

Österreichische Smart Grid Modellregionen im internationalen Kontext

Highlights aus der Energieforschung – Systemintegration von Wärme und Strom in zukünftigen urbanen Systemen

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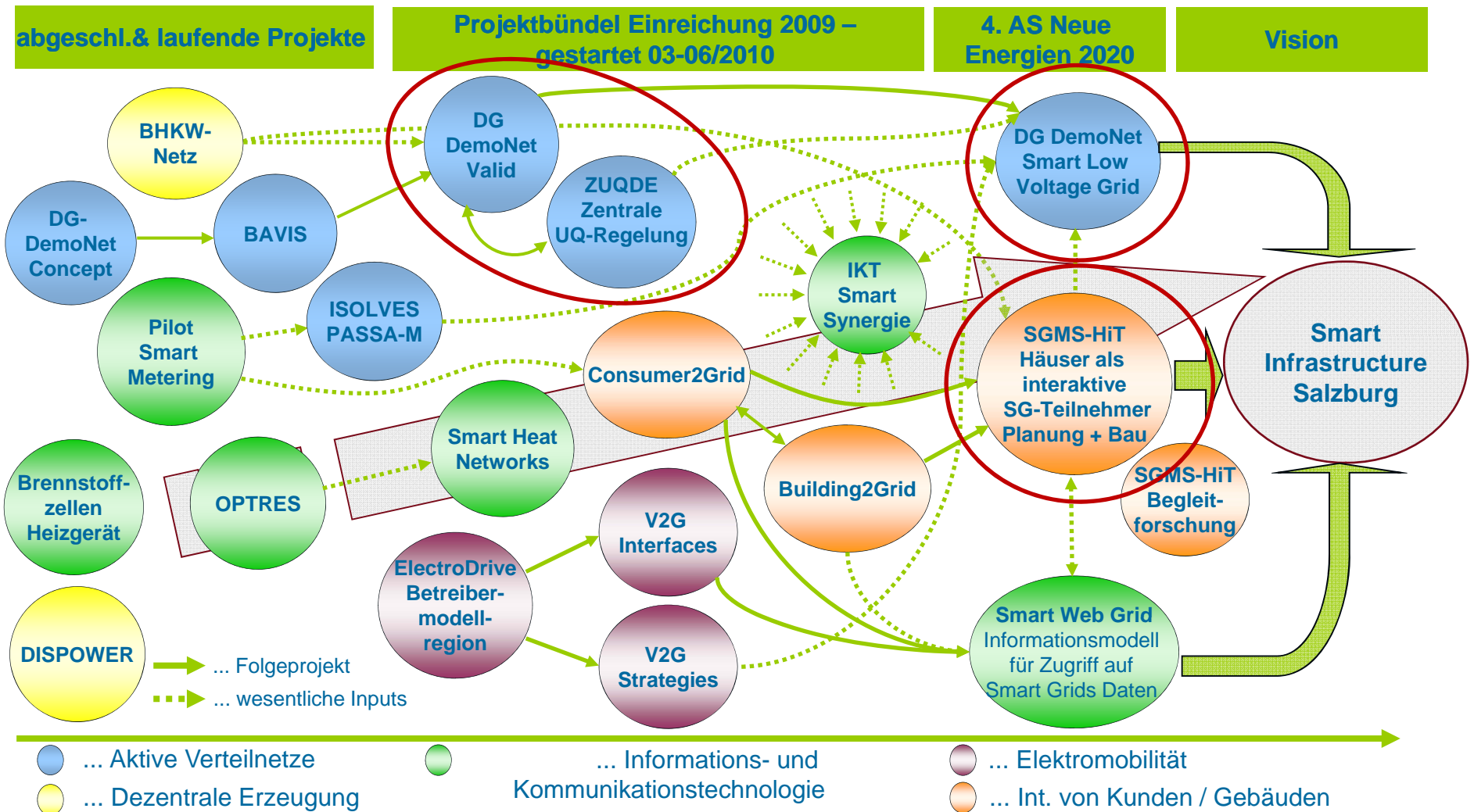
Energy Department

22.05.2013, Urania Wien

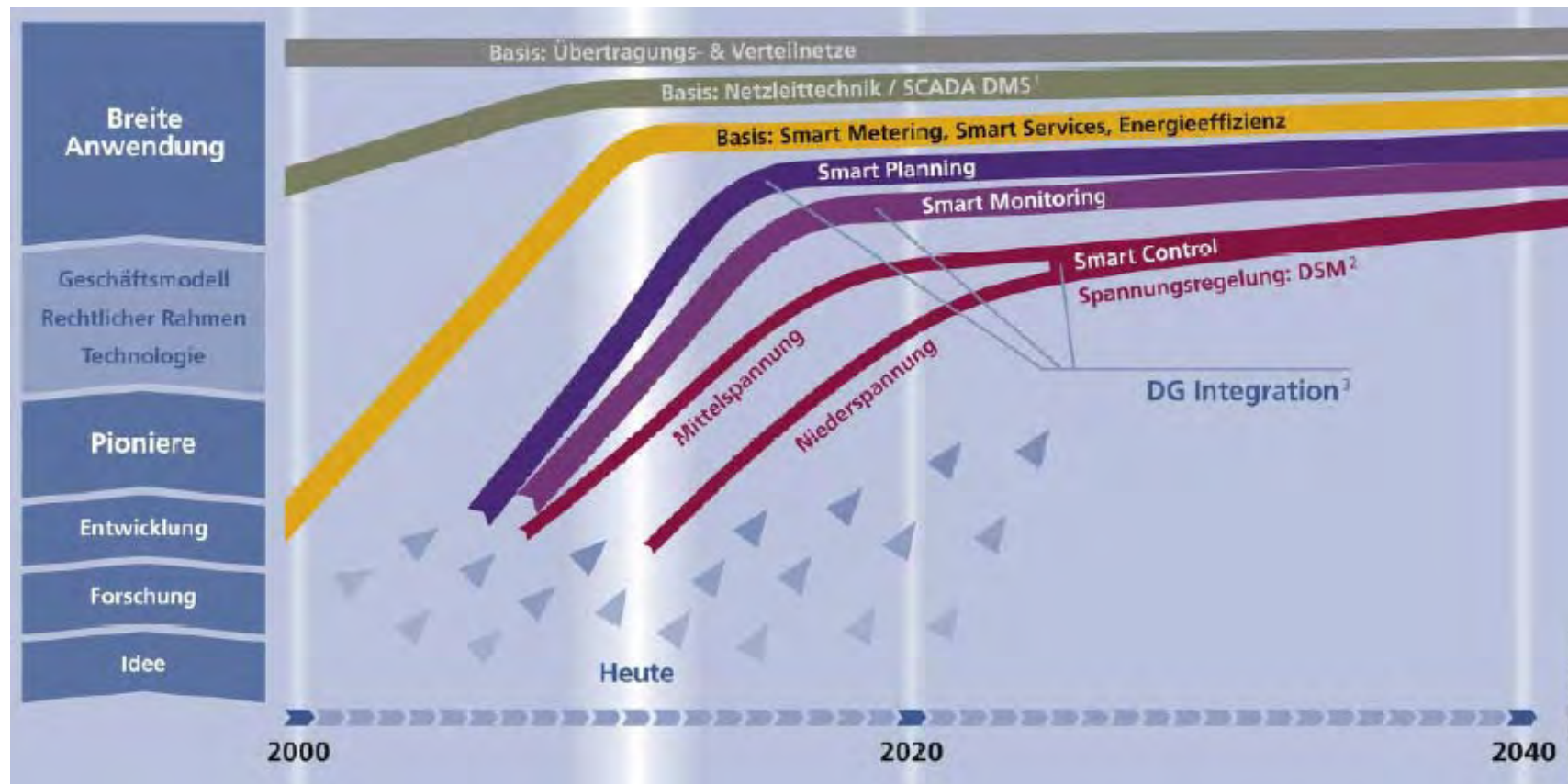
Content

- Austrian Smart Grid Model and Pioneer Regions and related projects
- Role of National Projects
- Austrian Contributions to SET Plan
 - EEGI
 - EERA
 - FP7
- International Collaboration
- Conclusions

Smart Grid Model Region Salzburg



Smart Grid Pioneer Region Upper Austria



Quelle: Andreas Abart, Energie AG OÖ Netz GmbH

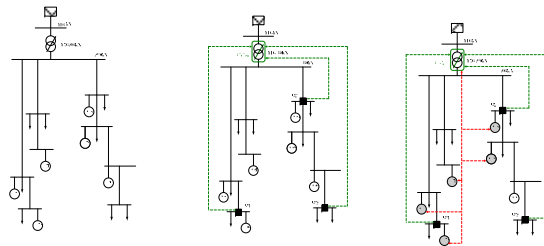
Project chain - DG DemoNet



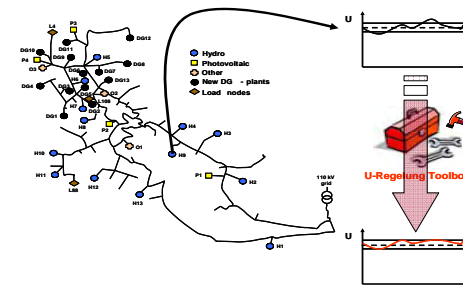
Influence of distributed generation on the parameter of power quality



BAVIS



Design of voltage control concepts to increase the hosting capacity of networks, Technical and economical assesment



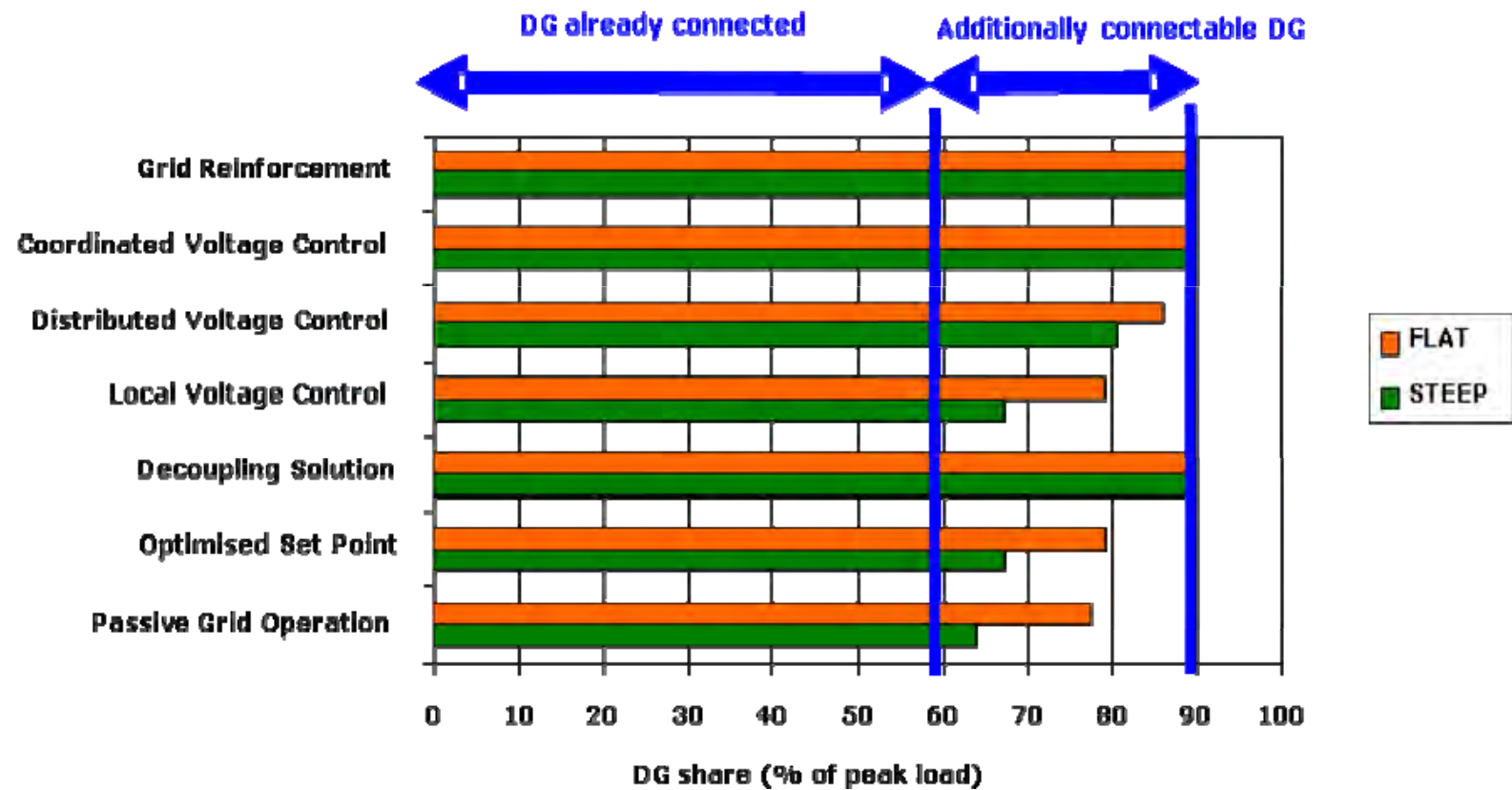
Improvement of concepts, advanced planning tools



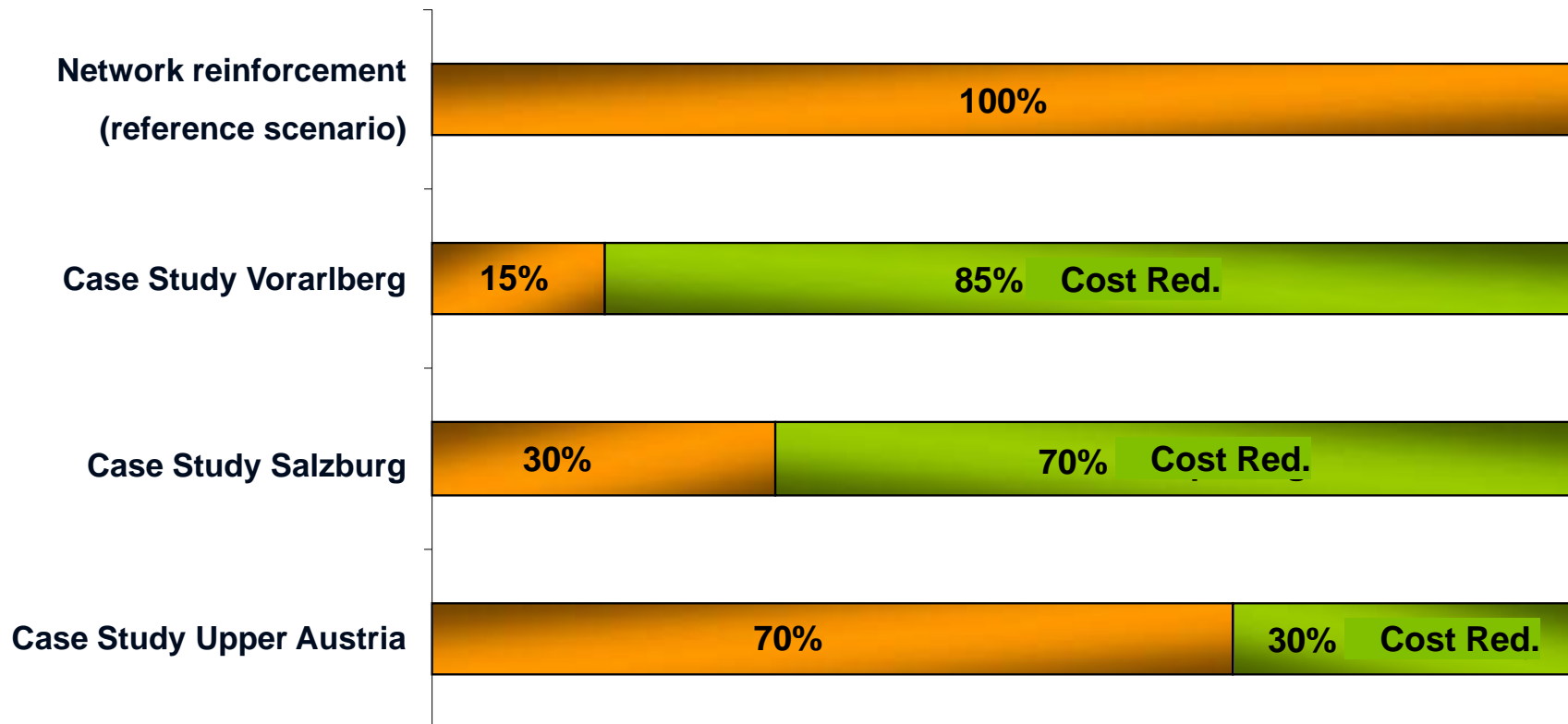
Development, field test, analysis and validation – proof of concept

Technical Investigations (Case Study 1)

Case study 1: connectable DG shares for different grid integration strategies



High economical advantages are expected



Costs and **cost reductions** compared to the reference scenario network reinforcement

Project DG DemoNet Smart LV Grid

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



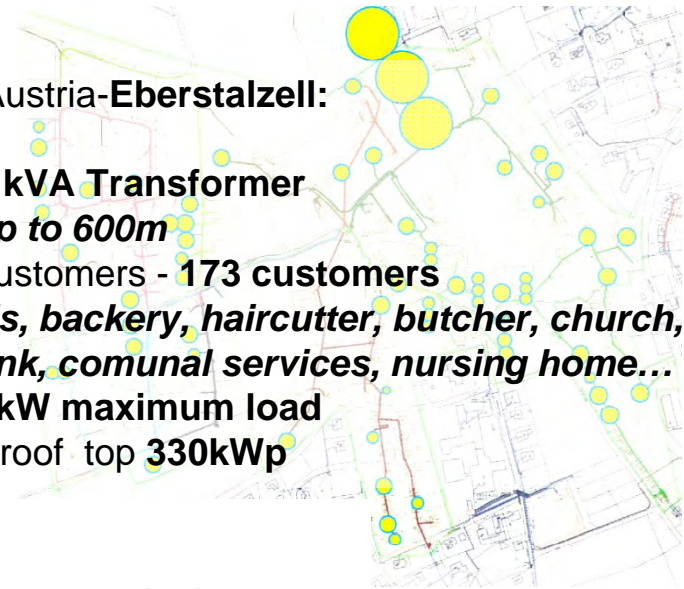
Project DG DemoNet Smart LV Grid Field Tests

LV Grid Salzburg-Köstendorf: Village

30/0,4 kV - 250 kVA Transformer
6 branches up to 1000 m
 95 buildings / 127 customers
households, school, doctor, building, store, carpentry, local authority, 1 farm
0,6 GWh/a 210 kW maximum load
40 PV-Systems roof top 180 kWp
37 e-cars
Building automation for demand side management

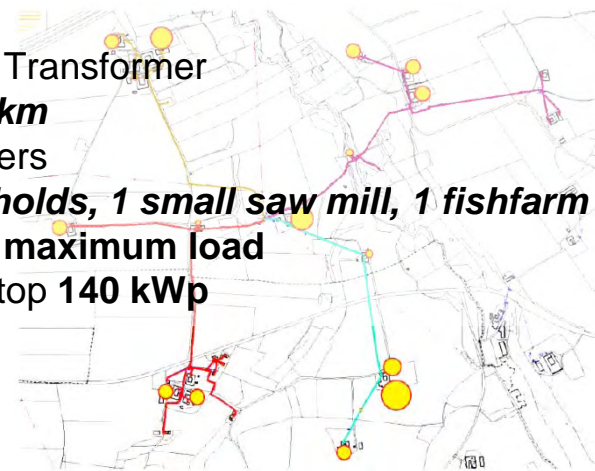
LV Grid Upper Austria-Eberstalzell: Village

30/0,4 kV – **630 kVA Transformer**
11 branches up to 600m
 165 Buildings/Customers - **173 customers**
150 Households, bakery, haircutter, butcher, church, car-service, bank, comunal services, nursing home...
1,3 GWh/a 450 kW maximum load
60 PV-Systems roof top 330kWp

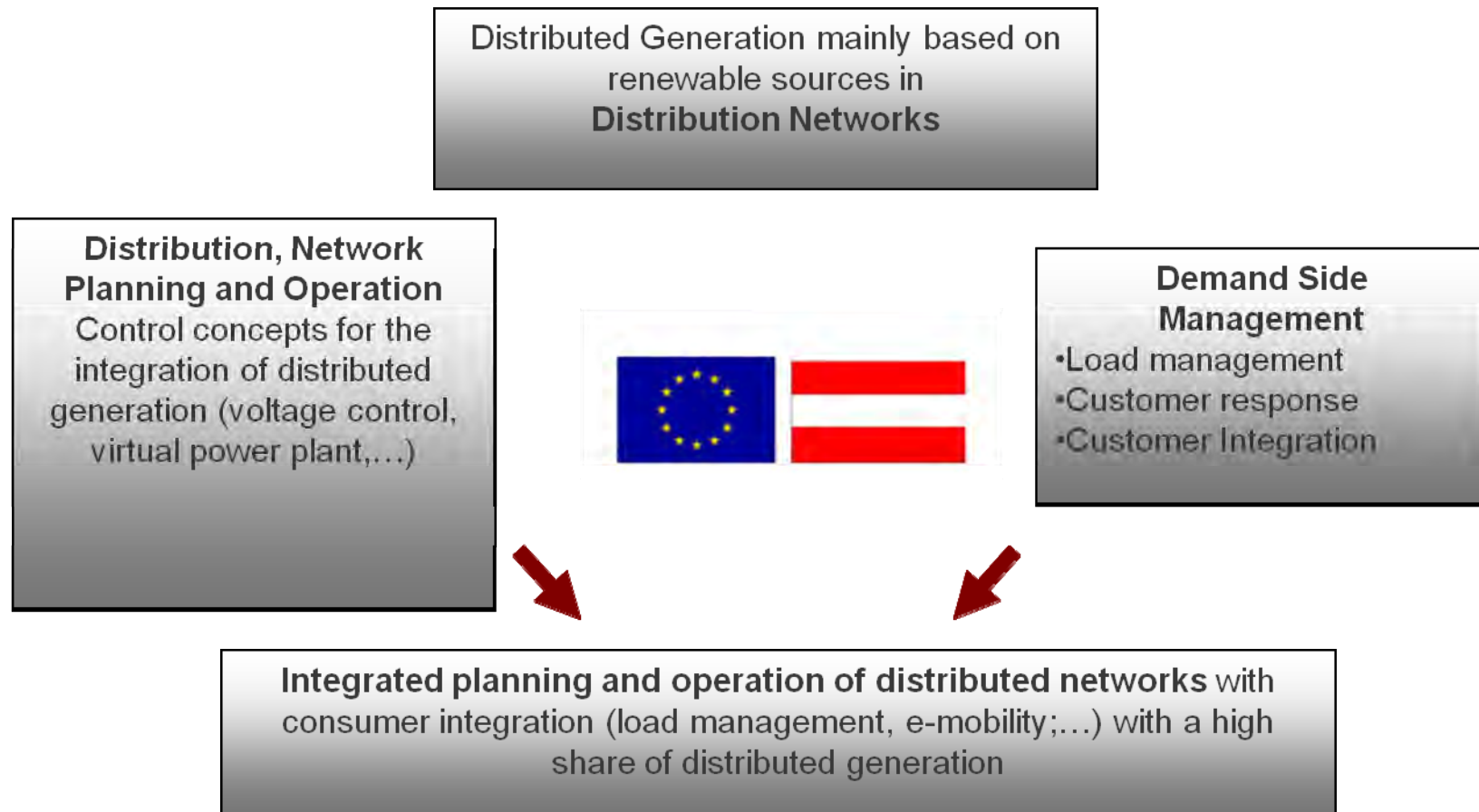


LV Grid Upper Austria-Littring: rural area

30/0,4 kV – 250 kVA Transformer
5 branches up to 1 km
 54 Buildings/Customers
15 farmers, 8 Housholds, 1 small saw mill, 1 fishfarm
0,35 GWh/a 120 kW maximum load
15 PV-Systems roof top 140 kWp



Austrian Smart Grid Focus



Supporting the SET Plan

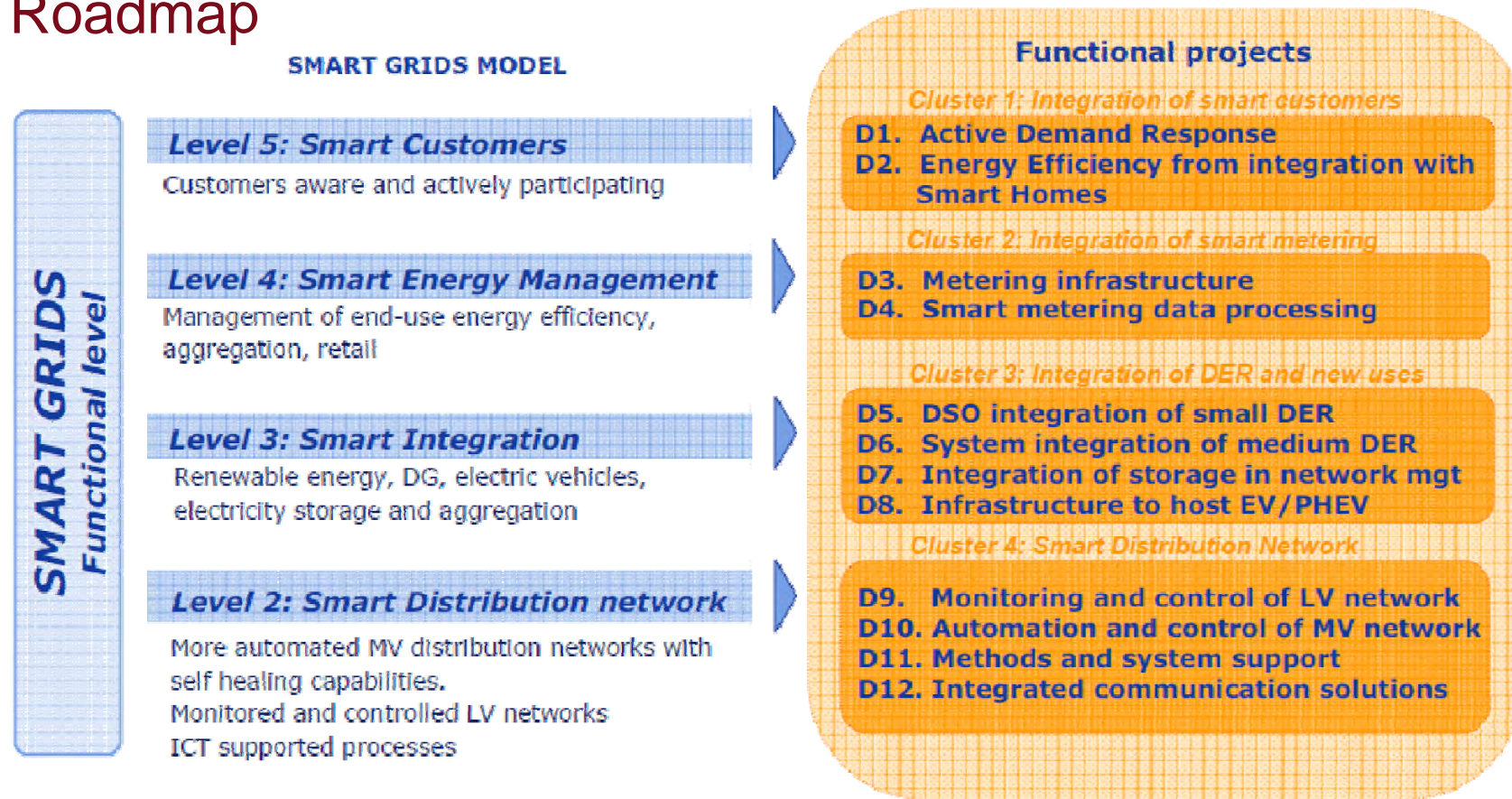
European Industrial Initiatives: public-private partnerships

- ✓ Electricity grids, Wind, Solar, Carbon capture and storage, Bio-energy, nuclear, smart cities, Hydrogen & fuel cells
- ✓ EEGI – Electricity Grid Initiative

European Energy Research Alliance (EERA)

- ✓ Smart grids, Smart Cities, Wind, Solar- PV & CSP, Carbon capture and storage, biofuels, marine energy, geothermal, materials for nuclear
- ✓ AIT is member of the EERA ExCo
- ✓ Participation in Smart Grids, PV and Smart Cities

Functional projects/objectives according to the EEGI Roadmap

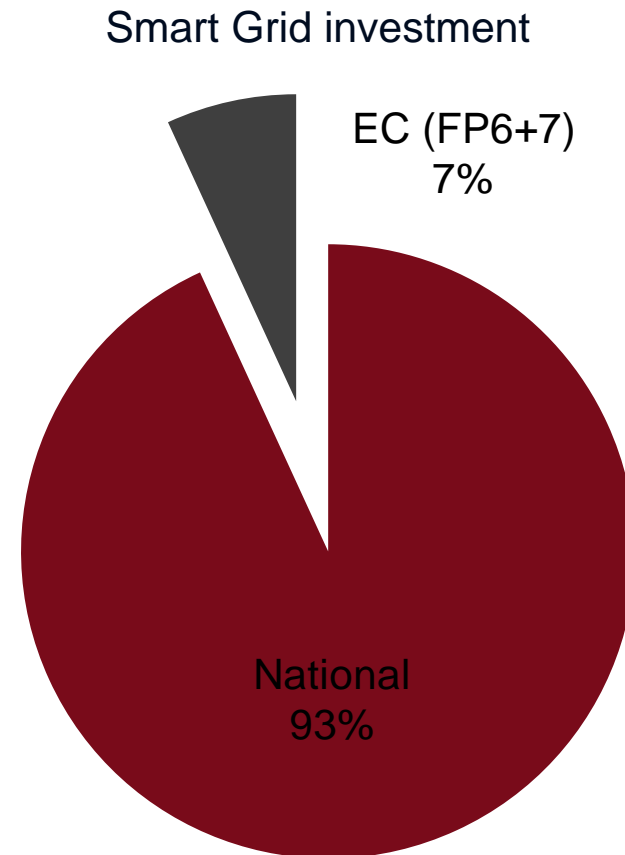


- Functional projects/objectives shall be implemented by local demonstration projects and related research projects

Importance of individual national contributions

EEGI MSI - Project and investment overview

- 203 European projects in total
 - 111 projects with significant demo part; 15 projects EC-funded, 189 MS-funded
 - Budget for SG projects on national level € 2.5bn acc. to JRC
 - Budget for SG projects on EU level: € 184m acc. to JRC (FP6 and FP7 funding)
- Lots of results but lack of European-wide coordination



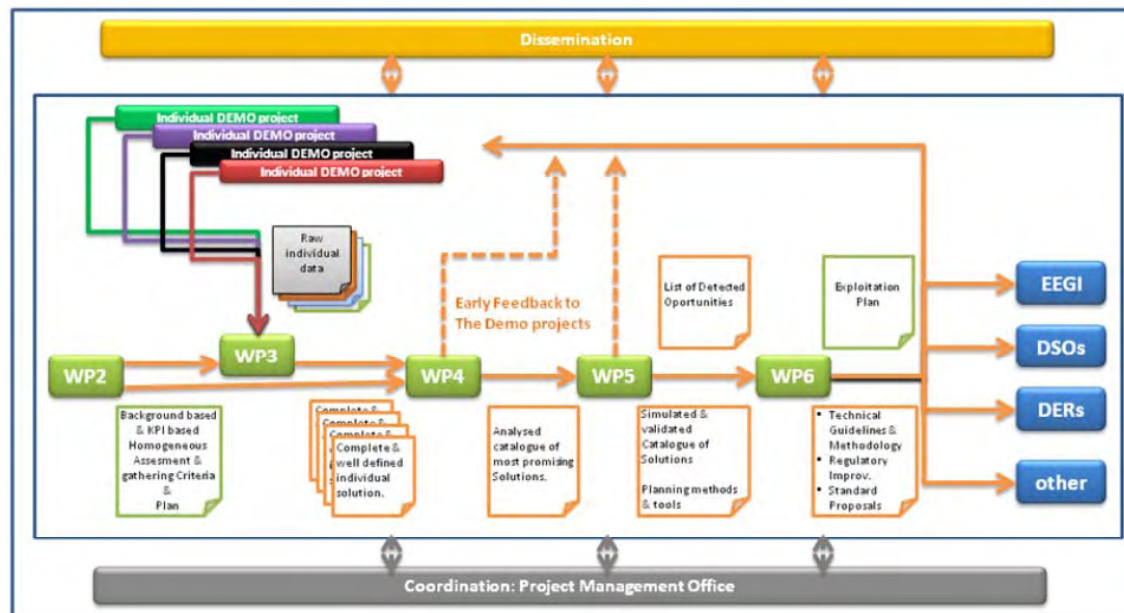
Strategic Cooperations in Europe

- **European Electricity Grid Initiative (EEGI):**
 - Roadmap on the Implementation of Smart Grids and Member State Initiative “A pathway towards functional projects for distribution grids”
 - Grid+ project
- **European Energy Research Alliance:**
 - Joint Program Smart Cities
 - Joint Program Smart Grids
 - Joint Program PV
- **ERA-Net Smart Grids** - European transnational program cooperation
- **DERlab:**
 - Laboratory Infrastructure with Focus on Distributed Energy Resources
- **Smart Grids D-A-CH** - Technology cooperation



EU Project iGREENGrid

- Establish a **family of relevant national projects** focused on the effective integration of variable distributed generation in power distribution grids.



EU Project iGREENGrid

- The analysis will be done in two steps:
 - analysis at demo project level (scalability)
 - analysis at European wide level with reference networks (replicability).
- In parallel an economic assessment of the different solutions will be performed (cost/benefit analysis) taking into account challenges for the future DSO regarding the integration of renewable energy in high scale:
 - Connection
 - Balancing
 - Signalling

Considering not only methods to increase the hosting capacity levels but also curtailment criteria and procedures: technical, economic and respectability processes.

EU Project S3C

Support the energy utility of the future to effectively cooperate with

- **smart consumers**, who want to
 - reduce energy consumption and costs
 - change lifestyle routines
- **smart customers**, who want to get services to become
 - a prosumer, i. e. produce as well as consume energy
 - a market partner providing consumption flexibility or energy services
- **smart citizens**, who want to
 - become part of a 'smart energy community'
 - help ensure quality of supply and environment preservation

EU Project S3C

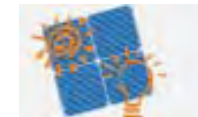
Expected Results

- interactive toolkit with robust guidance for practitioners
- report with detailed case analyses of ‘Family of Projects’ members who used the tools and the guidelines
- general and country specific recommendations for policy makers, regulatory and standardisation bodies and associations to support setting favourable framework conditions



Strategic Cooperations

- **International Energy Agency (IEA):**
 - IEA PVPS: AIT leads the Task 14: “High-Penetration of PV Systems in Electricity Grids”
 - IEA ENARD: Annex II: “DG System Integration in Distribution Networks”
 - International Smart Grid Action Network (ISGAN)



IEA ISGAN in a nutshell

- High level government attention and action to accelerate work-wide development and deployment of smarter electricity grids
- Facilitates dynamic knowledge sharing, technical assistance, peer review and, where appropriate, project coordination
- Sponsors activities that accelerate smart grid deployment and address knowledge gaps
- Fulfils a key recommendation in the smart grids technology action plan

ISGAN General Information

- Was launched as International Smart Grid Action Network (ISGAN) at the first Clean Energy Ministerial (CEM) in July 2010.
- Bringing together participants from 23 countries and the European Commission
- ISGAN is executed under a cooperative framework created by the International Energy Agency (IEA)
- Korea Smart Grid Institute (KSGI) was selected by the Executive Committee as ISGAN's Operating Agent for a 3 year term and is operating the IEA ISGAN secretariat

Participants

- Australia
- **Austria**
- Belgium
- Canada
- China
- Finland
- France
- Germany
- India
- Ireland
- Italy
- Japan
- Spain
- Sweden
- Korea



- | | |
|-----------------|------------------|
| • Mexico | • Spain |
| • Netherlands, | • Sweden |
| • Norway | • Switzerland |
| • Russia | • United Kingdom |
| • South Africa, | • United States |

Annexes

1. **Global Smart Grid Inventory** – of enabling programs and policies
2. **Smart Grid Case Studies** – using a common framework and metrics
3. **Benefit/Cost Methodologies** – (bottom-up & top-down) and related policy toolkits to assess smart grid investments
4. **Synthesis of Insights for High-level Decision Makers** – (e.g., CEM Ministers) from ISGAN and other related projects
5. **SIRFN** – Smart Grids International Research Facilities Network
6. **Power System Transmission and Distribution** – integrating renewables in the power system

SmartEST- Laboratory

- **Total Budget:** 3.5 Mio. EUR
- **Installation and Commissioning:** July 2012 – April 2013
- **Objective:**
 - Excellent environment for R&D, testing and verification in the field of large scale DG/RES grid integration and Smart Grids applications
 - New analysis methods include real-time (RT) Power-Hardware-in-the-loop (P-HIL) combining close-to-reality hardware system tests with the advantages of numerical simulation
- **Implementation:**
 - Methods developed within DG-EV-HIL will be applied to
 - the infrastructure (SCADA)
 - testing approaches (P-HIL)



Conclusions

- International cooperation is important to gain synergies and investigate replicability and saleability of national project results

- Strong contribution from Austrian projects and model regions with the focus on distribution networks both
 - European Level (EEGI, EERA, FP7)
 - and International Level (IEA)



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your ingenious partner

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