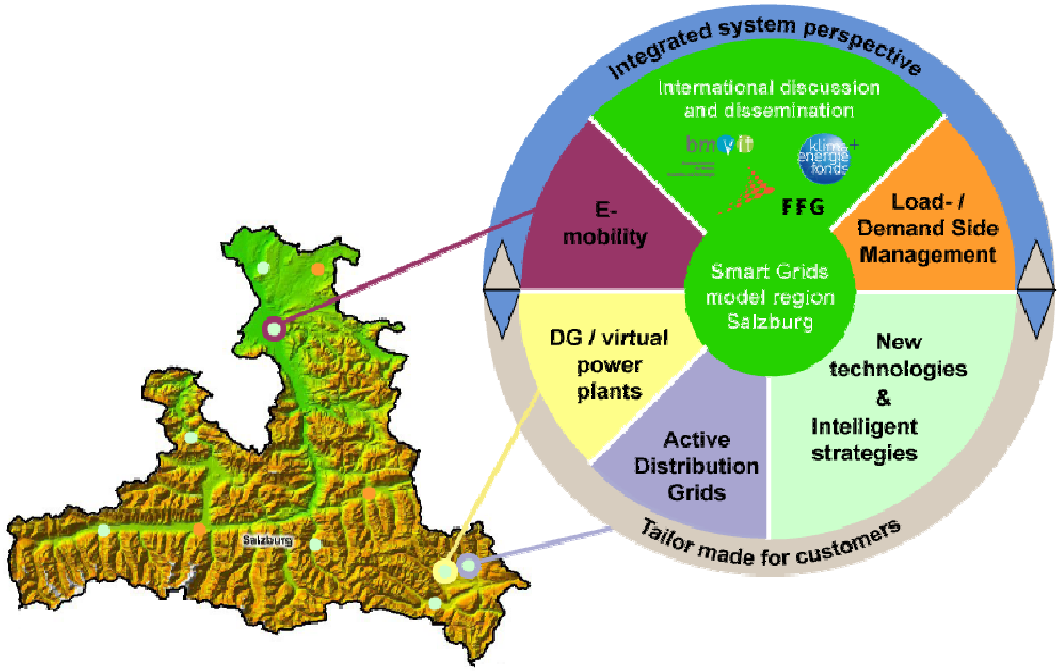
DI Thomas Rieder, MBA

Salzburg Netz GmbH
Head of Electricity Grids
Dpt. Head of Business Unit Grids



SMARTGRIDS
Model Region Salzburg

Salzburg AG Salzburg Wohnbau SIEMENS

CIRED Croatian National Committee

Seminar "Distribution Smart Grid"
14th June 2011, Zagreb

Multi Utility Company Salzburg AG
Business Units

Salzburg AG

Energy

Power Plants, Trading and Sales (Electricity, Gas)

Mobility – Public Transport

Grid-Infrastructur

Electricity | Gas | District Heating | Water | *Telecom-unications* | Cabel-TV Telephone VOIP | Internet

Salzburg Netz
Ein Unternehmen der Salzburg AG

Our Customers

Salzburg AG

Public Transport

46 Mio. Passengers

Electricity

250.000 Customers

Gas

35.000 Customers

Internet

56.000 Customers

District Heating

20.000 Customers

Cabel-TV

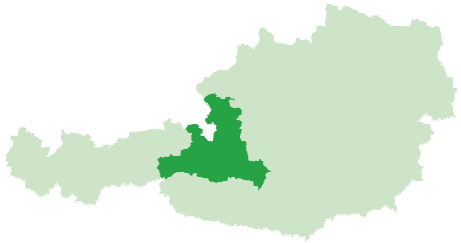
110.000 Customers

Water Supply

145.000 Inhabitants

Telephone (VOIP)

17.000 Customers



Business Volume 2010: 1.432 Mio €
Employees 31.12.2010: 1.989

www.salzburg-ag.at

Content

- Challenge – why Smart Grids?
- National Technologyplatform Smart Grids Austria
  A roadmap for implementation
- Smart Grids Model-Region Salzburg (SGMS)
  Report of experience concerning goals and benefits from Smart Grids

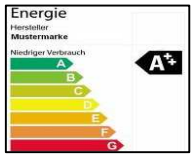
1. Challenge - Why (do we need) Smart Grids

Challenge:

Energy Policies and Trends in Society

Expansion of Renewable Energies

Reduction of CO2-Emissions



Increase of Energy Efficiency

Reduction of Dependance of Fossil Energy

Miniaturization

cause a

Total Reconstruction of the Energy System

E-Mobility

Networking

Increasing Individualisation

Increasing Environmental Awareness

Classical structure "central producer distributes the electricity to many small customers" is turned on its head

Challenge:

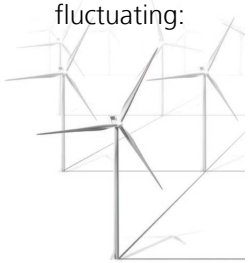
Offer + Demand made to cover

SMARTGRIDS Model Region Salzburg

Production

controllable:

fluctuating:



\+

Storage

Today: Pump Storage

In future also
parking E-Vehicles (?)

ELECTRODRIVE Steckt an. SALZBURG

=

Consumption

Quality of supply and supply reliability must meet !

Salzburg AG Salzburg Wohnbau SIEMENS

Possibilities

to adjust the current account

SMARTGRIDS Model Region Salzburg

1. Control of Consumption

Examples

Demand Side Managment
use of virtual storages
controllable charging
E-vehicles

=

2. More Storages to the Grid

Today: Pump Storage

In future also
parking E-Vehicles (?)

ELECTRODRIVE Steckt an. SALZBURG

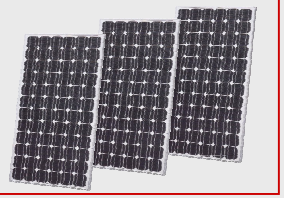
Vehicle to Grid
stationary batteries
flywheels,
...

+

3. Adjustment of Production

controllable

fluctuating



control of renewable
energy-producers,
load-shifting
...

Smart Grids
intelligent management and adjustment

Salzburg AG Salzburg Wohnbau SIEMENS

Smart Grids are the enablers to achieve the energy policy objectives

Excerpt from a lecture by **Fabrizio Barbaso (I),**

Deputy Director General of DG Energy, European Commission

(GEODE Autumn Workshop, 04.11.2010 in Brussels)

- **Smart grids play a central role in EU energy policy and contribute significantly to achieving the target in all three pillars of EU energy policy**
  1. Decarbonization / Sustainability (20-20-20-goals untill 2020 and longterm objective: -80% CO_2 untill 2050)
  2. Ensuring security of supply
  3. Market development and competitiveness

2. National Technology Platform (NTP) Smart Grids Austria A roadmap for implementation

Smart Grids Austria – Objectives

www.smartgrids.at

- To bundle the strength of different stakeholders
- To efficiently use synergies of the different Stakeholders
- To show competence through international visible light-house projects
- To indicate, how to overcome existing barriers

SMARTGRIDS AUSTRIA

FACHVERBAND DER ELEKTRO- UND ELEKTRONIKINDUSTRIE

oesterreichs energie.

NTP Smart Grids Austria –
Consortium (Mai 2011 – 35 partner)

Industry

Alcatel·Lucent
sprecher automation
BEA
IMENDO
austriamicrosystems a leap ahead in analog
Itron Knowledge to Shape Your Future
Fronius
IBM
PDTS
Infineon technologies
Landis+Gyr manage energy better
SIEMENS
LANTIQ
SCHRACK TECHNIK
Cegelec
ABB Power and productivity for a better world™
Nokia Siemens Networks

Grid Operators / Energy Sector

Verbund
oesterreichs energie.
ENERGIE AG Netz
LINZ AG STROM
Salzburg Netz
WIEN ENERGIE STROMNETZ
VKW Netz VKW-Netz AG
ENERGIE STEIERMARK STROMNETZ
TIWAG Netz
EVN

R&D Partner

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY
FACHHOCHSCHULE TECHNIKUM WIEN
TUG Institut für Elektrische Anlagen
ifz
TU WIEN
VIENNA UNIVERSITY OF TECHNOLOGY
INSTITUTE OF COMPUTER TECHNOLOGY
EEG Energy Economics Group

- ***joint vision, definitions of SG; benefits, explanations and building blocks***
- ***platform for active cooperation & joint international lobbiing***
- ***joint public affairs***

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oesterreichs energie.

Smart Grids Austria – How did we start ...

www.smartgrids.at

- **Mai 2008: Open discussion platform**
  - supported by “first movers” from industry, DSO’s an R&D-actors (Universities, Applied Researchers) - overall 15 partners
  - supportet and funded by the ministry (BmVIT) for the first 2 years of “networking” by a program-call “Neue Energien 2020” (50% of 250 T€ total costs)
  - open for further partners from the beginning on, but after start without funding

- **first 2 years :**
  - definition of Smart Grids – was does this mean for all of us, where do we confine
  - discussion of the goals, the benefits, the needs, ... of SG in Austria $\Rightarrow$ ***Roadmap***
  - conception of new (funded) R&D-projects through several partners (bilateral)

- **time “after funding”:**
  - Organizations of Electrical- and Electronic-Industry (FEEI) and Austrian E-Sector (Österreichs Energie – OE) finance the platform
    togehter with the cooporation of the research-actors all actions are organized
  - partners finance their contribute (working time, travel-/hosting costs) for their own
  - Ministry (BmVIT) promotes the cooporation with other countries (D-A-CH)

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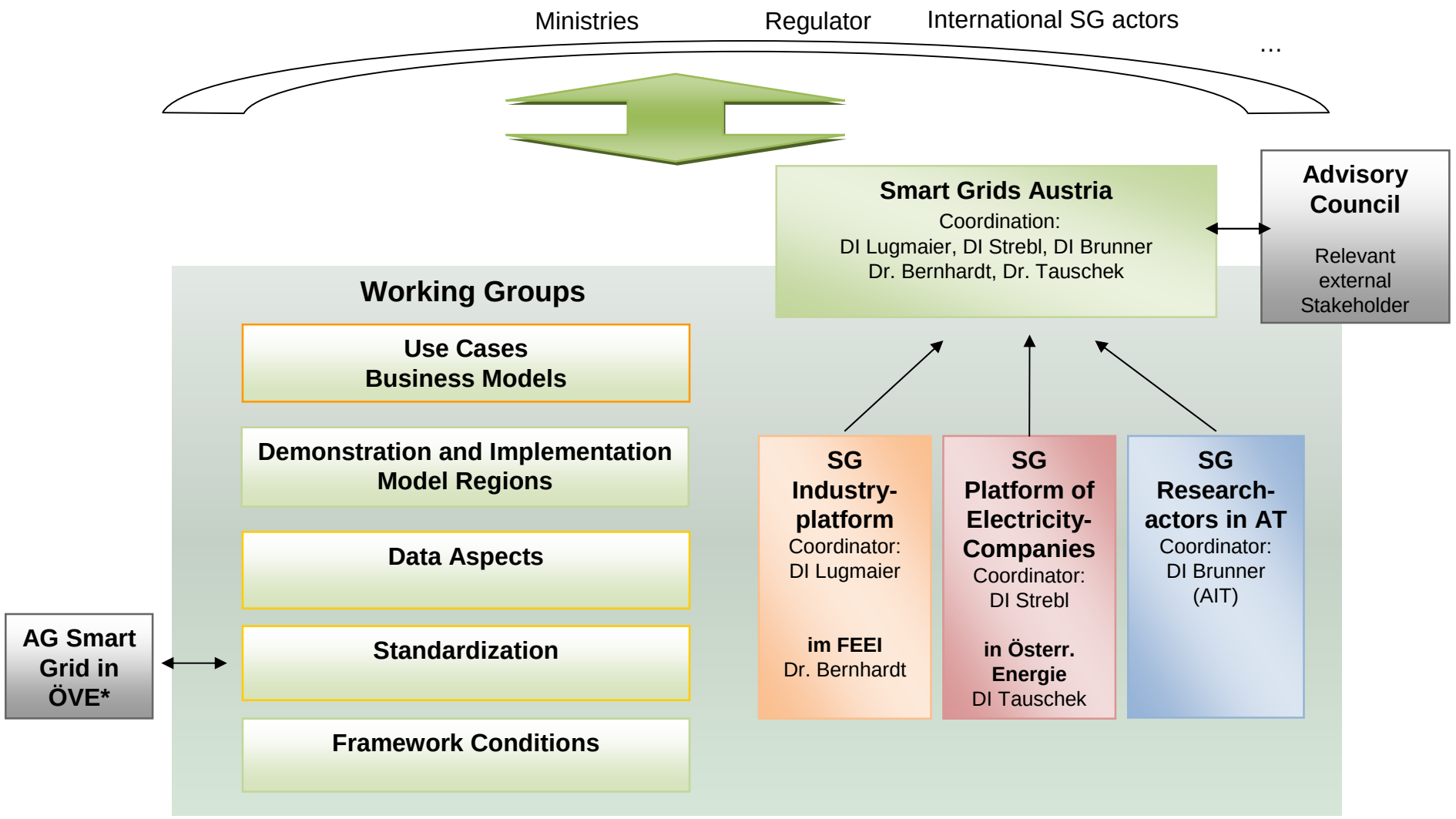
oesterreichs energie.

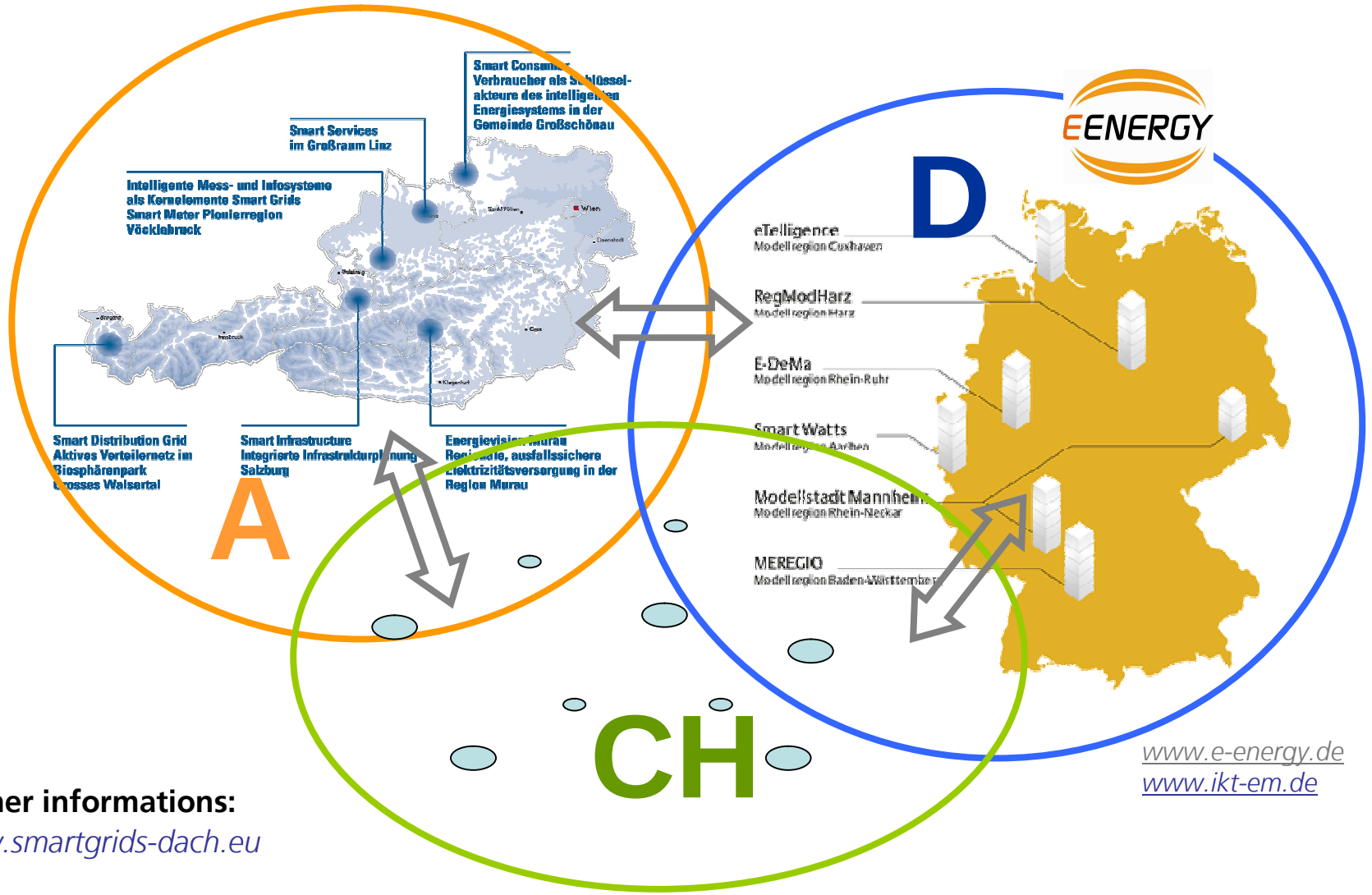
Smart Grids Austria – Structure



* commitee of standardization for electrical rules

also WG in D-A-CH - Cooperation

Smart Grids D-A-CH (Germany - Austria – Switzerland)



www.e-energy.de
www.ikt-em.de

further informations:
www.smartgrids-dach.eu

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oesterreichs energie.

R&D- Roadmap Smart Grids Austria

Download under

www.smartgrids.at (in German)

- Point of departure in AT and benefits
- Requirements for realization
- Strategy for implementation

Roadmap - Objectives

The Roadmap Smart Grids Austria…

- addresses relevant Smart Grid related trends
- describes important key aspects for the future modernisation of electricity grids.
- supports national decision makers from politics, ministries and research institutions with the supply of a profound decision basis.
- specifies the chances, challenges and implications resulting from possible R&D in the Smart Grids technology sector.
- Identification of a pathway for Austria which enables a future ready intelligent electricity supply, is prepared for dealing with the rising challenges and able to utilize the existing chances

SMARTGRIDS AUSTRIA

FACHVERBAND DER ELEKTRO- UND ELEKTRONIKINDUSTRIE

oesterreichs energie.

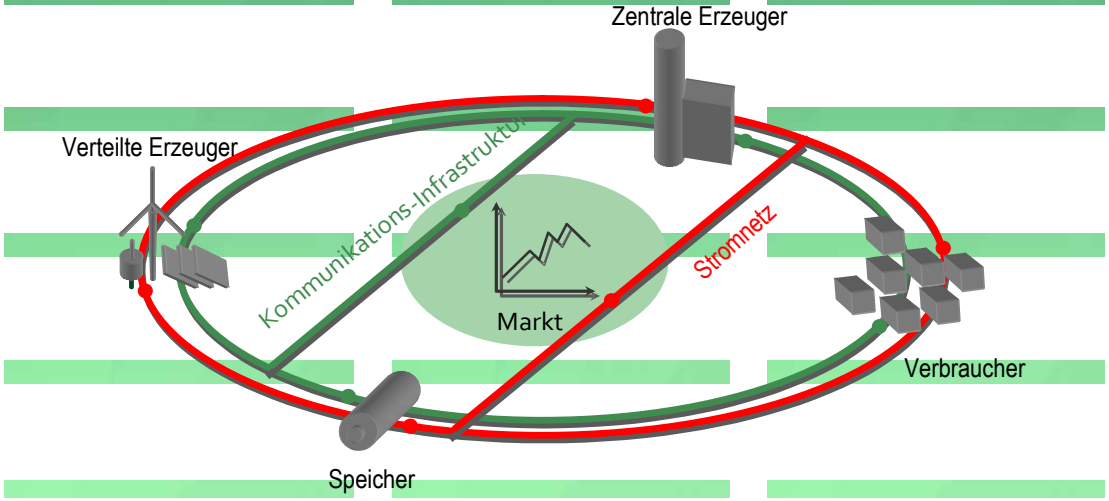
Raodmap - Topics

Technical:
Intelligent Management-Systems within communication from producer to customer

Enconomical:
New Business Models & Incentive Systems

Legal:
Adjustment of legal framework

Source:
National Technologyplatform Smart Grids Austria



Customer & Market / Regulation

System operation and Management

Communication- and Information-Infrastructure

Intelligent Components

R&D strategy for implementation

- timeframe: short- (2010 – 2012), middle- (2013 -2015), longterm (2016 – 2020), later than 2020
- differentiated between research, experimental development und demonstration
- weighted focus along the four Smart Grid topics
- estimation of budgets

SMARTGRIDS AUSTRIA

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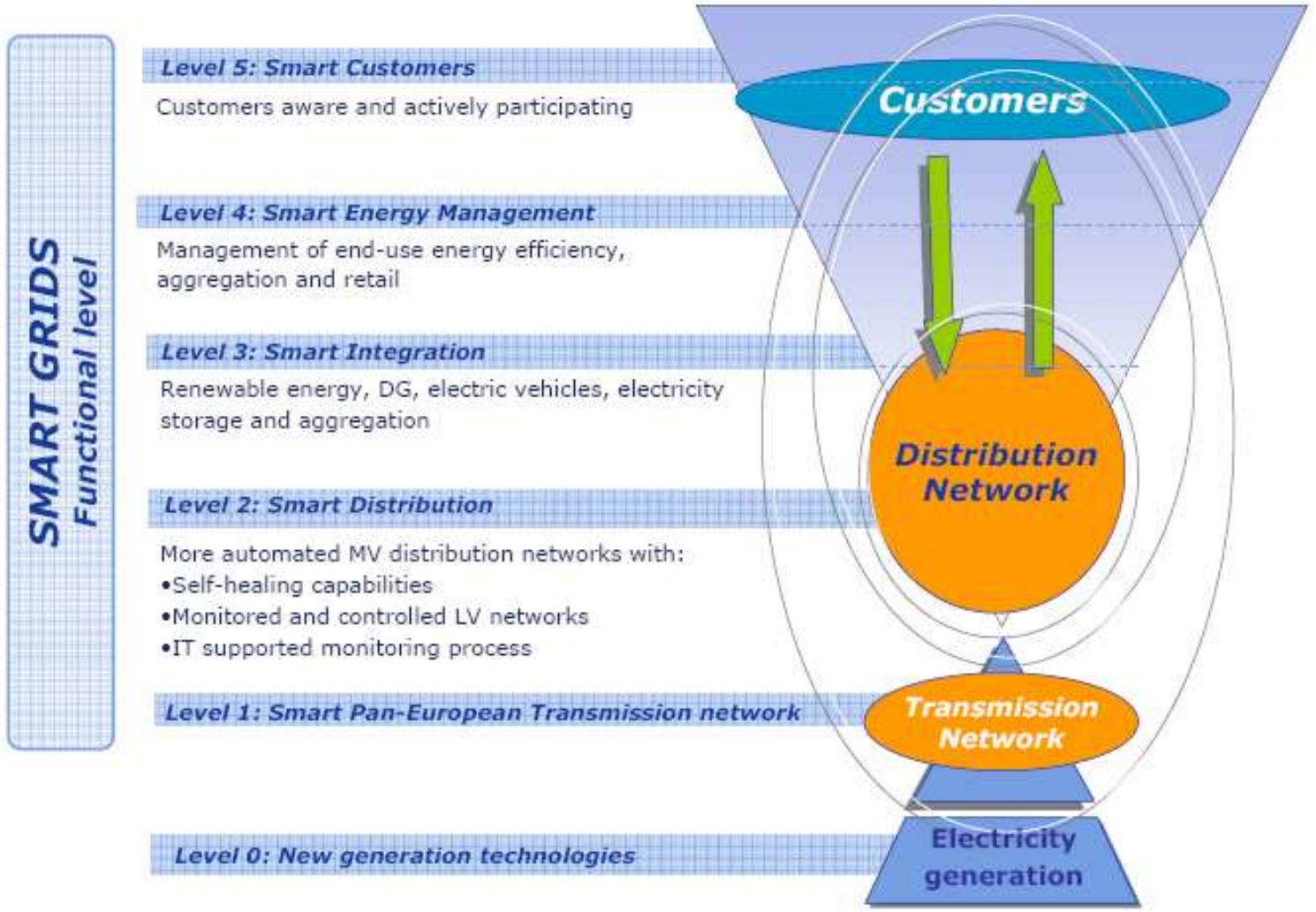
oesterreichs energie.

Austrian Contribution to EEGI / SET Plan*



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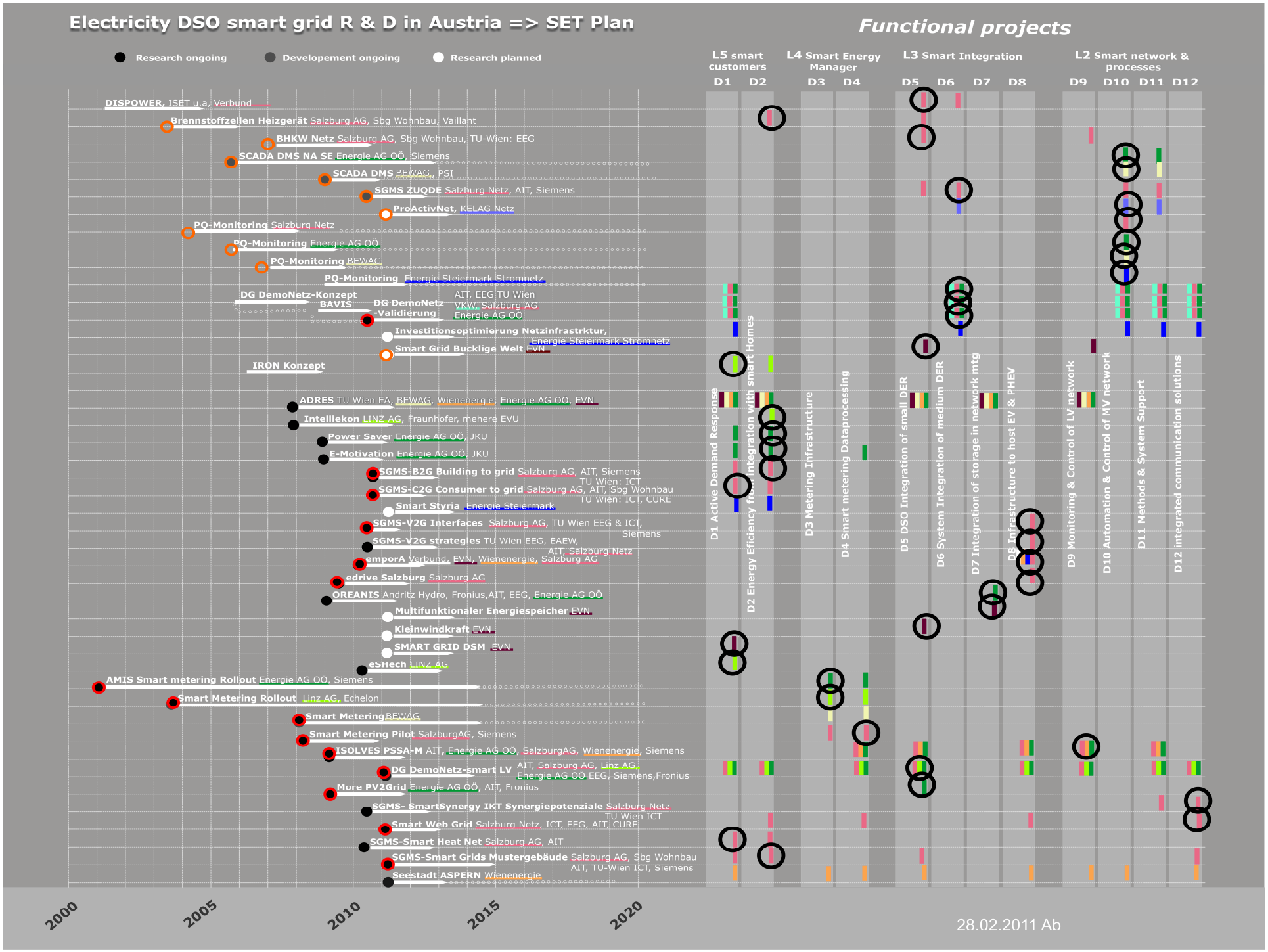
oesterreichs energie.

* European Electricy Grid Initiative /
Strategic Energy Technology Plan of the EU Commission


Electricity DSO smart grid R & D in Austria => SET Plan
Research ongoing
Developement ongoing
Research planned
DISPOWER, ISET u.a, Verbund
Brennstoffzellen Heizgerät Salzburg AG, Sbg Wohnbau, Vaillant
BHKW Netz Salzburg AG, Sbg Wohnbau, TU-Wien: EEG
SCADA DMS NA SE Energie AG OÖ, Siemens
SCADA DMS BEWAG, PSI
SGMS ZUQDE Salzburg Netz, AIT, Siemens
ProActivNet, KELAG Netz
PQ-Monitoring Salzburg Netz
PQ-Monitoring Energie AG OÖ
PQ-Monitoring BEWAG
PQ-Monitoring Energie Steiermark Stromnetz
DG DemoNetz-Konzept
BAVIS
DG DemoNetz Validierung
AIT, EEG TU Wien
VKW, Salzburg AG
Energie AG OÖ
Investitionsoptimierung Netzinfrastrktur,
Energie Steiermark Stromnetz
Smart Grid Bucklige Welt EVN
IRON Konzept
ADRES TU Wien EA, BEWAG, Wienenergie, Energie AG OÖ, EVN
Intelliekon LINZ AG, Fraunhofer, mehere EVU
Power Saver Energie AG OÖ, JKU
E-Motivation Energie AG OÖ, JKU
SGMS-B2G Building to grid Salzburg AG, AIT, Siemens
TU Wien: ICT
SGMS-C2G Consumer to grid Salzburg AG, AIT, Sbg Wohnbau
TU Wien: ICT, CURE
Smart Styria Energie Steiermark
SGMS-V2G Interfaces Salzburg AG, TU Wien EEG & ICT, Siemens
SGMS-V2G strategies TU Wien EEG, EAEW, AIT, Salzburg Netz
emporA Verbund, EVN, Wienenergie, Salzburg AG
edrive Salzburg Salzburg AG
OREANIS Andritz Hydro, Fronius,AIT, EEG, Energie AG OÖ
Multifunktionaler Energiespeicher EVN
Kleinwindkraft EVN
SMART GRID DSM EVN
eSHech LINZ AG
AMIS Smart metering Rollout Energie AG OÖ, Siemens
Smart Metering Rollout Linz AG, Echelon
Smart Metering BEWAG
Smart Metering Pilot SalzburgAG, Siemens
ISOLVES PSSA-M AIT, Energie AG OÖ, SalzburgAG, Wienenergie, Siemens
DG DemoNetz-smart LV AIT, Salzburg AG, Linz AG, Energie AG OÖ EEG, Siemens,Fronius
More PV2Grid Energie AG OÖ, AIT, Fronius
SGMS- SmartSynergy IKT Synergiepotenziale Salzburg Netz
TU Wien ICT
Smart Web Grid Salzburg Netz, ICT, EEG, AIT, CURE
SGMS-Smart Heat Net Salzburg AG, AIT
SGMS-Smart Grids Mustergebäude Salzburg AG, Sbg Wohnbau
AIT, TU-Wien ICT, Siemens
Seestadt ASPERN Wienenergie
2000
2005
2010
2015
2020
Functional projects
L5 smart customers
L4 Smart Energy Manager
L3 Smart Integration
L2 Smart network & processes
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D1 Active Demand Response
D2 Energy Efficiency from Integration with smart Homes
D3 Metering Infrastructure
D4 Smart metering Dataprocessing
D5 DSO Integration of small DER
D6 System Integration of medium DER
D7 Integration of storage in network mtg
D8 Infrastructure to host EV & PHEV
D9 Monitoring & Control of LV network
D10 Automation & Control of MV network
D11 Methods & System Support
D12 integrated communication solutions
28.02.2011 Ab

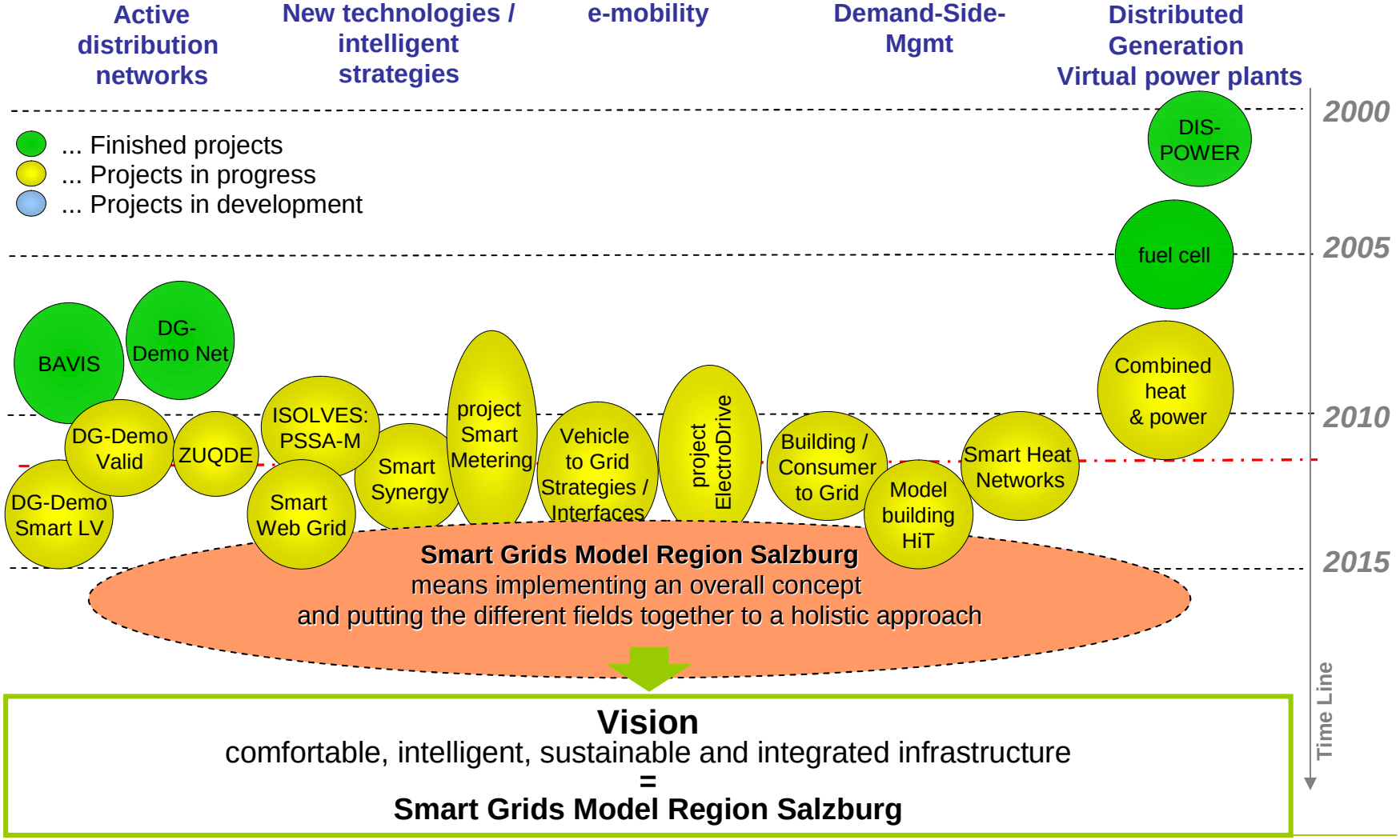
3. Smart Grids Model-Region Salzburg (SGMS)

Report of experience concerning goals and benefits from Smart Grids

The Smart Grids Model Region Salzburg consists of 5 major fields (Smart grids projects of Salzburg AG in the time line)

SMARTGRIDS Model Region Salzburg

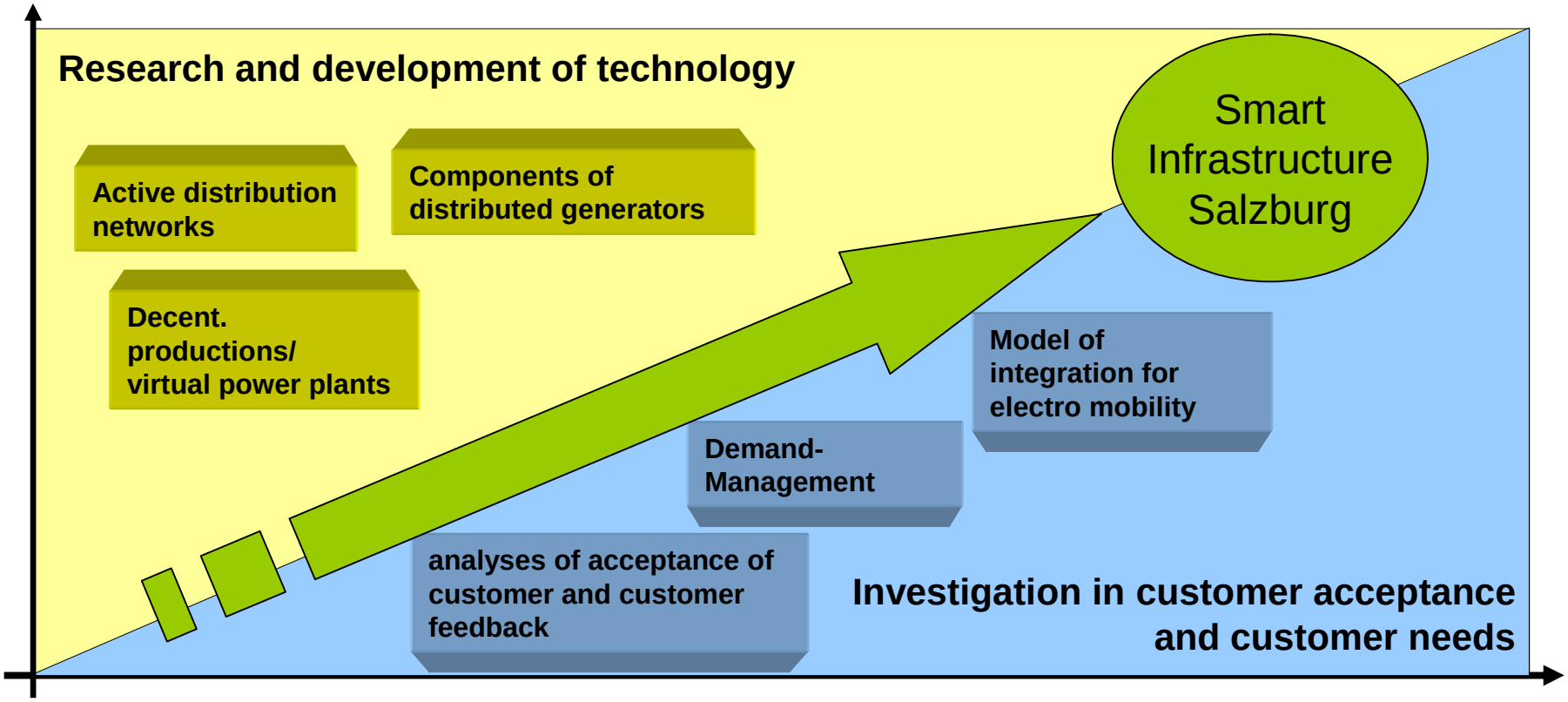
Smart Grids – major fields:



Salzburg AG Salzburg Wohnbau SIEMENS

Smart Grids Model Region Salzburg

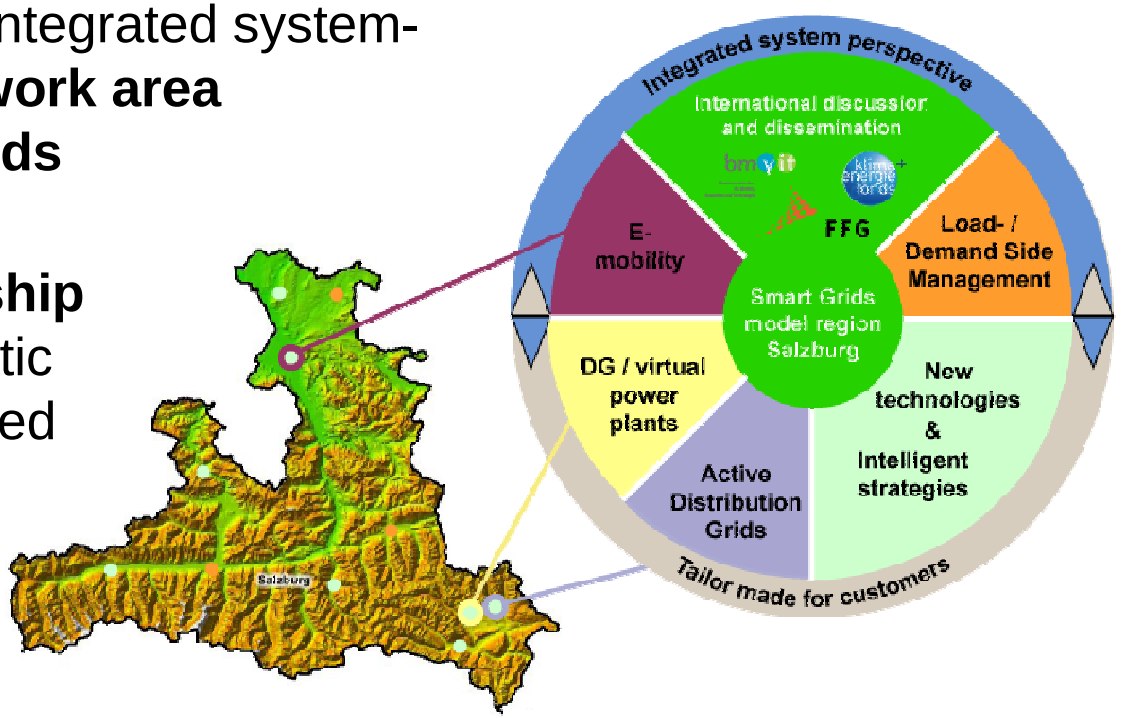
Technical solutions und customer demands as focus



- The Vision of the „Smart Infrastructure Salzburg“ has the two focuses
  - Research and development of technology solutions
  - Research and analyses of customer integrations and -acceptance

Main goals of the Smart Grids Model Region Salzburg

- **The questions** of all the projects are put together **in the Model Region**
- **Implementation** of an integrated system-approach **in a real network area** with real **customer needs**
- **Implementing of flag ship projects** were this holistic approach is demonstrated



The Consortium

Salzburg AG

Leader of the program, aspects of a utility / DSO grid as environment for demonstration

Salzburg Wohnbau

Requirements from customers, implementations of customers point of view and buildings as test objects

SIEMENS

Industrial partner, components, solutions tools

TU WIEN

Business models business cases IT-architecture

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

Industrial research knowledge active distribution grids, distributed generation, integration of buildings …

cure

customer-interfaces customer acceptance socio-economic aspects

FICHTNER IT CONSULTING

IT-integration international networking, dissemination

Economic aspects of the Model Region Salzburg

- **already completed and ongoing projects of the „Smart Grids Model Region Salzburg“ :**
  - Total projects costs: 7,9 Mio €
  - Funding share: 4,6 Mio €

- **Project bundle 2010 - setting up „lighthouse projects“ in the model region Salzburg (4th Call „Neue Energien 2020“ – *national call*)**
  - Total projects costs: 7,5 Mio €
  - Funding share: 3,1 Mio €

  Start 1st Quarter 2011

- **award-winning project „*ElectroDrive* Salzburg“ at the call model region „Electric Mobility“ in Dezember 2009:**
  - Total projects costs : 25,0 Mio €
  - Funding share : 1,9 Mio €

Note: all cost data for whole projects and all project partners

powered by: klima+ energie fonds

www.klimafonds.gv.at

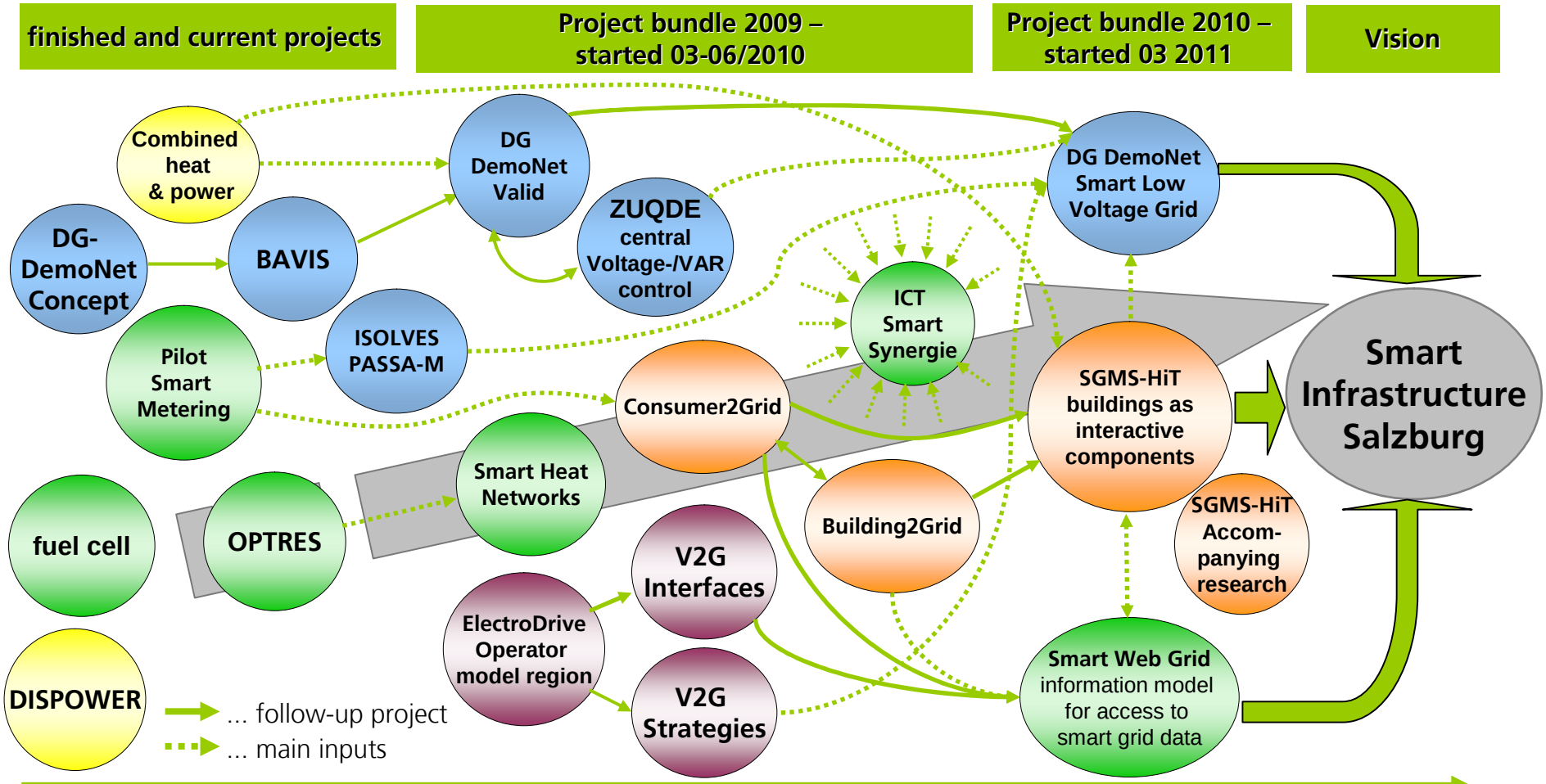
Smart Grids Model Region Salzburg

What we have done so far

Stepwise, logic architecture

of the Smart Grids Model Region Salzburg emerging to „Smart Infrastructure“

SMARTGRIDS Model Region Salzburg

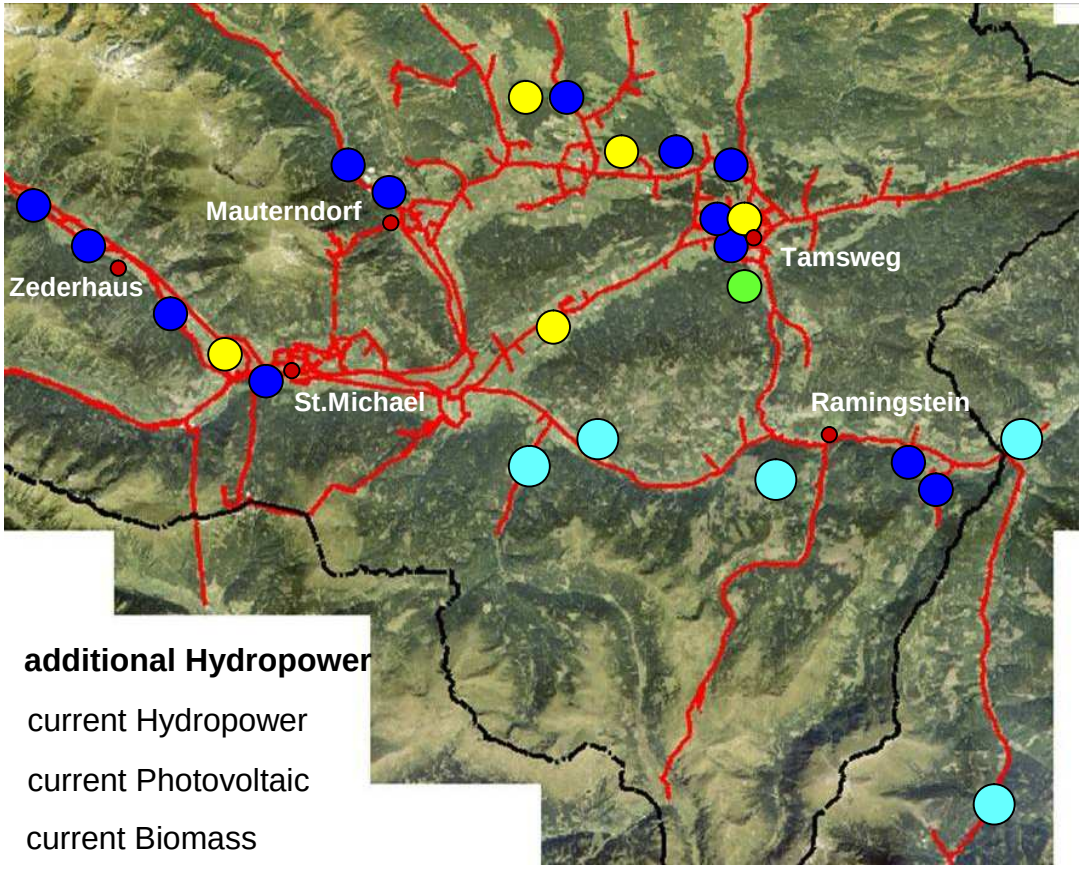


Short description of the projects in the annex

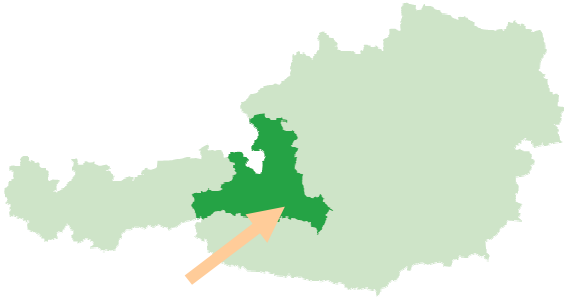
Salzburg AG Salzburg Wohnbau SIEMENS

Increasing of renewable Energy – more distributed generators:

In this special distribution grid of Salzburg AG it is necessary to implement conventional or innovative means to connect additional generators!



- **additional Hydropower**
- current Hydropower
- current Photovoltaic
- current Biomass



- maximum load ~23 MW
- distributed generation at the moment ~5,6 MW
- **additional distributed generation 6,6 MW**

→ **Problems with voltage control**

→ Necessary means**:**
  - **conventional** investment in the network (reference scenario)
  - **or innovative**, intelligent of voltage control

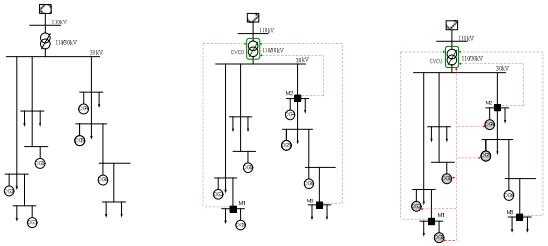
Example: 30 kV medium voltage network in Lungau (part of Salzburg) with current and expected distributed, renewable generators

Project-chain DG DemoNetz

SMARTGRIDS Model Region Salzburg

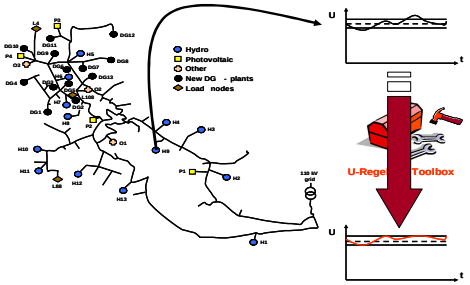
Influence of distributed generation on the quality of supply

DG DEMO NETZ KONZEPT



Development of voltage control concepts, Technical and economic assessment

BAVIS



Improvement of concepts and development of planning tools

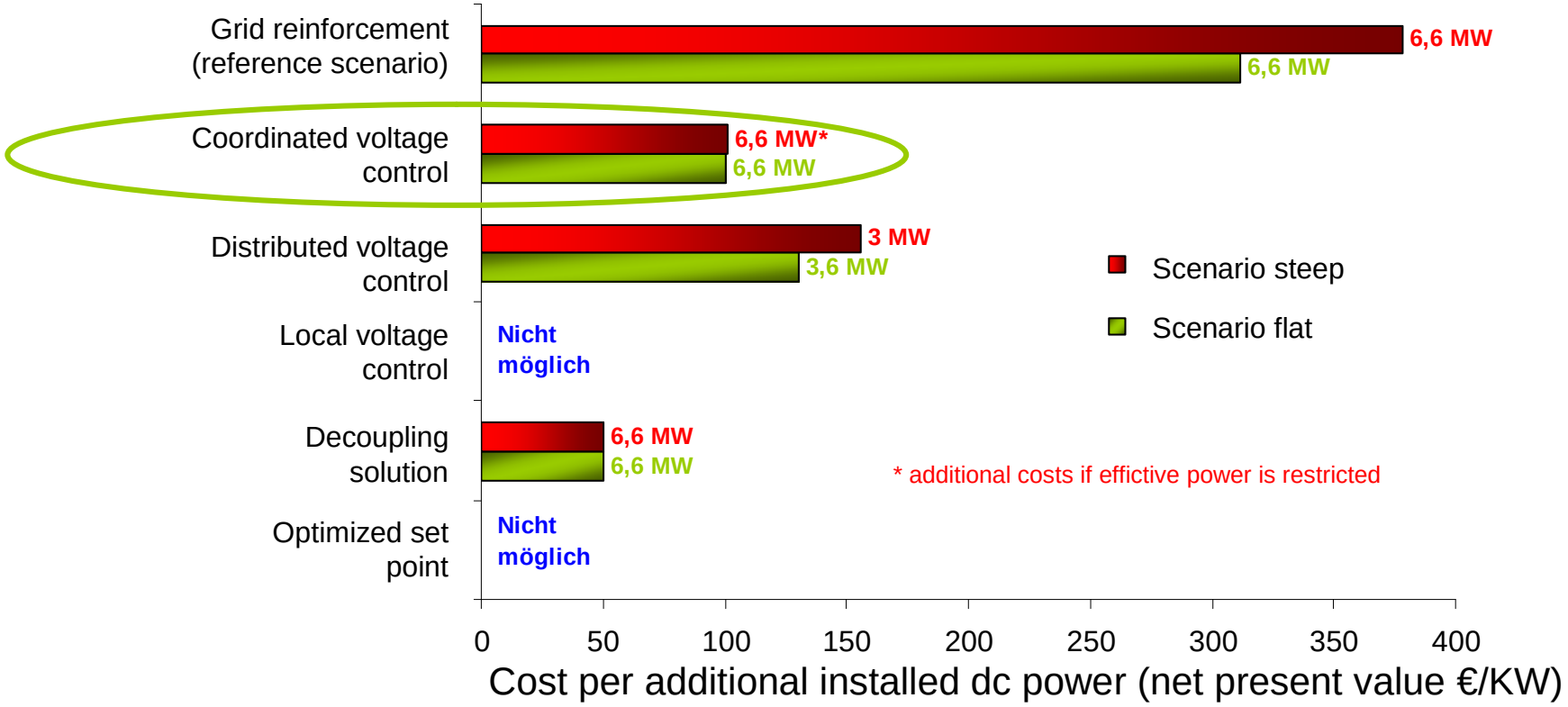
DG DEMO NETZ VALIDIERUNG

Development, field testing, analysis and validation – Proof of Concept

Salzburg AG Salzburg Wohnbau SIEMENS

Results network simulation and economic evaluation

The innovative solution to coordinated voltage control leads to far less costs refer conventional solution

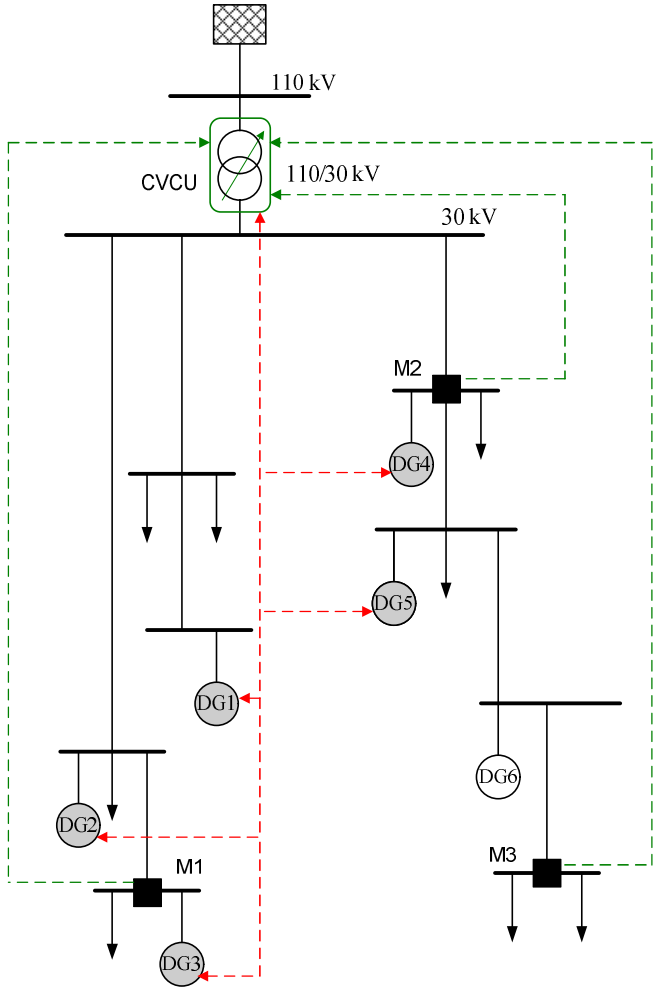


→ ***coordinated voltage control is actually implemented and validated!***

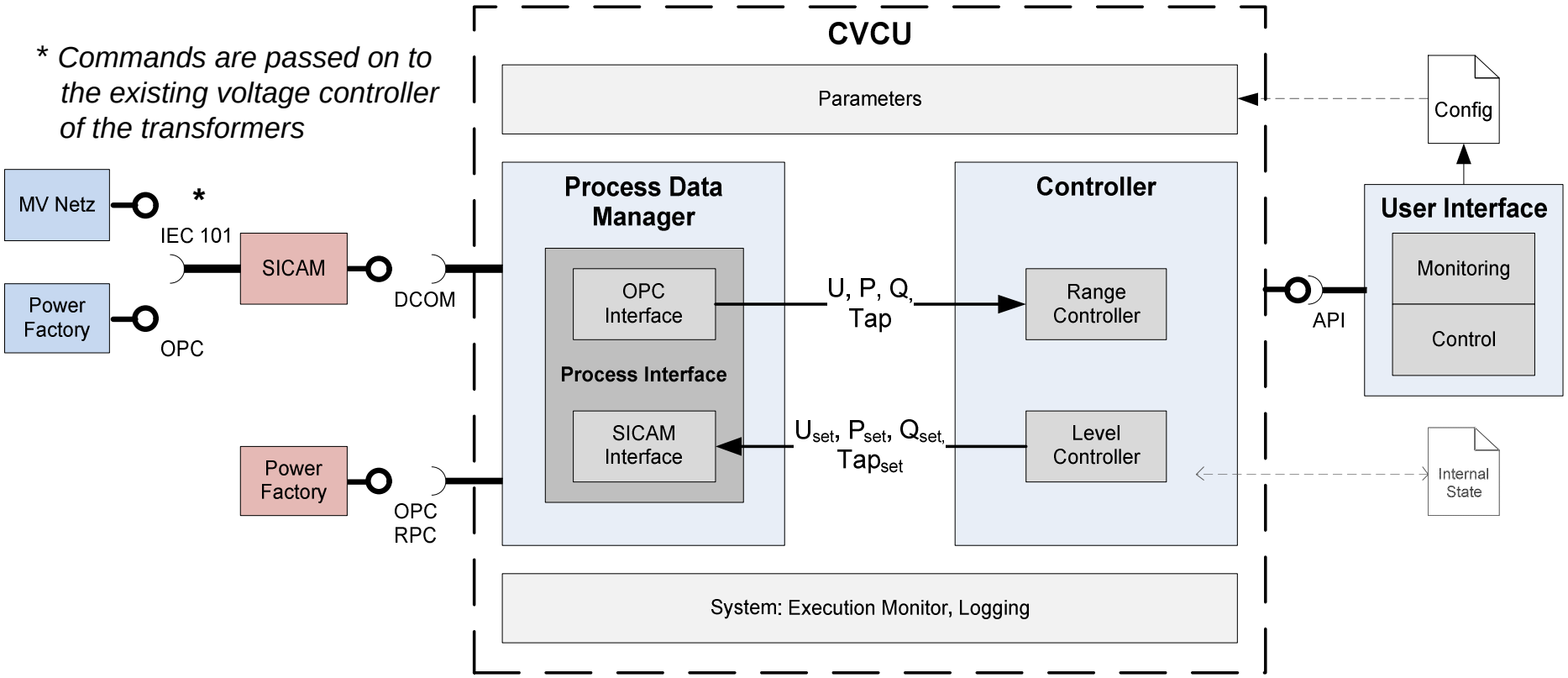
DG Demonetz approach

GREEN: The **remote control** is carried out through variable influence on the transformer taps based on measured data from the network *(development of U / I – compounding)*

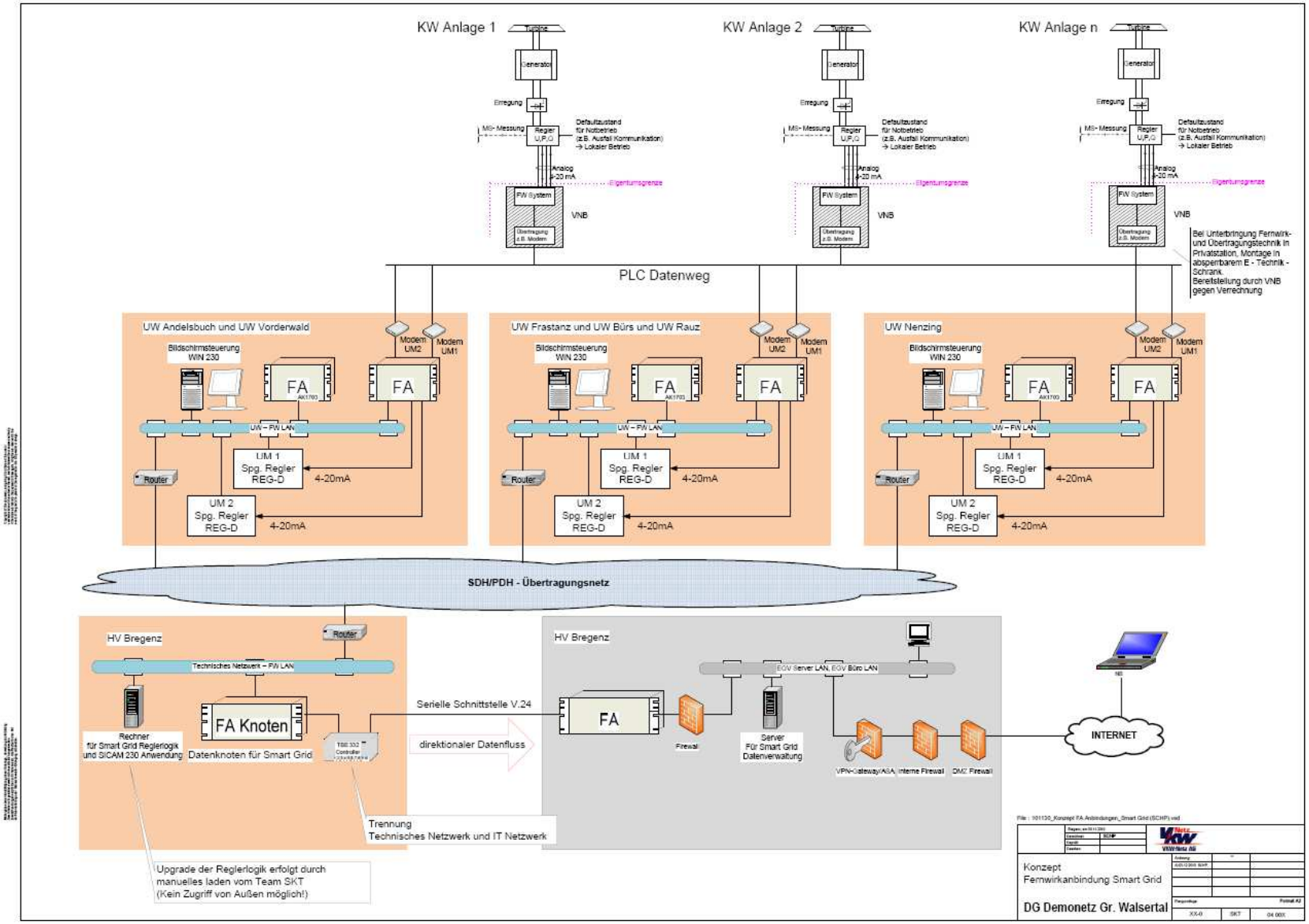
RED: The **coordinated voltage control** is carried out through a combination of the influence of the transformer taps with the aid of measured data from the network and the control of local reactive power and ultimately active power at appropriate generators.



CVCU: System architecture



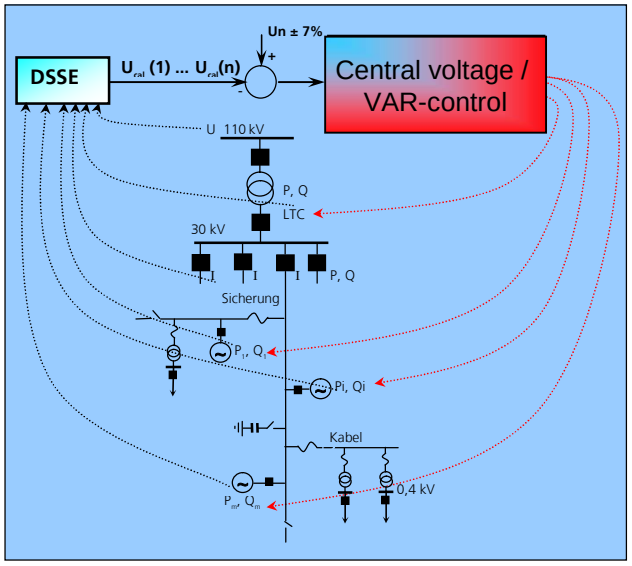
Project BAVIS
Remote control concept



ZUQDE

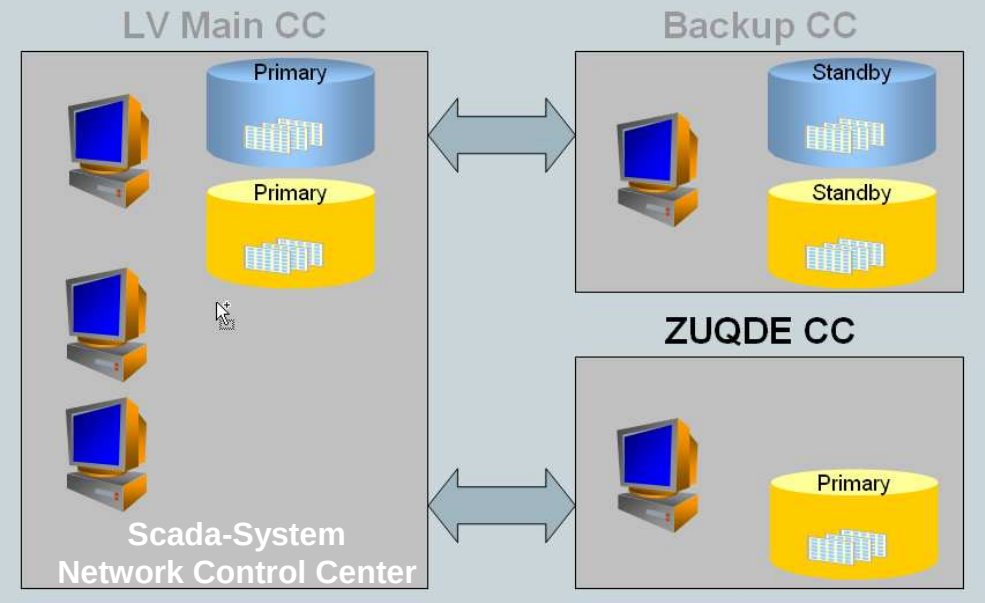
Central voltage (U)- and reactive power (Q)-control for distributed generators

- Implementing of a automatic, central steered voltage and reactive power control of transformers, generators and loads with to target to increase capacity of the grid for distributed generation.
- Based on the existing Scada System (Sinault Spectrum) the "ZUQDE-System" is added with a
  - Distribution State Estimator (DSSE)
  - central Vortage-Var-Control (VVC)



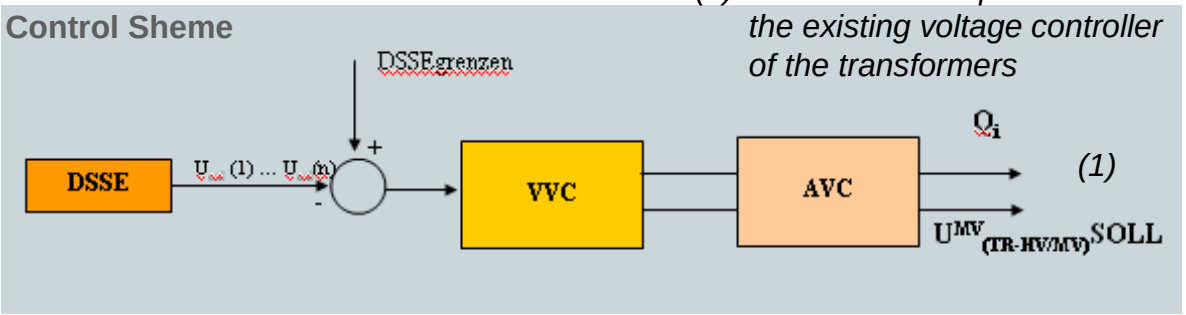
- Central voltage-/ power optimizer is integrated in the control system
- Optimizing in the grid knots in the middle voltage grid
- Optimization including 110-kV-grid
- Prototype development and „Closed-Loop" **Demonstration in the demo net Lungau (province Salzburg)**

ZUQDE
System architecture



- existing Scada-System has to be up-graded (additional data from generators, substations, remote control)
- state estimation and control systems have to run convergent on the system
- user interface for operation of ZUQDE hast to be enabled and tested
- many discussions and evaluations of data in detail were necessary

- the controller design and test scenarios have to be adjusted to the operational requirements
- criteria for operation and comparison of the projects ZUQDE + DG Demonet have to be definded

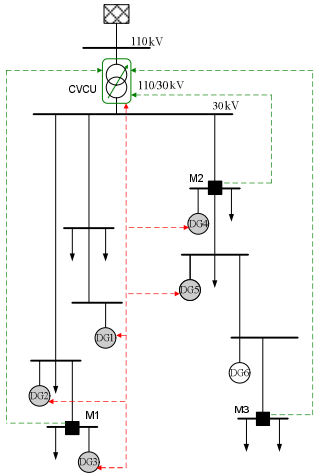


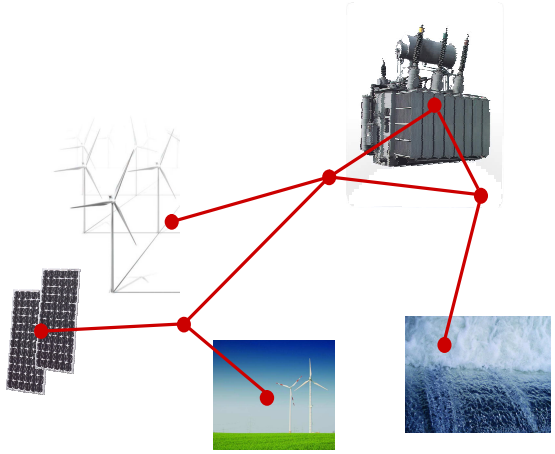
(1) Commands are passed on to the existing voltage controller of the transformers

DG DEMO NETZ VALIDIERUNG and *ZUQDE*

SMARTGRIDS Model Region Salzburg

- **Field-testing** of both concepts will start in 09.2011
- Contracts have been signed with relevant producers (4)
  - Aggreement to take influence on their generation
  - Conversion of the generator controller for active and reactive power control
  - Questions of insurance, loss of income, ... are to be regulated
- Remote control of relevant substations and distributed generators are installed untill 09.2011





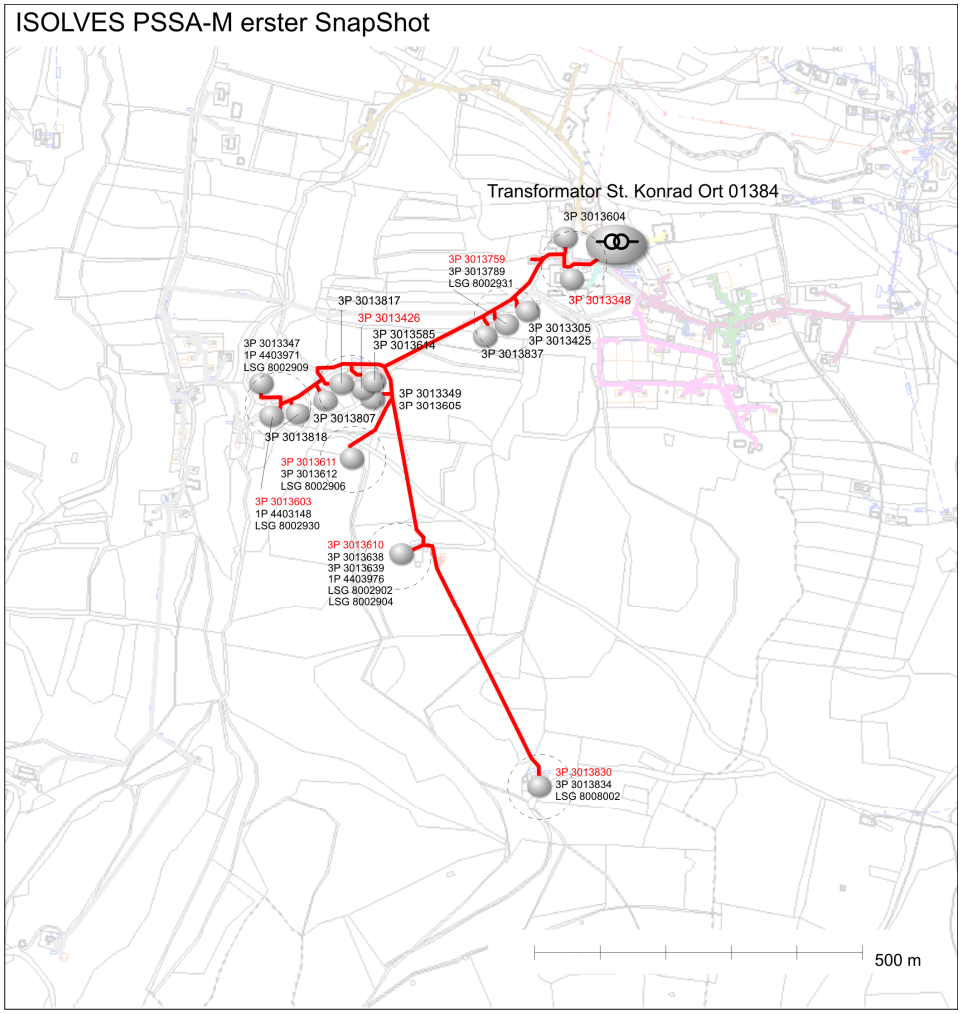
- "Open-loop-operation" from 09 – 12.2011
  "⇒ *either BAVIS **OR** ZUQDE"* **!**
- "closed-loop-operation" in our 30-kV-grid Lungau in 2012

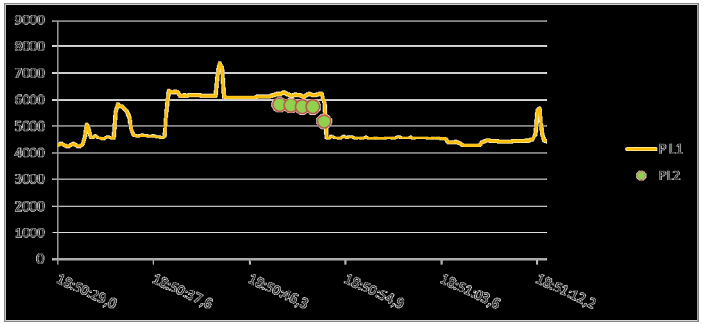
➢ *comparison of both concepts*

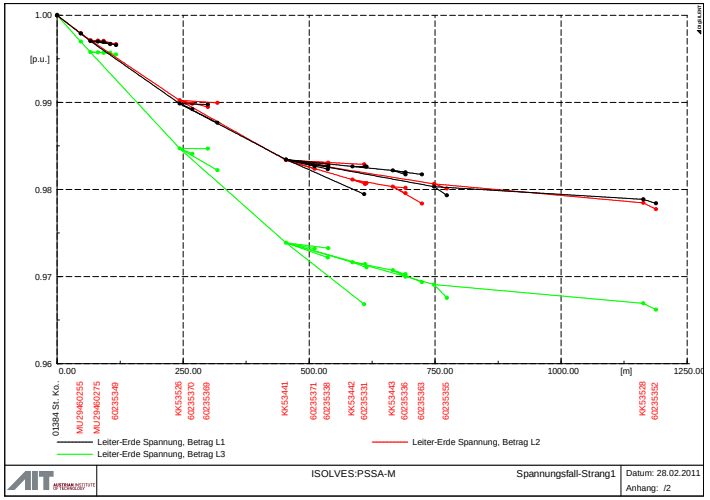
Salzburg AG Salzburg Wohnbau SIEMENS

Projekt ISOLVES PSSA-M

Measurements and simulation

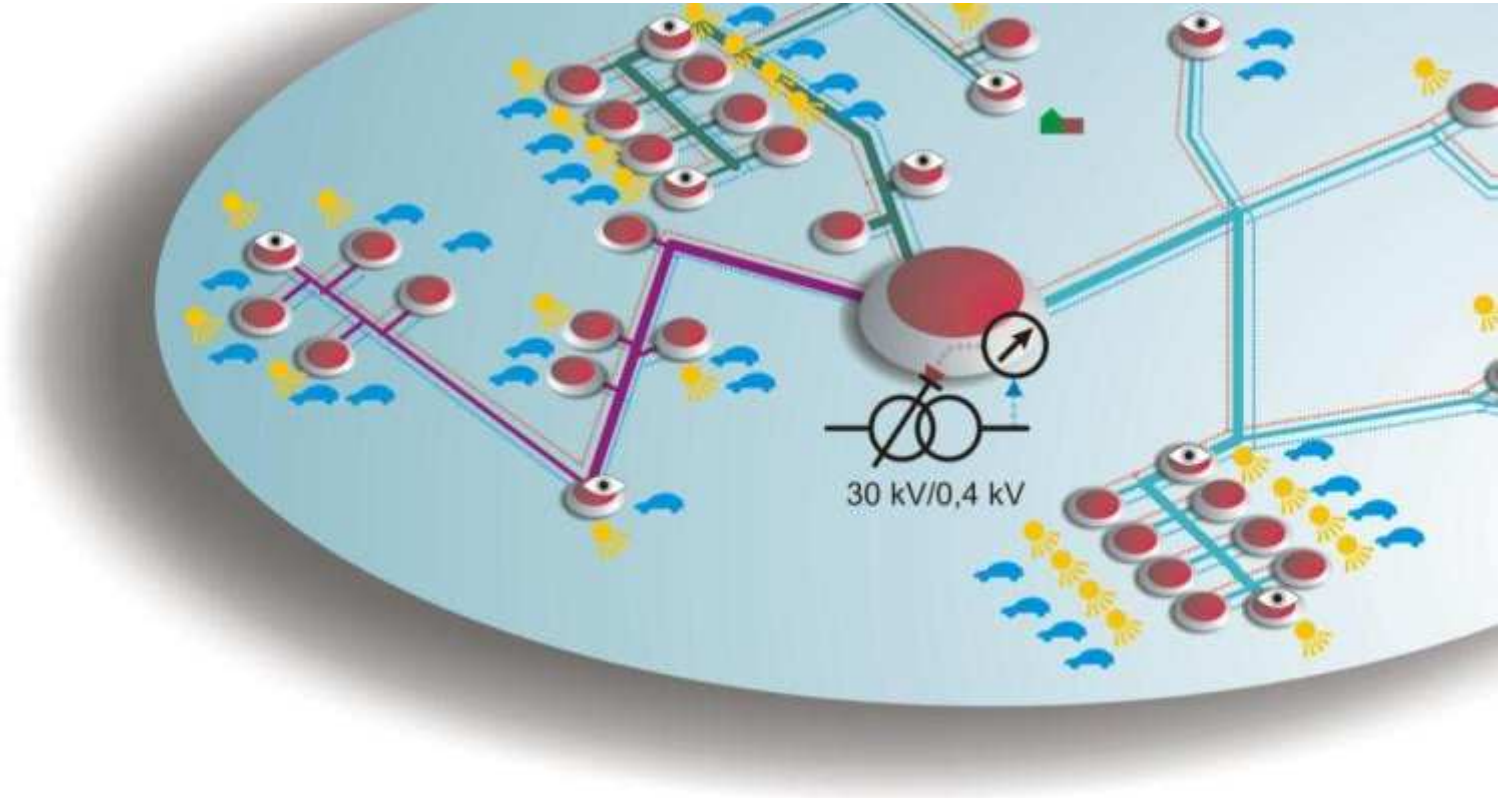






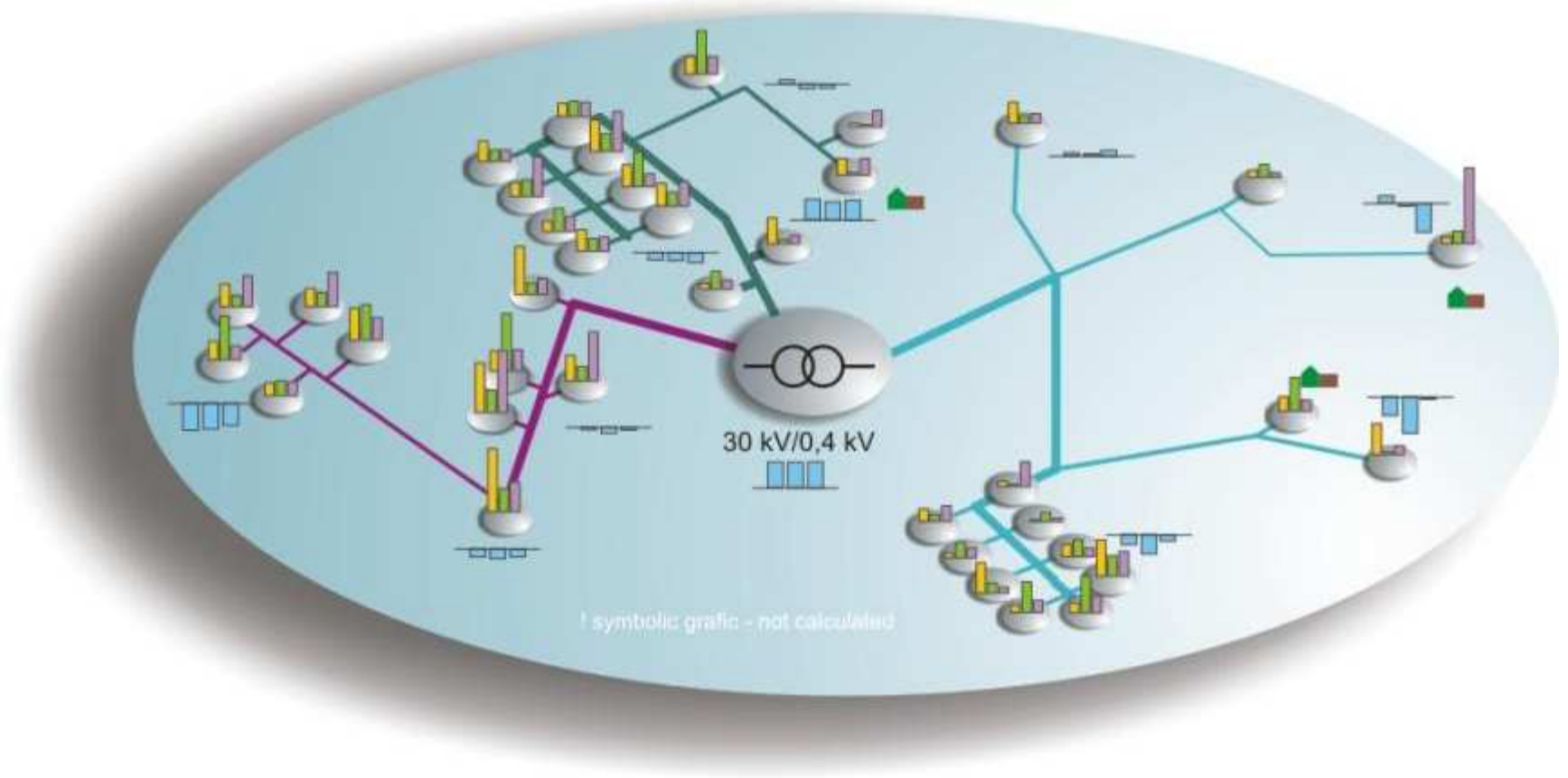
„Smart Meters as eyes in the grid ...“

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

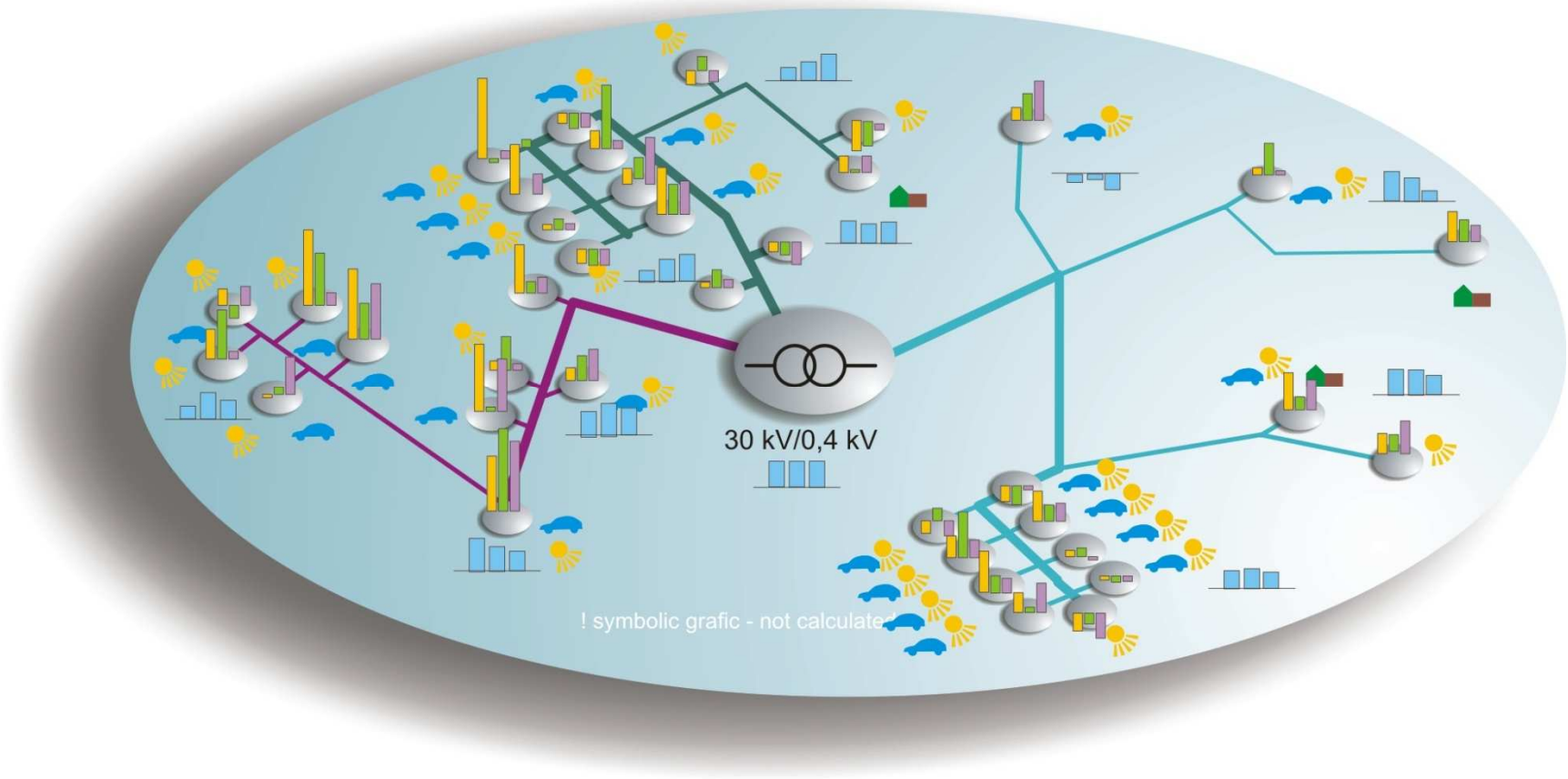


DG DEMO NET
SMART LV GRID

Current Situation in LV Grids

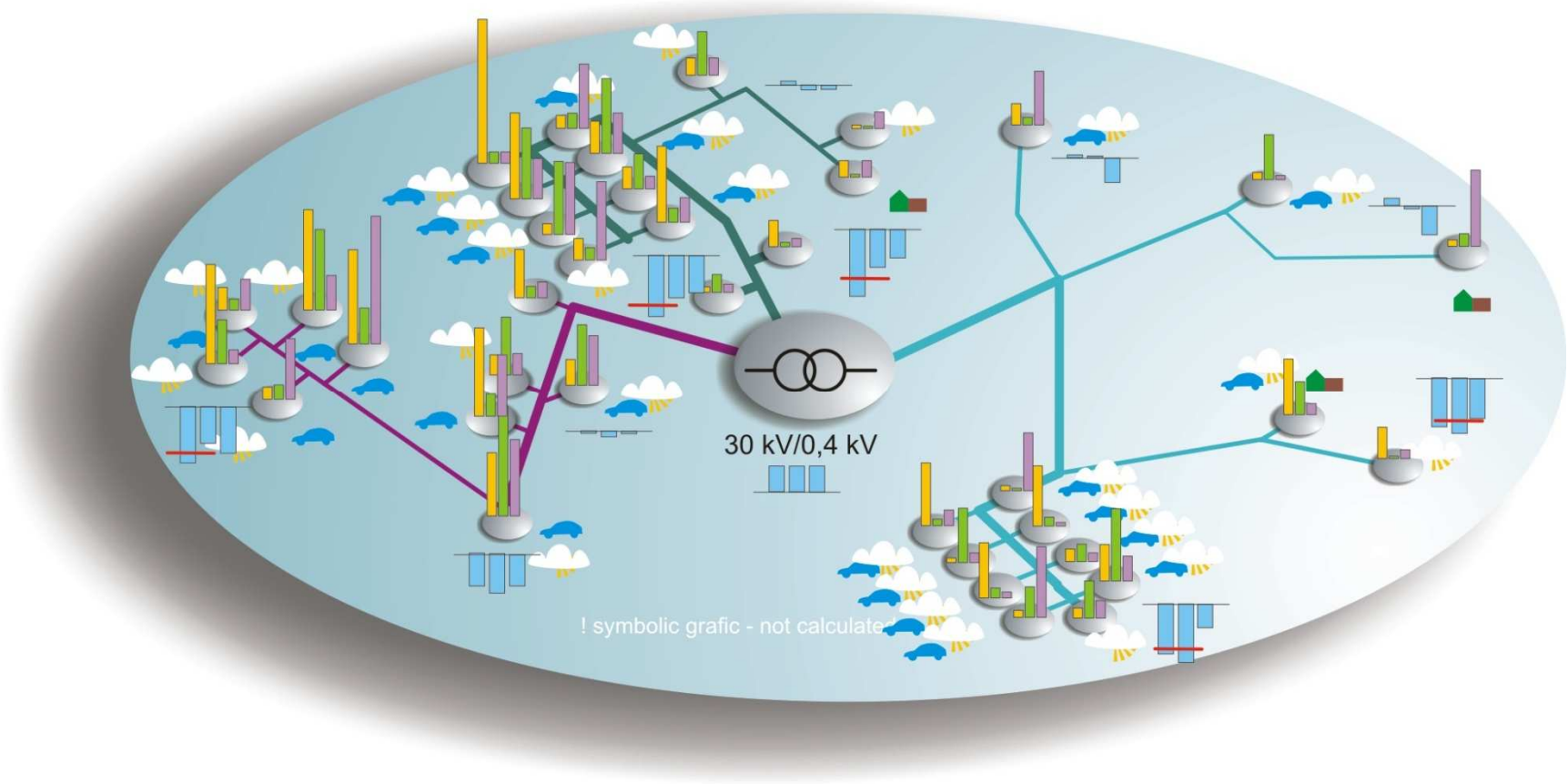


High share of PV and EV



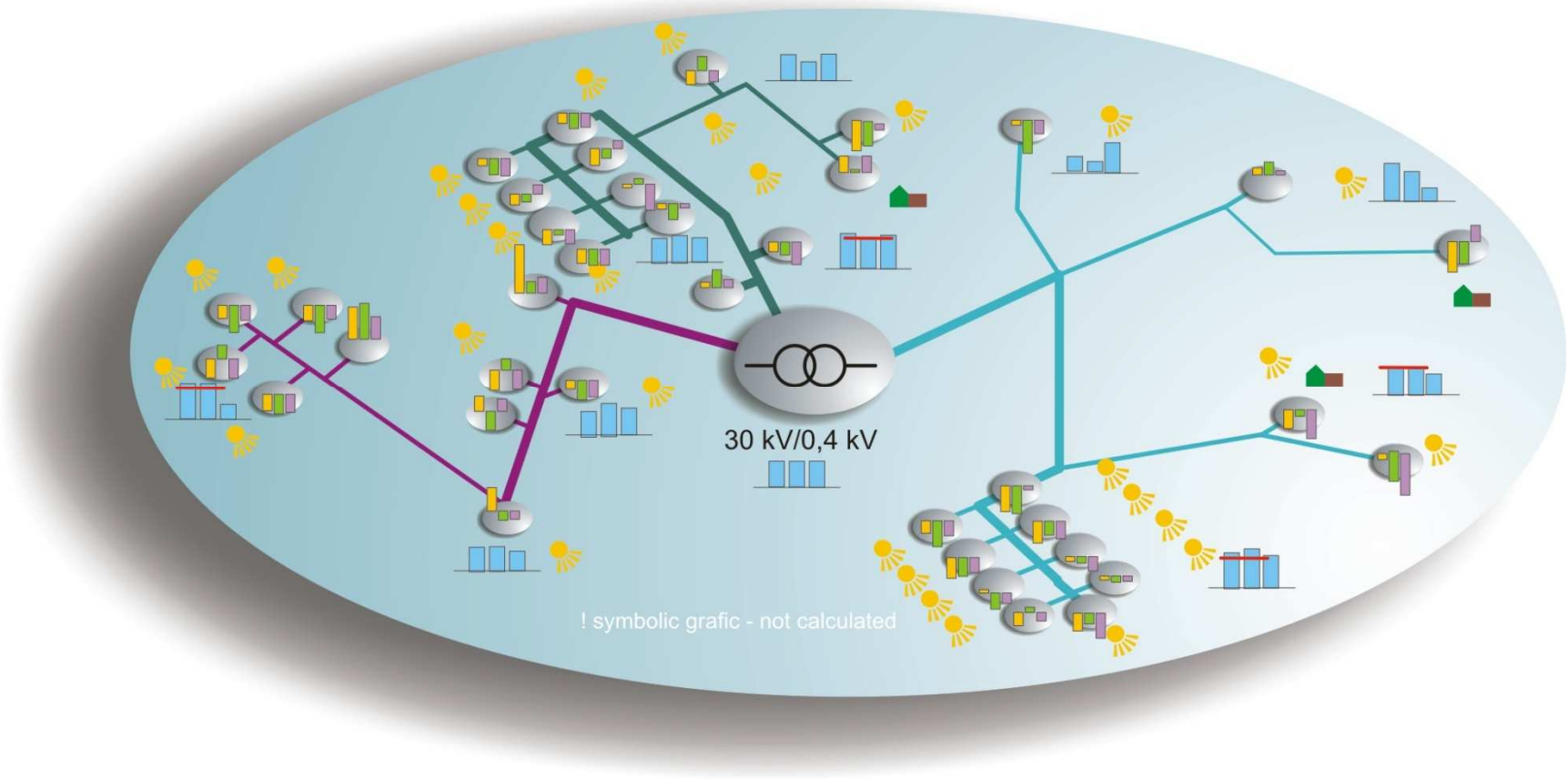
Photovoltaics and e-mobility are major drivers for introducing smart grid approaches in low voltage distribution networks

High share of PV and EV



in case there is no solar generation uncontrolled loading causes voltage levels below the EN 50160 criteria (Power Quality)

High share of PV and EV



in case there is no EV loading the solar generation causes voltage levels above EN 50160 criteria (Power Quality)

Objectives

Increase the hosting capacity of LV networks based on:

1. **Intelligent planning**
   → new planning methods enabling higher DER densities

2. **Intelligent monitoring**
   → new monitoring solutions for grid planning and operation

3. **Active management and control** using communication infrastructures restricted in bandwidth and availability
   → new and cost-effective active control solution approach

DG DemoNet Smart LV Grid –
Field Tests

SMARTGRIDS Model Region Salzburg

Smart LV Grid Concepts
Smart planning, monitoring, control approaches

Photovoltaic
on every 2nd roof

Field test area
Low voltage grid section

validation of solutions for future problems

e-vehicels
in every 2nd garage

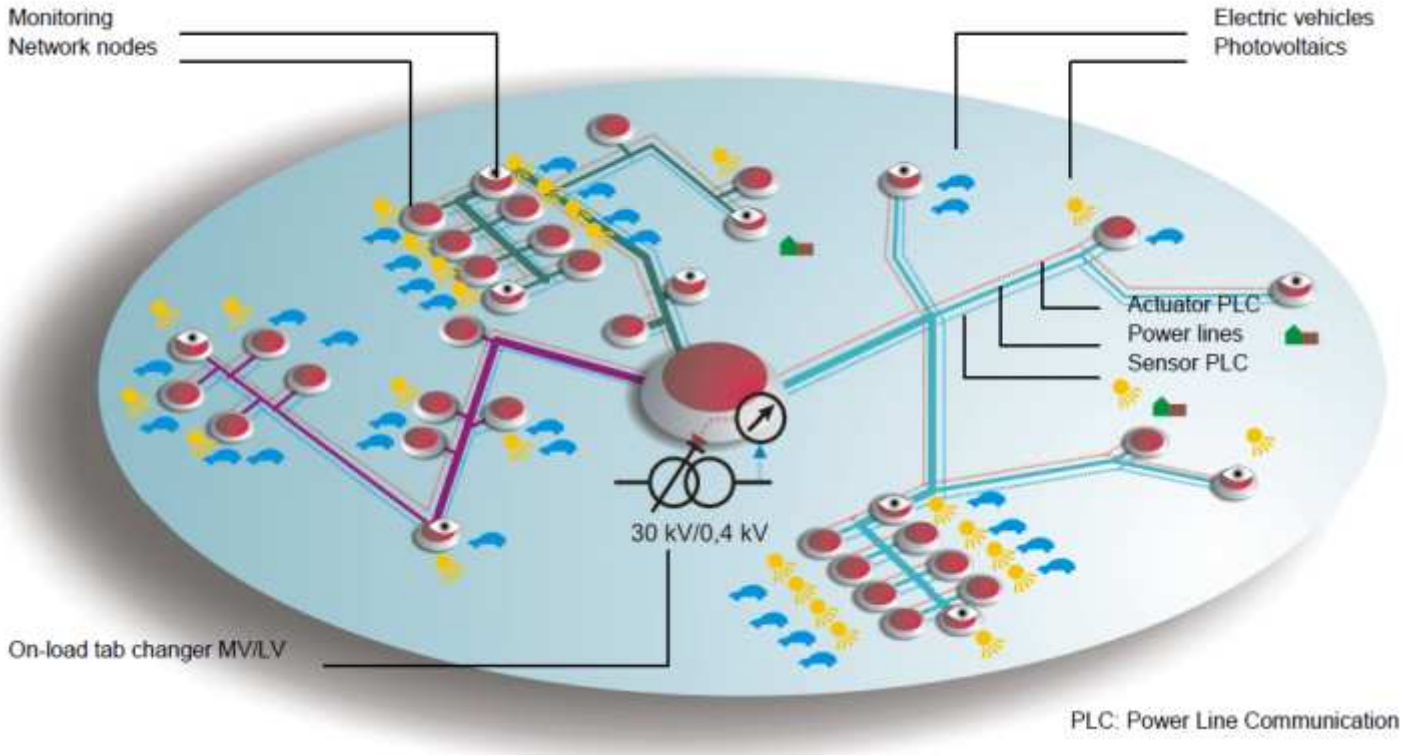
ELECTRODRIVE SALZBURG

Pilot in a grid-section in Salzbug : In a LV grid a high enough densitiy of PV-plants and E-cars will be installed and with new and smart solutions grid operation and quality of supply within all relevant ranges will be ensured

Salzburg AG Salzburg Wohnbau SIEMENS

Smart Grid Technologies in three field tests

SMARTGRIDS Model Region Salzburg



- Monitoring & intelligent probabilistic planning
- Intelligent voltage control at secondary substation
- Active and reactive power control at DG unit
- Demand response: controllable loads – e-mobility

DG DemoNet – Smart LV Grid

Goals of the project

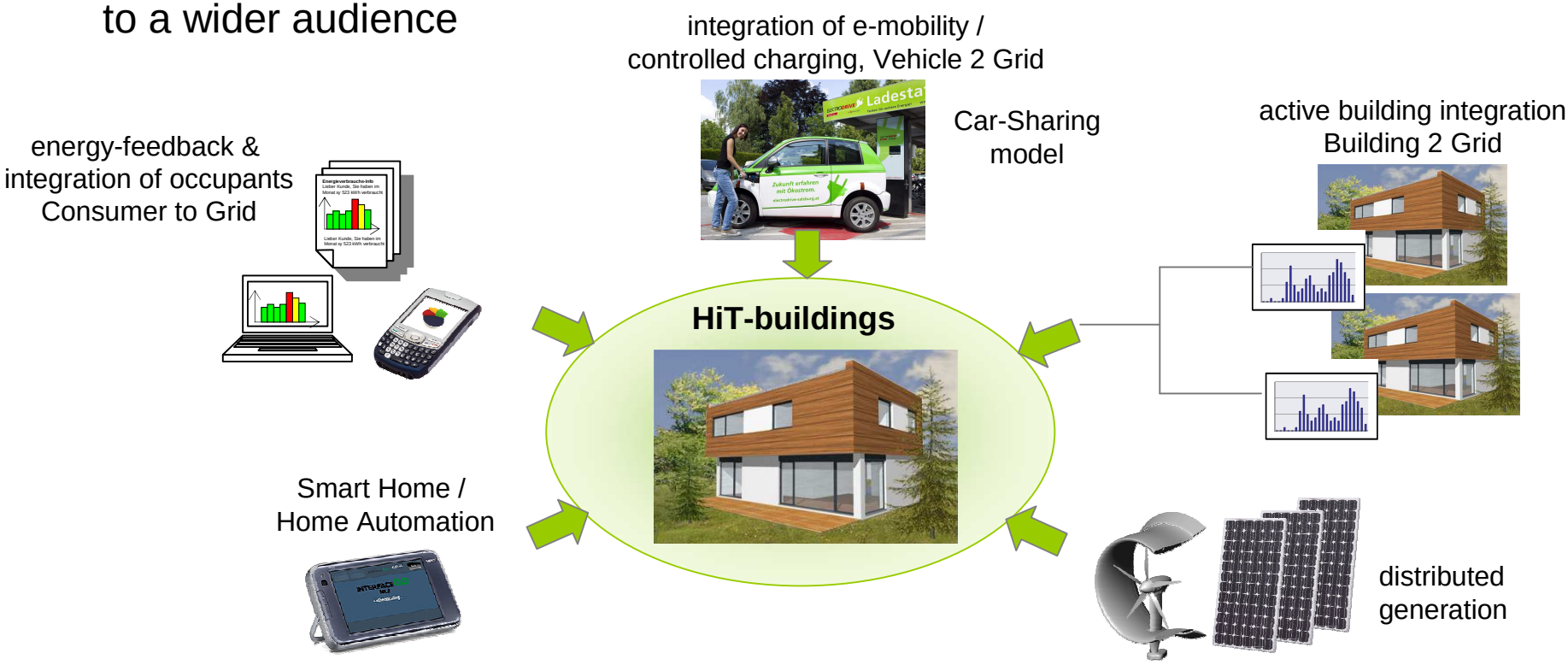
- Implementation and test of „overall-solutions“
  - verification of the usability of stochastic planning methods
  - power electronics to improve the efficiency of energy supply, intelligent converters to improve power quality
  - dezentralized control-algorithms and active local load-management, coordinated voltage-control as we can do it in MV-grid?
  - controllable transformers in substations (MV / LV with tap changers), dezentralized LV-gridcontroler (also single phase), ...
  - grid-management for e-mobility
  - combination of DG with other system-components, especially dezentralized storages, cooling systems, heating pumps
  - usability of operation management systems in LV grids
  - communication based on a necessary Smart-Meter-Infrastructur

⇨ Flexibility in LV-Grid: how does it make sense or even is it necessary ot realize or to combine all these (or part of these) ideas?

HiT – Buildings as interactive smart grid participants

(to be approved; acronym "HiT" is German: Häuser als interaktive Teilnehmer im SG)

- planning, construction, operation and monitoring of a smart grid optimized housing estate in Salzburg
- **Objective:** Presenting and demonstrating smart grids touchable and concrete to a wider audience



Lighthouse-project:
HiT – Buildings as interactive smart grid participants

- Demonstrator with „guiding light“
- Focus: optimum system integration of the building and its users into the Smart Grid
  - load management (thermal mass) including controlled charging of electric vehicles
  - Combination with distributed renewable generation (biogas CHP, heat pumps, photovoltaic)
  - User integration: persuasive power feedback, sustained user behavior, car-sharing for electric vehicles, etc.
- Testing of various smart grid technologies and approaches – in one location and in a real environment

Living Generations

a building block for establishing Salzburg as Smart City

Habitation of generations

145 flats for different user groups

- from young living,
- ownership for elder people,
- to senior-friendly living with technical assistance

ARGE: thalmeier felber architekten ZT GmbH
architekt schoenberger
detzlhofer-landschaftsplanung

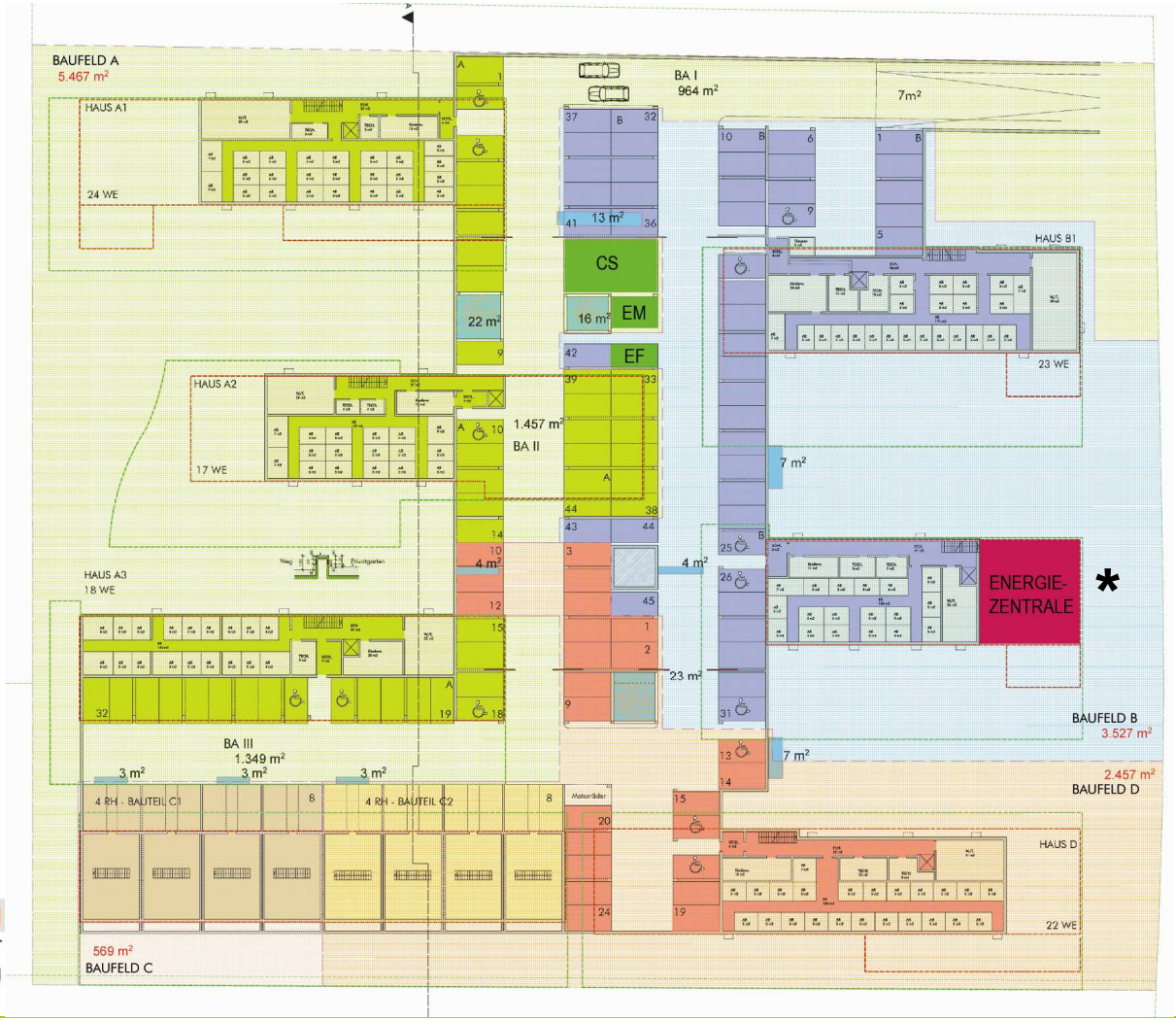
Living Generations
Smart Grids demonstrator „HiT“

SMARTGRIDS Model Region Salzburg

Underground parking with reserved parking spaces for:

Car-Sharing (CS)
Electric-motorcycles (EM)
Electric-bikes (EF)

* reserved space for the energy center



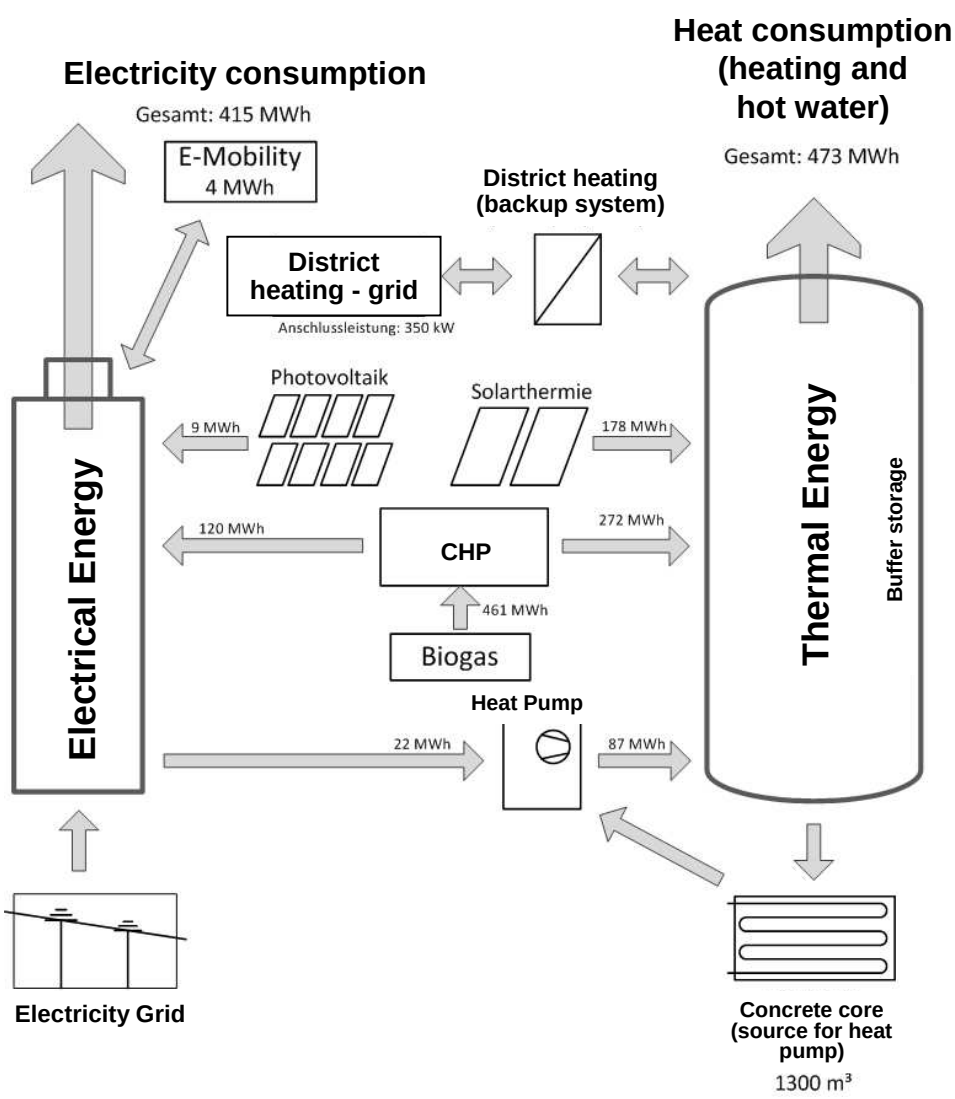
ARGE: thalmeier felber architekten ZT GmbH
architekt schoenberger
detzlhofer-landschaftsplanung

Salzburg AG Salzburg Wohnbau SIEMENS

Smart Grids demonstrator „HiT“

- project
  Salzburg, Rosa Hoffmann Road: implementation, construction (2011 – 2012)
- operation and monitoring of a smart grid pattern building incl. accompanying research (2013 ff)

- **Objective:**
  To make Smart Grids universally available and demonstrably, to secure the comfort of the users and to comply with low operating costs thanks to simple but intelligent systems.

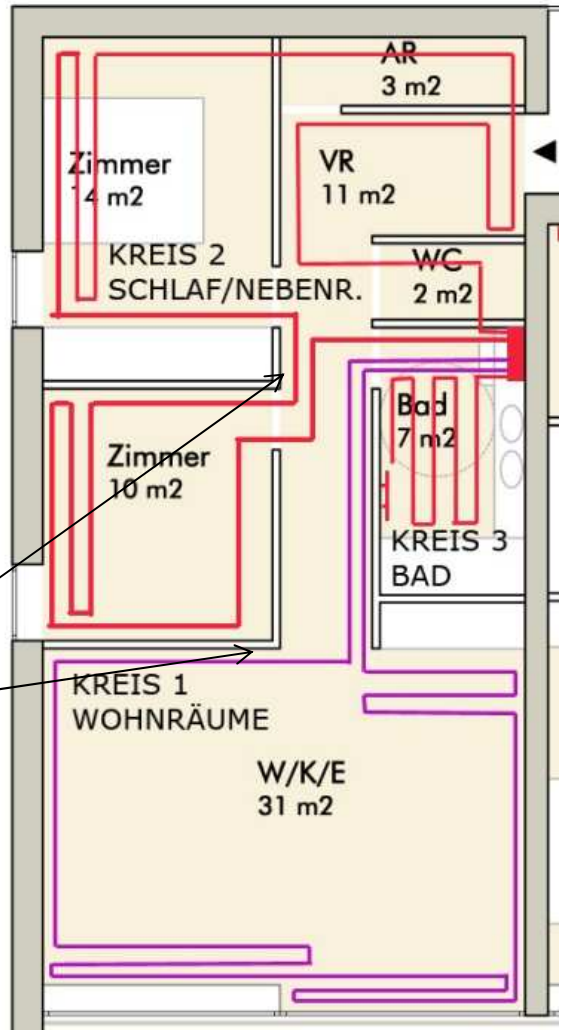


„Simply Living“

- **Simple technical solutions**
  in the conditioning of the housing association of the flat
  eg. “with two rotating wheels”

- **Goal:**
  - avoid over-boarded technologies
  - understandable design and operational use for residents
  - keep costs for maintenance and testing low!

- **„Add-on`s“ and additional benefits ...**
  ... to gain user acceptance!



Questions and discussion …

Contact

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Head of Electricity Grid

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www.salzburg-ag.at

SGMS-Project – further projects

Project

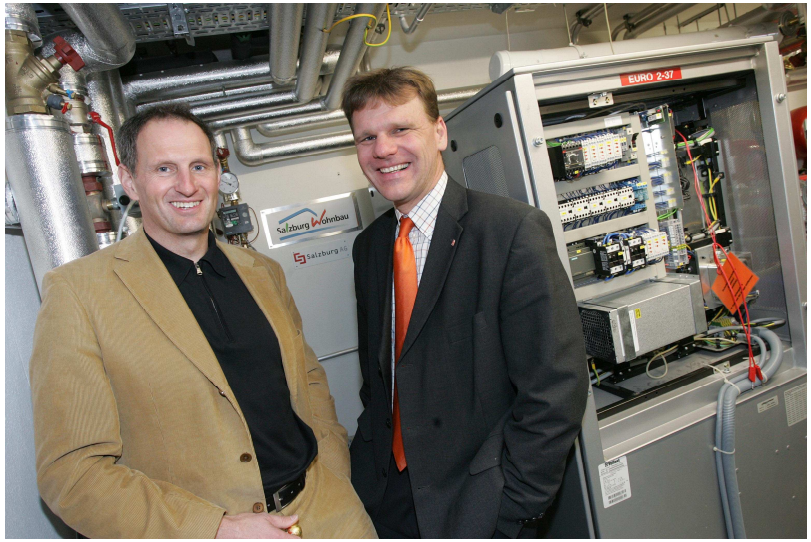
Fuel cell

- Pilot project of decentralized electricity- and heat generation with fuel cells
- First Austrian fuel cell stack in a housing estate
- Project time: October 2004-December 2006
- Consortium

Salzburg AG — Project government and coordination

Salzburg Wohnbau — Customer point of use and direction of the objects

Vaillant — supplier of the fuel cell



Project leaders: Roland Wernik (Salzburg Wohnbau) and Michael Strebl (Salzburg AG)

Energy award of the federal state of Salzburg 2005, Member of the local government LR Sepp Eisl

Smart grids week Salzburg :Roland Wernik, BL Ingolf Schädler (Federal Ministry of Innovation and Technology), Governor of Salzburg Gabi Burgstaller and CEO Arno Gasteiger

Arno Gasteiger (CEO Salzburg AG), Roland Wernik (CEO Salzburg Wohnbau), Eduard Mainoni (former member of the Austrian government)

Pilot project

Virtual Power Plant - Combined heat & power

- Pilot project: Investment and operations of 4 micro-chp units for decentralized electricity- and heat generation controlled by a central control unit
- Analyses of the possibilities of virtual power plants as part of „Smart Grid solutions“
- Project time: March 2007- July 2010

Salzburg AG	Investment and operations of chp
Salzburg Wohnbau	Selection of the objects evaluation of customer needs
TU WIEN / Energy Economics Group	Data evaluation and economic research
klima+ energie fonds	This project is subsidized by the Austrian climate- and energy fund

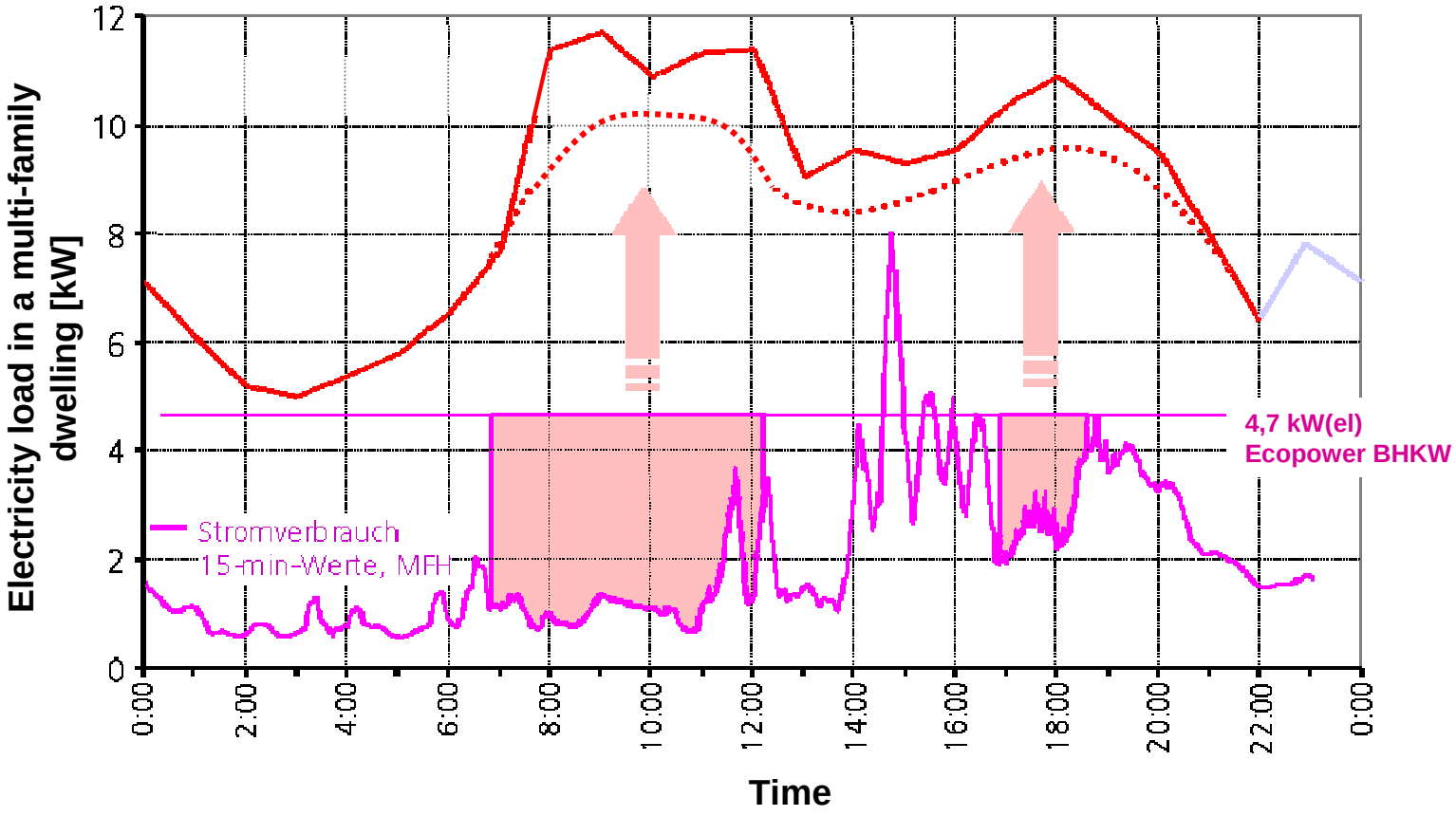
Pilot project

Virtual Power Plant - Combined heat & power

Pilot project

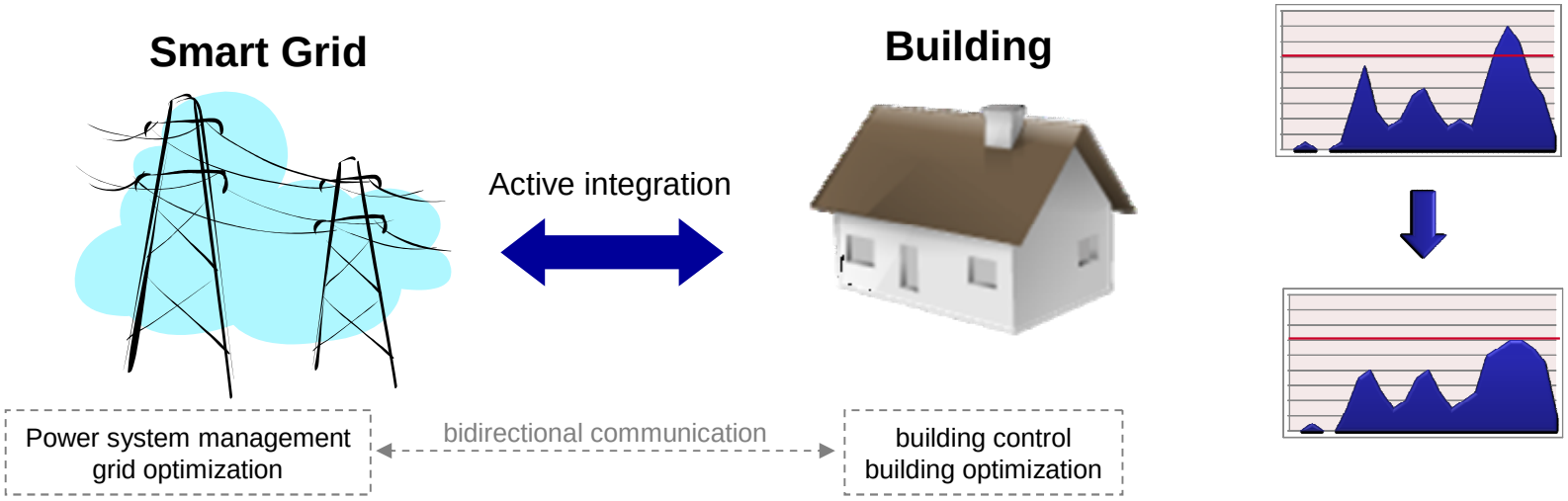
Virtual Power Plant

Reduction of peak load in the grid by decentralized generation (schematic graph):



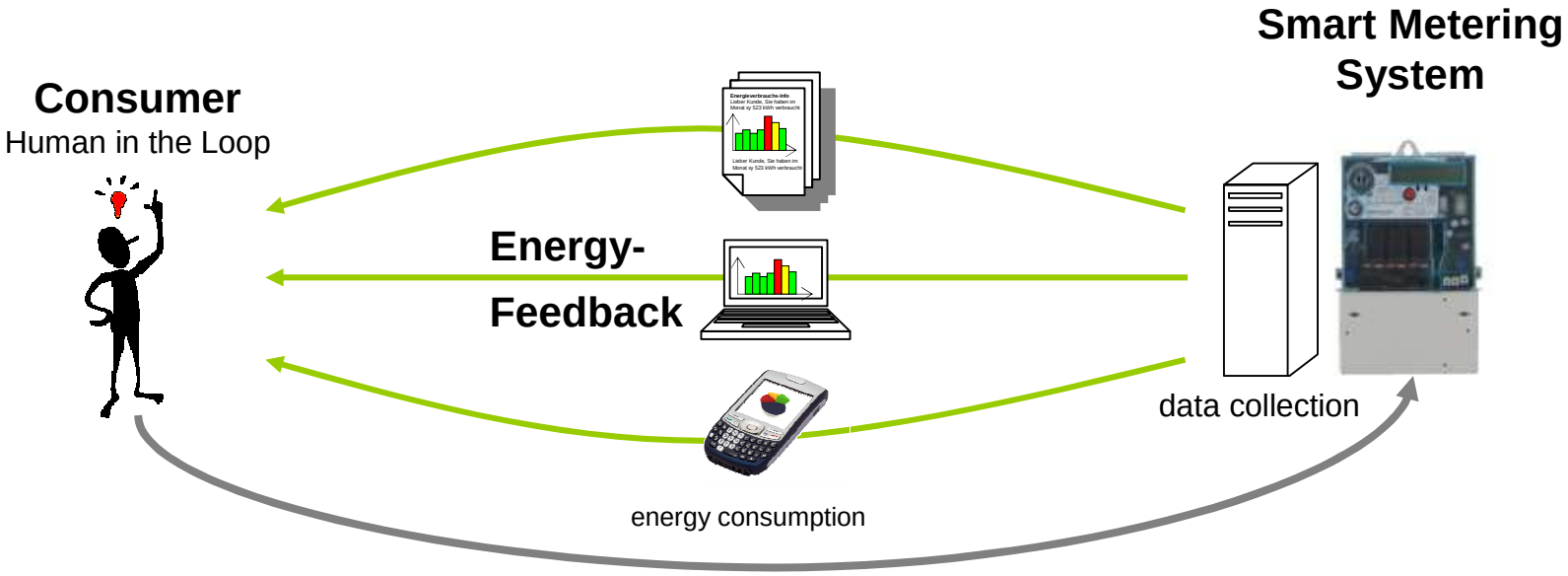
B2G - Building to Grid

- **Buildings as active Smart Grid-components**
- **Questions:** Is it possible to reduce peak loads and to enhance energy efficiency by intelligent, cooperative integration of buildings into the smart grid?
- **Model project with 10 real test objects** (from Salzburg Wohnbau)



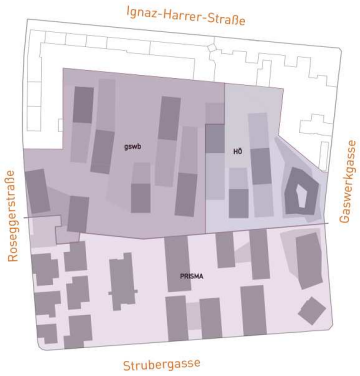
C2G - Consumer to Grid

- **Customer as active participant of a Smart Grid**
- **Energy-Feedback** as enabler for energy savings
- **Questions:** How should energy information be presented to customers to reduce energy consumption most effectively (Energy-Feedback)?
- **Field study /-experiment with 240 households**



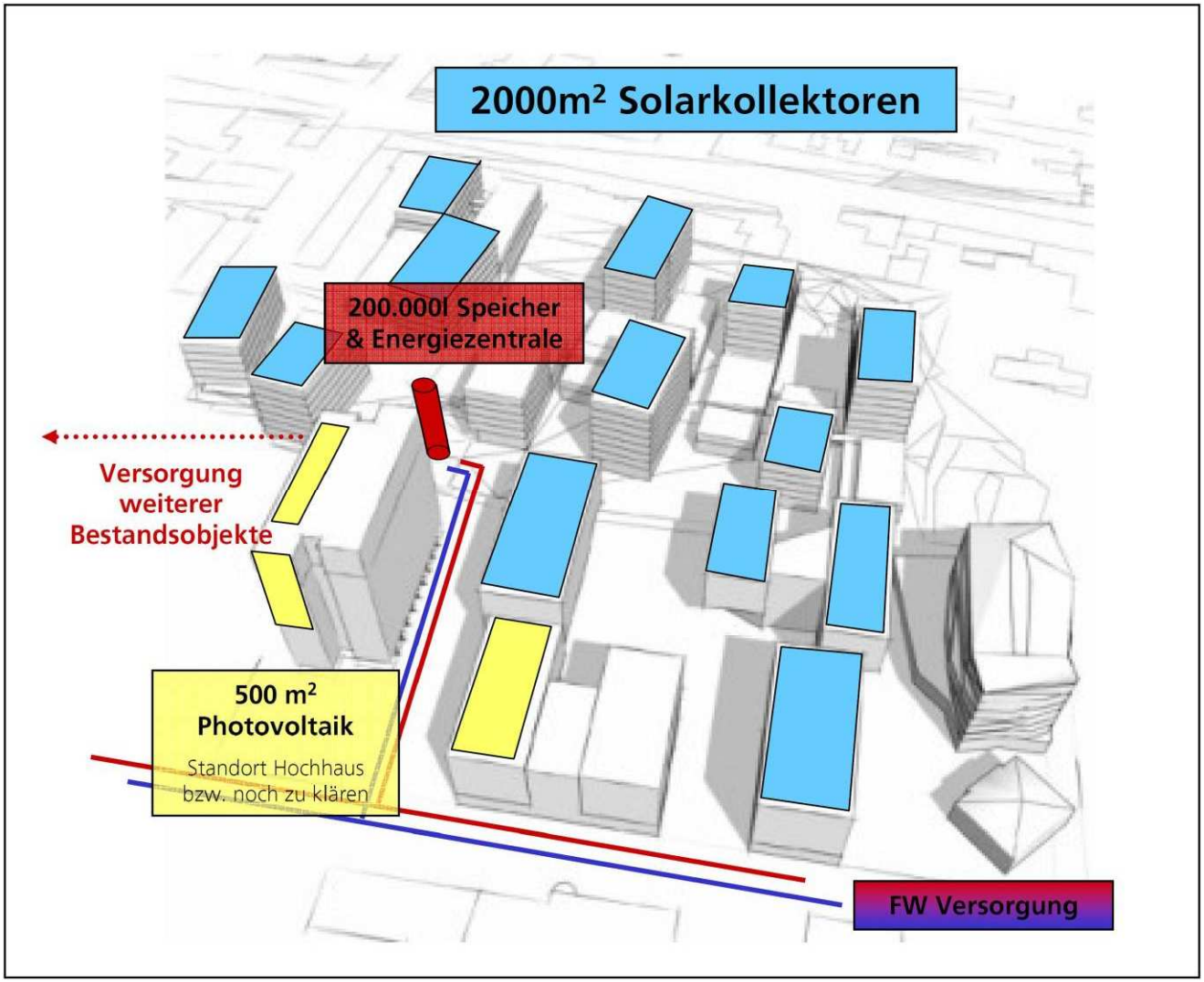
Concerto Project Salzburg

- Reconstruction of the city district Lehen to a sustainable city area
- Including former area of municipal utility (predecessor of Salzburg AG)
- Project partners of Salzburg AG
  - Salzburg Institute for Regional Planning and Housing (coordinator)
  - City of Salzburg
  - Property developers (GSWB, Heimat Österreich, Die Salzburg, Prisma)
  - Steinbeis Transferzentrum (resarch partner)
- Salzburg AG is responsible for energy concept with focus on solar energy and district heating from industrial waste heat



Concerto Project Salzburg

SMARTGRIDS Model Region Salzburg



The energy concept includes:

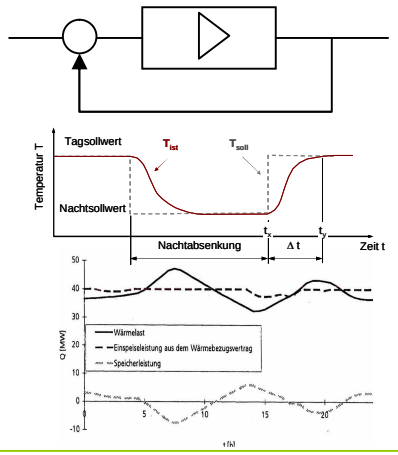
- solar thermal system (2.000 m²) combined with heat pumps and buffer tank
- district heating from industrial surplus heat
- micro heating grid
- 500 m² of photovoltaic panels
- Energy-Feedback interfaces for users

Salzburg AG Salzburg Wohnbau SIEMENS

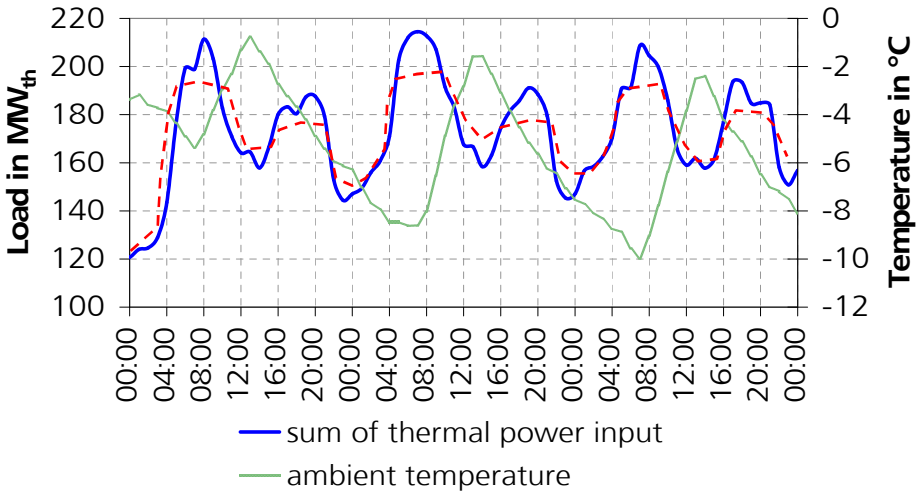
SmartHeatNet

- **Smart Grids in district heating network**
- **Question:** Which operation and control strategies are useful to reduce peak loads in district heat networks to minimize the use of oil or gas boilers?
- Dynamic network and building simulations
- **Innovative operations strategies and control algorithms**

Intelligent controlling algorithm



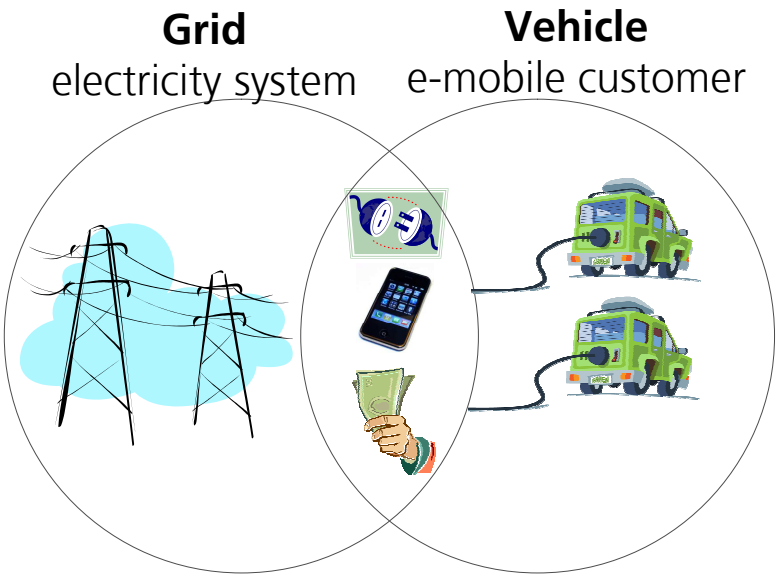
reduction of peak load



economic and ecology evaluation

Vehicle to Grid (V2G) - Interfaces

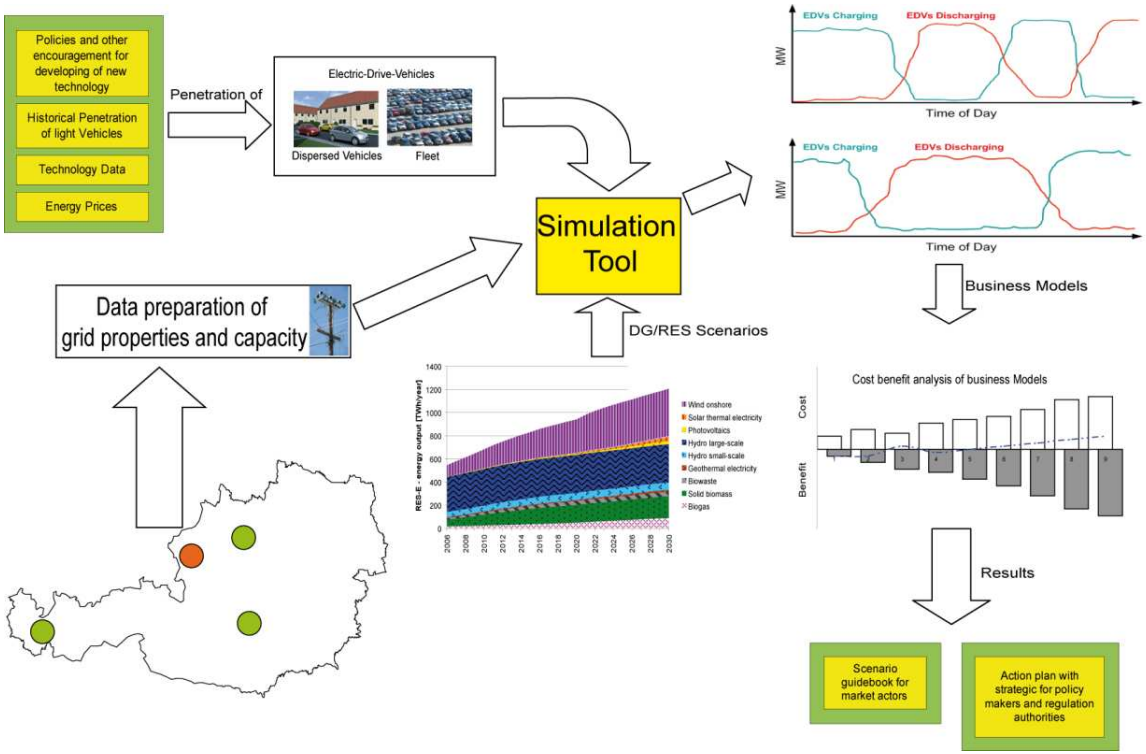
- **Interfaces for intelligent, solution to integrate e-mobility**
- **Question:** Which business models and customer interfaces have to be developed to make progress in vehicle to grid application and how can this be integrated in the existing processes an IT-systems in Salzburg AG?



- Technical system integration
- Customer-Interfaces
- Business models

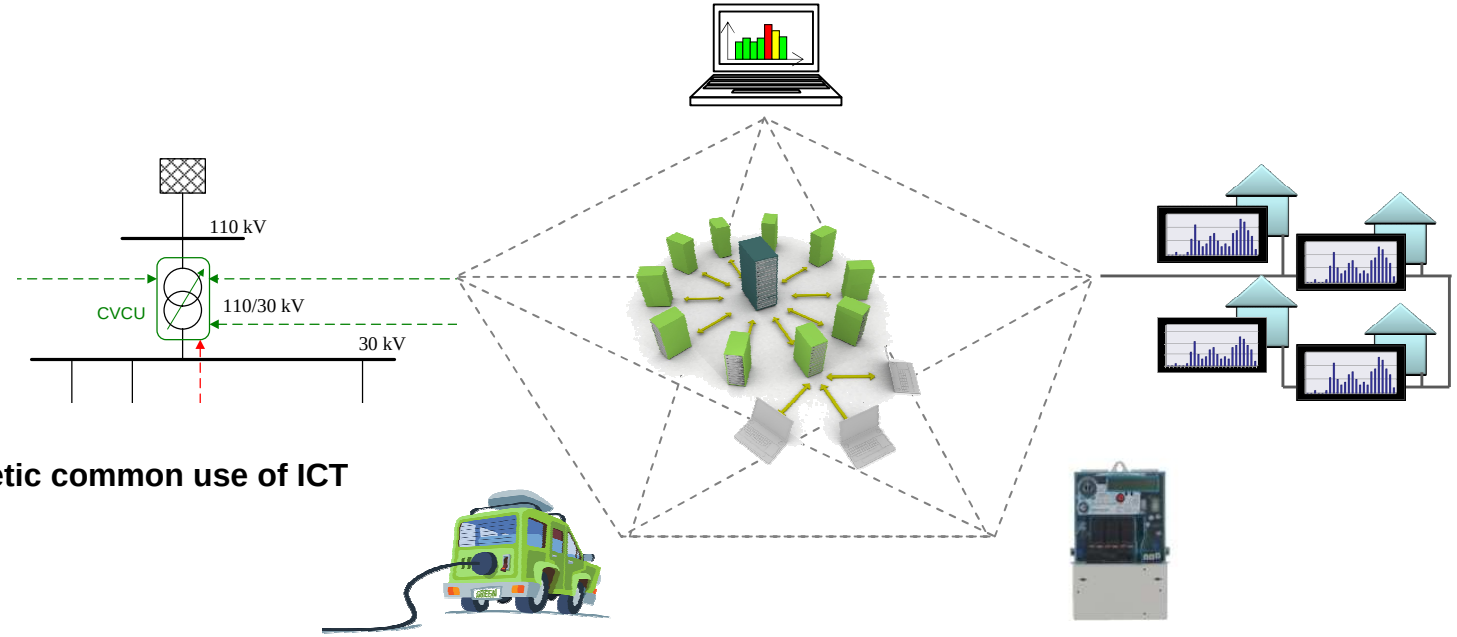
Vehicle to Grid (V2G) - Strategies

- **Strategies for intelligent solutions to integrate e-mobility in the electric power system**
- **Question:** Which technical, economical and ecological consequence will be caused by massive increase of e-mobility in the Austrian energy system



SmartSynergy

- **Synergy in the ICT-Infrastructure by common use of different Smart Grid applications**
- **Question:** Which **ICT-Infrastructure** is necessary to meet the demands of different smart grid- and e-mobility usages?



Synergetic common use of ICT

SGMS - Smart Web Grid

- **Future in the Smart Grid:**
  Data exchange between applications and market participants
- **open questions are:**
  user interaction
  technique
  economy
  data security

Objective: design an information model for web-based access to smart grids data sources

Proof of Concept for four applications

1. smart electric car charge
2. feedback energy consumption for end users
3. buildings as flexible loads
4. E-Car Sharing

Consortium: Salzburg AG, AIT, CURE, TU Wien – ICT, EEG, IRA

Project duration: 2011 - 2013

Further actual projects
Salzburg AG and Salzburg Netz GmbH

- **Supplying Verbundplan with measuring data for project DISPOWER**
  - Decentralized generation with a high penetration of renewable energies
  - partners: Verbundplan, further 37 companies from 11 countries; 2002-2005

- **Project ISOLVES PASSA-M**
  - Innovative Solutions to Optimise Low Voltage Electricity Systems – Power Snap-Shot Analysis by Meters
  - **partners :** SIEMENS, Energie AG Netz, Wienstrom Netz; 2009 – 2011

- **Project OPTRES**
  - Sustainable concept for grid-bounded energy supplement for the area of Salzburg by considering requirements of energy policy and urbanistic strategies
  - **partners :** Fichtner Consulting, Max Planck Institut, Magistrat Salzburg; 2008 – 2010

- **E-Mobility model region 2009 „Electrodrive Salzburg“**
  - Mobility service by e-mobility in Salzburg, operator model
    700 E-cars, 700 E-bikes, 150 loading units in Salzburg until 2012
  - implementation: *Electrodrve Salzburg GmbH*, 04 / 2009 market presence in Salzburg
    (www.electrodrive-salzburg.at or www.salzburg-ag.at/energie/strom/electrodrive/)
    The Mobility House GmbH, at the moment acitv in A, D, Ch *(www.mobilityhouse.at)*