



#InvestEUresearch

Research and Innovation Activities on Smart Grids and Energy Storage Financed by the EC







Rémy Dénos

DG ENER
New Energy Technologies
and Clean Coal

ETIP SNET Regional
Workshop – Nicosia –
Cyprus – 23/11/2017

Research and
Innovation

BRIDGE projects overview

Distribution grids	Distributed Storage	Transmission grids	Large-scale storage	RES and H&C
<p>2014: 10 projects, 60 M€</p> 	<p>2014: 7 projects, 72 M€</p> 	<p>2015: 4 projects, 82 M€</p> 	<p>2015: 2 projects, 25 M€</p> 	<p>2016: 2 projects, 8 M€</p> 
<p>2016: 7 projects, 90 M€</p> 				



Which barriers to Innovation were identified ?

Data
management

Business Models

Regulations

Customer
engagement

BRIDGE

- Is a European Commission initiative
- Gather Horizon 2020 Smart Grid and Energy Storage demonstration projects
- Creates a structured view of obstacles to innovation.
- Fosters continuous knowledge sharing amongst projects
- Deliver-conclusions and recommendations with a single voice



H2020 Challenge

Secure, clean and efficient energy system

Energy Efficiency



Heating & Cooling



Consumers



Buildings



Industry & Products



Finance for Sustainable Energy

Global Leadership in renewables



Smart and Clean Energy for Consumers



Smart Cities and Communities



Smart Citizen Centered Energy system



Carbon capture storage/use

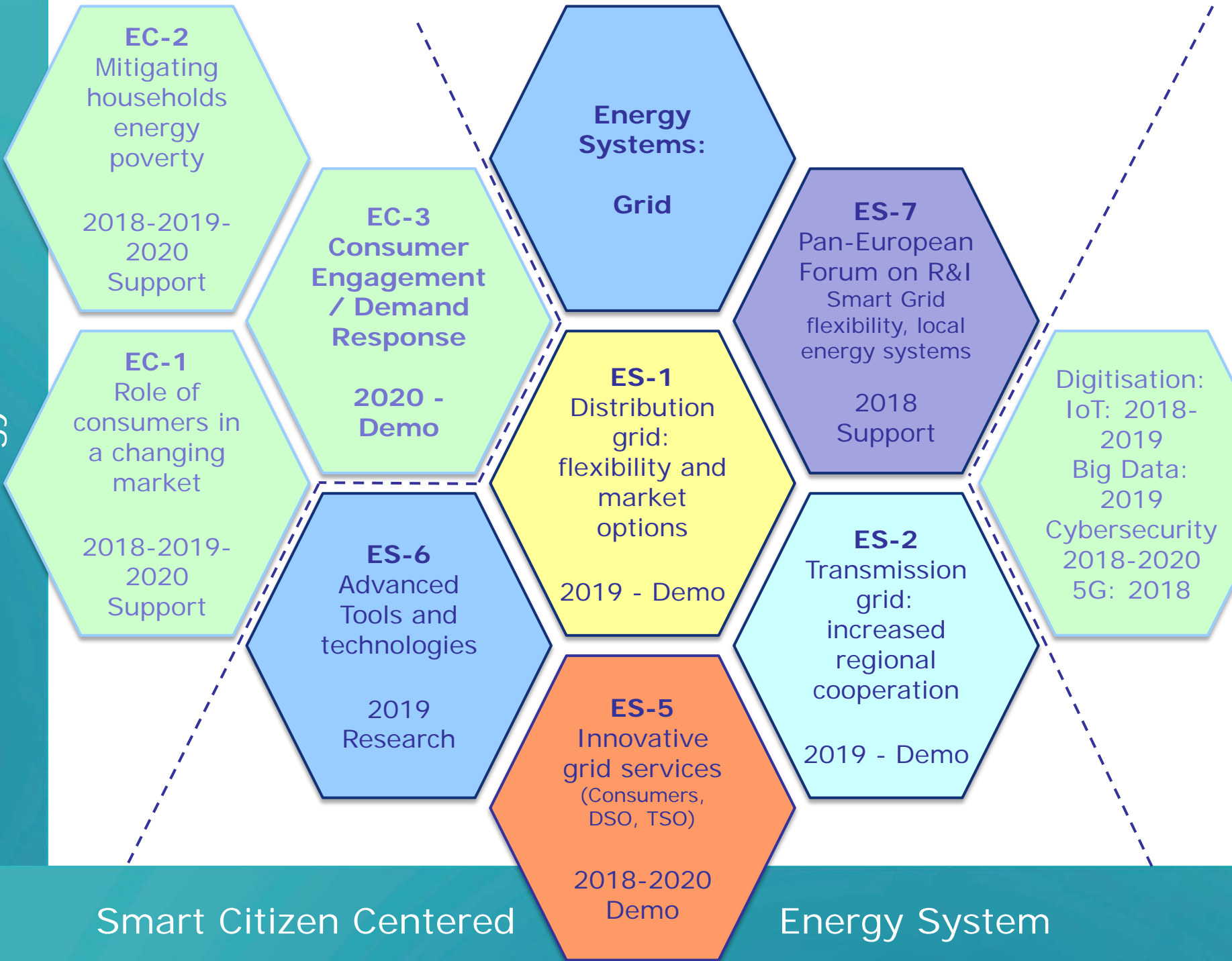
Near-zero CO2 emission from fossil fuel / carbon intensive industries

Overall Indicative budget for 2017 ~ 540 MEur



European Commission

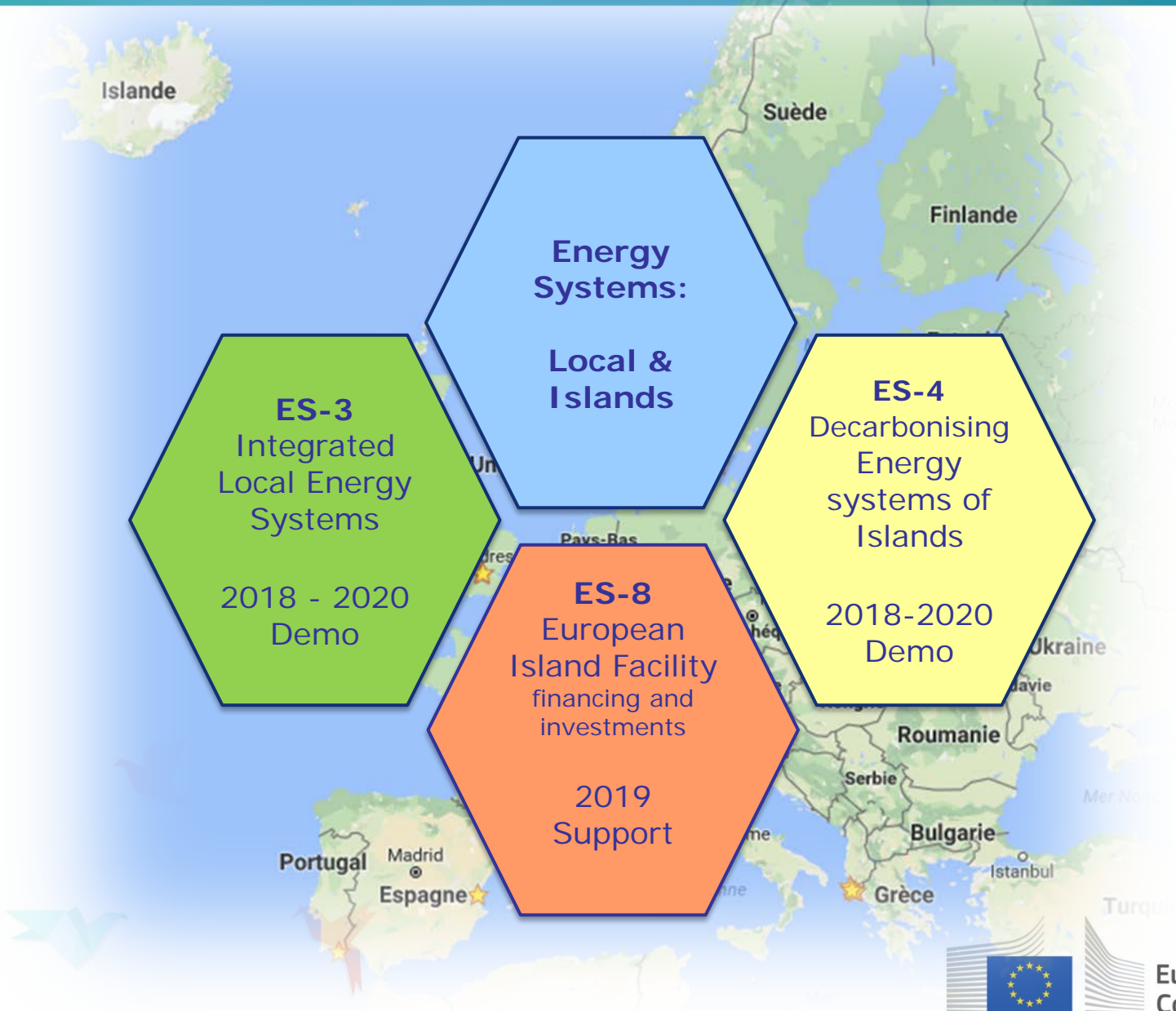
Smart and Clean Energy for Consumers



Smart Citizen Centered

Energy System

Smart Citizen Centered Energy System: Local and Islands



Overview of Topics

Instrument	TRL	Ec. fund per Proj. MEur	2018 MEur	2019 MEur	2020
------------	-----	----------------------------	--------------	--------------	------

EC-3	Consumer Engagment					Open
------	--------------------	--	--	--	--	------

ES-1	Distribution grid: flexibility and market	IA	5-8	6-8		37.3	
ES-2	Transmission grid: regional cooperation	IA	5-8	8-10		25	
ES-5	Innovative Grid services	IA	5-8	13-17	30		Open
ES-6	Advanced toosl and technologies	RIA	NA	2-4		25.4	

ES-3	Integrated local energy systems	IA	5-8	5-6	21		Open
ES-4	Decarbonising energy systems of islands	IA	5-8	7-10	19		Open
ES-8	European island facility	CSA	NA	10		10	

ES-7	Pan European	CSA	NA	3-4	3		
------	--------------	-----	----	-----	---	--	--

73	97.7
----	------



#InvestEUresearch

Research and Innovation Activities on Smart Grids and Energy Storage Financed by the EC

Rémy Dénos

DG ENER
New Energy Technologies
and Clean Coal

ETIP SNET Regional
Workshop – Nicosia –
Cyprus – 23/11/2017

Research and
Innovation

Specific Challenge:

- Proposal for the Electricity Directive, promotes that network operators procure balancing, congestion management and ancillary services from assets connected to the network both at transmission and at distribution level
- Enable More efficient and effective network management and optimisation
- Increased demand response, ability to integrate increasing shares of renewables
- TSOs and DSOs using a common pool of resources: define with market participants the services they need and set up ways to procure them

Scope: Demonstrate at a large-scale

- How markets and platforms enable TSOs and DSOs to connect and procure grid services relying on the relevant digital technologies and standardized products
- Procurement of energy services from large-scale and small-scale assets through a combination of local markets (in particular for congestion management), with wholesale & balancing markets, with increased cost-efficiency and consumer benefits.
- Develop a seamless pan-European electricity market that makes it possible for all market participants (e.g relying on energy suppliers or aggregators) to provide energy services in a transparent and non-discriminatory manner
- Coordinate their work with NRA's, ENTSO-E, the DSO organisations and other stakeholders



Define the needs



Offer new services





Expected Impact:

- Smart, secure and more resilient energy system through demonstrating cost-efficient model(s) for electricity network services that can be scaled up to include networks operated by other TSOs and DSOs
- Replicable across the EU energy system and provide the foundations for new network codes, particularly on demand-response.
- Opening up significant new revenue streams for consumers to provide grid services, and increase the share of RES in the electricity system.

Innovation Action
TRL between 5 and 8
EU funding per project
13 - 17 Meur
2018 budget: 30 MEur



Specific Challenge

- Large share of variable renewables connected to the distribution grid
- Electrification for transport / heating and cooling
- Flexibility / versus infrastructure

Scope: Develop and demonstrate integrated solutions with at least 2 of the following elements:

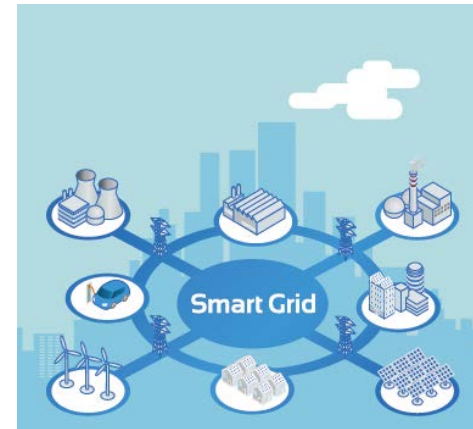
- Flexibility measures and grid services (storage, batteries incl. from EVs, power to X, demand response, variable generation)
- Smart grid technologies, observability, automation, control
- Market mechanisms: dynamic tariffs, tools to resolve congestion, non-frequency ancillary services, better integration of wholesale / retail



ES-1-2019: Flexibility and retail market options for the distribution grid

Expected Impact: contribute to at least 2 elements

- Enhance flexibility of distribution grids
- Define the conditions of a well-functioning market which creates business case for stakeholders willing to provide such flexibility and allow to sustain the necessary investments (e.g. variable price strategies);
- Improve the capability to manage future energy loads including electrical vehicles;
- Improve distribution grid operations which guarantee security of supply and the use of flexibility products while integrating large shares of variable renewables avoiding unnecessary investments by solving congestion;
- Include ad-hoc indicators to measure the progress against specific objectives that could be used to assess the progress during the project life.



Innovation Action
TRL between 5 and 8
6-8 MEur
EU funding per project
2019: 37.3 MEur

ES-2-2019 Solutions for increased regional cross-border cooperation in the transmission grid

Specific Challenge

- Wholesale price varies across Europe
- Optimal use of interconnector
- Cooperation between TSOs across borders
- Grid services across border

Scope: At least 3 of the following points

- Tools for communication and grid operations (incl. intraday and real time market)
- Prediction of VRES production and DR forecast
- New cross border grid services
- Well-functioning wholesale market , real-time market coupling
- Enhance cross border flow, trading, exploitation of large scale storage assets
- Guidelines to avoid distortion resulting from the non-harmonisation of regulations between countries.



ES-2-2019 Solutions for increased regional cross-border cooperation in the transmission grid

Expected Impact:

Contribute to enhance regional cooperation in:

- Operation of transmission grids so as to bring additional flexibility
- Optimising infrastructure investments and making best use of large scale assets
- Improved functioning of the wholesale market across borders;
- Development of future common approaches to grid services
- Include ad-hoc indicators to measure the progress against specific objectives that could be used to assess the progress during the project life.

Innovation Action
TRL between 5 and 8
8 – 10 MEur EU funding per project
2019: 25.0 MEur



ES-6-2019: Research on advanced tools and technological development

Specific Challenge:

Tools and future technologies to prepare the energy system of 2030 and beyond.

Scope: Proposals must address partially or entirely only one of the 3 following sub-topics:

1. Advanced modelling tools for

- The future electricity market: design and impact of electricity pricing structure from the wholesale markets, to real time markets and retail markets;
- Modelling and forecasting energy production from variable renewables, associated frequency and voltage controls issues in the electricity grid and benefits associated with the use of storage.



2. Advanced tools for

- Design, planning and operation of distribution and transmission grid infrastructure, taking into account environmental concerns, new constraints from variable renewable generation, place of storage and flexibility; Optimisation of the use of existing assets and network
- Grid predictive management strategies for maintenance with uncertainty (forecasting plus stochastic grid management tools)
- TSO / DSO collaboration and coordination tools, secure data exchange across networks along whole the value chain, ICT tools for cross-border trading for nearly real-time balancing; automated digital cross-border electricity market.

3. Technological developments:

- Reliable, robust and cost-effective energy storage technologies, (high specific energy rates, large number of life cycles, fast response and low maintenance); storage management systems
- Power electronics for batteries and software to manage combined or hybridised decentralised energy systems combining several energy vectors, key focus on cost reduction

ES-6-2019: Research on advanced tools and technological development

Expected Impact:

1. Advanced modelling tools:
Knowledge on how to design of price structure and magnitude in order to be able to finance e.g. infrastructure and research and innovation;
Enhance the accuracy of the prediction of electricity production from variable renewables and better qualify and quantity associated issues and remedies
2. Advanced tools:
New approaches to electricity grid planning, monitoring and maintenance that are better suited to today's future characteristics of the grid and enable savings on infrastructure costs.
3. Technological developments:
Reduce costs of key technology components
Integration of battery systems enabling high shares of renewable electricity
Proposals are invited to include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Research and Innovation
Action
EU funding per project
2 - 4 MEur
2019: 25.4 MEur

Ranking in each of
the 3 sub topics
The first ranked
proposals in each
sub-topic will be
selected

Proposers should demonstrate a good knowledge and compatibility with:

- Current regulations
- Available or emerging standards and interoperability issues (see work of the Smart Grid Task Force and its Experts Groups in the field of Standardization - CEN-CLC-ETSI M/490),
- Smart grid deployment, infrastructure and industrial policy (<http://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force>).
- A high level of cyber security; compliance with relevant EU security legislation, due regard of best available techniques
- Regulatory environment for privacy, data protection, data management and alignment of data formats (see “My Energy Data” and its respective follow-up, General Data Protection Regulation and industry standards, Data Protection Impact Assessment Template).

Topics on digitisation of energy

- SU-DS04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks
- DT-ICT-10-2018: Interoperable and smart homes and grids
- DT-ICT-11-2019: Big data solutions for energy



#InvestEUresearch

Horizon 2020 Work Programme for Research & Innovation 2018-2020

New Energy Technologies
and Clean Coal

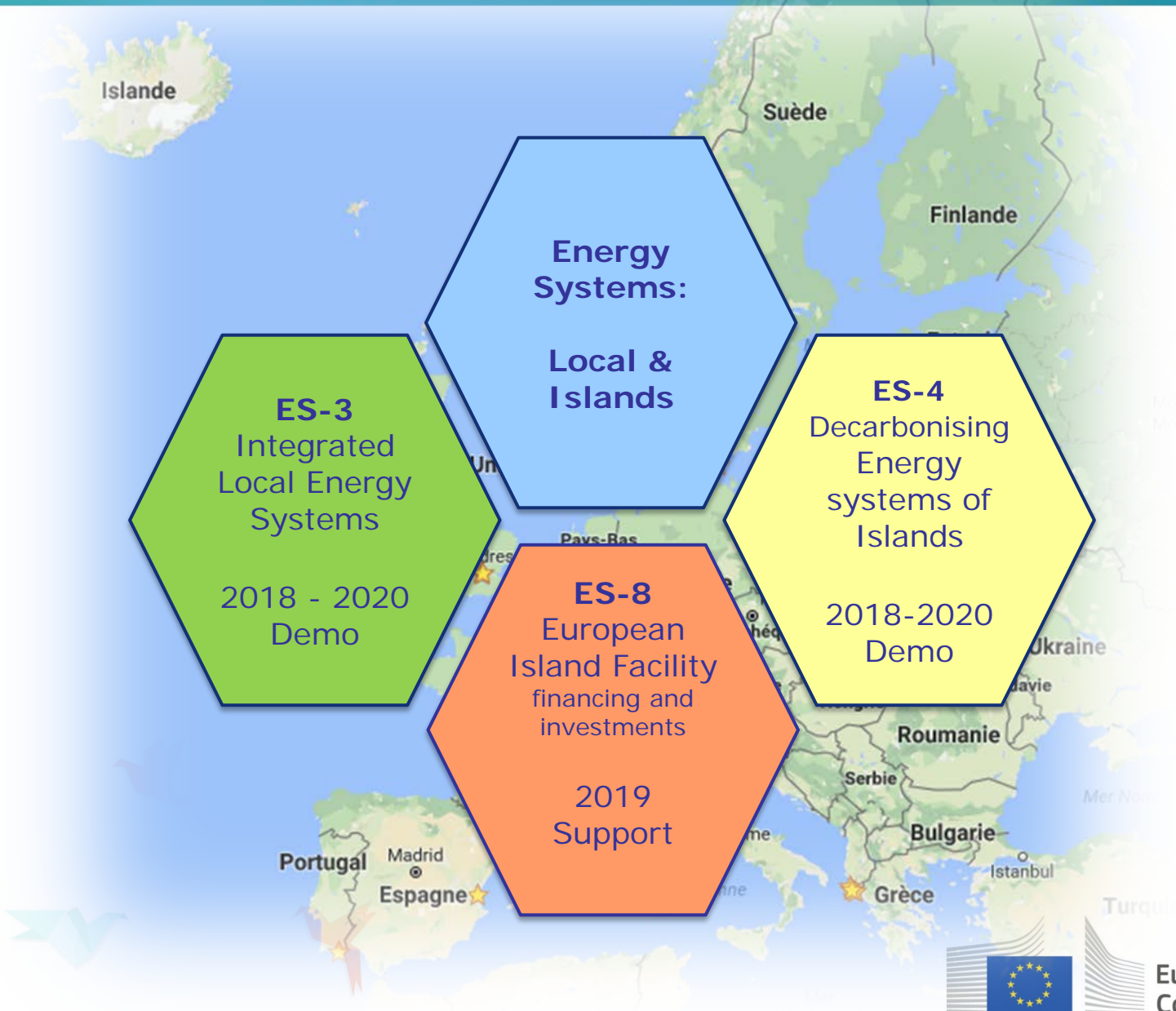
Energy Info Days

Secure, clean and efficient energy system

- Smart Citizen Centered
Energy System
- Smart Cities

Research and
Innovation

Smart Citizen Centered Energy System: Local and Islands



Specific Challenge

- Decarbonisation of local energy systems on the mainland
- All energy vectors, storage, demand-response, digitisation
- Local economy and business cases

Scope: develop and demonstrate solutions

- Preliminary analysis of the local case
- Develop solutions and tools for the optimisation of the local energy network
- High replication potential
- Local consumers, small to medium industrial production facilities and commercial buildings should be involved

International cooperation is encouraged, in particular with India.

ES-3-2018-2020: Integrated local energy systems

Expected Impact: The supported projects are expected to contribute to:

- Validate solutions for decarbonisation of the local energy system, positive impact on the centralised energy infrastructure, on the local economy, local social aspects and local air quality;
- Involvement of local energy consumers and producers, create energy communities, test new business models;
- Safe and secure local energy system that integrates significant shares of renewables
- Develop an accurate prediction systems for the local generation of energy and adequate solutions to match with local consumption;
- Benchmark technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens.
- Identify and substantiate to which impacts the proposal contributes
- Include ad-hoc indicators to measure the progress against specific objectives (could be used to assess the progress during the project life)



Innovation Action
TRL between 5 and 8
5 - 6 Meur
EU funding per project
2018: 21 MEur
2020: open

ES-4- 2018 – 2020: Decarbonising energy systems of geographical Islands

Specific Challenge:

- Energy prices on geographical island are typically 100% to 400% higher than on the mainland;
- Large-scale deployment of local renewable energy sources = economic benefits + decarbonisation
- Reduce greenhouse gases emissions and improve, or at least not deteriorate, air quality.

'Clean Energy for EU islands' initiative



Scope: at least 4 of the following objectives

- High levels of local renewable energy sources penetration;
- Integrated and digitalised smart grids based on high flexibility services from distributed generation, demand response and storage of electricity, heat, water, etc.;
- Develop synergies between the different energy networks (electricity, heating, cooling, water, transport, etc.);
- Significant reduction of the use of hydrocarbon based energies
- Modelling, forecasting of demand (e.g. for touristic/non-touristic seasons) and supply (e.g. weather, wind, sun, etc.);
- Innovative approaches to energy storage, including avoidance or delay of costly grid upgrades of existing grids).



ES-4- 2018 – 2020: Decarbonising energy systems of geographical Islands

Expected Impact:

- Developing RES-based systems (including heating and cooling and storage) that are cheaper than diesel generation;
- Reduce significantly fossil fuel consumption;
- Large-scale replication potential on the same island and on other islands with similar problems;
- Enhance autonomy for islands that are grid connected with the mainland (existing diesel generators shall be used primarily as security back-up in the long term).
- Identify and substantiate impacts to which the proposal contribute
- Include ad-hoc indicators to measure the progress against specific objectives (e.g. that could be used to assess the progress during the project life).
- Impact on future investment perspectives (see also topic LC-SC3-ES-8-2019).

Innovation Action
TRL between 5 and 8
7 - 10 MEur
EU funding per project
2018: 19 MEur



ES-8-2019 European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts

Specific Challenge:

Reduce islands dependency on energy imports

Local initiatives and/or public authorities have limited resources to access the analytic, financial and legal expertise needed to collect additional data and develop an investment programme of scale.

Access the various innovative financing streams which are being structured (e.g. PDA, ESIF Financial Instruments, National Investment Platforms), to increase the absorption rates of EFSI and to access private finance.

Scope: Set up and run a 'European Islands Facility' which offers expertise and/or financial support and services to islands:

Transition plan and a coherent set of projects that will lead to a decarbonised, efficient and resilient island energy system using local energy flows and resources;



Support under
the form of
lump sum

ES-8-2019 European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts

Legal analysis and support, a description of how the investments will be financed and, if relevant, how the financing will be mobilised locally, advice on available funds and a design of the process to launch the investments.

It can also cover the support for information and engagement actions among the islands inhabitants in the view of ensuring their acceptance, projects participation and co-ownership, also mobilising local financing;



Support under the form of lump sum



Expected Impact:

- Demonstration and documentation of increased leveraging of finance into energy transition investments by public authorities;
- Overall, for every million Euro of Horizon 2020 support the action should trigger energy transition investments worth at least EUR 10 million;
- Number of investment concepts delivered, and number of concepts that turned into tangible investments after the provided support;
- Number of public authority staff with increased capacity for developing investible energy transition projects;
- Innovation uptake by potential replicators;
- Primary energy savings, GHG reductions, renewable energy production and investments in sustainable energy (respectively in GWh/year and in million EUR of investments).

Coordination and
Support Action
10 MEur EU funding
2019: 10 MEur



Impacts should rely on quantified indicators and targets wherever possible



#InvestEUresearch

Horizon 2020 Work Programme for Research & Innovation 2018-2020

New Energy Technologies
and Clean Coal

Energy Info Days

Secure, clean and efficient
energy system

- Smart Citizen Centered
Energy System
- Smart Cities

Research and
Innovation

ES-7-2018: Pan-European Forum for R&I on Smart Grids, Flexibility and Local Energy Networks

Specific Challenge:

JRC smart Grid Outlook: 15 analysed countries (NO, CH, IE, PL, HU, SK, LT, RO, LV, HR, BG, LU, CY, EE, MT) account for less than 5 % of the R&I funds

Scope:

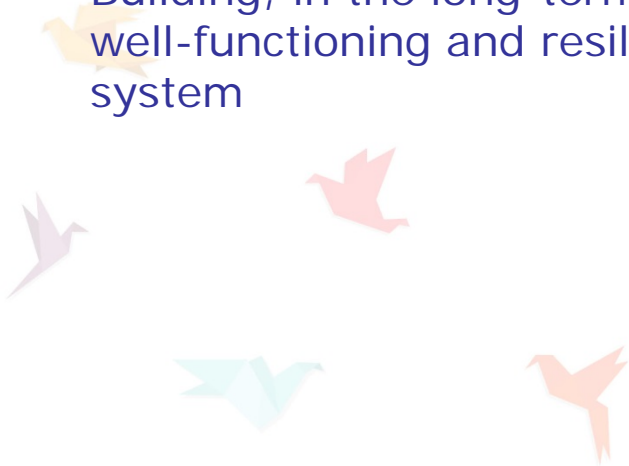
- R&I policy makers, R&I actors and experts ('community'), representative of the EU-28 energy system.
- Evolve towards a truly integrated pan-European Forum / R&I community
- Establish and spread the state of the R&I in the field in Europe e.g. with regional workshops
- Long term perspective development
- Make best use of ETIP SNET, ongoing Horizon 2020 projects (e.g. the BRIDGE project) existing associations with a true pan-European dimension
- Contribute to widen the representativity of European associations in the field which have weaknesses in their EU coverage.



Expected Impact:

- Building a true pan-European R&I community in the field of smart grids & associated flexibility measures/ energy systems;
- Establish new collaborations on a long-term perspective which has a potential to develop into industrial collaborations;
- Building, in the long-term, solidarity and trust for a well-functioning and resilient pan-European energy system

Coordination and Support
Action
EU funding per project
3 - 4 MEur
2018: 3 MEur



Deadlines

05 April 2018

ES-5

ES-3

ES-4

ES 7

05 February 2019

ES-1

ES-2

ES-6





#InvestEUresearch



Horizon 2020 Work Programme for Research & Innovation 2018-2020

Research and
Innovation

