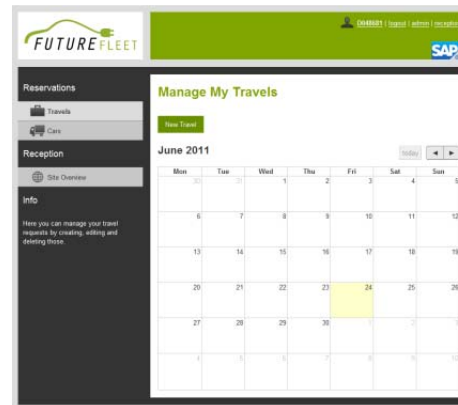


Right car for everybody

Smart Grid

Smart Car

Smart Traffic



- extended driver assistance
- mobility provision
 - intelligent accounting
 - fleet and mobility services
 - new market roles and business scenarios
- intermodal systems





I have a dream

Smart Grid

Smart Car

Smart Traffic



- extended driver assistance
- mobility provision
 - intelligent accounting
 - fleet and mobility services
 - new market roles and business scenarios
- intermodal systems



I have a dream



from:

here

to:

Munich Airport

via:

Landsberg



I have a dream



leave building, go left 100 m and
pick up electric bike Nr. 12

follow **this** route to bus station

take bus Nr. 325 to Landsberg

click **here** to receive electric car

follow **this** route to Andechs
(monastery, brewery, stay 1 hour)

follow **this** route to the airport

total price 32 €

buy



A dream becomes true

Smart Grid

Smart Car

Smart Traffic



- extended driver assistance
- mobility provision
 - intelligent accounting
 - fleet and mobility services
 - new market roles and business scenarios
- intermodal systems





Load shaping



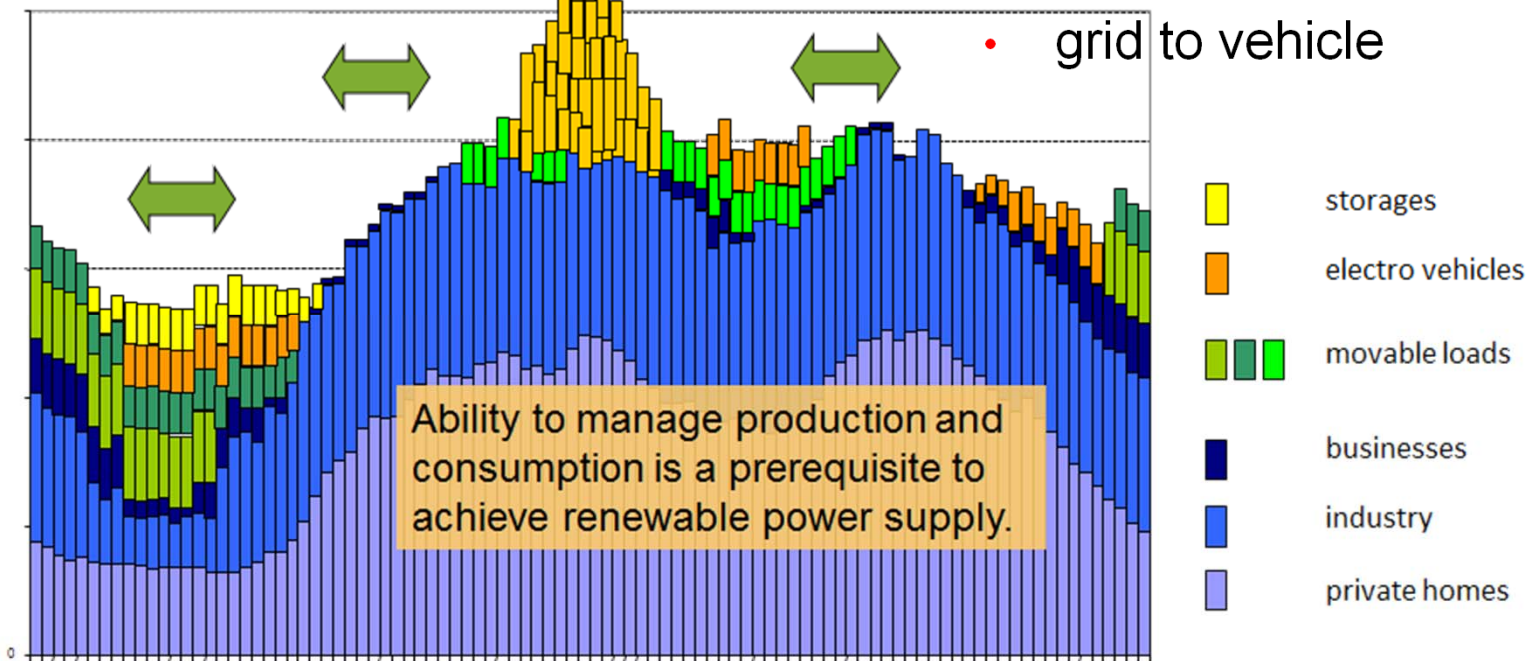
Smart Grid

Smart Car

Smart Traffic

➤ load management

• grid to vehicle





The magic formula

G2V

grid to vehicle

+ V2G

vehicle to grid

= V4G

vehicles for the grid

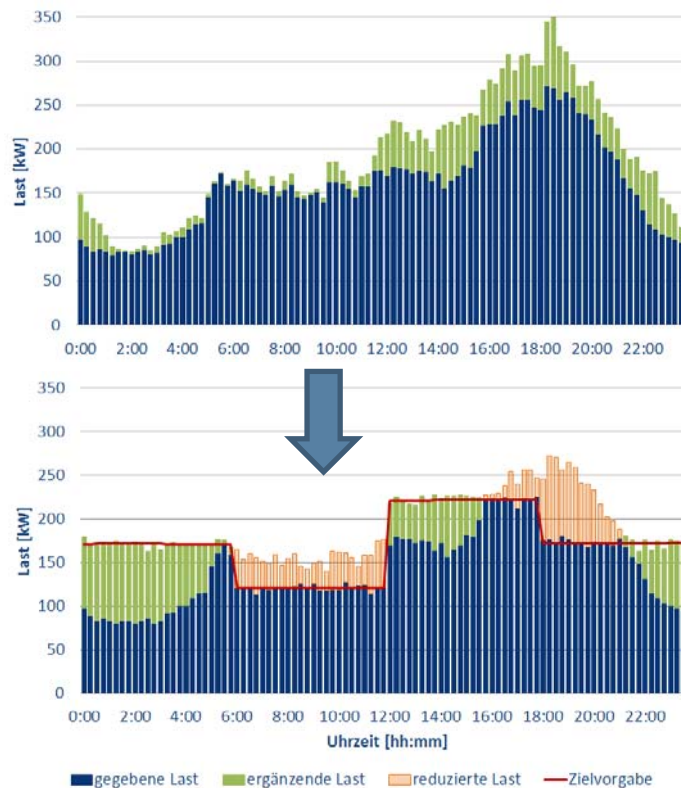


Stabilizing instead of stressing

Smart Grid

Smart Car

Smart Traffic



- load management
 - grid to vehicle
 - vehicle to grid
- new business models:
 - multiple use of batteries
 - combination of electric cars and renewable energies

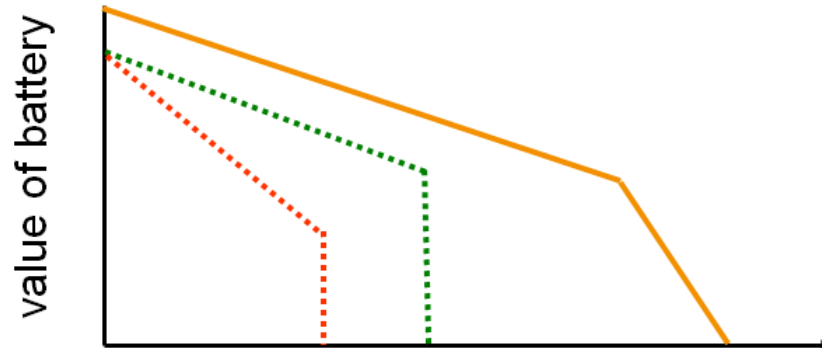


Stationary car earning money

Smart Grid

Smart Car

Smart Traffic



- ✓ balancing power
- ✓ peak shaving
- ✓ short time buffering

- load management
 - grid to vehicle
 - vehicle to grid
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Stationary car earning money

Smart Grid

Smart Car

Smart Traffic

kWh

kW

km

- load management
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EV: master piece of the Smart Home



Smart Grid

Smart Car

Smart Traffic



- load management
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More to come: IKT-EM II

econnect Germany



iZEUS

intelligent Zero Emission Urban System

SecMobil

Secure eMobility

O(SC)²ar

Open Service Cloud for the Smart Car

RACE

Robust and reliant Automotive Computing
Environment for future eCars

...

...



A new world of energies and mobility



ICT FOR 
ELECTRIC MOBILITY



Federal Ministry
of Economics
and Technology

Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

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