Running Greener: E-Mobility at SAP
5,000 Electric Vehicles in 2020
Ashok R, Horst Terhalle, Marcus Wagner
November 14th 2014
Running Greener: E-Mobility at SAP

AGENDA

- Why is e-Mobility important
- Our strategy “20% e-cars by 2020”
- Regional highlights
- E-Mobility Service Provider Solution
- FAQ
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  all
SAP has strong ambitions for sustainable business success
Reduce carbon footprint to 2000 level by 2020

www.sapintegratedreport.com

Greenhouse Gas Emissions
New Thinking, New Possibilities
It’s a Journey, Not an Event

Better ...

...commuting
...carpooling
...e-Mobility
...fleet management
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Global Electric Vehicles Strategy: 20% e-cars by 2020

Why should invest SAP in electric vehicles?

**Revenue**

Generating showcases for SAP’s mobility solutions and driving co-innovation for new software solutions in expanding markets

**Margin**

Transformation to a cost-saving car fleet management independent from fuel price increases

By electrifying the car fleet using renewable energies SAP reduces today’s emissions by 5% ($25'000$ tCO2) by 2020

5.000 e-cars by 2020 *)

**Employee Engagement**

SAP is a role model for green mobility and new technologies attracting early talents

Employees actively contribute to reach SAP’s carbon target

*) electric or alternative vehicles
Global Electric Vehicles Roadmap
Our road to 2020 (increasing growth rate of e-car share)

“Big Bang”

2.100 e-cars (9 %) 2018

2020
5,000 e-cars in SAP’s fleet (20%)

“Pilot projects”

23,700 cars in global fleet: 170 cars with electric drive (< 1%)

2014

600 e-cars (2.5%) 2016
Global Electric Vehicles Transformation
Four Milestones to e-fleet transformation

1. Initialize
   - Start e-car initiative
   - Run situation analysis
   - Run request for proposal (RfP) for infrastructure and e-cars

2. Pool Car
   - Start change management
   - Offer test drive and showcases for customers and partners
   - Communication and feedback with employees

3. Pilot Project
   - Define e-car addendum to existing car policy
   - Implementation of incentive systems for front runners
   - Integration and testing of new mobility solutions
   - Limited amount of cars and project time

4. Policy Integration
   - Define e-car guidelines for local policy
   - Integrated incentive: eco-bonus
   - Implementation billing system for electricity costs
   - Open policy for e-cars in general

Investment in Electric Vehicles is a long-term cost reduction strategy that can leverage software revenue, co-innovation and a sustainable way of doing business.
Electric Vehicles Pilot 2014 – SAP Headquarter Walldorf
Evaluation criteria for chosen e-cars

Economy
- Price and discounts
- Lease rate

Charging
- Charging system
- Charging infrastructure

Services
- Maintenance
- Warranty

Availability
- Car dealers
- Delivery times

Phase 1: Germany (2014)
Electric Vehicles Pilot 2014 – SAP Headquarter Walldorf
Highlights for employees

**Mobility**
- Be the **pioneer**: Drive one of the first **60 company e-cars**
- Keep it for **24 months** – instead of 48 months

**Environmental**
- At SAP charge **100% renewable energy** = **CO₂ neutral**
- **Reduce consumption** of fossil fuels and noise

**Benefits**
- Unique **battery subsidy** as benefit
- Enjoy **free charging** exclusively at SAP‘s charging spots
Global Rollout of Electric Vehicles
SAP as a role model for electric mobility in company fleets (~ 200 e-cars globally)

**North America, Palo Alto**
- 60 employees driving electric cars (e.g. Nissan Leaf)
- 16 charging stations, one of the largest of its kind in the U.S.
- 1 inductive charging station

**Netherlands, ’s Hertogenbosch**
- 16 Opel Ampera
- 1 Fisker Karma
- 37 Volvo V60-Hybrid
- 25 Mitsubishi Outlander-Hybrid
- Smart metering @ Home

**Germany, Walldorf and Markdorf**
- 5 Mercedes A-Klasse E-Cell
- 10 BMW i3, 13 Renault ZOE
- 10 Smart ED, 6 VW e-Up
- 1 Transporter e-Kangoo
- 50 Charging spots

**Switzerland, Regensdorf**
- E-car initiative with BMW i3 and Tesla Model S

**Italy**
- Peugeot ion
- Recharge using photovoltaic energy
- Free access to downtown Milan & Rome

**Singapore**
- E-car initiative with 2 e-cars (Mitsubishi MiEV)

**India, Bangalore**
- 43 electric cars (Reva)
- 33 charging spots
- Options for owning and operating electric cars at a minimum cost

**E-Car initiatives planned:**
- Austria, Vienna
- Bulgaria, Sofia
- France, Paris
- Hungary, Budapest
- Spain, Madrid & Barcelona
- United Kingdom, Feltham/London
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Regional Highlights: E-Mobility at SAP Labs India

- 30 Cars were leased in 2011 out of which 11 are active now.
- 4 E-cars for employees usage.
- 2 E-cars for Airport transports covered 450 trips between March-Sep 2014.
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E-Mobility Service Provider Solution

Objective:
Design and implementation of an E-Mobility Service Provider solution that incorporates invoicing / billing, asset management, charge point monitoring, visual business, analytics, charging management and data hub for customers

The solution shall:

- Provide Energy Management functionally that incorporates customer requirements, grid capacity and availability of electrical power into charging schedule
- Allow energy market participants to influence charging schedule via “Demand Response“ events
- Offer data hub for customer and vehicle data as a base for smart charging and added value services
- Allow direct communication toward the customer via vehicle onboard system, smart phones or website
Electric Mobility
Why electric mobility

- **Motivation No. 1**
  - The '20-20-20 by 2020' Energy and Climate Package of the EU defines a reduction of greenhouse gases for the transport sector
  - By 2021 the CO$_2$ emissions of passenger vehicles shall in average not exceed 95 grams CO$_2$ per kilometer. That translates into an average of 4,1 liters of gasoline or 3,6 liters of diesel per 100 km

- **Motivation No. 2**
  - Reduction of controllable air pollutants
  - ($\text{SO}_2$, $\text{NO}_x$ and $\text{NH}_3$)

- **Motivation No. 3**
  - Alternative and environmentally friendly energy sources for transportation sector

- **Motivation No. 4**
  - Reduction of noise, especially in cities
Challenges and requirements

1. High power consumption of electric vehicle fleets
   - Energy consumption = ~16kW/h per 100 km
   - AC 3.6 kW (230V*9A) = 5 hours
   - AC 22 kW (230V*3x32A) = 45 minutes
   - DC 50 kW (400V*125A) = 20 minutes
   - DC 120 kW (400V*300A) = 8 minutes

2. Power generation

3. Power distribution

4. Customer willingness to provide charging information
Challenges and requirements

1. High power consumption of eVehicle fleets

2. Power generation

3. Power distribution

4. Customer willingness to provide charging information

Customer requirements
- Arrival time, Departure time
- Location
- Desired kWh
Opportunities for SAP

- Invoicing / billing
- Asset management
- Analytics
- Charging management

- Invoicing / billing
- Asset management
- Visual Business
- Analytics
- Charging management
- SMP with SAP UI5
Overview IT landscape

eVehicles

EVSE

1518

ISO

1618

Continental

RENAULT

BMW

OCPP 2.0*

Energy Market Participants

Demand Response

Energy Management

Simulation Environment

Customer

SAP UI5

Mobile App

Web frontend

eMobility Service Provider

SAP NW ABAP 7.31

SAP NW Gateway

HTML 5

SAP NW 7.30 Server J2EE

SAP CC 3.0

SAP Hana Cloud platform

SAP ERP ECC 6.07 Utilities Switch

CFM

SAP CI

Visual Business

EAM

IS-U EDM

https/ SOAP

ISO 15118

OCPP 2.0*

https/ SOAP

https/ SOAP

https/ SOAP

https/ SOAP
Mobile App for end customers

This app is the key to an efficient and reliable charging of your e-car while you are at work.

Start with entering your main profile

Save this profile and register your car
Mobile App for end customers

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E-Mobility Dashboard for Service Provider

![E-Mobility Dashboard Screenshot](image-url)
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Thank you