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Status quo of R&D and Product Development on intelligent Secondary Substations (iONS)

Andreas Lugmaier, Head of Research Group “Industrial Networks”

Industry Day 2014, Vienna
10.2014

Agenda

1. Motivation
   - Challenges for LV Grids
   - Smart Grid Migration Path (LV & MV)
   - Smart Grids 2.0
2. Examples for R&D projects and product development
   - ISOLVES & GMD
   - Smart LV Grid & FITformer® REG –v2 and iONS
3. Summary

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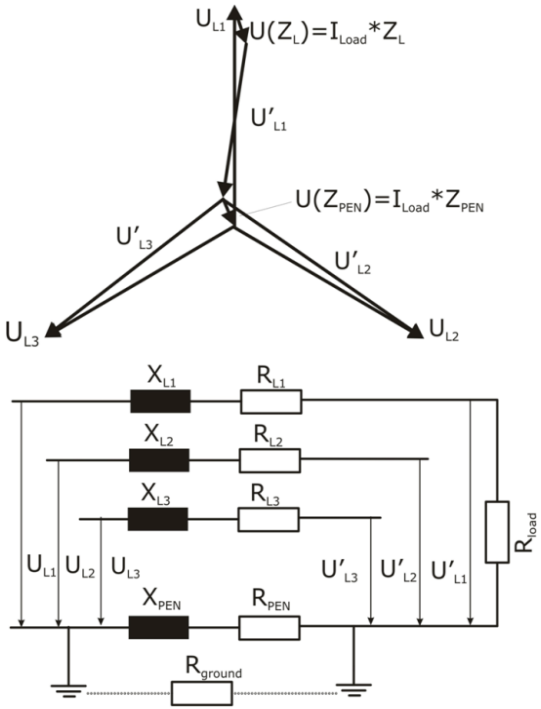
Challenges for LV networks

voltage problem

asymmetrical load flows



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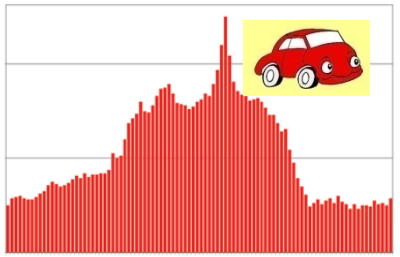
real peak load



decentralized generation

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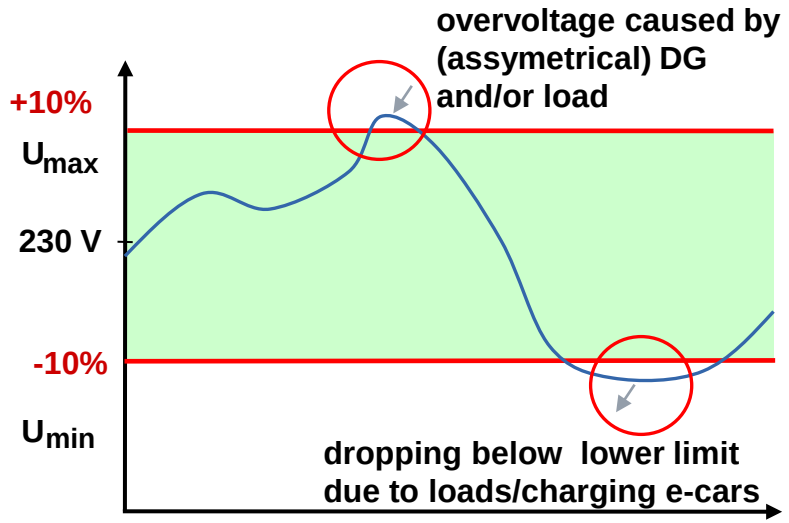
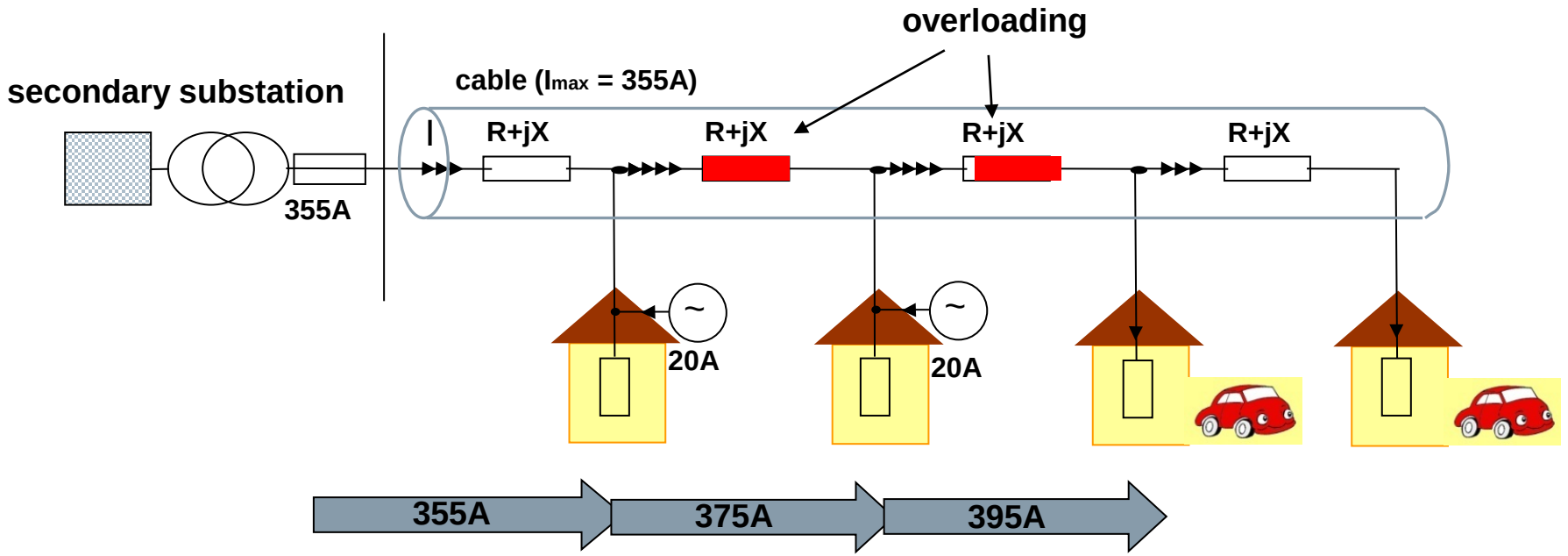
potential voltage band violations



monitoring and management of voltage band become necessary standardized limits: nominal voltage (230V) +/- 10%

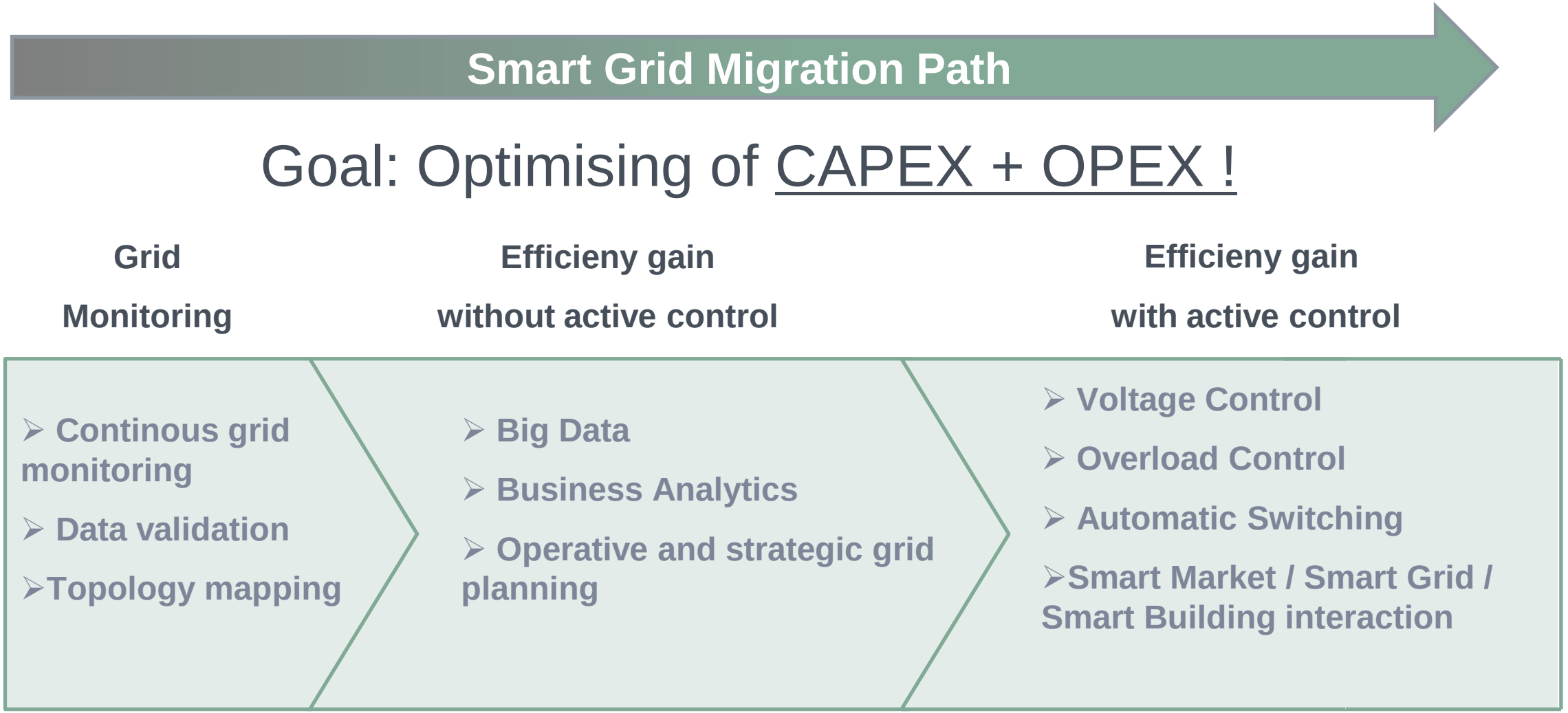
Challenges for LV networks

load flow problem



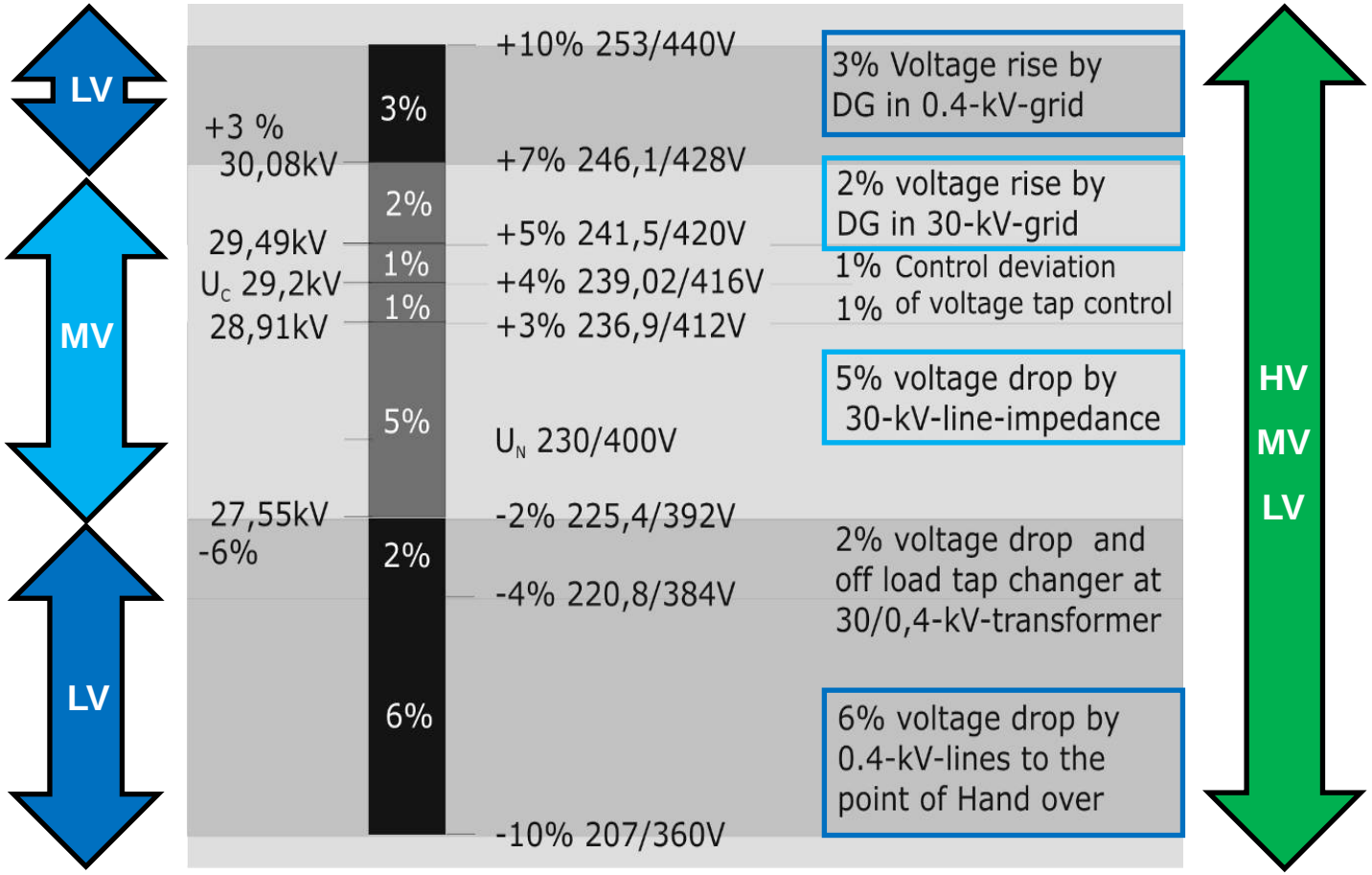
load flow management to protect network infrastructure become necessary limits: cable loading

Smart Grid Migration Path



Smartgrids 2.0

Future Active Network Management



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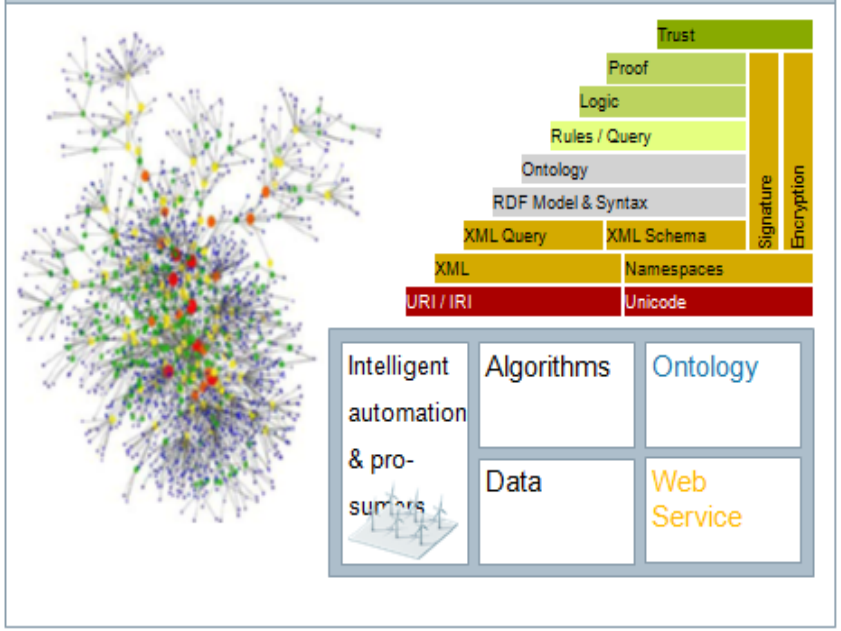
Smart ICT & Web down to the field



= **Smartgrids 2.0**

source: CIRED 2010, Session 5 Paper 0198

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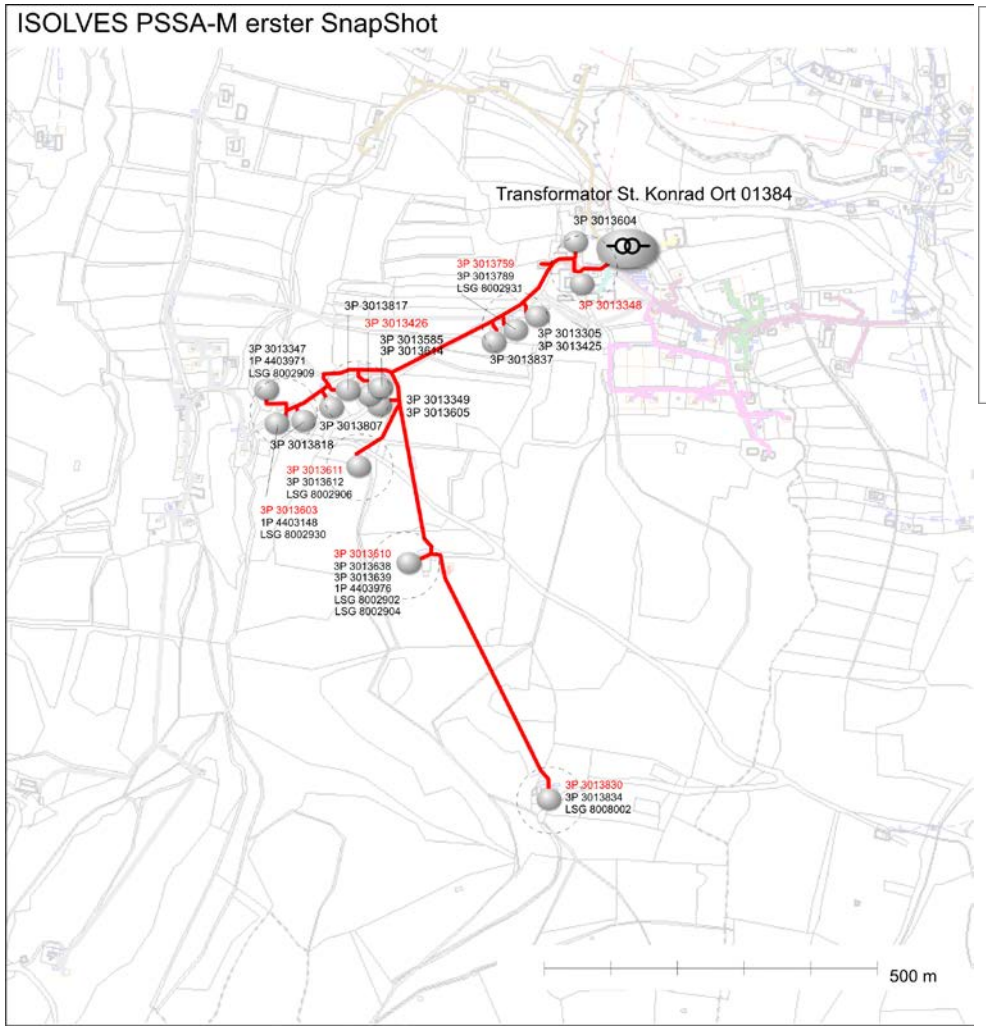
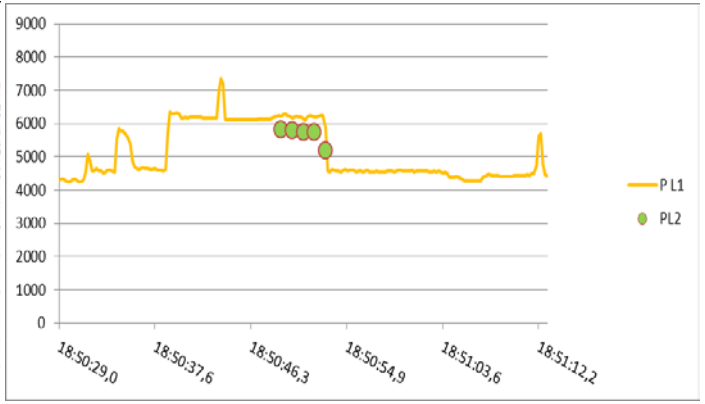
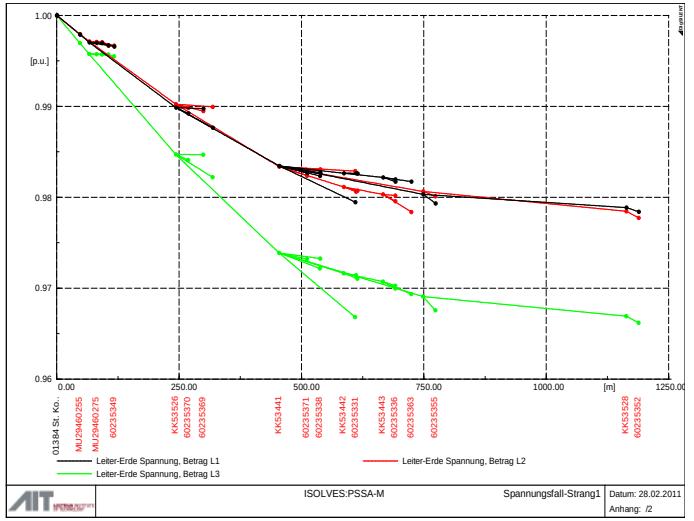
Projects considering LV networks
ISOLVES - Power Snap Shot Analysis by Smart Metering (PLC – CX1)







„Smart Meters as eyes in the grid ...“

... especially for unbalanced loads in the LV-grid as a four-wire system ..!

Source: Energie AG Oberösterreich Netz GmbH, A. Abart

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AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

WIEN ENERGIE STROMNETZ

Salzburg Netz

ENERGIE AG Netz

Projects considering LV networks
Smart Low Voltage Grid (SLVG)

ENERGIE AG Oberösterreich | BEWAG NETZ | Salzburg AG | LINZ AG STROM

Smart LV Grid Konzepte
Smart planning, monitoring, control

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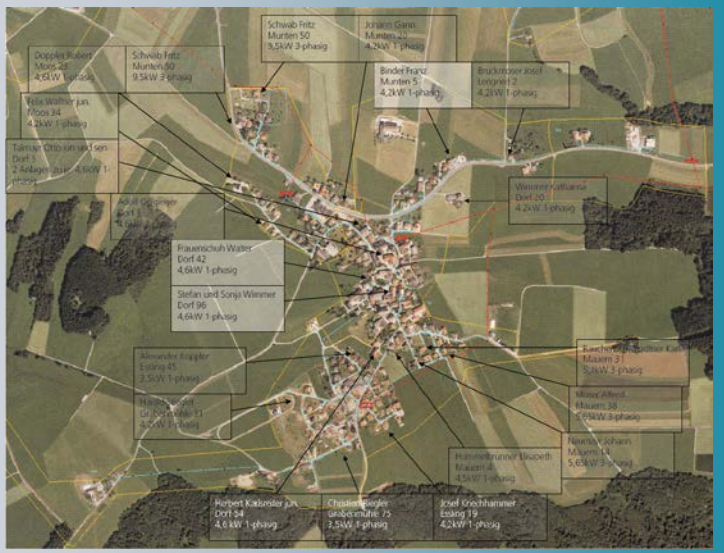
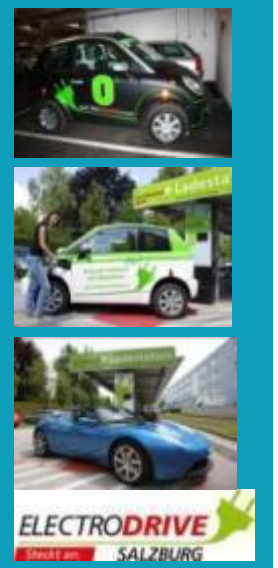
Photovoltaic
every 2nd roof“

Feld Test Gebiete
Köstendorf/S – Eberstalzell/OÖ



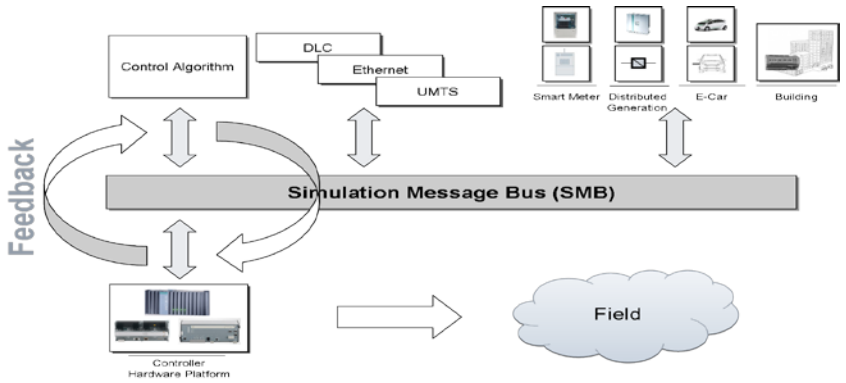
„Validation of solutions for future problems!“

E-Car
„every 2nd car“



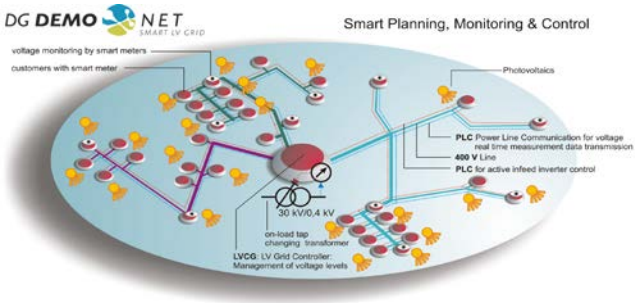
Projects considering LV networks - Smart Low Voltage Grid (SLVG)
Development of intelligent Monitoring & Control

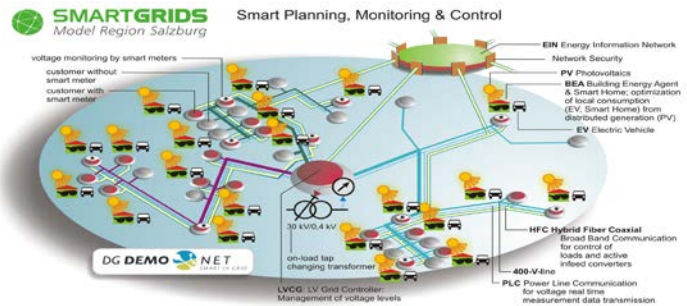
Co-Simulation



Test systems

Field tests





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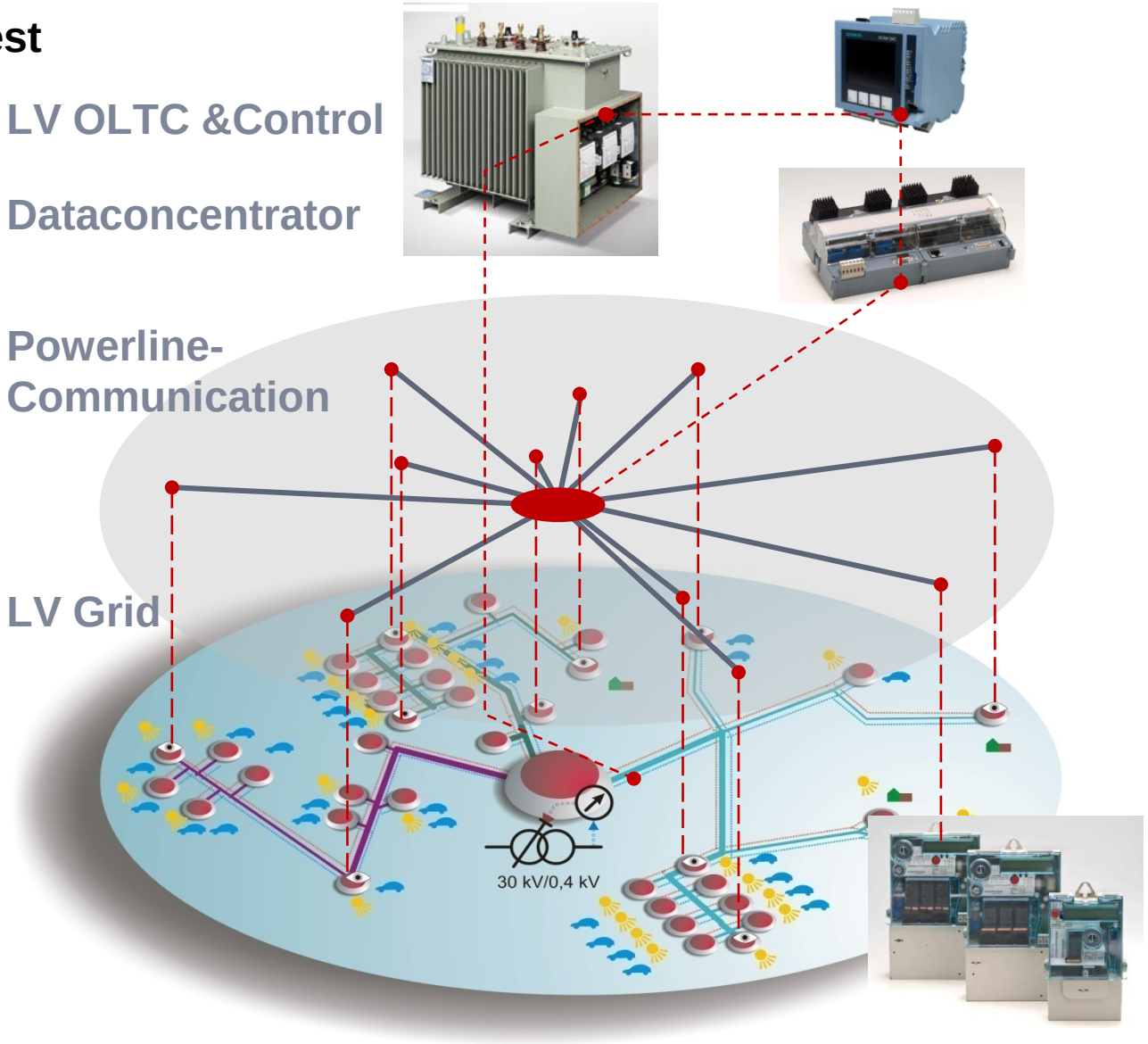
Field Test



Modell / Simulation

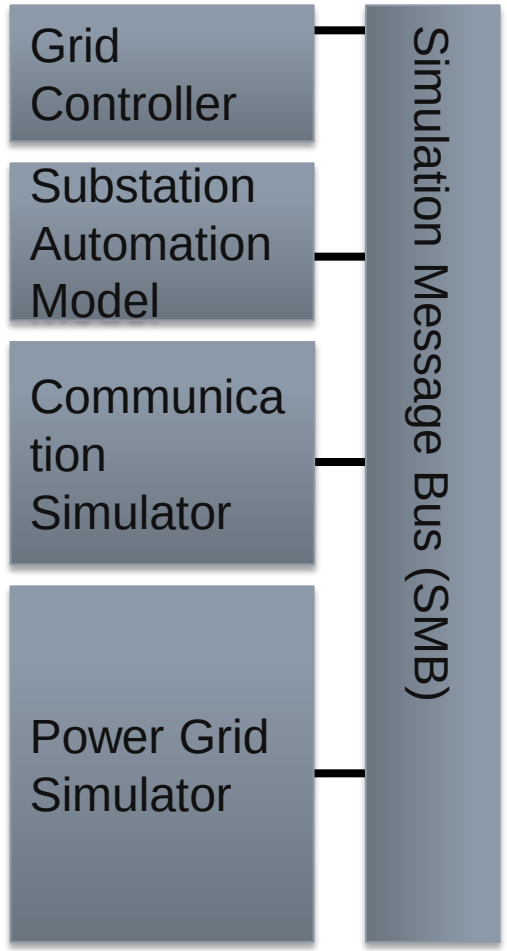


Illustration: Abart/Kupzog

Projects considering LV networks - Smart Low Voltage Grid (SLVG)
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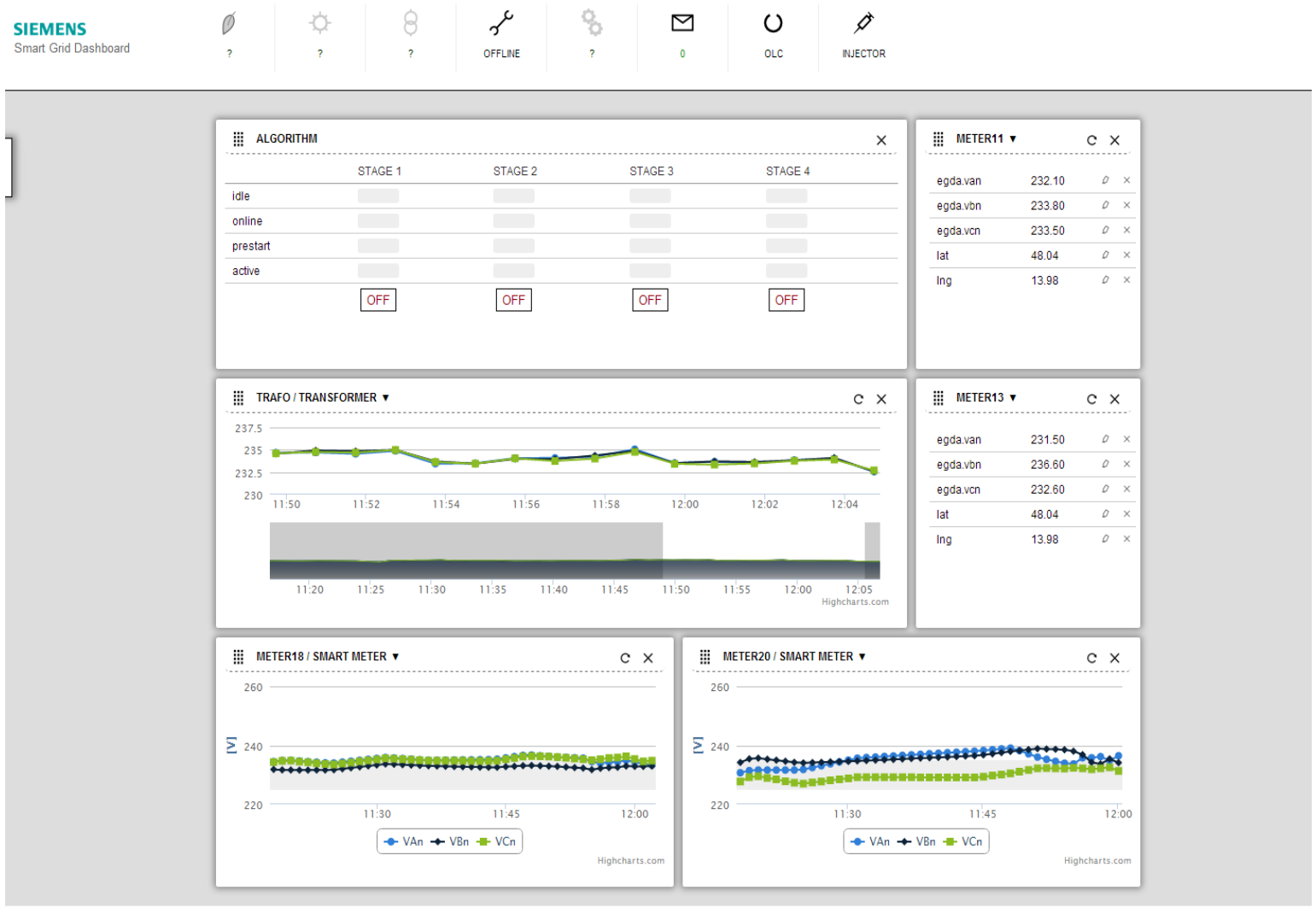

LV Grid – Testsystem

Projects considering LV networks - Smart Low Voltage Grid (SLVG)
Development of intelligent Monitoring & Control

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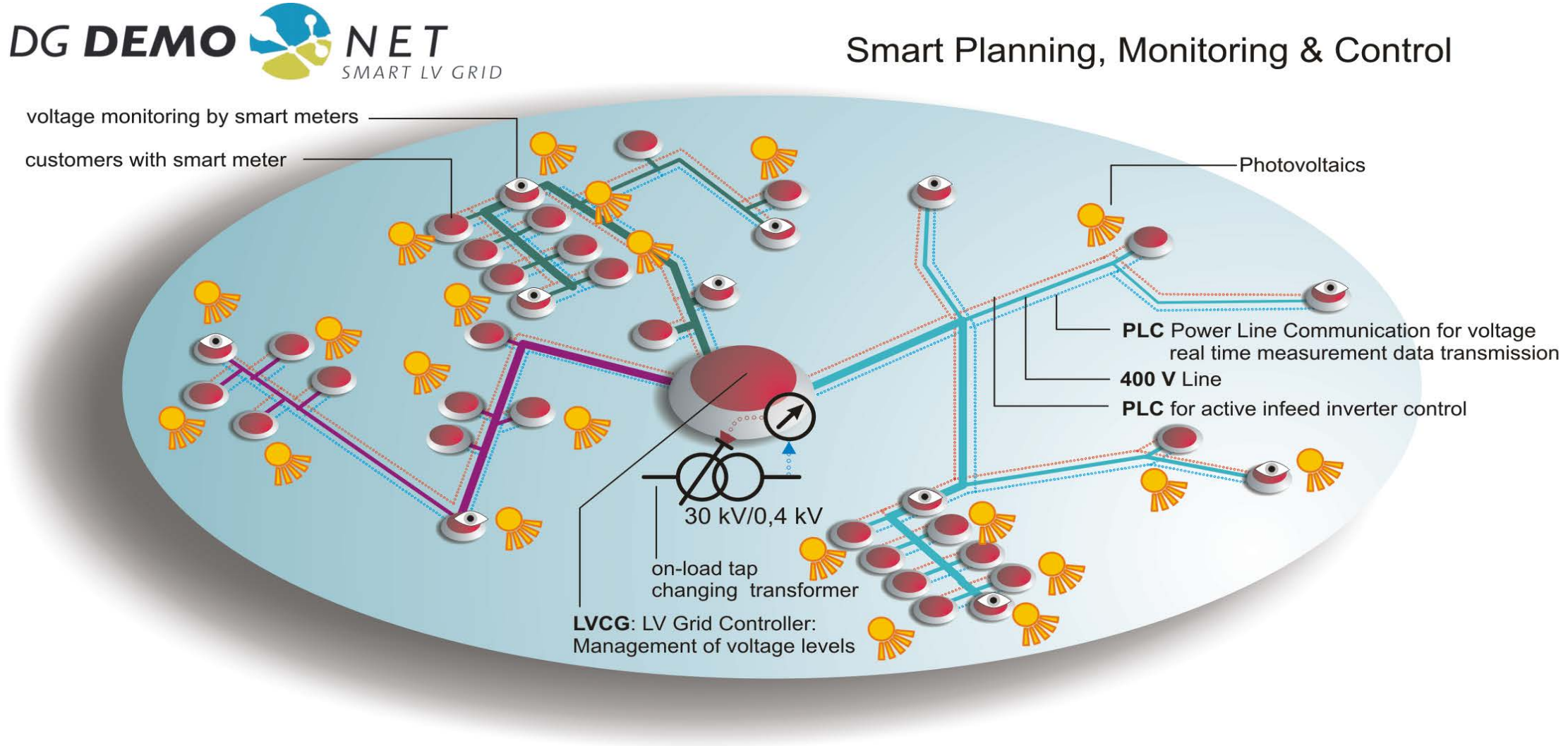
DG DEMO NET
SMART LV GRID



Field Test 1: Eberstalzell / Energie AG Netz / Upper Austria

Illustration: Abart/Kupzog

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Development of intelligent Monitoring & Control

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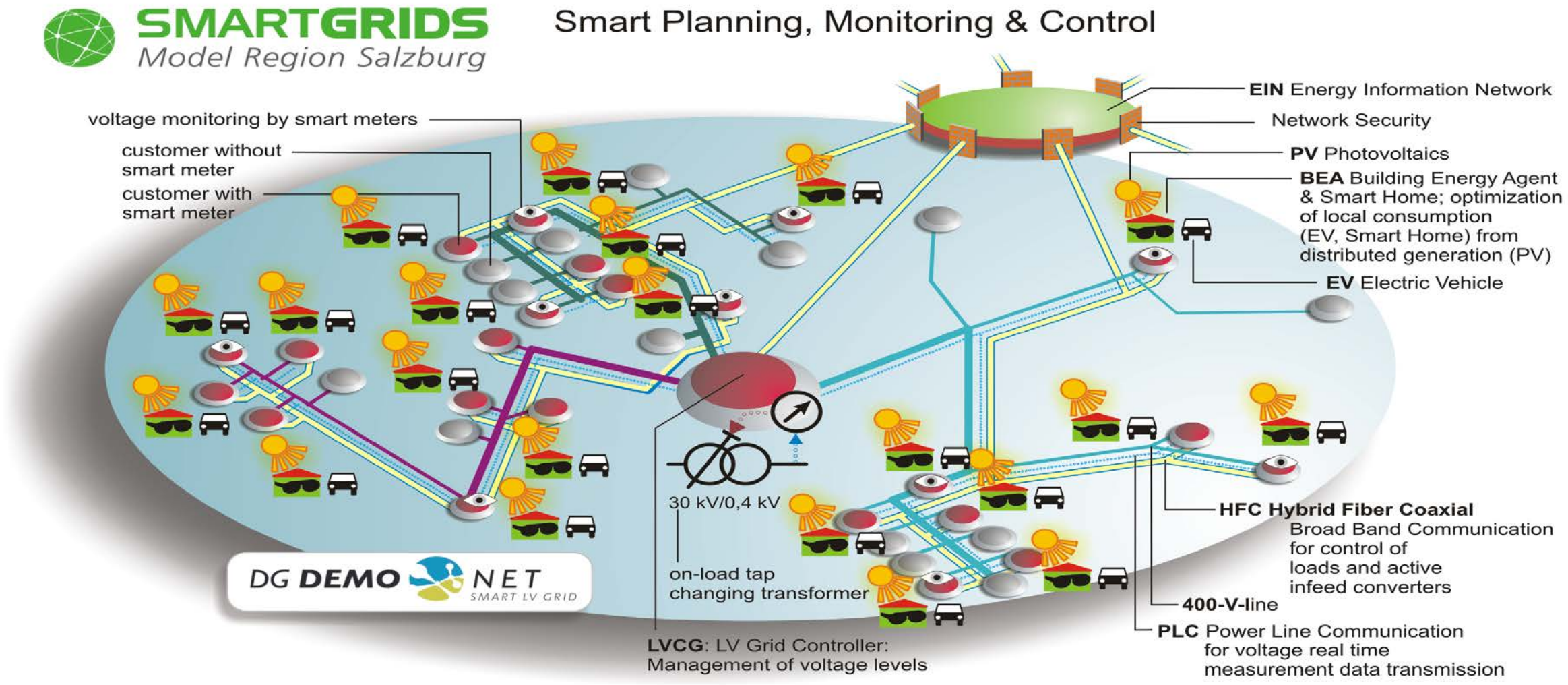
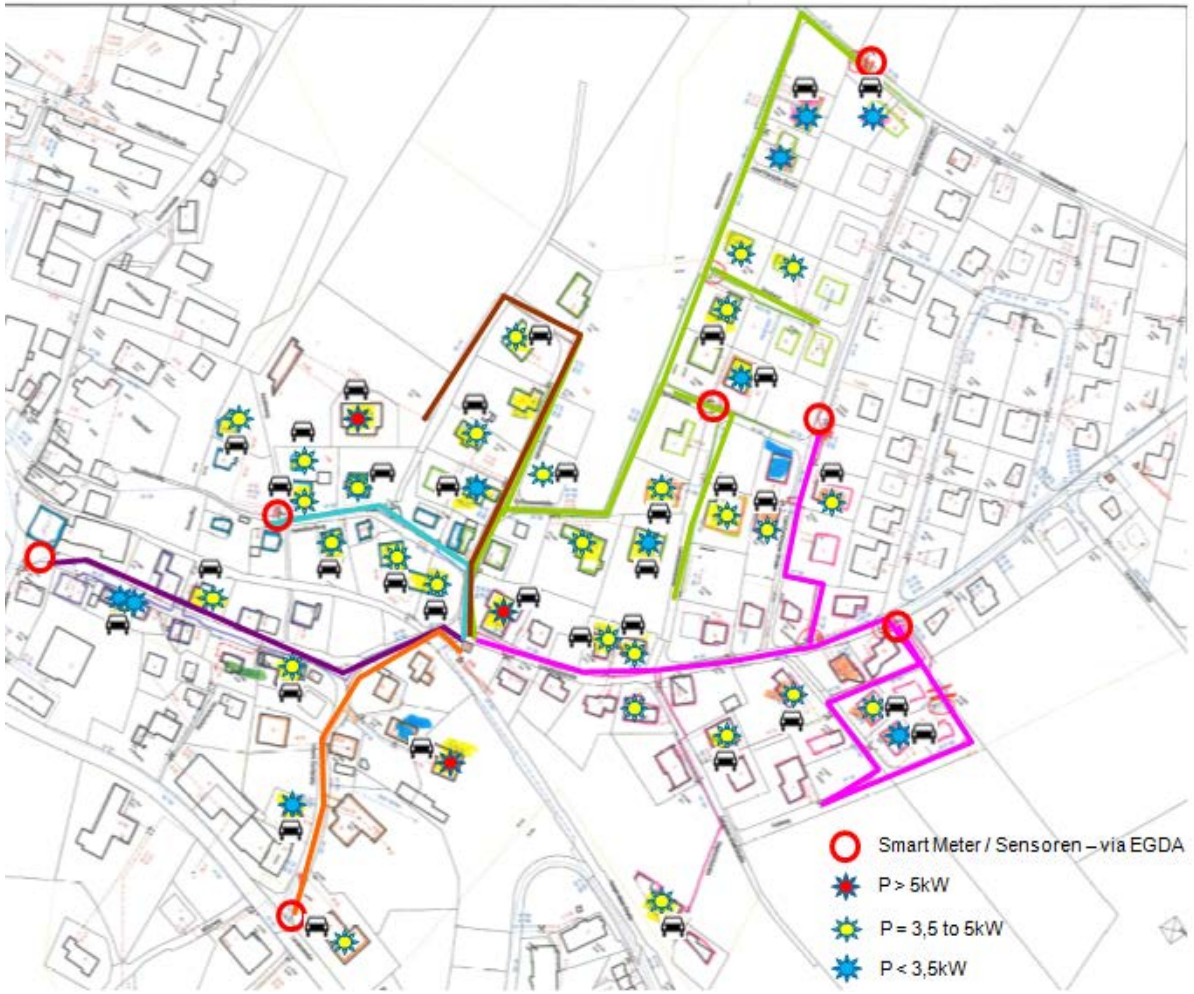


Field Test 2: Köstendorf / Salzburg Netz / Salzburg

Illustration: Abart/Kupzog

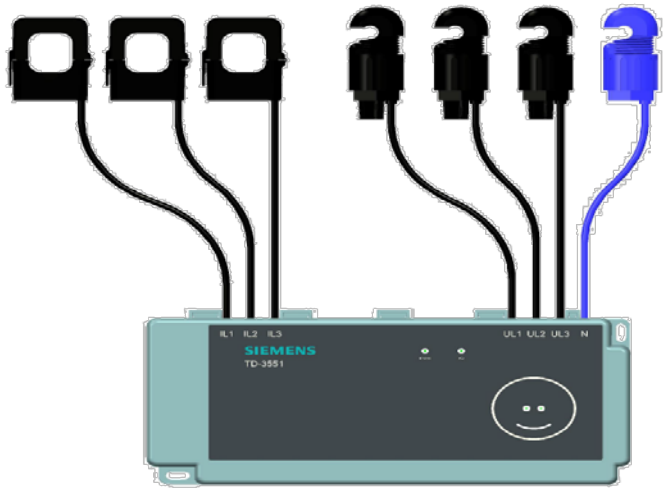
Projects considering LV networks - Smart Low Voltage Grid (SLVG)
Development of intelligent Monitoring & Control

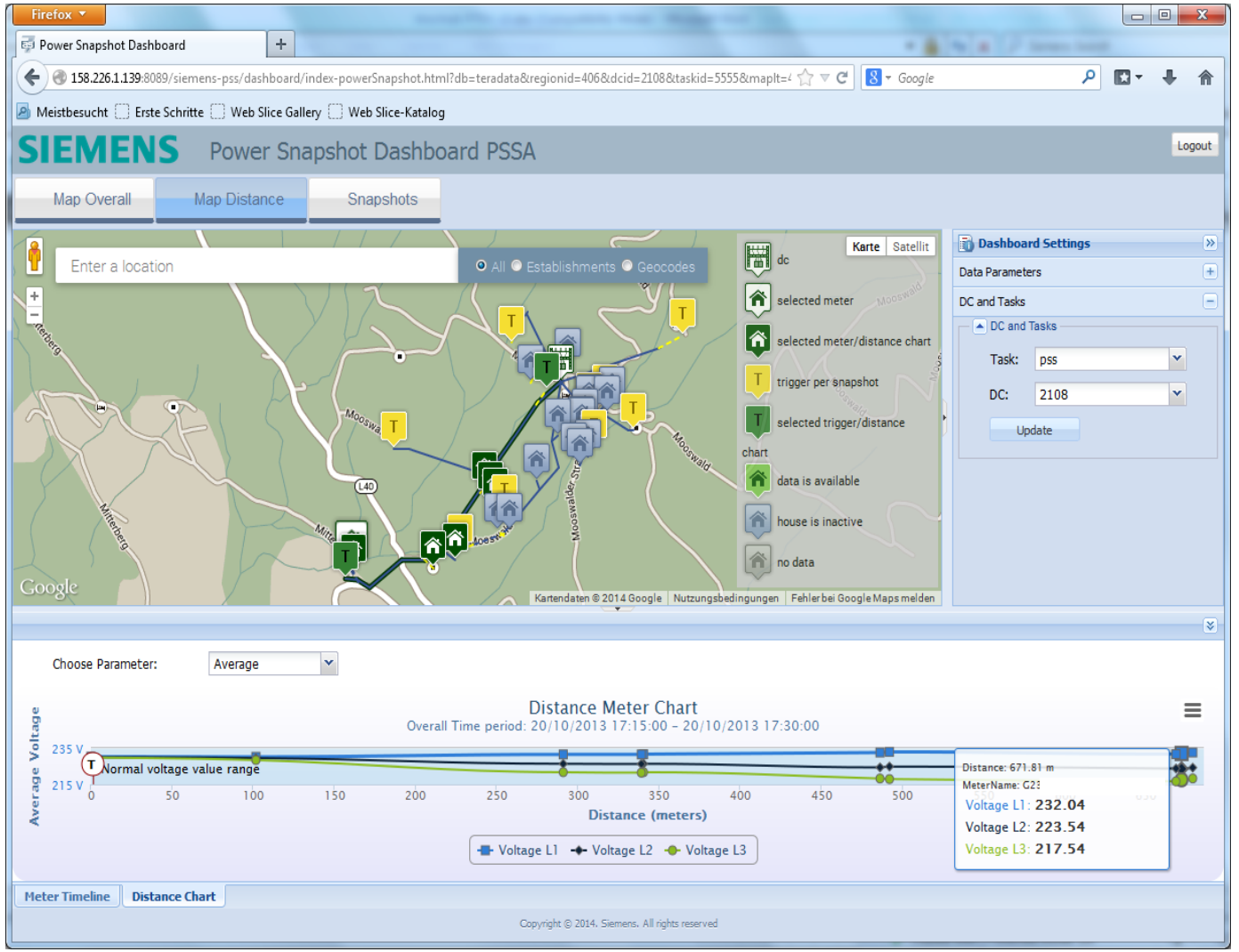
Field Test Köstendorf / Salzburg Netz / Salzburg



Results of R&D Projects and ongoing Product Development - Example 1: Grid Monitoring Device & Datenauswertung - AMIS TD-3551/3552

- e3 Phasen Messbaugruppe: 3x230/400V bzw. 100/250/500A
- Erfassung von Spannungs – und Strom Effektivwerten; Genauigkeit: Klasse=1
- Abgeleitete Werte: P+ / P-; Q+ / Q-; (Lastgangspeicher : 60 Tage 15 Minwerte) f, cos φ P
- Integrierte DLC-Kommunikation (EN 50065-1; 3-95 kHz)
- Infrarot-Schnittstelle für lokales Auslesen und Parametrieren



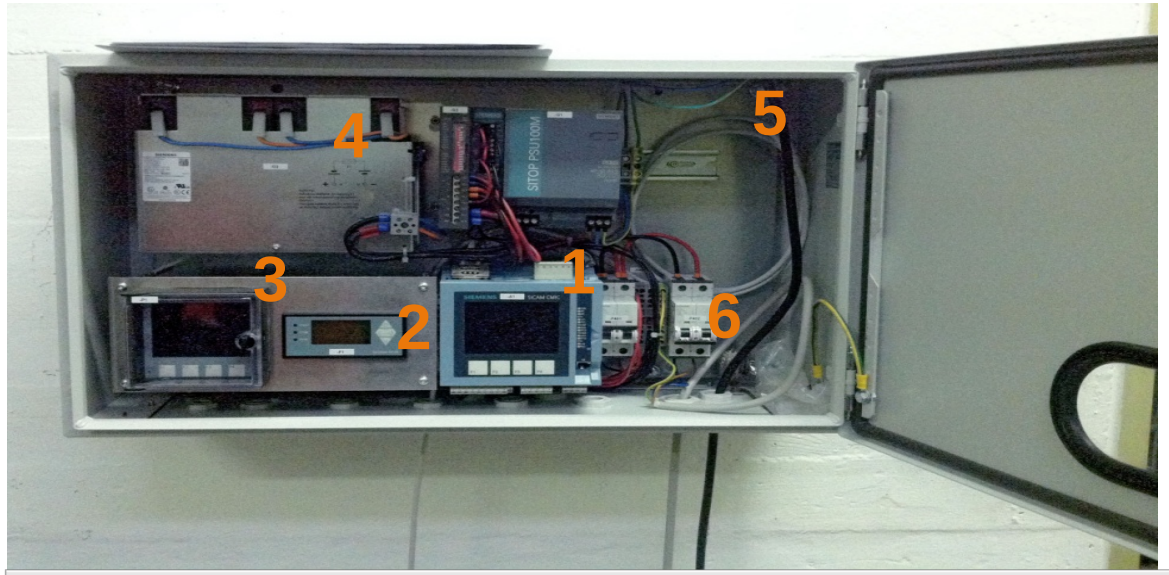


Results of R&D Projects and ongoing Product Development - Example 2: FITformer® REG –v2

- Leistungsbereich bis 630 kVA,
  max. Betriebsspannung: 36 kV
- Unterspannungs-Lastregelbereich
  in drei Stufen
- Zusätzlicher Oberspannungsseitiger Einstellbereich für optimalen Betrieb:
  +/- 2,5% und +/- 5% (Einstellbar im spannungslosen Zustand)
- **Separate Steuer- und Regelungseinheit** für erleichterten Zugang sowie Wartung
- **Regeleinheit enthält ausschließlich elektromechanische Bauelemente** (Verbesserung von Sicherheit u. Wartung)
- **Neue Verbindung der Cast Resin Durchführung** (verbesserte Abdichtung)
- **Luftschütze**
- **Optimiertes Layout der Komponenten**

- **Neue Steuerung mit höherem Isolationslevel,** sowie integrierter IEC 60870-5-104/101 und Modbus RTU Kommunikation

Results of R&D Projects and ongoing Product Development - Example 3: Abgesetzte / Retrofit Lösung für automatisierte Ortsnetzstationen (MS & NS)



Komponenten einer automatisierten ONS im abgesetzten RTU-Schrank:

1 RTU SICAM CMIC (SPS) – Modbusverbindung mit MS-FCM und zB Linak Motor
2 Feeder Condition Monitor SICAM FCM (in der NS)
3 Power Quality Recorder SICAM P855 (in der NS)
4 SiTop USV mit Stromversorgungseinheit und Batterie
5 freier Platz für Modem
6 Sicherungsautomaten

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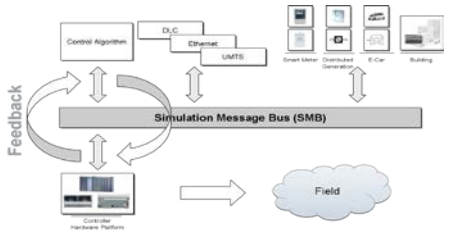
Summary

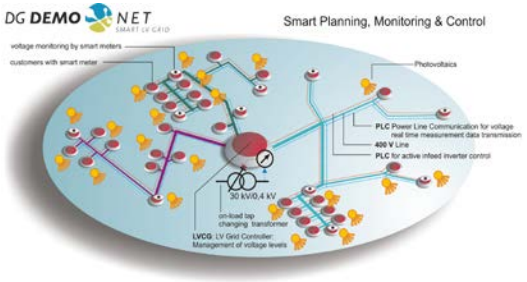
From Research to Products to Smart Grid Migration Path

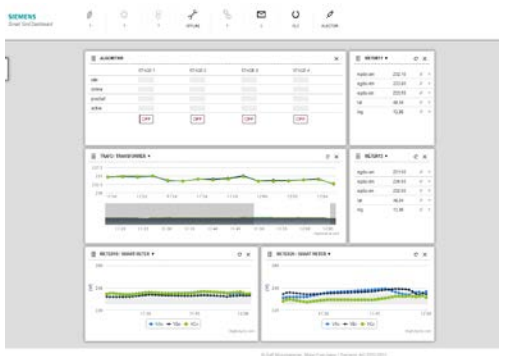
Optimising of

CAPEX + OPEX !

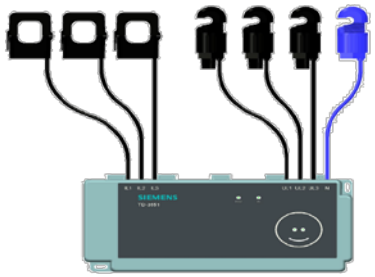
R&D, Test systems & Field tests







Products & Migration Path



1. Grid Monitoring

2. Efficieny gain without active control

3. Efficieny gain with active control

Thank you for your attention!

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