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European Research and Innovation in Smart Grids



European led smart grids Research & Innovation (R&I) initiatives:

European Electricity Grid Initiative (EEGI) – a part of the SET Plan:

- ✓ 2020 perspective
- ✓ System integration
- ✓ Cost: 2 Billion €
- ✓ European Industrial Initiative Team leads the work

European Energy Research Alliance (EERA)

- ✓ Joint Programme on Grids of Research Centres

Strategic Agenda 2035 (ETP on SmartGrids)

- ✓ 2035 perspective for technology development and system integration

Education, training and innovation (KIC)

- ✓ Preparing tomorrow's generation of engineers

SET Plan Materials initiative





Drivers towards 2020:

Policy:

- ✓ Integrate 30-35% of variable renewable electricity
- ✓ Develop planning and operation of the pan-European network
- ✓ Guarantee a high-level of reliability, improve efficiency
- ✓ Engage users in efficiency and active demand
- ✓ Enable electrification of the transport sector
- ✓ Increase network flexibility towards 2050 objectives





Drivers towards 2020:

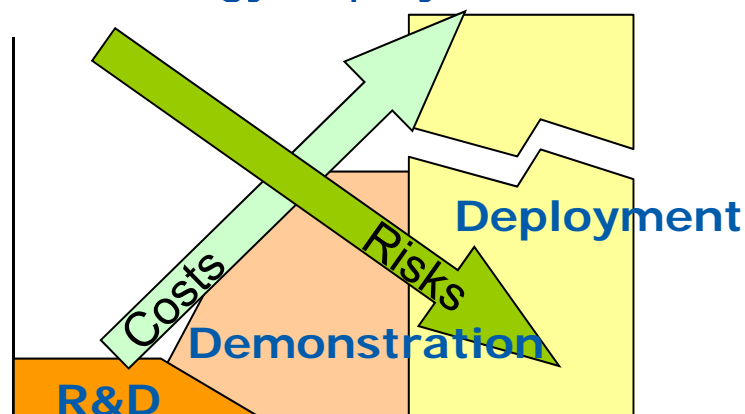
Operations:

- ✓ Replace ageing infrastructure
- ✓ Integrate new sources through new connections
- ✓ Maintain security of supply in a higher share of variable energy sources
- ✓ Support active participation of consumers through demand side technologies
- ✓ Optimize CAPEX + OPEX
- ✓ Develop infrastructure for electrical vehicles charging



Innovation in system integration :

- ✓ Need for large-scale demonstrations to validate technologies integration (proven at pilot scale)
- ✓ Reduce risks of new technology deployment



- ✓ Analyse results of demonstrations and create positive business cases for investment in innovation
- ✓ Prepare replication and scaling up
- ✓ Knowledge sharing





European R&D support to grids: 2007-2010

Transmission:

- ✓ **PEGASE, ICOEUR**: Coordinated control of pan-EU network
- ✓ **TWENTIES**: Demonstration and validation of new technologies
- ✓ **REALISEGRID, SUSPLAN**: Coordinated grid planning
- ✓ **OPTIMATE**: Market operation

Distribution:

- ✓ **ADDRESS**: Activate demand
- ✓ **ECOGRID-EU, GRID4EU**: Large smart grids demonstrations
- ✓ **MERGE, G4V**: Impact of electric vehicles
- ✓ **OPEN METER, DERLAB** (FP6): Standardisation





European R&D support to grids: 2007-2010

ICT infrastructure:

✓ **INTEGRIS, DLCVIT4IP, MIRABEL , W2E, HIPERDNO, OPENNODE:**

High performance computing technologies

Security:

✓ **AFTER, SESAME, EURACOM, ESCORTS, NI2S3:**

Security of electricity supply against malicious and accident threats



European R&D support to grids: 2011-2013

2011 calls: total 50M€

- ✓ **ITESLA, UMBRELLA: Transmission R&D – coordinated operation**
- ✓ **GRID+: Network of demonstration projects**
- ✓ **2 storage demonstration projects under negotiation**

2012 calls: total 60M€

- ✓ **Families of projects: DER integration, distributed intelligence, smart customers**
- ✓ **Planning for future electricity highways**
- ✓ **ICT for Smart energy grids: decision support, metering infrastructure, power electronics, home systems, standardization**

2013 calls:

- ✓ **Planning started**

➔ 315 M€ EC for grids projects (FP 7 2007-2013)





Horizon 2020:

- **Commission proposal for a 80 billion euro research and innovation funding programme (2014-2020)**
- **A core part of Europe 2020 Strategy, Innovation Union flagship initiative & European Research Area:**
 - **Responding to the economic crisis** to invest in future jobs and growth
 - **Addressing people's concerns** about their livelihoods, safety and environment
 - **Strengthening the EU's global position** in research, innovation and technology





What's new:

- **A single programme** bringing together three separate programmes/initiatives*
- **Coupling research to innovation** – from research to retail, all forms of innovation
- **Focus on societal challenges** facing EU society, e.g. clean energy, health and transport
- **Simplified access**, for all companies, universities, institutes in all EU countries and beyond.

*The 7th Research Framework Programme (FP7), innovation aspects of Competitiveness and Innovation Framework Programme (CIP), EU contribution to the European Institute of Innovation and Technology (EIT)





Three priorities:

1. **Excellent science**
2. **Industrial leadership**
3. **Societal challenges**





Societal challenges:

- Concerns of citizens and society/EU policy objectives (climate, environment, energy, transport etc) cannot be addressed without innovation
- Breakthrough solutions come from multi-disciplinary collaborations, including social sciences & humanities
- Promising solutions need to be tested, demonstrated and scaled up





Energy R&I in Horizon 2020:

- Included as a **key challenge 'Secure, clean and efficient energy'** under the societal challenges' block of Horizon 2020
- Separate but **complementary programme for nuclear** energy activities adopted under the Euratom Treaty





Key Challenges Proposed funding: (million euro, 2014-2020)

<i>Health, demographic change and wellbeing</i>	<i>8 033</i>
<i>Food security, sustainable agriculture, marine and maritime research & the bioeconomy</i>	<i>4 152</i>
<i>Secure, clean and efficient energy*</i>	<i>5 782</i>
<i>Smart, green and integrated transport</i>	<i>6 802</i>
<i>Climate action, resource efficiency and raw materials</i>	<i>3 160</i>
<i>Inclusive, innovative and secure societies</i>	<i>3 819</i>

**Additional €1 788m for nuclear safety and security from the Euratom Treaty activities (2014-2018). Does not include ITER.*





Horizon 2020 next steps:

- Ongoing:** Parliament and Council negotiations on the basis of the Commission proposals
- Ongoing:** Parliament and Council negotiations on EU budget 2014-2020 (including overall budget for Horizon 2020)
- Mid 2012:** Final calls under 7th Framework Programme for research to bridge gap towards Horizon 2020
- Mid 2013:** Adoption of legislative acts by Parliament and Council on Horizon 2020
- 1/1/2014:** **Horizon 2020 starts, launch of first calls**





Secure, clean and efficient energy:

- (1) Reducing energy consumption and carbon footprint by smart and sustainable use;
- (2) Low-cost, low-carbon electricity supply;
- (3) Alternative fuels and mobile energy sources;
- (4) A single, smart European electricity grid;
- (5) New knowledge and technologies;
- (6) Robust decision making and public engagement;
- (7) Market uptake of energy innovation.



Secure, clean and efficient energy:

Specific implementation aspects:

- Support the **implementation of the SET-Plan**
SET-Plan roadmaps, implementation plans and governance structure
- **Partnering with European stakeholders**
- **Improved coordination** with relevant Programmes, initiatives and policies (e.g. Cohesion policy and the ETS mechanisms)



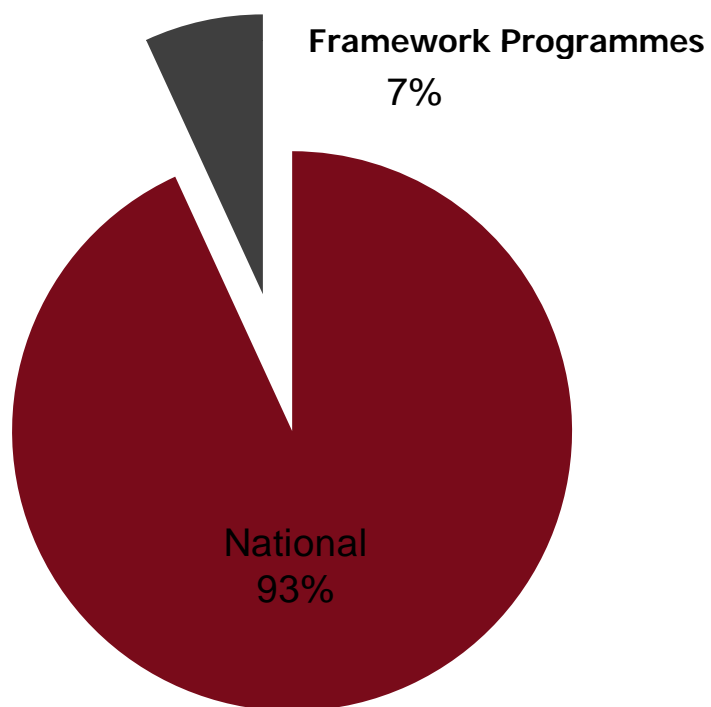


A single, smart European electricity grid:

Activities shall focus on research, development and full scale demonstration of new grid technologies, including storage, systems and market designs to plan, monitor, control and safely operate interoperable networks in an open, decarbonised, climate resilient and competitive market, under normal and emergency conditions.



Partnership with European stakeholders is the key



AIT and ERA-NET have mapped existing smart grids distribution projects :

- ✓ 189 projects MS-funded, for a total of €2.5bn funding

(according to JRC smart grids project database)

- ✓ 15 projects EC-funded, for a total of €184m funding

(according to JRC smart grids project database)





Thank You !



Back ups



Rules for Participation: *what's new? (1)*

1. A single set of rules

- *Adapted for the whole research and innovation cycle*
- *Covering all research programmes and funding bodies*
- *Aligned to the Financial Regulation, coherent with other new EU Programmes.*

2. One project - One funding rate.

- *Maximum of 100% of direct costs (except for actions close to market, where a 70% maximum will apply)*
- *Indirect eligible costs: a flat rate of 20% of direct eligible costs*

3. Simple evaluation criteria

- *Excellence – Impact - Implementation (Excellence only, for the ERC)*

4. New forms of funding aimed at innovation: pre-commercial procurement, inducement prizes, dedicated loan and equity instruments.

5. International participation: facilitated but better protecting EU interests.





Rules for Participation: *what's new? (2)*

6. Simpler rules for grants: broader acceptance of participants accounting practices for direct costs, flat rate for indirect costs, no time-sheets for personnel working full time on a project, possibility of output-based grants.

7. Fewer, better targeted controls and audits

- Lowest possible level of requirements for submission of audit certificates without undermining sound financial management;*
- Audit strategy focused on risk and fraud prevention.*

8. Improved rules on intellectual property

- Balance between legal security and flexibility;*
- Tailor-made IPR provisions for new forms of funding;*
- A new emphasis on open access to research publications.*

Beyond the Rules: further simplified provisions in the Grant Agreement and implementing procedures to facilitate access to Horizon 2020 (eg. common IT platform).





Horizon 2020: Partnering

Public private partnerships:

- Through Joint Technology Initiatives or other formal structures (Art. 187)
- Through contractual agreements, which provide inputs for work programmes
- Only when criteria met, e.g. clear commitments from private partners

Public public partnerships:

- Through « ERA-Nets » for topping up individual calls/actions (replacing current ERA-Net, ERA-Net Plus, Inco-Net, Inno-net)
- Through participation in joint programmes between Member States (Art. 185)
- Supporting agendas of Joint Programming Initiatives when in line with Horizon 2020
- Only when criteria met, e.g. financial commitments of participating countries

European Innovation Partnerships:

- Not funding instruments, but for coordination with broader policies and programmes

