

# The European Commission's science and knowledge service

## Joint Research Centre



# EU Energy Transition: challenges and opportunities

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Policy Conference: Energy Transition Governance for Better Energy Security in Europe

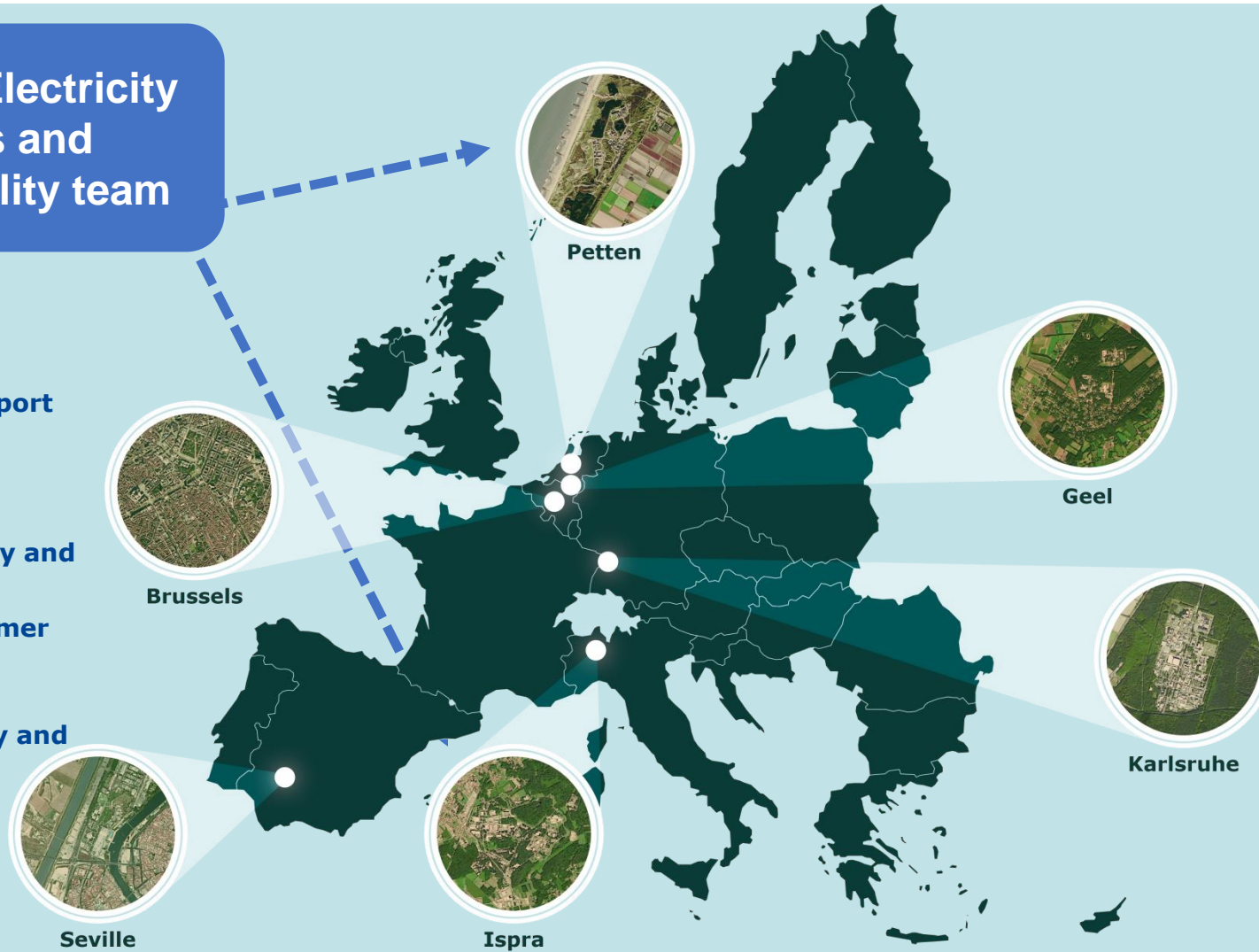
Paris, 17 October 2019

# The Joint Research Centre at a glance

## JRC Smart Electricity Systems and Interoperability team

### • 6 Directorates

- B. Growth and Innovation
- C. Energy, Transport and Climate
- D. Sustainable Resources
- E. Space, Security and Migration
- F. Health, Consumer and Reference Materials
- G. Nuclear Safety and Security



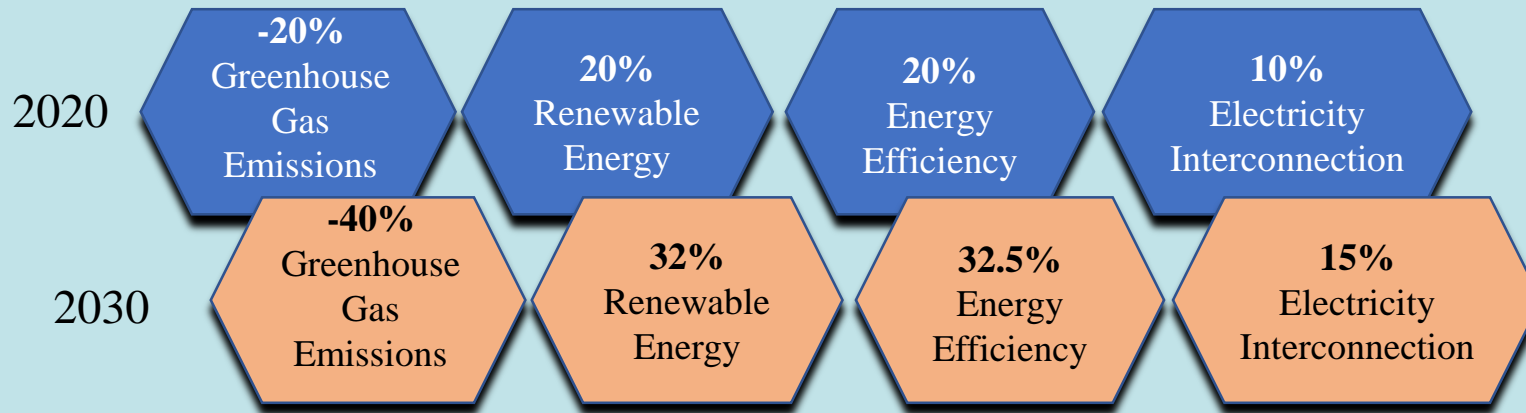
- As the **science and knowledge service** of the Commission, the JRC's mission is to support EU policies with **independent evidence** throughout the whole policy cycle
- 6 locations in 5 Member States: *Italy, Belgium, Germany, The Netherlands, Spain*

# Presentation Outline

- What is driving the EU Energy Transition
- The European Energy System of the future
- Some challenges ahead
- Identifying opportunities

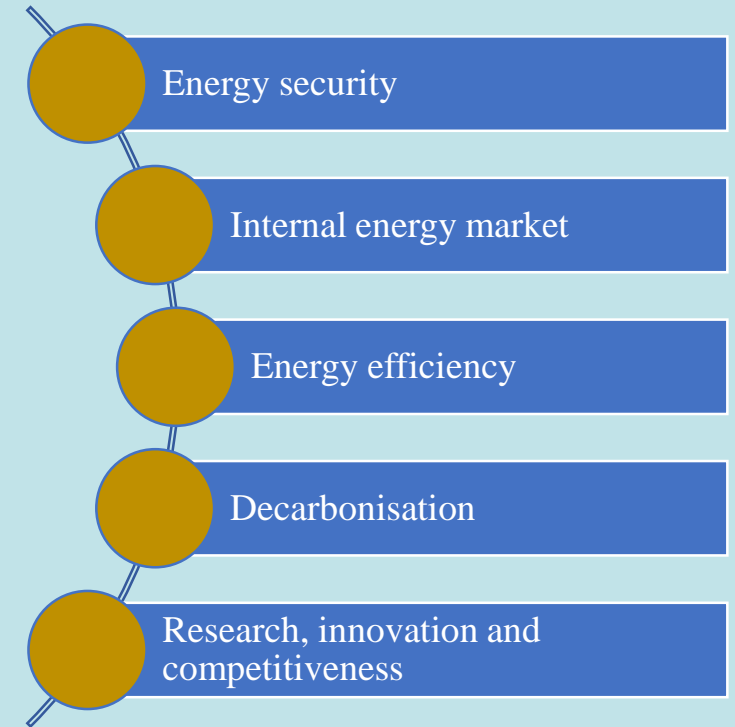
# What is driving the EU Energy Transition

## Updated Union-wide energy targets



Giving Union consumers, **secure**  
**sustainable**  
**competitive**  
and **affordable** energy

## Covering the five dimensions of the Energy Union



# The European Energy System of the future

- Electricity will play a stronger role as an energy carrier
  - *Decarbonisation*
  - *Decentralisation*
  - *Digitalisation*
- Power to consumers
  - *Consumer choices and rights*
  - *Access to information*
  - *Energy communities*
  - *Poor and vulnerable protection*



# Some challenges ahead

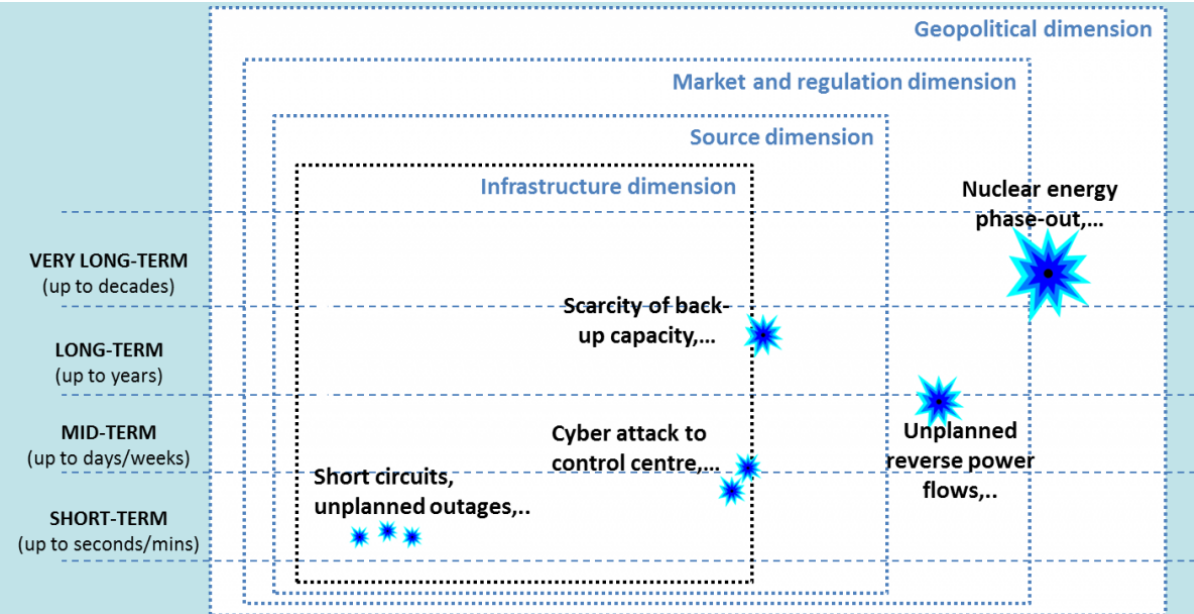
- **Security and resilience**
- **Social dimension / vulnerable protection**
- **Systems integration / Interoperability**

#EnergyUnion



# Security of supply: keeping the lights on

- Stable energy supply is essential for almost all aspects of modern life
- The high penetration of variable RES is challenging systems' security of supply in terms of:
  - *generation adequacy (reliable available capacity)*
  - *network reliability (number & duration of blackouts)*
- New threats are emerging – Cybersecurity to become more of an issue in the future
- Resilience of the energy system more important due to interdependences of energy infrastructure – not only a national issue



Source: The EU Electricity Security Decision-Analytic Framework: Status and Perspective Developments, G. Fulli et al., *Energies* 2017, 10, 425

# Risk preparedness in the electricity sector

## Dealing with electricity crises:

- requiring **short term** response
- with **cross-border or simultaneous** effects in MSs
- prevented/managed with **solidarity** among MSs
- **not solved solely** via **market & operational** rules



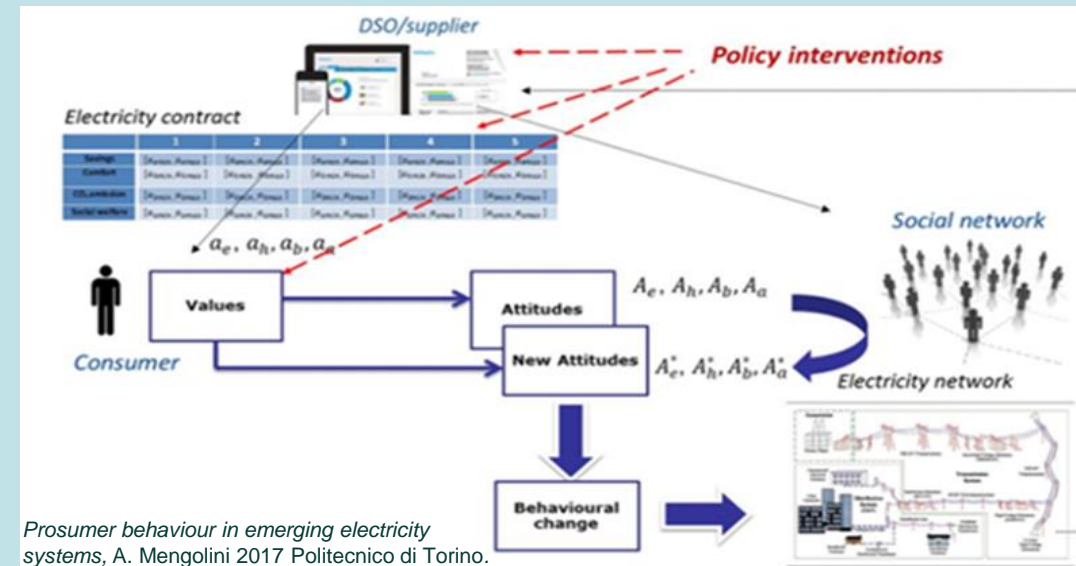
JRC supports the **Risk Preparedness** Regulation (Clean Energy Package) providing support for:

- the analysis of the methodologies for the identification of electricity crisis and short-term adequacy
- the implementation of regional measures and guidance for solidarity compensation to prevent and manage electricity crisis situations

# The social dimension of EU energy policies

"... a vision of an Energy Union with citizens at its core, where *citizens take ownership of the energy transition, benefit from new technologies to reduce their bills and participate actively in the market, and where vulnerable consumers are protected.*" <sup>(1)</sup>

- **Energy fairness:** how to implement a just energy transition?
- **Integrated approach:** socio-energy system?
- It is estimated that more than 50 million people in Europe were experiencing energy poverty in 2018
- **Energy poverty:** "a situation where households are unable to adequately meet their energy needs at an affordable cost".



<sup>(1)</sup> Commission Communication 25/02/2015, 'A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy'

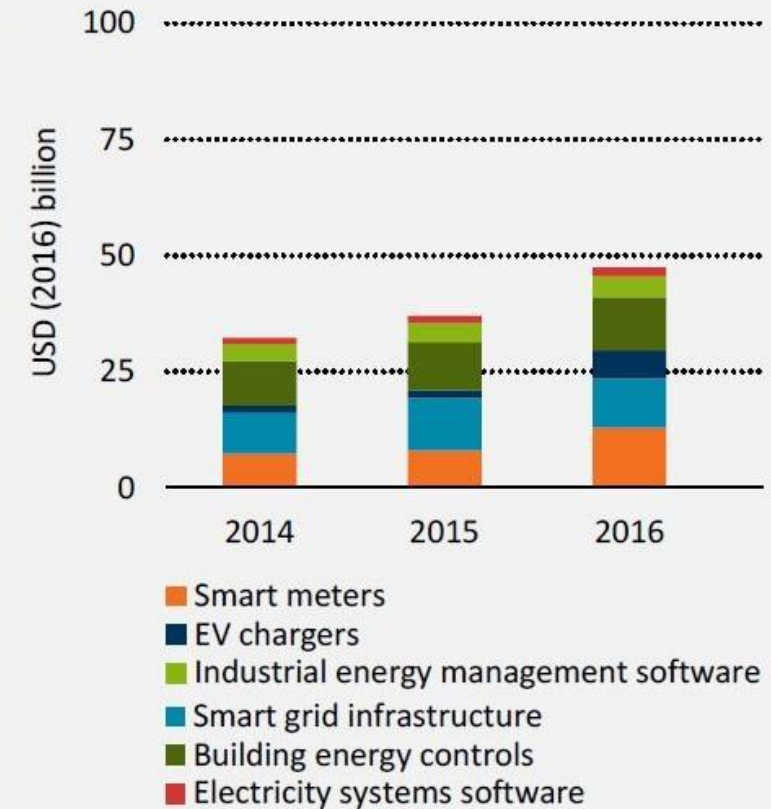
# Energy poverty and vulnerable consumers in R&I projects

- JRC Science for Policy report – *Energy poverty through the lens of EU Research & Innovation projects*
- Analysis of EU R&I projects with focus on energy poverty and vulnerable households
- Projects categories: **digital technologies, behavioral change, financing, sharing of best practices**
- Target groups: consumers in **social housing**, consumers receiving **social welfare**, consumers facing **energy affordability issues**.
- More focus on needs of vulnerable consumers and wider societal aspects of energy poverty



# Systems integration / Interoperability

- Digital technologies have taken centre stage in discussions about the future of energy.
- Total investment worldwide in **smart-grid technologies** grew by **50%** between 2014 and 2016
- Understanding the **system integration** and **interoperability** of digital solutions is key for smooth operations of the system.
- Key challenge of the Smart Grid is **integration**, affecting all components, information, systems and applications
- **Interoperability**: an essential requirement for the Smart Grid, paving the way for the creation of mass markets for products and services



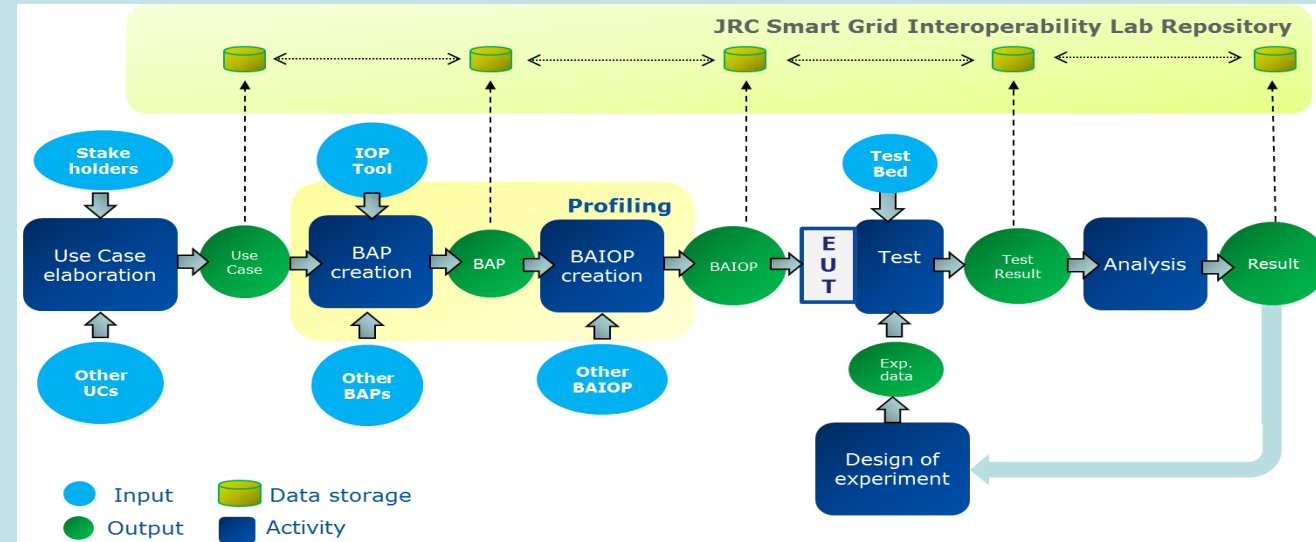
Source: IEA, World Energy Investment 2017

# Putting the digital grid interoperability under test



- The JRC Smart Grid Interoperability Lab will perform **interoperability testing** extending **best practices**
- A **repository** collecting the outcomes of the process in a **consistent framework** will be created

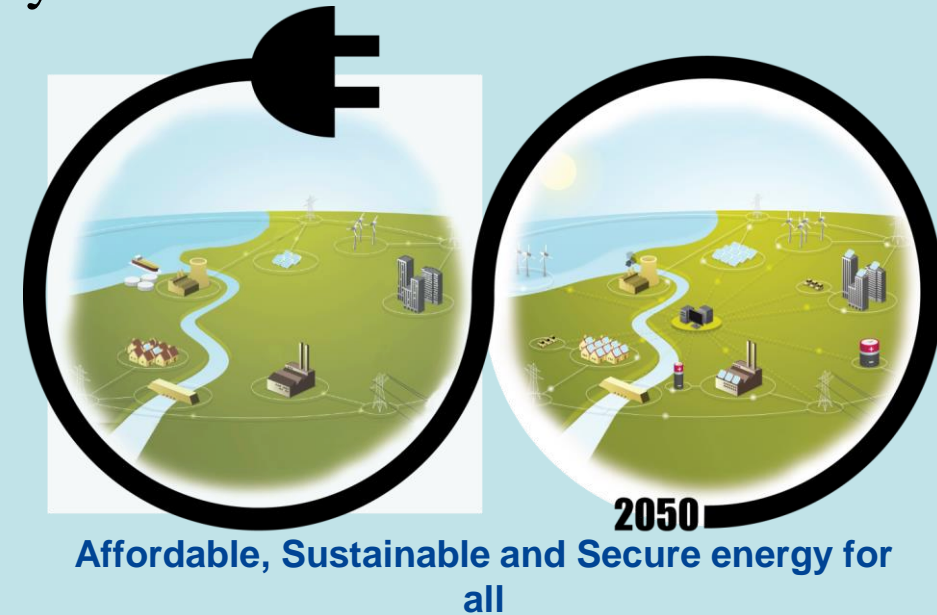
- The **database** would be an inventory of interoperability testing **key elements**
- The **objective** is to create a dynamic collaborative platform for stakeholders



# Identifying opportunities for a successful EU Energy Transition

The development of the Energy Union and the EU long-term strategy on climate action provide important opportunities for a decarbonised energy system.

- Empowering consumers and communities
  - *Implementing a just and inclusive energy transition*
  - *Changing consumer behaviour to invest in the transition*
- Increasing security of supply
  - *Fostering regional cooperation*
  - *Building a "smarter" power system*
- Innovating to drive the EU energy transition
  - *Introducing new technologies, processes, services, techniques and behaviours*
  - *Opportunities for sharing knowledge and best practices*



# Thank you for your attention!



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