

EU policy objectives and European research on Smart Grids

European Commission, DG Research
Henrik Dam
Research Programme Officer

ADDRESS international workshop - Paris 9th June 2010

Key targets

Sustainability:

- ✓ 20% of renewable energy in the EU's overall mix
Translates into 30-35% of electricity from Renewables

Security of supply

- ✓ Reduce dependence on energy imports,
- ✓ Avoid blackouts

Competitiveness:

- ✓ Unbundling of generation and transmission
- ✓ Freedom to choose supplier

20 20 20

The role of electricity and of electricity grids in integration of Renewables

- ✓ Renewable energy is often **transported to users through electricity**
- ✓ Reducing CO₂ requires a **higher share of electricity** in the energy portfolio (e.g. more electricity in transport, heating, industry)
- ✓ Variability of renewable electricity requires a new approach to electricity grids. We need **stronger and smarter grids**
- ✓ FP7 work aims at promoting the **innovations in technology and at system level** to support smart network evolution.

Key needs

- ✓ Large-scale **demonstration** of smart grids implementations, particularly for distribution networks
 - ✓ Integration of variable distributed energy resources
 - ✓ Active distribution networks
- ✓ **Research** on European-level integration of the high-voltage transmission networks
 - ✓ Planning
 - ✓ Technology demonstrations
 - ✓ Control
 - ✓ Markets
- ✓ Supporting technologies, e.g. **ICT infrastructure, energy storage, smart meters, electric vehicles**

Highlights of our activities in Smart Electricity Grids

In the EU Framework Programmes for research (FP5-FP7)

- ✓ 60 M€EC support for 50 R&D projects in FP5 (1998-2002)
- ✓ 65 M€EC support for 27 R&D projects in FP6 (2002-2006)
- ✓ More than 140 M€ spent/earmarked so far (2005 - 2010) in FP7 (2007-2013)
- ✓ Substantial FP7 budget increase for 2012-2013



Highlights of our activities in Smart Electricity Grids

... and beyond the Framework Programmes

- ✓ Strategic Energy Technologies Plan (SET Plan)
- ✓ SET Plan European Electricity Grids initiative launched June 2010
- ✓ European Technology Platform on Smart Grids launched in 2005
- ✓ EU-US Energy Council (Joint research and development of low carbon energy technologies. Particular focus to smart grids)
- ✓ International Conference on Integration of Renewable and Distributed Energy Resources EU – US – Canada – Japan started 2004
Next edition: Albuquerque December 2010

FP6 Projects on Smart Electricity Grids (completed)

Integration of renewables, aggregation of distributed resources, demand response:

- ✓ Three integration projects with pilot tests: aggregation (EU-DEEP), virtual power plants (FENIX), microgrids (MORE-MICROGRIDS)
- ✓ Standardisation and testing of grid interfaces (DER-LAB)

Enabling technologies:

- ✓ Applications of High-Temperature Superconductivity cables, transformers, hydro-generators, current limiters
- ✓ Inverters

Coordination:

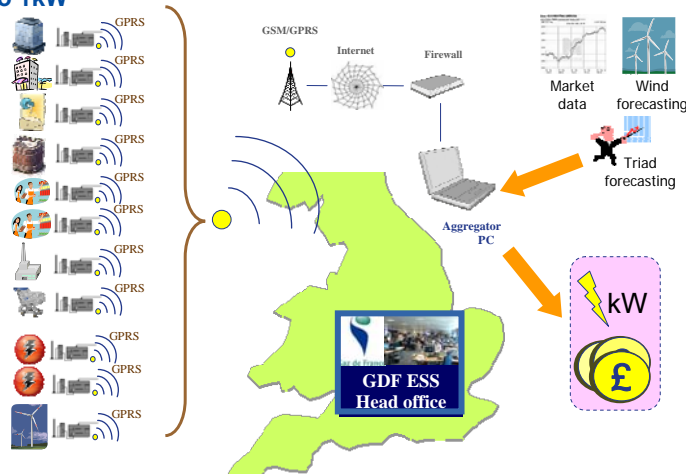
- ✓ Project clusters, leading to the Smart Grids Technology Platform

EU-DEEP: European Distributed Energy Partnership

Business models for aggregation of Distributed Energy Resources

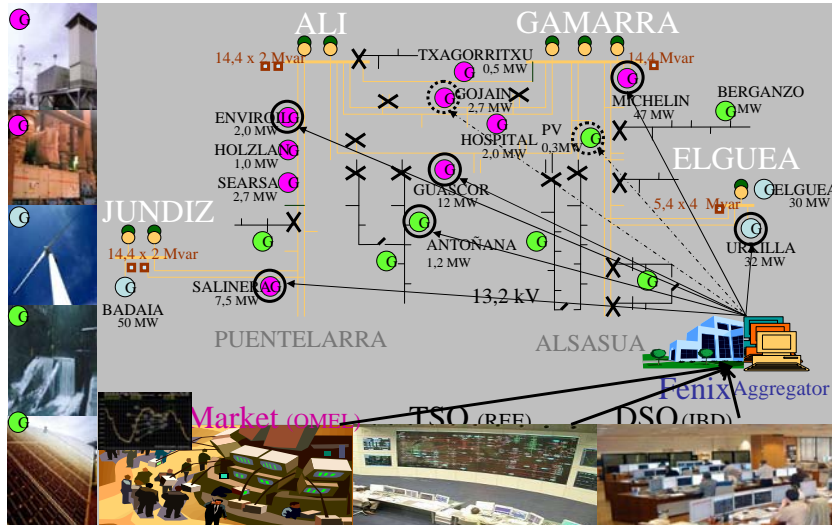
- ✓ Existing Grids
- ✓ Lower the minimum size threshold for aggregation from 10 MW to 50 kW... to 1kW

Example:
TF1 (UK)



FENIX: Flexible Electricity network to integrate the expected energy evolution

Virtual Power Plants as a common information architecture for aggregation of resources – covering market and congestions.



FP7 Projects on Smart Electricity Grids (running)

Active distribution networks:

integration distributed resources and demand response

- ✓ ADDRESS pilot project
- ✓ Large demonstration projects starting early 2011

Pan-European transmission networks:

- ✓ Planning: EWIS, SUSPLAN, IRENE 40
- ✓ Demonstration of power technologies: TWENTIES
- ✓ Monitoring and control: PEGASE
- ✓ Markets: OPTIMATE

Additional developments:

- ✓ ICT infrastructure: 6 projects
- ✓ Standardisation of Smart Meters: OPEN METER
- ✓ Impact of Electric Vehicles on electricity grids: MERGE, G4V
- ✓ Storage

The SET plan European Electricity Grids Initiative

Objectives:

- ✓ Accelerate system innovation and the development of future European electricity networks,
- ✓ Develop and validate a portfolio of Smart Grids demonstrations: user-centered, market based, sustainable, efficient
In a variety of contexts: geographical, networks, regulation, etc.
- ✓ Prepare the scaling-up and replication of the experiences

The European Electricity Grids Initiative

Expected benefits:

- ✓ Increased hosting capacity for renewable and distributed sources
 - ✓ Integration of national networks into a truly pan-European network
 - ✓ High level of quality of electricity supply to all customers
 - ✓ Active participation of users in markets and energy efficiency
 - ✓ Anticipation of a progressive electrification of transport
 - ✓ Efficient future networks, for the benefit of grid users
 - ✓ Opening business opportunities for new players in smart grids
- Roadmap 2010-18 and detailed implementation plan 2010-12 at www.smartgrids.eu
- Total budgeted costs for RD & D: 2 B€

Call ENERGY-2010-1

- ✓ Energy storage for stationary applications

Call ENERGY-2010-2

- ✓ Large scale demonstration of smart distribution networks

Work Programme 2011: preliminary thoughts

- ✓ Pan-European transmission networks: coordinated control, security
- ✓ Demonstration of large-scale innovative storage
- ✓ Network of smart grids demonstrations
- ➔ Publication expected July 2010
- ➔ Research contributions from non-EU participants are welcome

Thank you for your attention