Smart Infrastructures

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Smart Infrastructures

- Smart infrastructures are essential for a sustainable development
  - Growing energy consumption vs. need to reduce CO_2 emissions
  - Increasing shortage of resources
  - Increasing traffic
  - Growing urbanization
  - Increasing use of Renewable Energy
  - Web services, eSales

Some of the major drivers for smart infrastructures

- Smart Cities and Metropolitan Solutions
- eMobility
- The German "Energiewende"
- Digitization - Internet and web services
  - Voice / data / image integrated services, smart mobile devices
  - Entertainment
    - Media streaming, IPTV, Video on Demand
  - eCommerce, eGovernment, industrial applications

The digitization megatrends

This is the best of times for some companies and the worst of times for other companies

DIGITIZATION
is the conversion of all available information into digital form, so that it can be stored, transmitted, shared, processed and valued in real time.

Big data

We now create in 7 days as much data as we created in the whole year 2002

Cloud

2/3 of all new business application decisions will be cloud based by 2015

Mobility

46 million apps downloaded daily on the Apple store

Social Media

1 minute in social media means:
- 2,000,000 videos viewed on Youtube
- 700,000 messages delivered on Facebook
- 175,000 tweets fired off

Intelligent infrastructures are already arising all around

- Smart grid and energy management
- Traffic control
- Cloud services
- eLearning and eGovernment

Whatever we do: Electrical energy is the key

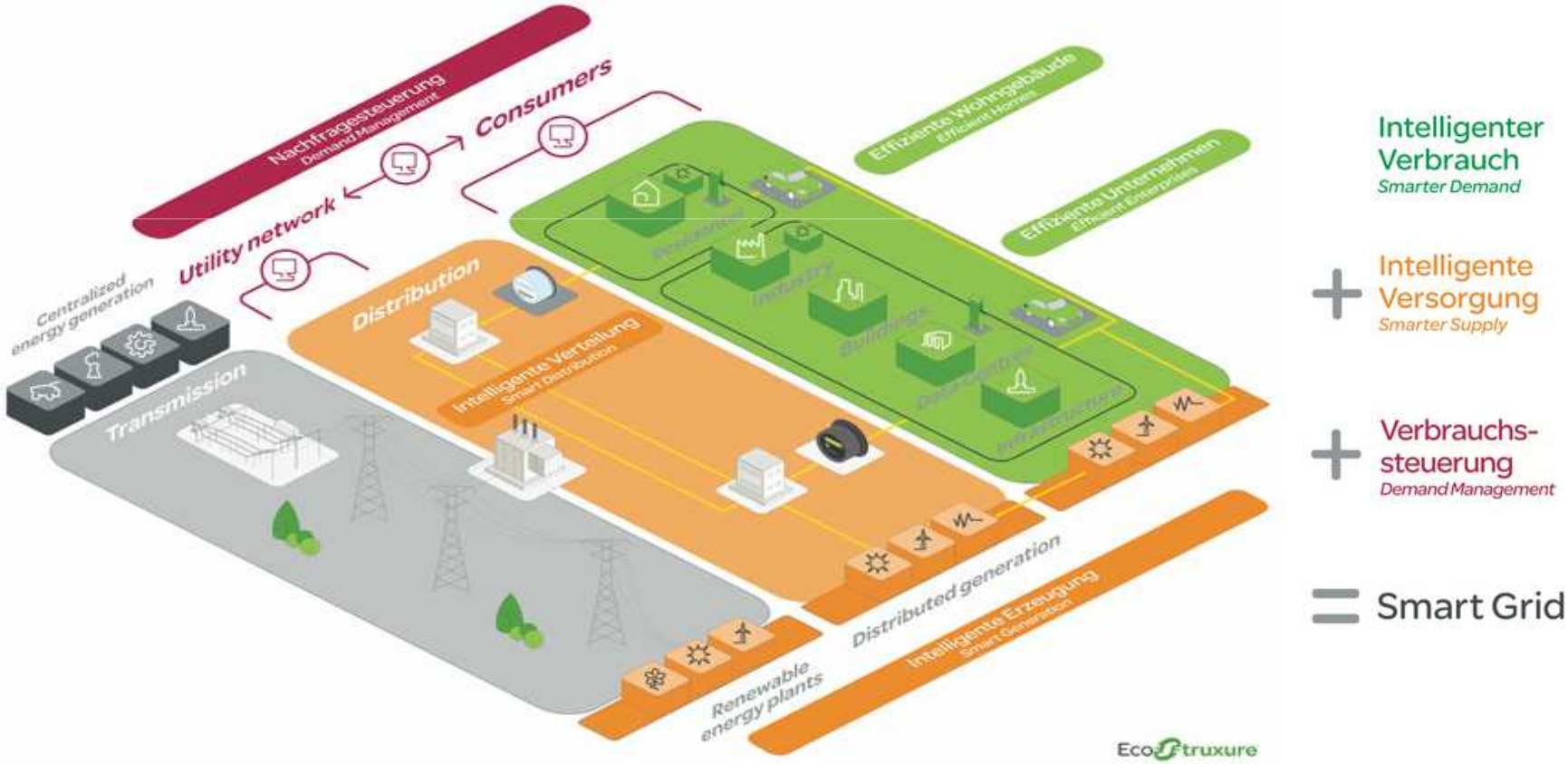
- Intelligent infrastructures need electricity
  - Data communication infrastucture
  - Data centers for data storage and processing
- Efficient and scalable data center infrastructures need to meet the increasing demands
- **Smart Grid** is a key element for reliable energy supply
  - It drives the data center development (big data, cloud computing, ...)

The Smart Grid, one of the key elements of smart infrastructures

The **Smart Grid**
combines
electricity and IT infrastructure
to integrate and interconnect all users
- generators, operators, marketers, consumers etc. -
in order to continue
to efficiently balance demand and supply
over an increasingly complex network.

Intelligent infrastructures: The Smart Grid

From top-down grid to an interactive Smart Grid



Intelligent infrastructures: The Smart Grid

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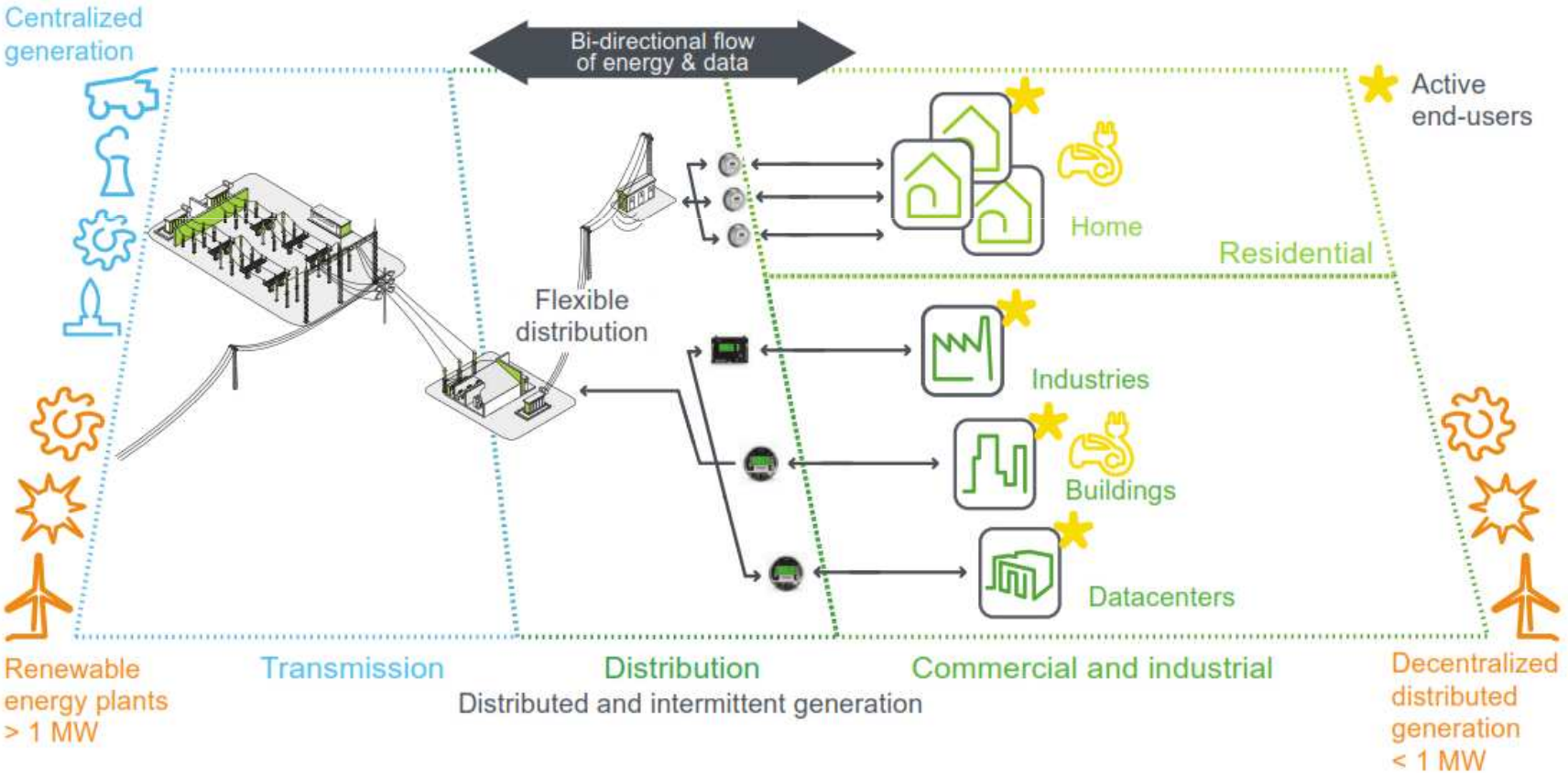


Example: EUREF Campus Micro Smart Grid in Berlin – a living lab

(C) InnoZ GmbH (Lorenz Crössmann), 2012

Mitwirkende Partner:

DB BAHN · Schneider Electric · GASAG DIE BERLINER ENERGIE · NETZGESELLSCHAFT BERLIN-BRANDENBURG · SOLON · DAI-Labor TU Berlin · RLI REINER LEMOINE INSTITUT · EUREF

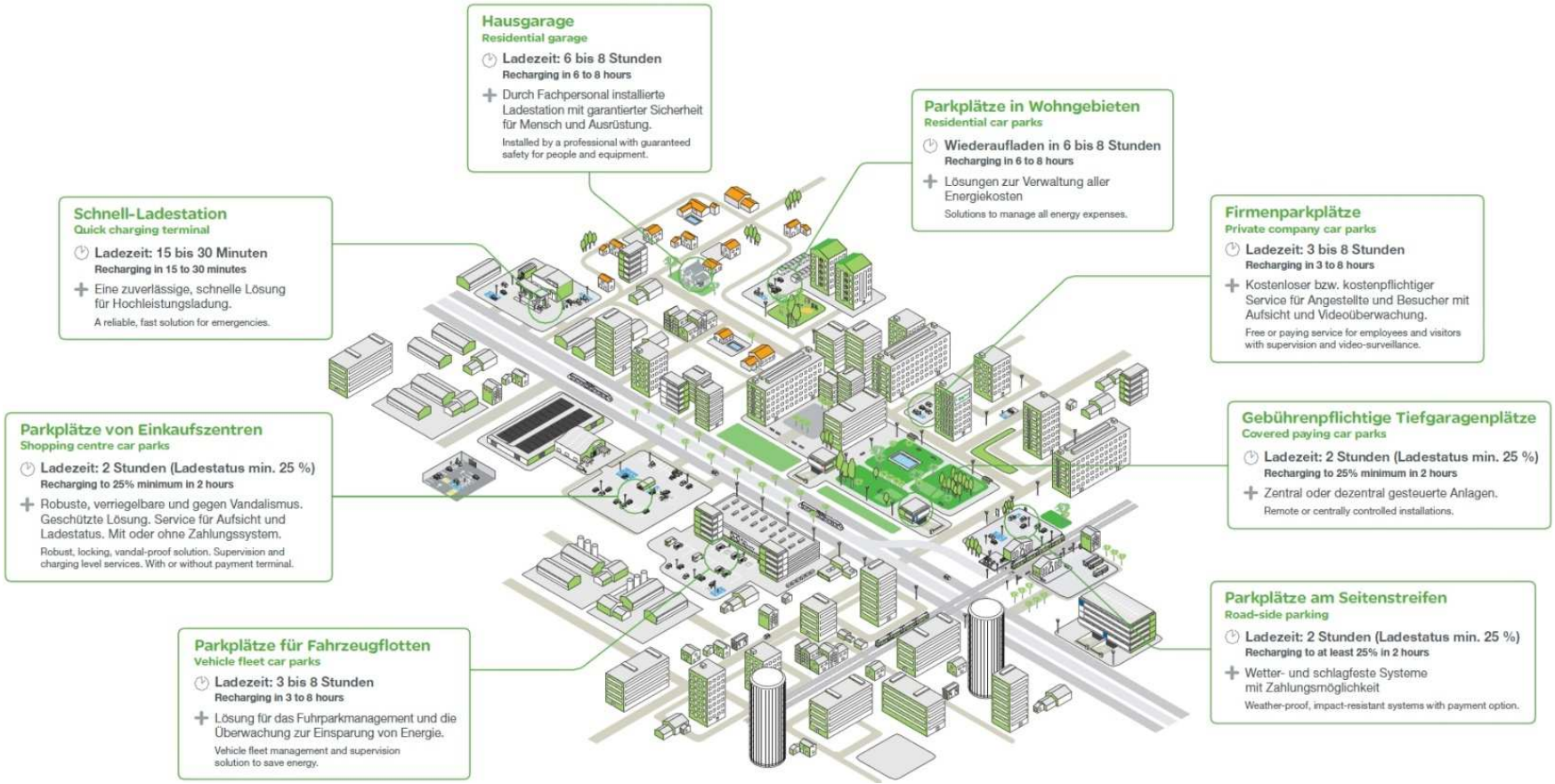
Energy management, one of the key elements of Smart Grid

- The best energy is the one we don't use
- With savings of up to 30 % energy management is decreasing the pressure of eg. extending HV-networks
- Network automation / intelligent substations
- Remote control of renewable energy generation

Energy management, one of the key elements of Smart Grid (cont‘d)

- Cross site energy management
  - Big end customers, e.g steel industry
  - Schneider Electric: Schneider Energy action
- Charging infrastructure for electrical vehicles
  - Connection to the Smart Grid
  - Billing, accounting

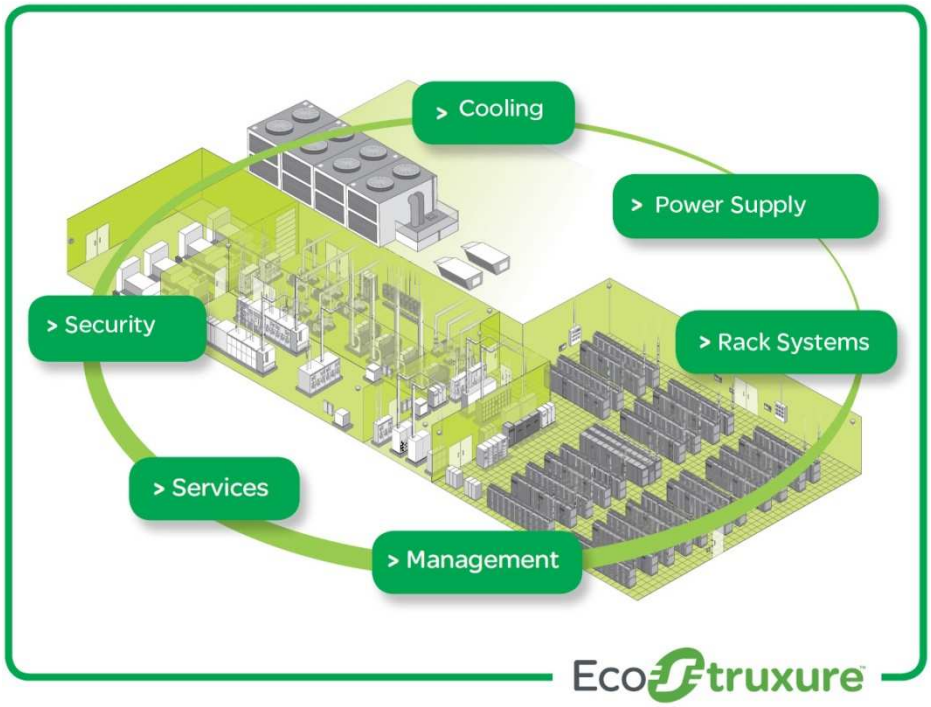
Smart eMobility infrastructures



Smart data centers to meet the requirements

- Efficient data center infrastructue
  - Appropriate architectures
    - Hot aisle containment systems, facility modules, advances cooling solutions
  - Scalability to guarantee maximum efficiency
  - High sophisticated planning and management software
  - Integrated management software for operations
    - Integrated solution: integrate with facility management
    - Smart Grid ready

Smart data center



- Smart data center
  - Best-in-class energy efficiency
  - Comprehensive energy management
  - Linked to facility management and the Smart Grid

The target: smart integration in a smart city