The Smart Grid Innovation Process in Austria

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Supported by:
Michael Hübner – Ministry of Transport, Innovation and Technology
AUSTRIA – am Member of the European Union

Population: 8.3 million
Capital city: Vienna
- ~50 Hydro Storage power plants
  - out of them 13 as pump storage up to 730 MW (total 3.3 GW)
- ~30 Run of River power plants (20...330 MW)
- ~2800 Small Hydro power plants

12 GW of Hydro (40.000 GWh)...
...care for 60-65% of Austria’s total Electricity
Strong Interlinks with ist neighbours:

- Installed Capacity in Austria: 23 GW
- Peak capacity used: 10 GW

Year: 2011

Target for 2020: 34% Renewables in Austria

Target for 2050: 85% Renewables in Austria

Final Energy Demand in PJ

Quelle: Daten laut Grundlage der „Energiestrategie für Österreich“ bis 2020; modifiziert und erweitert durch RFTE
Smart Grids in Austria – Overall national Targets

- **Integration**: optimal integration of renewable energy sources and new energy applications

- **Optimisation**: in the total energy system concerning the transition towards a sustainable and renewable energy system, including energy efficiency and economic optimisation.

- **Safety and security**: reliable and safe energy supply including data handling and privacy aspects

- **Flexibility**: Enlargement of the Flexibility in the whole System (Grid and user) for future requirements of generation, trade and end-use. By active involvement of all these stakeholders

- **Smart Services**: (Energy- and Information services like Smart Metering, Electromobility, Energieconsulting Services, Demand Management,…)

- **Regions**: Development of Energy Regions with high level of responsibility for local energy services
Austrian Innovation Support System for Smart Grids

International Cooperation
Accompanying Measures
Technology Development
Basic Studies
New Concepts

2003

2010 - 2015

Funding Programs:

• KLI.EN eMission (Energy Research)
• KLI.EN- Demo fit4SET
• IKT der Zukunft (ICT Research)
• KIRAS (Security Research)

Accompanying Measures: Knowledge for Policy and Deployment
(Interoperability, Standards, Business Models, Legal Framework, Regulation, …)

Project Budgets: ca. 130 Mio €
Subsidies: ~55 Mio €
Public Private Partnership: Technology Plattform Smart Grids Austria

More Working groups at
- Smart Grids at Utility association (Österreichs Energie)
- Standardisation (ÖVE, Austrian Standards)
- Ministries (Strategy for Cybersecurity, …)
- Administration (Regulation)

www.smartgrids.at
Smart Grids Week (since 2008) a yearly international forum

- 5 days in different places on invitation of DSO-companies
- More than 350 participants (> 20 countries)
- Up to 10 project workshops as side events

Smart Grids Week | Salzburg 2010
SG-Model region of Salzburg

Smart Grids Week | Linz 2011
Power Snapshot by Meters

Smart Grids Week | Bregenz 2012
Live Präsentation Spannungsregelung Walsertal

Smart Grids Week | Salzburg 2013
Live Präsentation Leuchttürme R.H/ Köstendorf

Smart Grids Week | Graz 2014
Kooperationspartner Energie Steiermark

Smart Grids Week | Vienna 2015
Smart Grids meets Smart City

18.-22.5.2015 - VIENNA
Developing Austrian Pioneer Regions

- Smart City Graz
- Smart Community Groß-Schönau
- Smart Monitoring – Smart Planning – Smart Control Oberösterreich
- Smart Distribution Grids Großes Walsertal
- Smart Infrastructure-Planning Salzburg
- Smart regional Micro Grids Murau
Technical Evaluation (Case Study Vorarlberg)

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

- Grid Reinforcement
- Coordinated Voltage Control
- Distributed Voltage Control
- Local Voltage Control
- Decoupling Solution
- Optimised Set Point
- Passive Grid Operation

DG share (% of peak load)

- DG already connected
- Additionally connectable DG

FLAT
STEER

B. Bletterie, © AIT, 25.11.2014
Economical Evaluation - Simulations

Network reinforcement (reference scenario) 100%

Case Study Vorarlberg 15% 85% Cost Red.

Case Study Salzburg 30% 70% Cost Red.

Case Study Upper Austria 70% 30% Cost Red.

Costs and cost reductions compared to the reference scenario network reinforcement
Economical Evaluation – After Field Test

Network reinforcement (reference scenario)

Case Study Vorarlberg

Case Study Salzburg

Case Study Upper Austria

Costs and cost reductions compared to the reference scenario network reinforcement
... proof of concept for different use-cases (examples)

- Active Distribution Networks
- Building 2 Grid
- Consumer to Grid
- PV to / Vehicle to Grid

- Coordinated Voltage Regulation
- Costs for additional DG power (values incl. operating costs [€/kW])
- Automated Load Shifting
- BiKWs
- Photovoltaik
- Home Automation
- Energetics feedback / User interaction
SmartEST- Laboratory at AIT

- **Total Budget:** 3.5 Mio. EUR
- **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 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)
Labor infrastructure for Education & Training

at University AS Technikum - Hybrid Energy - Smart Micro-Grid Lab
Working with the European Electricity Grids Initiative (EEGI)

Under the guidance of the Steering Group of the SET Plan, the EEGI team is composed of Industry, European Commission, Member States, and when necessary, other relevant stakeholders. It provides a flexible platform for planning and programming of actions to implement the initiative. Thus, it will develop actions, identify investment needs, put into operation and monitor the activities which compose the initiative. In addition, it will work with other EI Teams to address cross-cutting issues, synergies, and overlaps.

The European Distribution System Operators for Smart Grids is an international non-profit association committed to the development of Smart Grids in Europe. It aims to be the key reference point in the coordination of all European DSOs efforts. Its purpose is to structure, lead, and enhance cooperation between European distribution system operators for electricity, as well as assure, manage, represent and promote their common interests, specifically on smart grids development and implementation.

The European Network of Transmission System Operators for Electricity (ENTSO-E) is the key forum for the coordination of policy and technology R&D pathways for the smart grids sector, as well as the linking glue between EU-level related initiatives. For further information visit the website: www.smartgrids.eu

The GRID+ project has the aim to implement and support the networking process of the EEGI over the years 2012-2014, both within and beyond the European borders. Furthermore, GRID+ plays an important role in networking national projects and initiatives. Thanks to GRID+, the EEGI enhance the delivery by the European network operators of the new knowledge needed to deploy Smart Grid solutions in the most effective way. For further information visit its website: www.gridplus.eu
Austrian contribution to the EEGI

“The Austrian contribution aims at an integrated planning and operation of distribution networks with high share of distributed generation based on renewable energy resources and electro mobility”

Integrated planning and operation of distributed networks with consumer integration (load management, e-mobility;…) with a high share of distributed generation

Distributed Generation mainly based on renewable sources in Distribution Networks

Demand Side Management
- Load management
- Customer response
- Customer Integration

Distribution, Network Planning and Operation
Distribution management systems only partly used in medium voltage networks - Control concepts for the integration of distributed generation (voltage control, virtual power plant,…)

Austrian Pioneer Regions in European “Families of Projects”:
EC R&D validated in national demonstration projects
6 projects linking each to 4-9 national demo projects, Completing negotiations e.g.: RES Integration

![Diagram of Austrian Pioneer Regions in European Families of Projects](image)
From regional initiatives to European Smart Grids

Innovation Process from local trials to Implementation:

- Invent new concepts
- Proof of concept & validation
- Development of R&D roadmaps

R&D, pilots, local demos

Transnational cooperation only on Research

- Meta analysis of achieved results
- Integrate technology, market and adoption
- Derive knowledge for scaling & replication

Families of projects and deep knowledge sharing
transnational co-operation on demonstration and validation

- Interoperable systems
- Established Standards
- Implementation according to a common reference architecture model

Smart Grids products and services

Systems technology & service markets

Strategic Knowledge

- Cost Benefit
  - Planning
  - Preparation
  - Regulation
  - Market
  - Business Models
  - Data Models

Demonstration & Comparative Validation

Service Demonstration

Feasibility Demonstration

First Trial
- FENIX
- CRISP
- DG-Demo Net ...

Pilot/Demo
- Power Matching
- Smart City Grids
- Linear
- Smart Grids Gotland
- DG-Demo Net Validation

City 1
- IGREENGrid
- Grid4EU
- Smart Energy Collective

Demonstration
- Power Matching City 2
- Inovgrid
- Royal Seaport: Stockholm
- E-Dema
- Modellregion Salzburg

Implementation
NEW: ERA-Net Smart Grids Plus is aiming to contribute to the EEGI

EEGI

- EU - Projects
  - FP7, Horizon 2020
- Trans-national Projects
  - ERA-NET PLUS

Knowledge on EEGI-level

Horizon 2020

National / regional R&D funding programs

Michael Hübner
ERA-Net Smart Grids Plus
partner countries and regions

JRC Smart grid projects heatmap

ERA-Net SG+ Geographical Coverage
Up To Date Information

- R&D Projects
- Pioneer Regions
- Publications
- Events
- International Cooperations (D-A-CH, ISGAN, EEGI, ERA-Net,)

www.ENERGIESYSTEMEderZukunft.at/Highlights/SmartGrids

http://www.ERANET-smartgridsplus.eu/
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