Running Greener: E-Mobility at SAP
5.000 Electric Vehicles in 2020

Ashok R, Horst Terhalle, Marcus Wagner
November 14th 2014

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AGENDA

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Our strategy “20% e-cars by 2020”	Marcus Wagner
Regional highlights	Ashok R.
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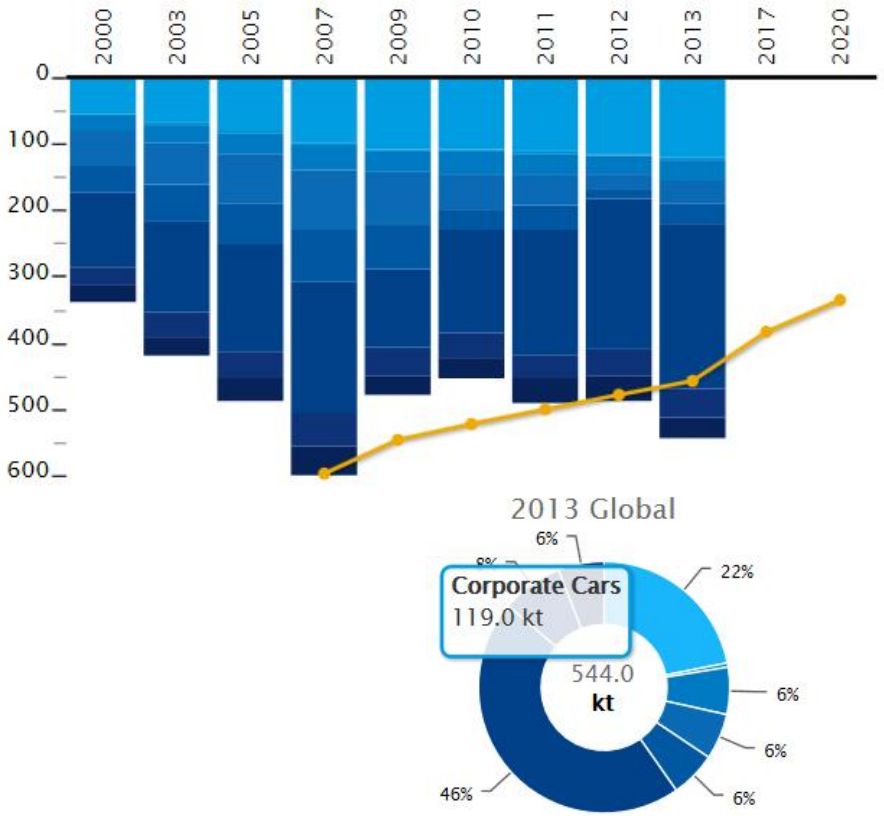
SAP has strong ambitions for sustainable business success

Reduce carbon footprint to 2000 level by 2020

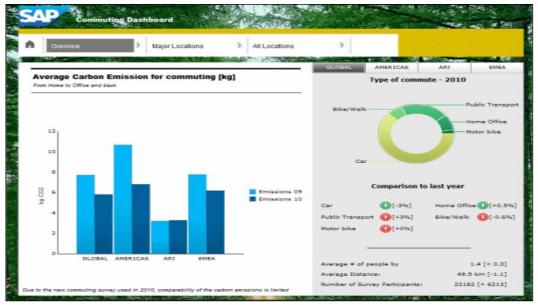
www.sapintegratedreport.com



Greenhouse Gas Emissions

New Thinking, New Possibilities

It’s a Journey, Not an Event



…commuting

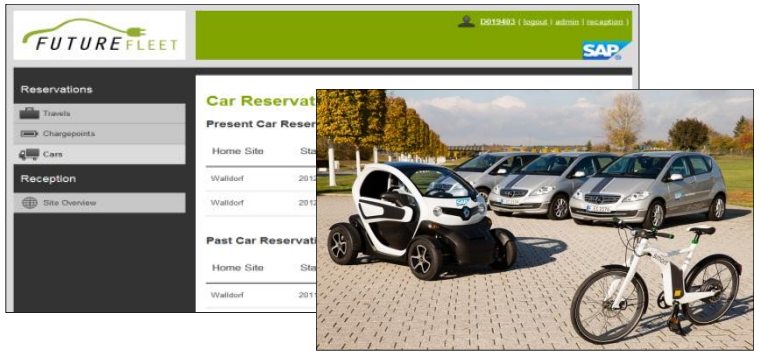
Better …

Innovate Differently

…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

5.000 e-cars by 2020 *)

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

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”

2020

5.000 e-cars in SAP’s fleet (20%)

2.100 e-cars (9 %)

2018

600 e-cars (2,5%)

2016

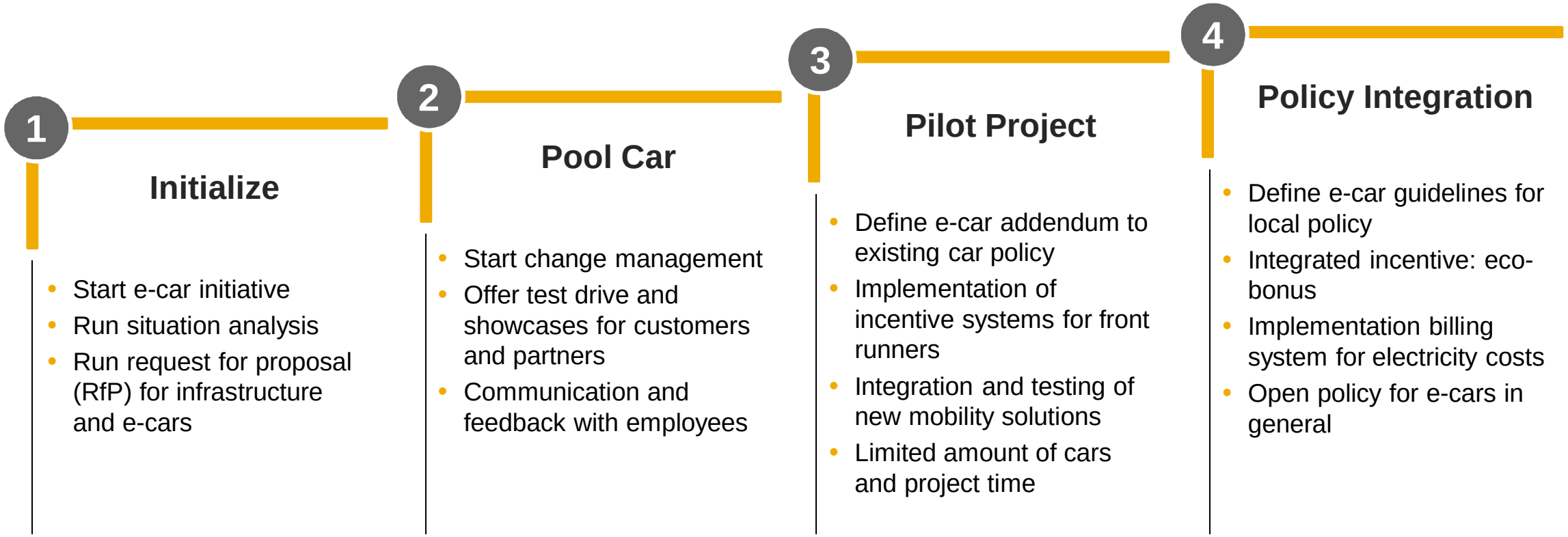
“Pilot projects”

2014

23.700 cars in global fleet: 170 cars with electric drive (< 1%)

Global Electric Vehicles Transformation

Four Milestones to e-fleet transformation



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

e-cars as company cars

Economy

- Price and discounts
- Lease rate

Services

- Maintenance
- Warranty

Charging

- Charging system
- Charging infrastructure

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 = **CO_2 neutral**
- **Reduce consumption** of fossil fuels and noise

Benefits

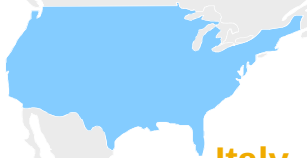
- Unique **battery subsidy** as benefit
- Enjoy **free charging** exclusively at SAP‘s charging spots

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

Supported by:
Federal Ministry for Economic Affairs and Energy
on the basis of a decision by the German Bundestag

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

Supported by:
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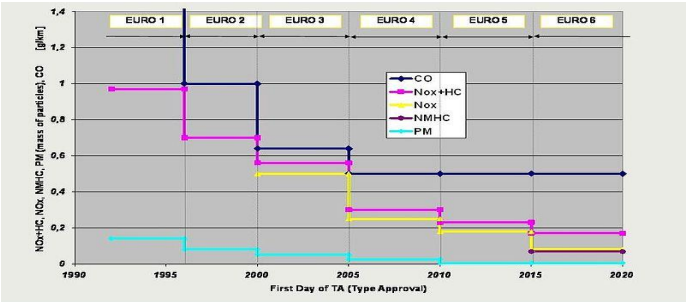
- **Motivation No. 1**
  - The '20-20-20 by 2020' Energy and Climate Package of the EU defines a reduction of green house gases for the transport sector
  - By 2021 the CO_2 emissions of passenger vehicles shall in average not exceed 95 grams CO_2 per kilometer. That translates into an average of 4,1 liters of gasoline or 3,6 liters of diesel per 100 km

- **Motivation No. 2**
  - Reduction of controllable air pollutants
  - (SO_2, No_x and NH_3)

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

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



European emission reduction measures for vehicles with diesel engines

Challenges and requirements

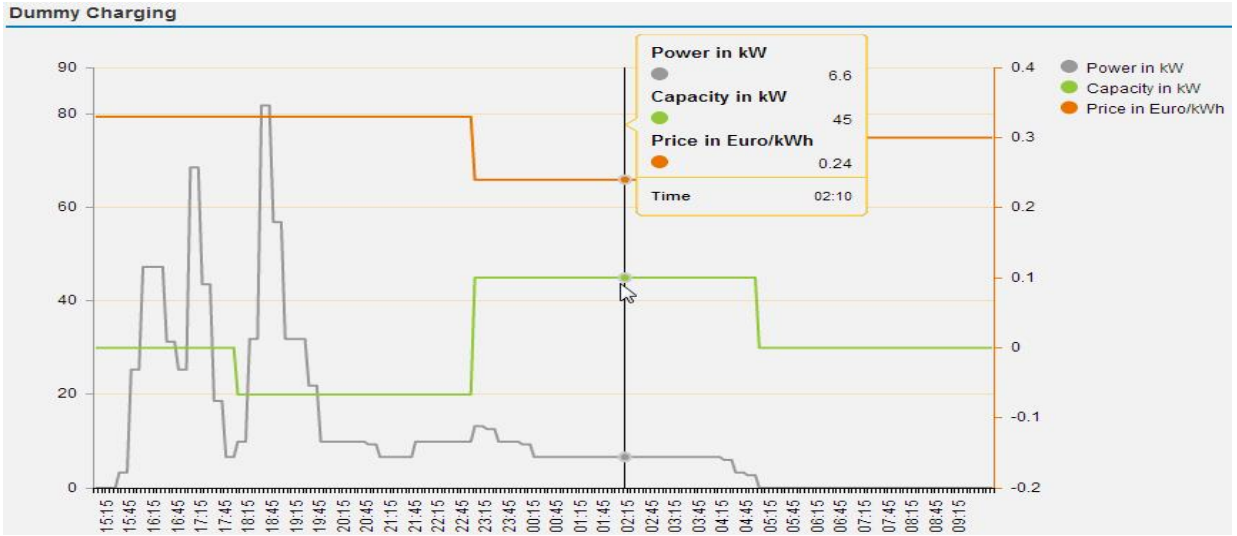
1 High power consumption of electric vehicle fleets

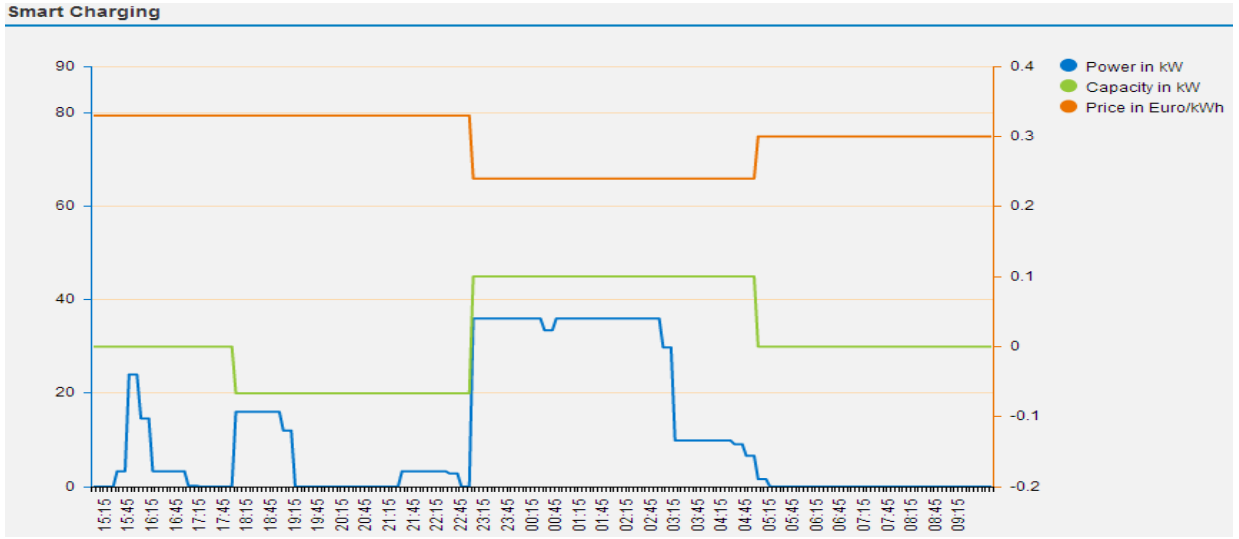
- Energy consumption = ~16kW/h per 100 km
- AC 3.6 kW (230V*9A) = 5 hours
- AC 22 kW (230V*3x32A) = 45 minutes
- DC 50 kW (400v*125A) = 20 minutes
- DC 120 kW (400V*300A) = 8 minutes

2 Power generation

3 Power distribution

4 Customer willingness to provide charging information





Challenges and requirements

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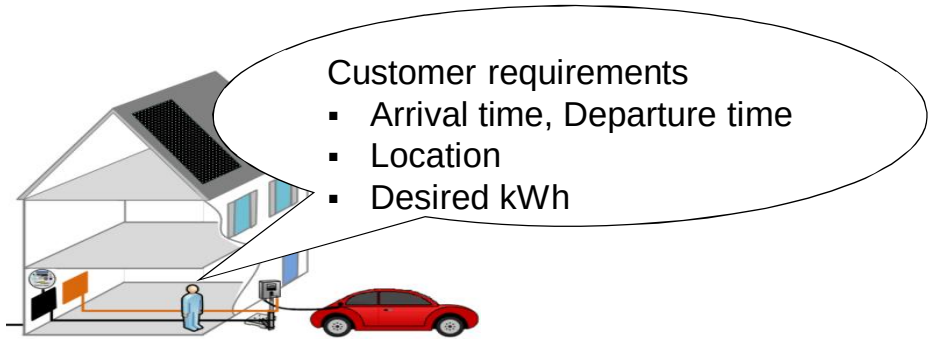

4 Customer willingness to provide charging information

Opportunities for SAP

Fleetmanagement

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

eMobility provider

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

Overview IT landscape

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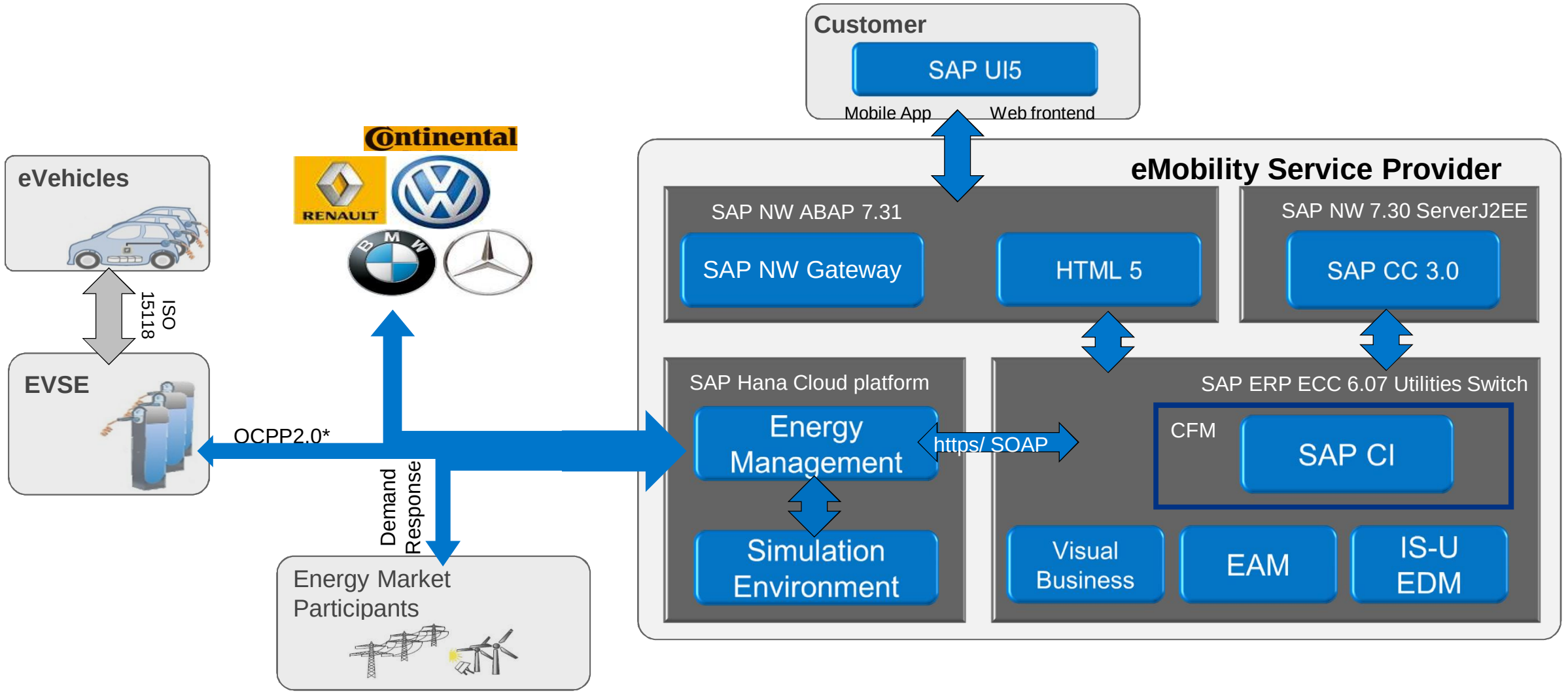
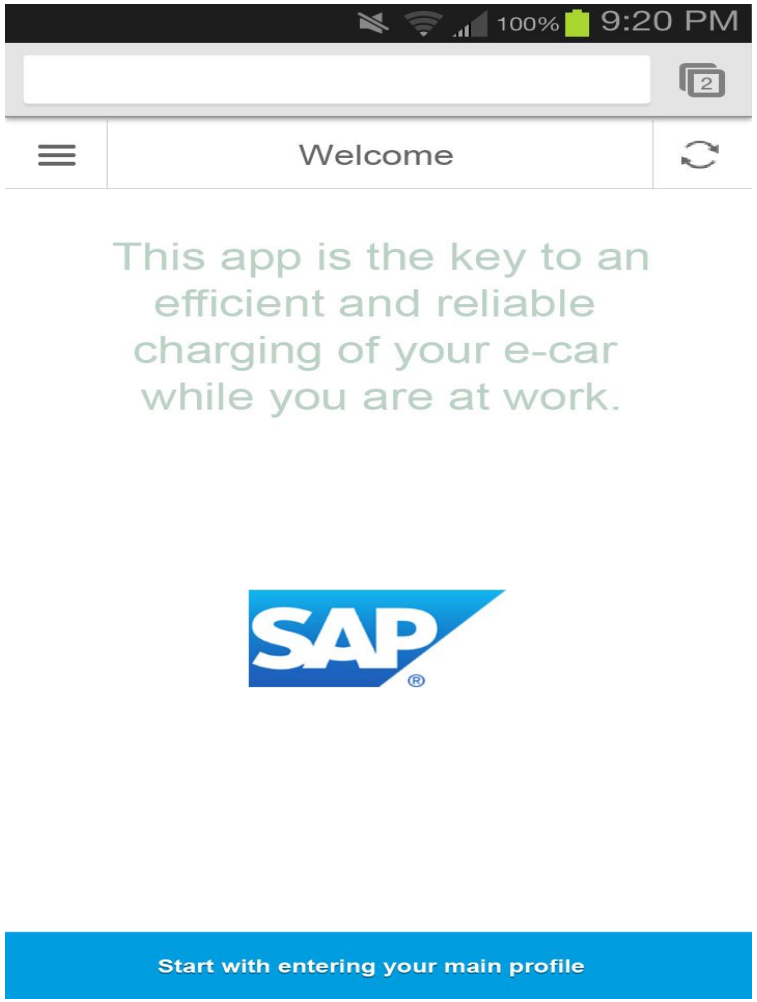
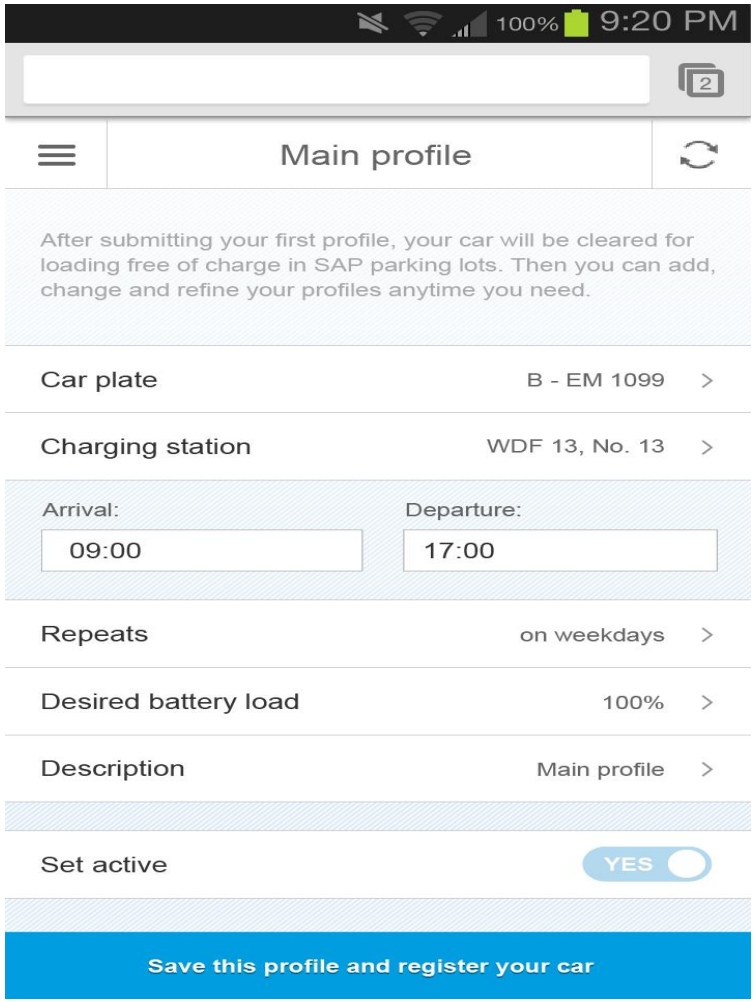
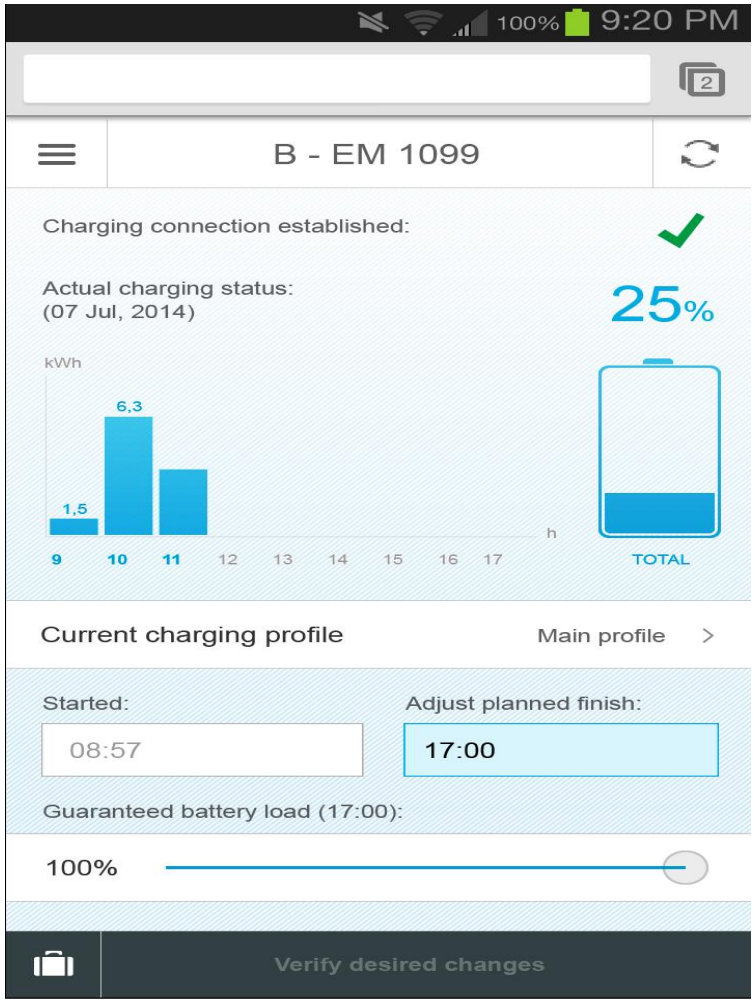


Mobile App for end customers







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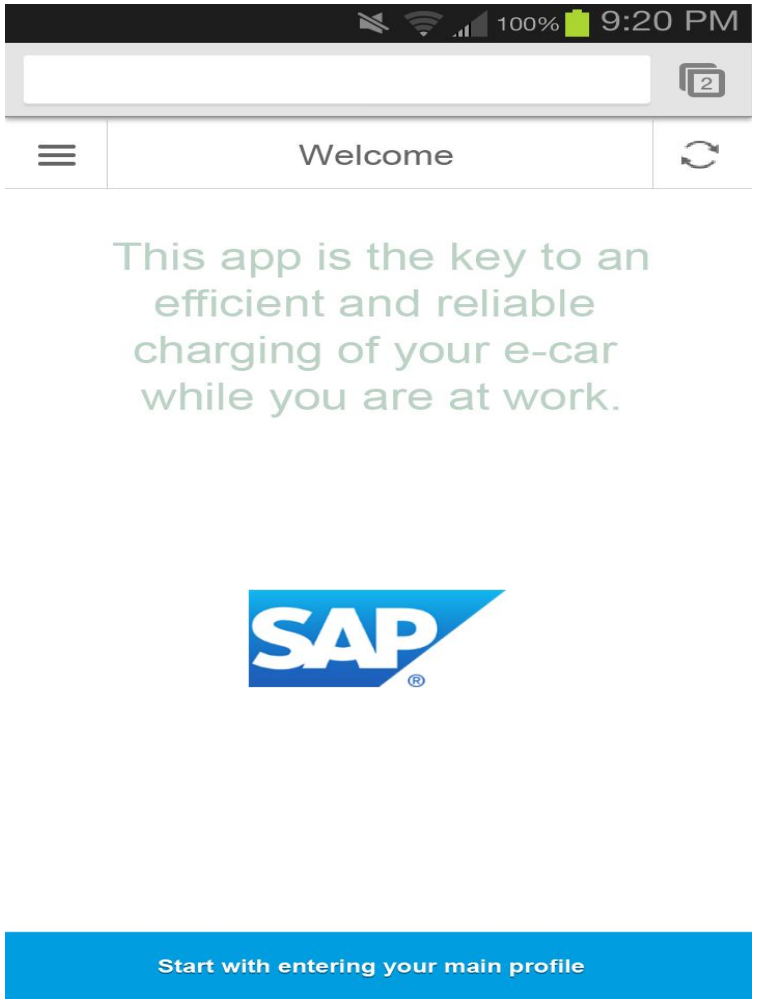
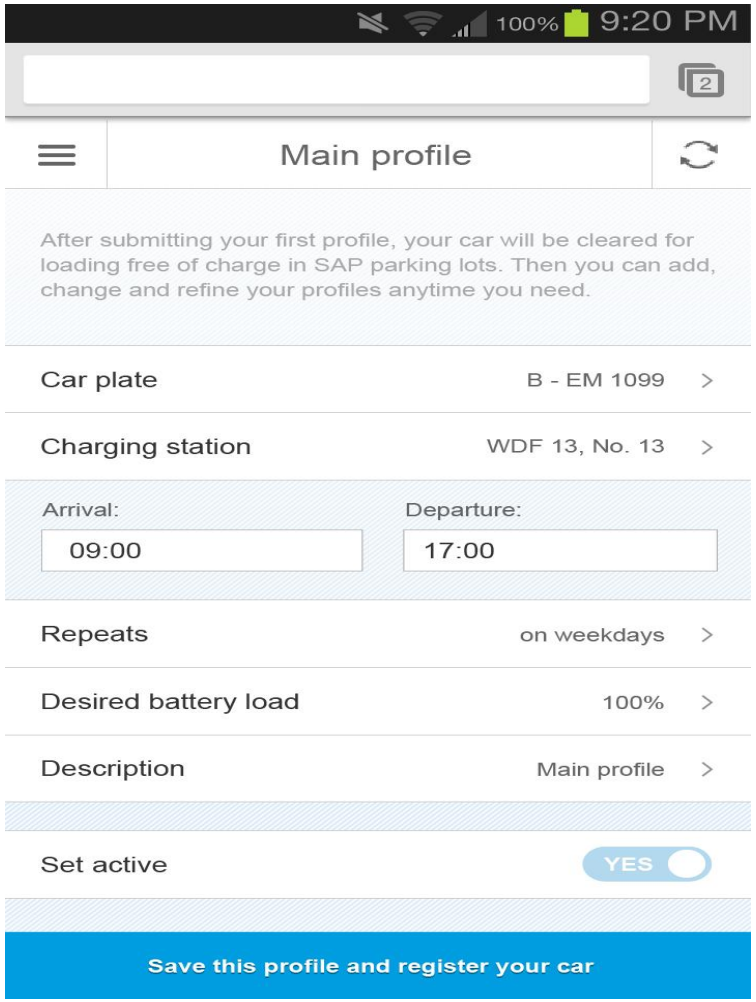
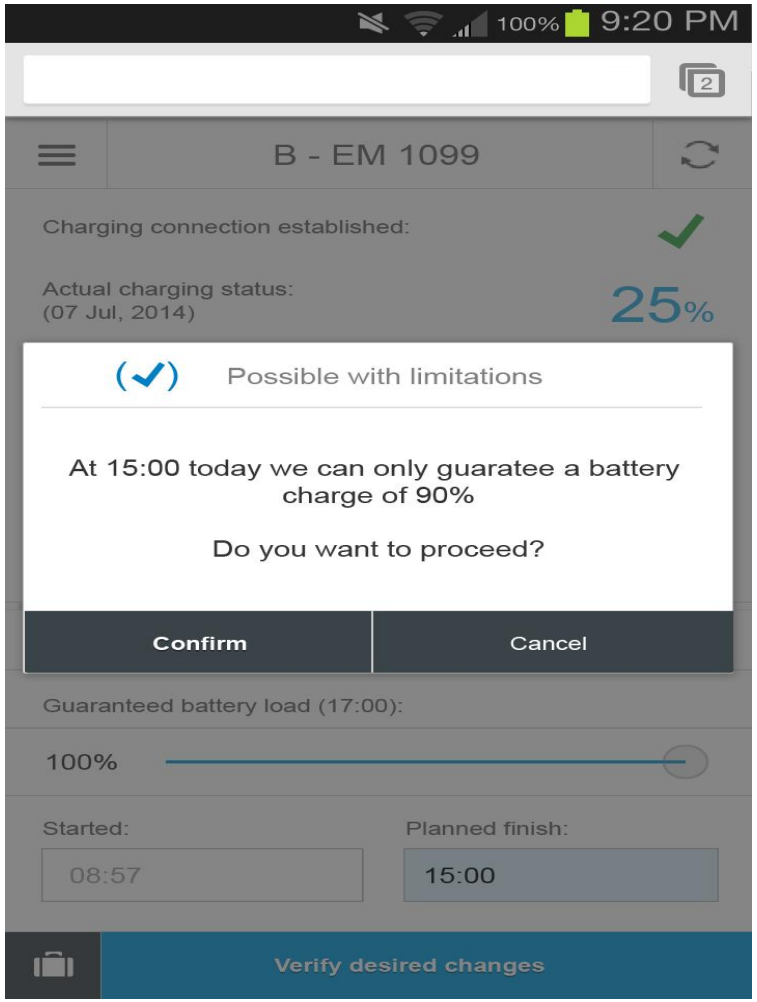
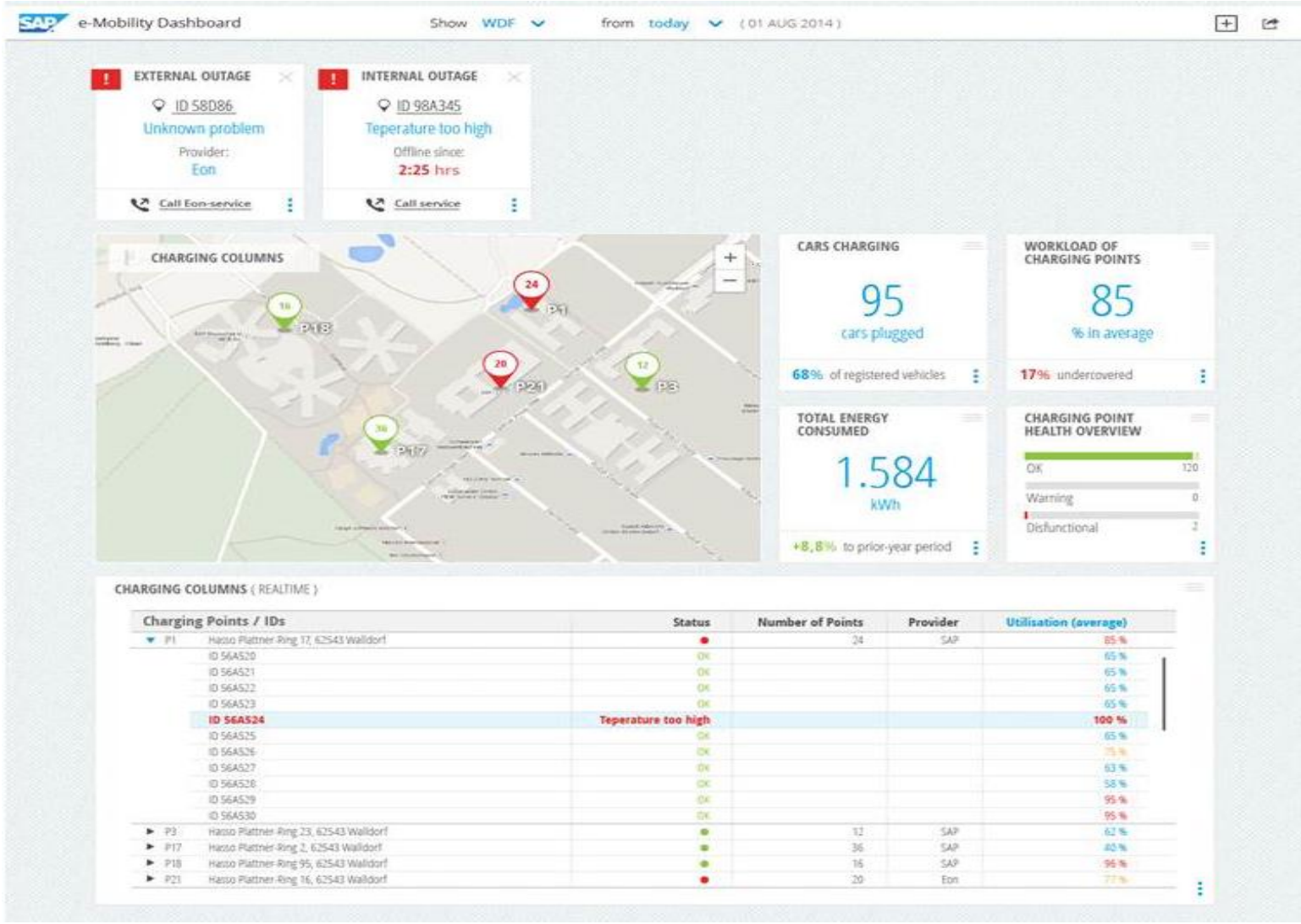






E-Mobility Dashboard for Service Provider



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