The European Commission’s science and knowledge service

Joint Research Centre

How regulation and innovation are reshaping the local electricity systems in the EU

Gianluca Fulli
JRC Deputy Head of Unit
Cagliari, 30/05/19
As the *science and knowledge service* of the Commission, the JRC’s mission is to support EU policies with *independent evidence* throughout the whole policy cycle.
Core power system research areas

- Scanning the smart electricity ecosystem
- Capturing the electricity socio-technical interface
- Putting the digital grid interoperability under test
- Assessing smart grid costs, benefits, and impacts
- Evaluating electricity supply security and resilience
- Assessing the evolving electricity markets schemes
- Studying low-carbon power system integration
- Informing national, regional investment strategies
- Looking at transcontinental and global power grids
Electrification trends

• Decarbonisation
• Digitalisation
• Decentralisation
Decarbonisation

Gross electricity generation from renewable sources

- WIND
- SUN
- HYDRO
- BIOGAS/BIOLIQUIDS
- RENEWABLE WASTES
- WOOD & OTHER SOLID
- GEOTHERMAL

Eurostat
Decentralisation
JRC DSO Observatory

Techno/economic data collected from **99** out of **191 largest DSOs** (serving > 100,000 clients, i.e. **84.6% of the total European users**)

**PV dominating at low voltage**

**more wind than PV at medium voltage**
• 950 smart grid R&I projects in Europe
• ~5 billion EUR invested
INNOVATION
Applications of smart grid R&I projects

In the ~thousand surveyed smart grid projects:

- Most targeted applications: **smart network mgmt** & **demand side mgmt**...
- ...with an eye at **system integration** and **interoperability**
How is smart grid R&I being financed?

**Private** investment:

- **highest source** for R&D and demo projects
- **shrank after 2011**, partly compensated by EU funding
Demand side management in smart grid R&I

- Include several **end-use sectors** (residential, commercial, public,...)
- Address **multiple services** (electricity, water, gas,...)
- From individual to **community behaviours** change

Exploring Community-Oriented Approaches in Demand Side Management Projects in Europe, Sustainability 2016
Local energy communities: an insight from European smart grid projects, CIRED Workshop 2018

Organizations involved in Local energy communities

Emerging stakeholders in Local energy communities
#EnergyUnion

- Market reform
- Access to information
- Consumer choices
Overarching policy/regulatory challenges

• Risk allocation and cost recovery
• Coupling, integration and interoperability
• Costs-benefits and business cases
• Data security and privacy
Policy/regulatory challenges on consumers

- Energy poverty and vulnerability
- Dynamic pricing
- Consumer interaction with markets
- Social engagement and acceptance
Green/innovation deals, sandboxes & living labs

The Netherlands

Germany

EU

The Joint Declaration of Intent for the INNOVATION DEAL on "From E-Mobility to recycling: the virtuous loop of the electric Vehicle"
JRC research capabilities – recent developments
JRC interoperability testing

JRC Petten, NL
Smart home technologies
Digital energy solutions

JRC Ispra, IT
Smart city
Smart mobility

Interoperability testing platform and living lab
JRC open access distribution modelling platform

ses.jrc.ec.europa.eu/dinemo
Thank you for your attention!

gianluca.fulli@ec.europa.eu

JRC Smart Electricity Systems and Interoperability:

https://ses.jrc.ec.europa.eu/