División
Programas de la UE

MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD

CDTI Centro para el Desarrollo Tecnológico Industrial

H2020: ENERGÍA LIMPIA, SEGURA Y EFICIENTE: WP2018-2020*

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Zaragoza, 28 de noviembre de 2017

Índice

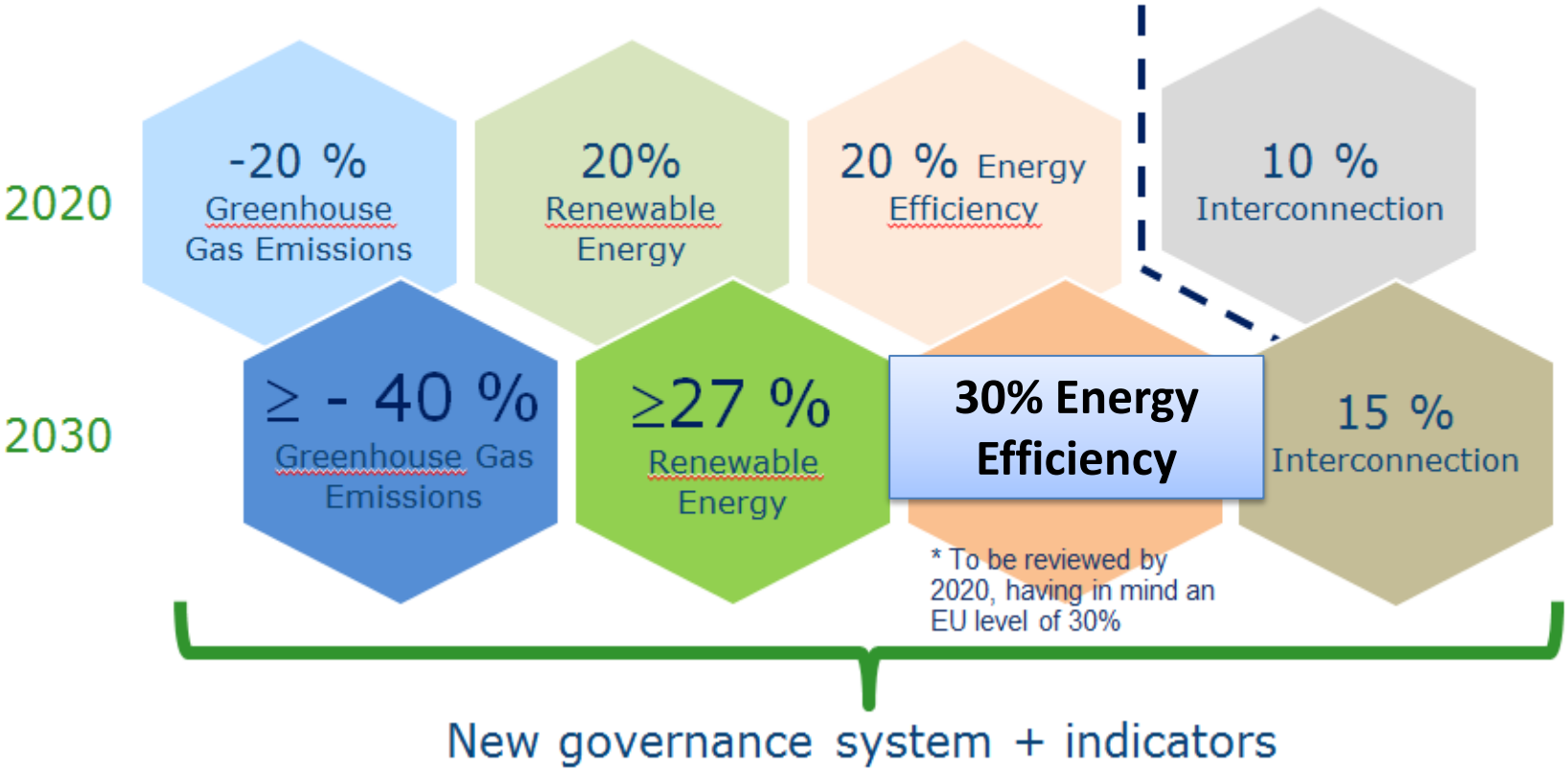
- Contexto Político y Regulatorio
- Energía en H2020
- WP 2018-2020*
- Resultados

Índice

- **Contexto Político y Regulatorio**
- **Energía en H2020**
- **WP 2018-2020***
- **Resultados**

UE: 2030 Framework for Climate and Energy

Agreed headline targets



Political Context (1)

Energy Union

- *Energy **security,** solidarity and trust*
- *A fully **integrated** internal energy market*
- ***Energy efficiency** first*
- *Transition to a **low-carbon** society*
- *An Energy Union for Research, Innovation and Competiveness*

Political Context (2)

https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition

COP21 · CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

MISSION INNOVATION
Accelerating the Clean Energy Revolution

http://mission-innovation.net/

http://unfccc.int/paris_agreement/items/9485.php

SET Plan Integrated Roadmap (13 themes)	ENERGY UNION R&I & Competitiveness priorities	SET Plan (10 key actions)
T10: Development of renewables T8: System flexibility	N°1 in Renewables	1. Performant renewable technologies integrated in the system 2. Reduce costs of technologies
T1: Engaging consumers T2: Smart technologies for consumers	Smart EU Energy System with consumers at the centre	3. New technologies & services for consumers
T6: Modernising the electricity grid T7: Energy storage T8: System flexibility T9: Smart cities & communities		4. Resilience & security of energy system
T3: Energy efficiency in buildings T4: Energy efficiency in heating & cooling T5: Energy efficiency in industry & services	Efficient Energy Systems	5. New materials & technologies for buildings 6. Energy efficiency for industry
T7: Energy storage T13: Biofuels, fuel cells & hydrogen, alternative fuels	Sustainable Transport	7. Competitive in global battery sector (e-mobility) 8. Renewable fuels
T11: Carbon capture storage/use		9. CCS/U
T12: Nuclear energy		10. Nuclear Safety

https://setis.ec.europa.eu/low-carbon-energy-technologies

Índice

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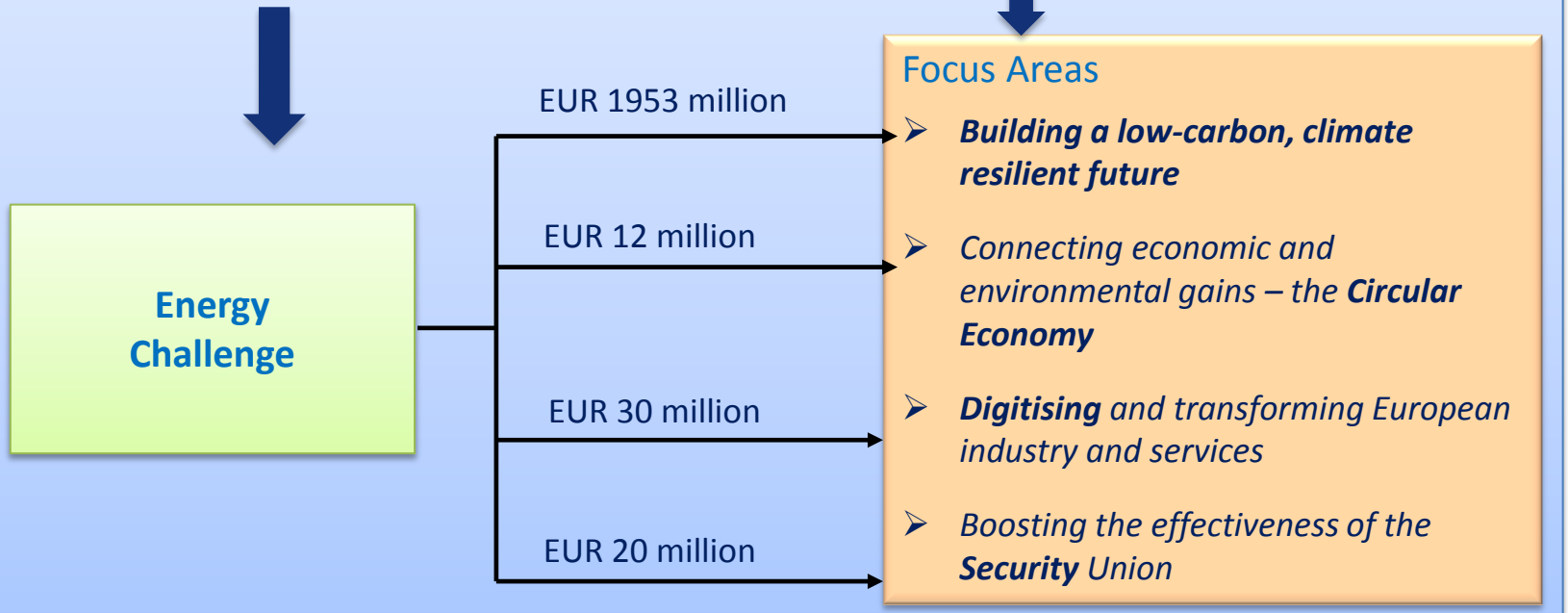
Horizon 2020 work programme 2018-2020

Horizon 2020 work programme 2018-2020

- Total budget envelope: ~ EUR 30 billion
- Covering 18 programme parts (i.a. Energy Challenge) contributing to various extents to focus areas (virtually linked calls)



Energy in Horizon 2020

Appart from SC3, Energy is addressed in many Horizon 2020 parts

Bottom-up activities

- European Research Council (ERC)
- European Innovation Council (SME instrument, FTI pilot, FET)
- Marie-Sklodowska Curie Actions

Industrial Leadership

- Materials
- **PPPs on Energy-efficient Buildings and SPIRE**
- Information and Communication Technologies
- Space (Galileo)

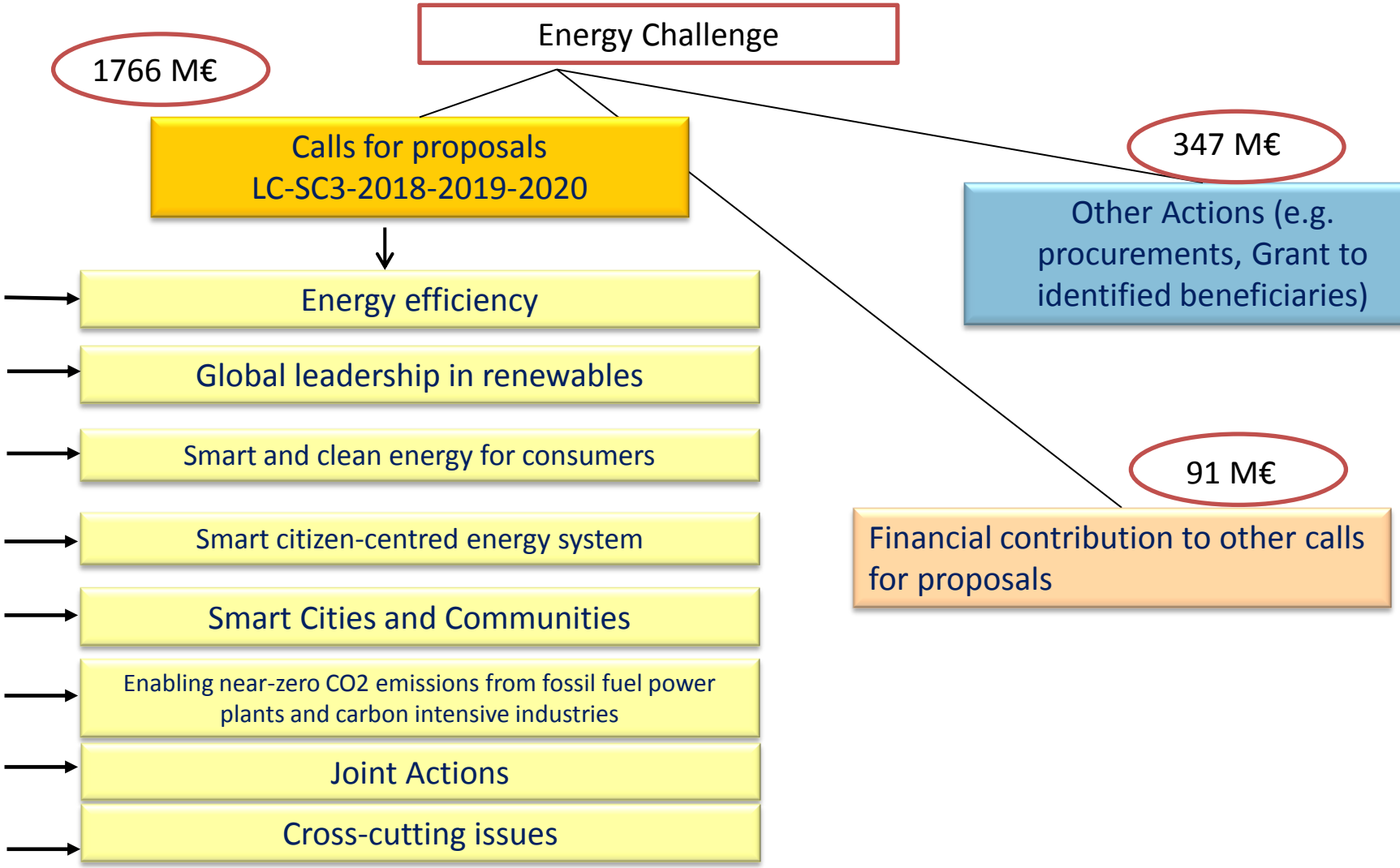
Societal Challenges (SC)

- SC2: Bioeconomy, Blue Growth
- SC4: Electric vehicles, Batteries, Energy-efficient transport
- SC5: Cities
- SC7: Cybersecurity, Critical energy infrastructure

FCH | FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

Please check also calls of other Horizon 2020 parts!

Societal Challenge 3 - Secure, clean and efficient energy



Índice

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Societal Challenge 3 - Secure, clean and efficient energy

Calls for proposals LC-SC3-2018-2019-2020

Energy efficiency	Global leadership in renewables	Smart and clean energy for consumers	Smart citizen-centred energy system	Smart Cities and Communities	Enabling near-zero CO2 emissions from fossil fuel power plants and carbon intensive industries	Joint Actions	Cross-cutting issues
192 M€*	**445 M€***	**20 M€***	**176 M€***	**110 M€***	**88 M€***	**52 M€***	**42 M€***

* Budget figures for **2018-2019** only (2020 to be confirmed at a later stage)

Calls for proposals LC-SC3-2018-2019-2020

- Energy efficiency
- Global leadership in renewables
- Smart and clean energy for consumers
- Smart citizen-centred energy system
- Smart Cities and Communities
- Enabling near-zero CO2 emissions from fossil fuel power plants and carbon intensive industries
- Joint Actions
- Cross-cutting issues

Energy Efficiency
Overview of the 2018/2019-20 topics

	Buildings	Consumers & Services	Industry	Financing Energy Efficiency	Public Authorities & Policy Support	Digitisation
Innovation Actions 3 to 30 M€ / project	EE1 EE4		EE6			DT-ICT-10 DT-ICT-11
Coordination & Support Actions 0.5 to 2 M€ / project	EE2 EE3 EE5	EC1 EC2 EE13	EE8	EE9 EE10 EE11	EE16 EE15 EE17	

EE14 (RIA)

Energy Efficiency
Call 2018 (Deadline 4/9/2018)

Buildings
21 M€

Consumers & Services

Industry

Financing Energy Efficiency

Public Authorities & Policy Support

Digitisation

Innovation Actions	**EE1 - Innovative approaches for building renovation**
Coordination & Support Actions	**EE2 – Integrated home renovation services** **EE5 – Next generation of energy performance certification**

Upgrading buildings' energy performance and smartness

LC-SC3-EE-1-2018-2019-2020

The market for deep renovation of buildings needs to be transformed in terms of technologies, processes and business models.

From TRL 8 to 9

IA

EUR 3 to 4 million

Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation

- Innovations can be right across the value chain, during **any stages** of design or construction
- **Building fabric, technical systems, links to DHC** are all relevant
- Address the **drivers to renovate** buildings
- Address how **consumers** & others can use measured data
- Multiple **benefits** of energy efficiency (**high performance, cost, time, rate…)**

EeB cPPP

Upgrading buildings' energy performance and smartness

LC-SC3-EE-2-2018-2019

Many project promoters lack the skills and capacity to set up, implement and finance ambitious sustainable energy projects

In addition, many lack access to attractive and adequate financing products from the market

Integrated home renovation services

- ✓ Create (or replicate) "**integrated home renovation services**", operational by the end of the action
- ✓ Cover the **whole "customer journey**": from technical and social diagnosis, technical offer, contracting of works, structuring and provision of finance, to the monitoring of works and quality assurance.
- ✓ Create **more demand for holistic approaches** as a result of improved offer by trustful market operators and better awareness from homeowners

CSA

EUR 0,5 to 1,5 million

Webinar on "Home Renovation": 21 November 2017 (11:00 – 12:30)
see https://ec.europa.eu/energy/en/financing-energy-efficiency/sustainable-energy-investment-forums

Upgrading buildings' energy performance and smartness

LC-SC3-EE-5-2018-2019-2020

Assessment processes and certificates need to become more reliable, user-friendly, cost-effective and compliant with EU legislation

CSA (2018)

EUR 1 to 2 million

Next-generation of Energy Performance Assessment and Certification

- ✓ Involve stakeholders including certification bodies, in stimulating **roll-out of next-generation schemes**
- ✓ Develop **strategies to help converge EPC practices** across EU
- ✓ Assess applicability of schemes through **case studies**
- ✓ Demonstrate potential of **EU-wide** uptake of the schemes
- ✓ Embed EPCs in energy audits, databases, one-stop-shops
- ✓ Link EPCs to buildings renovation passports, individual buildings renovation roadmaps or building logbooks

EeB cPPP

Energy Efficiency
Call 2018 (Deadline 4/9/2018)

Buildings

Consumers & Services 14 M€

Industry

Financing Energy Efficiency

Public Authorities & Policy Support

Digitisation

Coordination & Support Actions

EC1 – Role of consumers in changing the market

EC2 – Mitigating household energy poverty

EE13 – Next generation of smart energy services

Consumers & Services

LC-SC3-EC-1-2018-2019-2020

Informing consumers of the potential energy savings and their related benefits can result in increased motivation for replacing installed appliances

CSA (2018)

EUR 1 to 2 million

The role of consumers in changing the market with informed decision or collective actions

- ✓ Develop activities **informing and motivating** consumers to change old and inefficient installed **appliances**
- ✓ **Focus on highest energy saving potential** (e.g. boilers, local space heaters, air heaters)
- ✓ Address **financial aspects** (cost savings, payback period) and multiple benefits of energy efficiency improvements (e.g. improved air quality)

Consumers & Services

Ca. 50 million Europeans affected by energy poverty;

Roots of this phenomenon lie in low income and poor thermal insulation of buildings, but energy efficiency measures at the household level and increased use of renewable energy can play a part

CSA

EUR 1 to 2 million

LC-SC3-EC-2-2018-2019-2020

Mitigating household energy poverty

Actions should contribute to actively **alleviating energy poverty** and developing a better understanding of the types and needs of energy poor households and how to identify them building on any existing initiatives (e.g. European Energy Poverty Observatory).

The proposed action should cover **one or more** of the following:

- ✓ Facilitate **behaviour change** and implementation of low-cost energy efficiency measures tailored for energy poor households
- ✓ Support the set-up of **financial and non-financial support schemes** for energy efficiency and/or small scale renewable energy investments for energy poor households (local and national initiatives)
- ✓ Develop, test and disseminate innovative schemes for energy efficiency/RES investments established by utilities or other obligated parties under Article 7 (Energy Efficiency Obligation Schemes)

Consumers & Services

LC-SC3-EE-13-2018-2019-2020

Potential for Energy (Efficiency) Services not sufficiently tapped.

New opportunities for innovative services and business models.

CSA (2018)

EUR 1 to 2 million

Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource

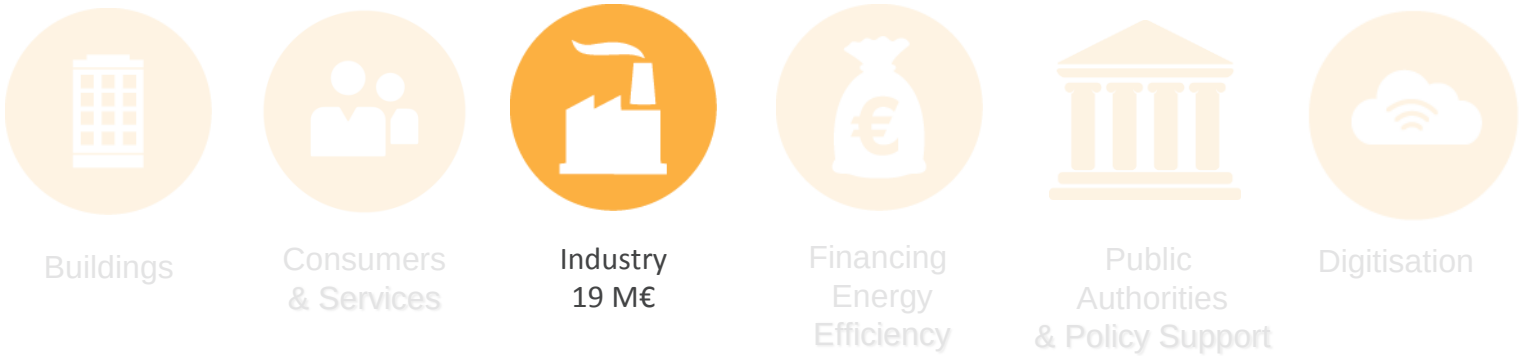
Actions developing **integrated concepts and (business) models**.

They should cover **at least two** of the following elements/aspects:

- **Energy service models** (like EPC) and services targeting new sectors and/or new actors
- **Innovative service and business models**:
  - ✓ integrating energy efficiency with other services (including pay-for-performance schemes); involving non-traditional actors
  - ✓ integrating energy efficiency with non-energy features
- **Innovative approaches**:
  - ✓ to make systematic use of big data for energy services
  - ✓ to improve accessibility and quality of demand side service providers

Actions should help prepare the ground for Innovation Actions under Call 2019!

Energy Efficiency
Call 2018 (Deadline 4/9/2018)



Innovation Actions	**EE6 – Industrial waste heat/cold recovery**
Coordination & Support Actions	**EE8 – Capacity building to support energy audits**

Industry

LC-SC3-EE-6-2018-2019-2020

Business cases for industrial waste heat/cold recovery

Waste heat/cold can be a valuable resource for other industries and buildings/District Heating and Cooling operators

From TRL 4 to 8

IA (2018)

EUR 3 to 4 million

- ✓ Develop **integrated cost-benefit simulation tools** that allow industrial sites/parks to determine the most **financial attractive option** for their recovered **waste heat/cold and/or surplus renewable energy**
- ✓ Consider characterization of processes and waste streams, barriers and opportunities (on the DHC side) and other variables (e.g., technology, infrastructure, administrative and legal costs, energy prices, demand)
- ✓ Simulation tools should be **flexible to allow different types of industrial sites/parks** to use them
- ✓ Validation through **demonstration in real operating conditions** in industrial facilities expected
- ✓ **Include business model** development and **dissemination and communication**

SPIRE cPPP

Industry

LC-SC3-EE-8-2018-2019

Capacity building programs to support implementation of energy audits

Member States to develop programmes encouraging SMEs to undergo energy audits and to implement the recommended energy-saving measures.

CSA

EUR 1 to 2 million

Proposals should focus on one, or more, of the following issues:

- ✓ Staff **trainings and capacity buildings programmes**, facilitating **SMEs** to undergo energy audits and to implement the recommended energy-saving measures
- ✓ **Capacity building** to support the take-up of audits recommendations and undertake the actions necessary to reduce energy consumption in **large companies**.
- ✓ Initiatives supporting **Member States** in empowering or establishing **national supporting schemes for SMEs** providing appropriate incentives to undergo energy audits and/or to implement the recommended energy-saving measures.

Energy Efficiency
Call 2018 (Deadline 4/9/2018)

Buildings | Consumers & Services | Industry | **Financing Energy Efficiency 19 M€** | Public Authorities & Policy Support | Digitisation

Coordination & Support Actions

EE9 – Innovative financing for EE investment

EE10 – Mainstreaming EE finance

EE11 – Project Development Assistance

Financing Energy Efficiency

LC-SC3-EE-9-2018-2019

Innovative financing for energy efficiency investments

"Smart Financing for Smart Buildings" initiative.

Innovative regional/national financing schemes

CSA

EUR 1 to 1,5 million

Proposals should focus on one, or more, of the following issues:

- ✓ Establishment of **new innovative**, operational **financing schemes**;
- ✓ **Replication of previously successful solutions** e.g. developed and implemented under various project development assistance (PDA) facilities under the Horizon 2020 and Intelligent Energy Europe programmes (including MLEI PDA or ELENA);
- ✓ Establishment of **regional/national aggregators** which are able to develop large (standardized) project pipelines;
- ✓ Creation **of EU or regional/national energy efficiency investment roundtables/platforms** to organise dialogue with and between the relevant stakeholders

Financing Energy Efficiency

LC-SC3-EE-10-2018-2019-2020

Mainstreaming energy efficiency finance

Energy efficiency needs to become as normal as a car loan!

CSA

EUR 1 to 1,5 million

Proposals should focus **at least one** of the following issues:

- ✓ Development, demonstration and promotion of frameworks for the **standardisation and benchmarking** of sustainable energy investments;
- ✓ **Capacity building** for banks and investors at the national and local level, in particular on underwriting sustainable energy investments;
- ✓ Gathering, processing and disclosing **large-scale data** on actual financial performance of energy efficiency investments;
- ✓ Further integration of **non-energy benefits** in project valuation, in particular in the building sector;
- ✓ Targeting **institutional investors** (e.g. public pension schemes) in order to increase the share of their funds invested in energy efficiency, or to develop specific funds or investment products.
- ✓ Exploring the impact of **revised risk ratings** and requirements for energy efficiency on financial regulations (Basel III, Solvency II).

Financing Energy Efficiency

LC-SC3-EE-11-2018-2019-2020

Aggregation - Project Development Assistance

What?

- ✓ Launch of concrete sustainable energy investment projects
- ✓ Building technical, economic and legal expertise

Who?

Public and private project promoters (e.g. public authorities or their groupings, public/private infrastructure operators and bodies, energy service companies, retail chains, large property owners and services/industry)

Proposals from **1 single entity** are eligible!

Sectors targeted?

Existing public & private buildings including social housing, Street lighting, Water / Wastewater services, Retrofiting of existing district heating/cooling, Industry and services, Urban Transport

Financing Energy Efficiency

LC-SC3-EE-11-2018-2019-2020

Aggregation - Project Development Assistance

EUR 7,5 to 50 million

Main features?

- Lead to **investments launched before end of the action** (i.e. signed contracts for sustainable energy investment – e.g. construction work, energy performance contract, turnkey contracts)
- **Every million Euro of H2020 support should trigger investments worth at least EUR 15 million** (1:15)
- Have an **exemplary/showcase** dimension in their ambition (i.e. reduced energy consumption and/or investment size)
- Deliver **organisational innovation in financial engineering** (e.g. on-bill financing schemes, guarantee funds, factoring funds) and/or mobilisation of investment programme (e.g. bundling, pooling, stakeholder engagement)
- Demonstrate high degree of **replicability** and include clear action plan to communicate experiences/results across EU towards potential replicators
- **Build on the experiences from previous PDA**

Energy Efficiency
Call 2018 (Deadline 4/9/2018)

Buildings | Consumers & Services | Industry | Financing Energy Efficiency | **Public Authorities & Policy Support 17 M€** | Digitisation

Coordination & Support Actions	**EE16 – Supporting public authorities** **EE15 – New energy label**
Resarch & Innovation Actions	**EE14 – Socio-economic research**

Public Authorities & Policy Support

LC-SC3-EE-16-2018-2019-2020

Support should continue and be reinforced in building capacity of public authorities and empowering them to take up their role of energy transition

CSA

EUR 1 to 1,5 million

Supporting public authorities to implement the Energy Union

a) Support to **local and regional public authorities**

b) Supporting the delivery of the **Energy Efficiency Targeting**

✓ Proposals should link into **existing, relevant initiatives** such as ManagEnergy and target a specific sector with high energy saving potential such as buildings, transport mobility, heating and cooling, or water infrastructure operation etc., as seen relevant by applicants.

Public Authorities & Policy Support

LC-SC3-EE-15-2018

Labels will be 'rescaled' (as well as go back to A-G scale), i.e. existing products will be re-categorised in lower classes so that the top classes are empty and provide new stimulus for innovation.

CSA

EUR 1 to 1,5 million

New energy label driving and boosting innovation in products energy efficiency

Proposals should focus **one or more** of the following issues:

- ✓ Raise the **capacity of manufacturers and**, in particular, **retailers** to fulfil their obligations providing and displaying respectively the correct label at the point of sale;
- ✓ Develop and roll out **tailored and effective actions** focusing on **awareness-raising** and information campaigns to alert market actors of label rescaling,
- ✓ Exchange of **best practices** in relation to these campaigns, including through the recommendation of common key messages to the respective target groups.

Public Authorities & Policy Support

LC-SC3-EE-14-2018-2019-2020

Make the energy efficiency first principle more operational

RIA

EUR 1 to 1,5 million

Socio-economic research conceptualising and modelling energy efficiency and energy demand

Actions which conceptualise and assess the **impacts and model the energy efficiency first principle**, in particular as regards:

- ✓ its **role and value in the energy system** (e.g. for planning of generation assets and networks adequacy etc.) **and the energy market** (participation in capacity market, participation and impact on prices and costs on wholesale and balancing/reserve markets);
- ✓ its role and value in **financing decisions**;
- ✓ its economic and **social impacts**;
- ✓ its correlation and interaction with other policy objectives (e.g. renewable energy, demand response);
- ✓ existing best practices worldwide where energy efficiency projects are given priority over additional supply side measures.

Energy Efficiency

Call 2018 (14/11/2018)

Buildings | Consumers & Services | Industry | Financing Energy Efficiency | Public Authorities & Policy Support | Digitisation 15 M€ (+ 15 M€ '19)

Innovation Action

DT-ICT-10 Interoperable and smart homes and grids

Calls for proposals LC-SC3-2018-2019-2020

- Energy efficiency
- Global leadership in renewables
- Smart and clean energy for consumers
- Smart citizen-centred energy system
- Smart Cities and Communities
- Enabling near-zero CO2 emissions from fossil fuel power plants and carbon intensive industries
- Joint Actions
- Cross-cutting issues

Global leadership in renewables

	2018	2019	2020
Next renewable energy solutions	RES-2	RES-1	RES-3
Renewable energy solutions at consumer scale	Energy generation at building scale RES-4, RES-5, RES-6	Renewable energy solutions at district level and for industrial processes RES-7, RES-8	RES-9, RES-10
Renewable energy solutions for energy system implementation	Reduce costs of key technologies for renewable energy conversion RES-11, RES-12, RES-13	Optimize processes and manufacturing RES-14, RES-15 Provide flexibility to the energy system RES-16, RES-17	RES-18, RES-19, RES-20
Renewable fuels for transport	Drop-in fuel solutions for fossil-fuel substitution RES-21, RES-22	Upscaling renewable fuels production RES-23 RES-24	RES-25, RES-26, RES-27
Market Uptake Support	RES-28	RES-28	RES-28

Global leadership in renewables

Technology area	Research activities (RIA)	Innovation activities (IA)
Solar energy (PV, CSP)	RES-1-2019, RES-2-2018, RES-4-2018, RES-7-2019, RES-11-2018, RES-14-2019	RES-6-2018, RES-8-2019, RES-13-2018, RES-15-2019, RES-17-2019
Wind energy	RES-1-2019, RES-4-2018, RES-11-2018	RES-13-2018
Ocean energy	RES-1-2019, RES-11-2018, RES-14-2019	
Biofuels / alternative fuels	RES-1-2019, RES-2-2018, RES-16-2019, RES-21-2018, RES-23-2019	RES-17-2019, RES-22-2018, RES-24-2019
Geothermal energy	RES-1-2019, RES-4-2018, RES-11-2018, RES-14-2019	RES-8-2019, RES-13-2018
Heating / cooling, CHP	RES-1-2019, RES-4-2018, RES-11-2018	RES-5-2018, RES-8-2019, RES-12-2018
Hydro energy	RES-1-2019, RES-11-2018, RES-16-2019,	RES-17-2019
Virtual Power Plant	RES-16-2019	

- Topics for 2018 in black font; for 2019 in purple font; topics for 2020 not included (added as of mid-2018)
- Market-uptake activities (CSA, RES-28) cover all areas

Next renewable energy solutions

RES-1-2019: Developing the next generation of renewable energy technologies

- *Bring technologies that form be the backbone of the energy system in 2050 to TRL 3 to 4*
- *Recommended EU contribution per project: EUR 2-5 million*
- *Indicative topic budget: EUR 20 million, RIA*

RES-2-2018: Disruptive innovation in clean energy technologies

- *Accelerate technology development for Photovoltaic windows and bionic leaf from TRL3 to at least TRL5*
- *Stage-gate approach based on milestones and periodic reviews.*
- *Recommended EU contribution per project: EUR 2-3 million*
- *Indicative topic budget: EUR 12 million, RIA*

RES-3-2020: International Cooperation with USA on alternative renewable fuels for energy and transport

- Text, budget and deadlines to be decided as of mid-2018

Next renewable energy solutions

LC-SC3-RES-2-2018

Boosting the breakthrough of particular promising technologies … to secure that investment brings innovation that is taken up by the market

From TRL 3 to 5

RIA

EUR 20 million

Developing the next generation of renewable energy technologies

- Photovoltaic windows ('transparent' solar cells): development of transparent and economically viable PV cells for integration in building applications
- Bionic leaf technology: advanced renewable fuel production through biological conversion of CO2 and renewable hydrogen in the presence of inorganic catalysts. The process is based on first using solar energy to split water molecules and then using bacteria to consume the hydrogen together with CO2 to produce fuels

➔ Projects selected under this pilot will follow a stage-gate approach based on milestones and periodic reviews.

Renewable energy solutions for implementation at consumer scale

2018: Energy generation at building scale

- **RES-4:** Renewable energy system integrated at the building scale
  - *RIA, TRL 3/4 -> TRL 4/5, EUR 2-5 million/project, topic budget: EUR 27.5 million, 2-stage submission*
- **RES-5**: Increased performance of technologies for local heating and cooling solutions
  - *IA, TRL 5/6 -> TRL 6/7, EUR 3-10 million/project, topic budget: EUR 10 million*
- **RES-6**: Demonstrate significant cost reduction for Building Integrated PV (BIPV) solutions
  - *IA, TRL 5/6 -> TRL 6/7, EUR 6-10 million/project, topic budget: EUR 30 million*

2019: Renewable energy solutions at district level and for industrial processes

- **RES-7:** Solar Energy in Industrial Processes
  - *RIA, TRL -> TRL 4/5, EUR 3-5 million/project, topic budget: EUR 10 million*
- **RES-8**: Combining Renewable Technologies for a Renewable District Heating and/or Cooling System
  - *IA, TRL -> TRL 6, EUR 8-15 million/project, topic budget: EUR 15 million*

Renewable energy solutions for implementation at consumer scale

Decarbonisation of the building sector (heating, cooling, electricity)

Further integration of energy technologies (and storage)

Highest possible share of RES in buildings, considering costs and implications for the user

TRL to 4-5

RIA

EUR 2 to 5 million

LC-SC3-RES-4-2018

Renewable energy system integrated at the building scale

- Solutions combining different renewable energy technologies to cover the highest possible share of electricity, heating and cooling needs
- Multi-family residential or commercial or public or industrial buildings (in the case of the industrial buildings, energy needs of the industrial process should not be addressed)
- Needs and requirements of users and installers to be addressed (**SSH expertise**)
- Reduction of air pollutants

→

✓ Mission Innovation
✓ EeB cPPP

División Programas de la UE

MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD

CDTI Centro para el Desarrollo Tecnológico Industrial

Renewable energy solutions for implementation at consumer scale

Use of RES available locally to supply heating & cooling

Innovation needed also in resource mapping, monitoring & control tools

Reduce investments and operation costs & increase the systems' performance

TRL to 6-7

IA

EUR 3 to 10 million

LC-SC3-RES-5-2018

Increased performance of technologies for local heating and cooling solutions

- One or more of the following aspects to be addressed:
  - ✓ Optimisation components of renewable heating & cooling system
  - ✓ Tools to optimize design and monitoring of components heating & cooling system
  - ✓ Integrated control for smart operation heating & cooling system
- Residential (single house and apartment blocks) and commercial buildings
- Reduction of air pollutants

→

- ✓ Mission Innovation
- ✓ EeB cPPP

Renewable energy solutions for implementation at consumer scale

BIPV to satisfy multiple building functions

Architectural and aesthetic aspects

Control system for building management functions, grid-feeding, self-consumption and local storage

TRL to 6-7

IA

EUR 6 to 10 million

LC-SC3-RES-6-2018

Demonstrate significant cost reduction for Building Integrated PV (BIPV) solutions

- Proposals to:
  - ✓ Address new BIPV concepts and cost-efficient production techniques reducing additional cost by 75% by 2030 compared to 2015 levels
  - ✓ Demonstrate the concepts into a BIPV energy system (life-cycle basis)
- Multidisciplinary consortia including the PV manufacturing industry (and building materials industry, certification bodies and market actors where relevant)
- Standardization issues to be addressed

Renewable energy solutions for energy system level implementation

2018: Reduce costs of key technologies for renewable energy conversion

- **RES-11:** Developing solutions to reduce the cost and increase performance of renewable technologies
  - *RIA, TRL 3/4 -> TRL 4/5, EUR 2-5 million/project, topic budget: EUR 30 million, 2-stage submission*
- **RES-12:** Demonstrate highly performant renewable technologies for combined heat and power (CHP) generation and their integration in the EU's energy system
  - *IA, TRL 5 -> TRL 7/8, EUR 15-20 million/project, topic budget: EUR 30 million*
- **RES-13:** Demonstrate solutions that significantly reduce the cost of renewable power generation
  - *IA, TRL 5 -> TRL 7, EUR 15-20 million/project, topic budget: EUR 45 million*

2019: Optimize processes and manufacturing

- **RES-14:** Optimising manufacturing and system operation
  - *RIA, TRL 3/4 -> TRL 4/5, EUR 3-5 million/project, topic budget: EUR 20 million, 2-stage submission*
- **RES-15:** Increase the competitiveness of the EU PV manufacturing industry
  - *IA, TRL 5/6 -> TRL 6, EUR 10-13 million/project, topic budget: EUR 25 million*

2019: Provide flexibility to the energy system

- **RES-16:** Development of solutions based on renewable sources that provide flexibility to the energy system
  - *RIA, TRL 3/4-> TRL 4/5, EUR 3-5 million/project, topic budget: EUR 15 million*
- **RES-17:** Demonstration of solutions based on renewable sources that provide flexibility to the energy system
  - *IA, TRL 5-> TRL 7, EUR 12-15 million/project, topic budget: EUR 40 million*

Renewable energy solutions for energy system level implementation

Achieving or maintaining global leadership in renewable energy technologies requires cost reductions

TRL 3-4 to 4-5

RIA

EUR 2 to 5 million

Reduce the CAPEX and/or OPEX of energy generation

LC-SC3-RES-11-2018 1/2

Developing solutions to reduce the cost and increase performance of renewable technologies

- **Floating Wind** Technology development including reliable, cost efficient **anchoring and mooring system**, dynamic cabling, installation techniques, and O&M concepts;
- **Onshore Wind** Disruptive technologies for the **rotor, generator, drive train and support structures** for the development of the advanced or next generation wind energy conversion systems;
- **Ocean** New integrated design and testing of **tidal energy devices** with behavioral modelling to achieve **extended life**time and high resistance in marine environment;
- **Geothermal** **Novel drilling** technologies to reach cost-effectively depths in the order of 5 km and/or temperatures higher than 250°C;

Renewable energy solutions for energy system level implementation

LC-SC3-RES-11-2018 2/2

Achieving or maintaining global leadership in renewable energy technologies requires cost reductions

TRL 3-4 to 4-5

RIA

EUR 2 to 5 million

Reduce the CAPEX and/or OPEX of energy generation

Developing solutions to reduce the cost and increase performance of renewable technologies

- **CSP Novel components** and configurations for linear focusing and point focusing technologies;
- **Hydropower** Novel components for hydropower hydraulic and electrical machinery to allow efficient **utilization also in off-design operation conditions** (ramp up and ramp down phases) and **reduce related machinery wear and tear**;
- **Bioenergy** Improve small and medium-scale **combined heat and power (CHP) from biomass to reduce CAPEX and OPEX** through achieving high resource efficiency and high overall and electrical conversion performance.

Renewable energy solutions for energy system level implementation

Progressive replacement of fossil fuels used in the heat and power sectors by means of renewable energy sources

TRL 5 to 7-8

IA

EUR 15 to 20 million

Reduce the cost of combined heat and power generation from renewable sources, making it competitive to fossil fuel based solutions

LC-SC3-RES-12-2018

Demonstrate highly performant renewable technologies for combined heat and power (CHP) generation and their integration in the EU's energy system

- **Biomass based combined heat and power (CHP)** Demonstration of technically **feasible and cost-effective installation of medium to large-scale CH**P through **retrofitting of existing fossil-fuel d**riven CHP or power plants **>10 MW electrical** to CHP plants with the use of **sustainable biomass feedstoc**k. Commercial operation of the plant with biomass after the end of the project is to be envisaged;
- **Geothermal** Demonstration of **geothermal plants** to respond cost-effectively to the heat and to the power demand of the network. Proposals are expected to propose technologies for **more flexible or more efficient geothermal plants** or a combination of these two aspects. Associating other renewable heat sources to geothermal and adding storage would its increase flexibility (not a necessary condition).

Renewable energy solutions for energy system level implementation

LC-SC3-RES-13-2018

Reduce the cost of energy generation from renewable energy sources

TRL 5 to 7

IA

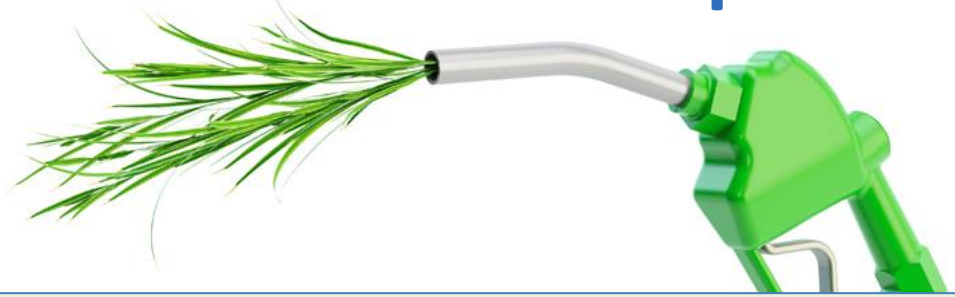
EUR 15 to 20 million

Reduce the cost of energy generation rendering the renewable energy technologies competitive

Demonstrate solutions that significantly reduce the cost of renewable power generation

- **Offshore wind** Development and validation of **new manufacturing, installation and/or operation and maintenance techniques**, introduction of new materials. Health and environmental impact issues will be taken into account;
- **Deep geothermal** Demonstration of **cost efficient technologies to limit emissions and/or to condense and re-inject gases**. Turning the emissions into commercial products could contribute to cost reduction (not a necessary condition);
- **CSP** Demonstration in operational environment of CSP solutions based on **novel heat transfer fluids and/or of solutions** which make an innovative use of a heat transfer fluid that is already used in other CSP applications.

Renewable Fuels for transports



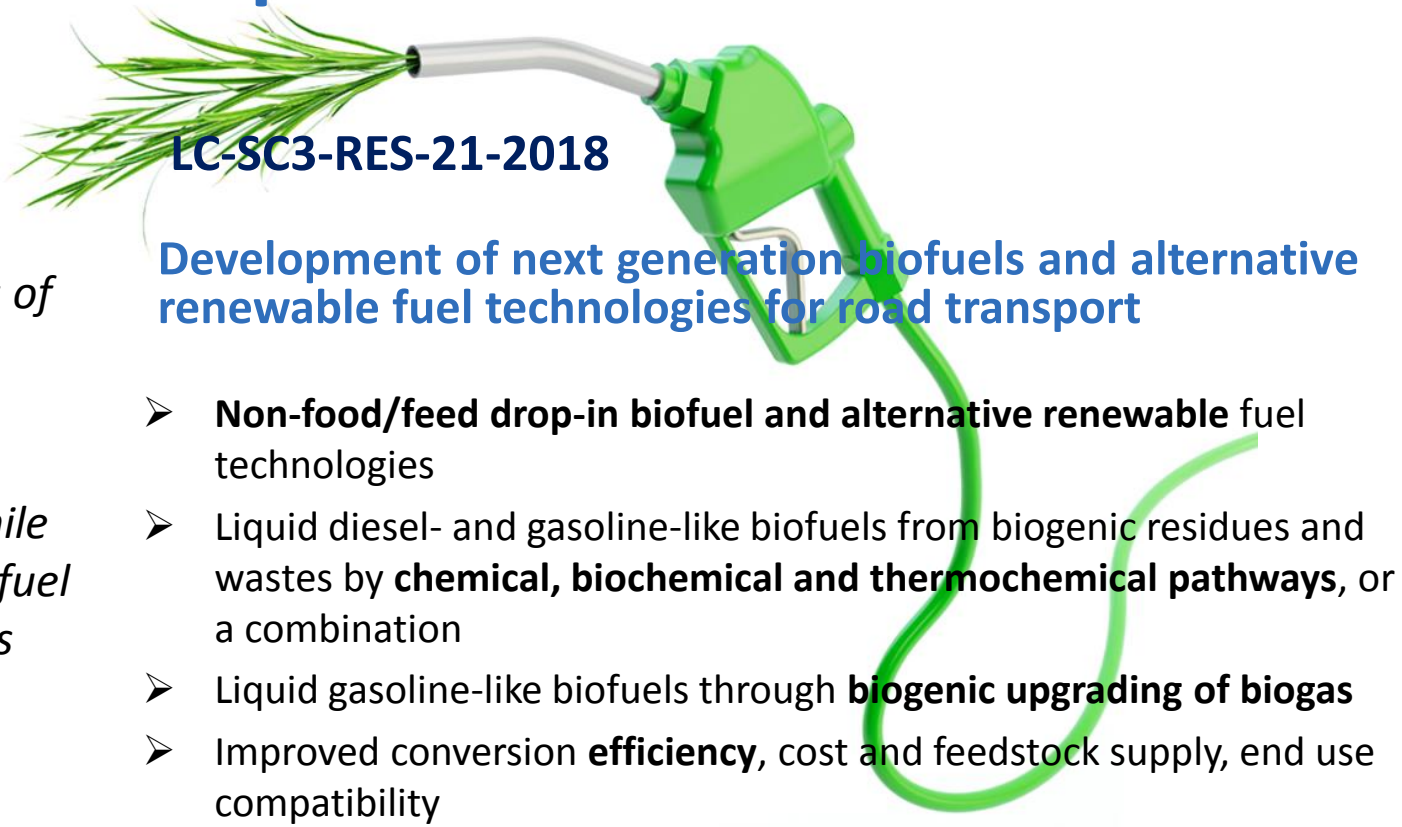
2018: Drop-in fuel solutions for fossil-fuel substitution

- **RES-21:** Development of next generation biofuels and alternative renewable fuel technologies for road transport
  - *RIA, TRL 3/4 -> TRL 5, EUR 3-5 million/project, topic budget: EUR 25 million*
- **RES-22:** Demonstration of cost effective advanced biofuel pathways in retrofitted existing industrial installations
  - *IA, TRL 5 -> TRL 7, EUR 8-10 million/project, topic budget: EUR 30 million*

2019: Upscaling renewable fuels production

- **RES-23:** Development of next generation biofuel and alternative renewable fuel technologies for aviation and shipping
  - *RIA, TRL 3 -> TRL 5, EUR 3-5 million/project, topic budget: EUR 20 million*
- **RES-24:** Boosting pre-commercial production of advanced aviation biofuels
  - *IA, TRL 5 -> TRL 7, EUR 15-20 million/project, topic budget: EUR 20 million*

Renewable energy solutions for energy system level implementation



LC-SC3-RES-21-2018

Increase the competitiveness of next generation biofuel and renewable fuel technologies while diversifying the fuel supply pathways

TRL 3-4 to 5

RIA

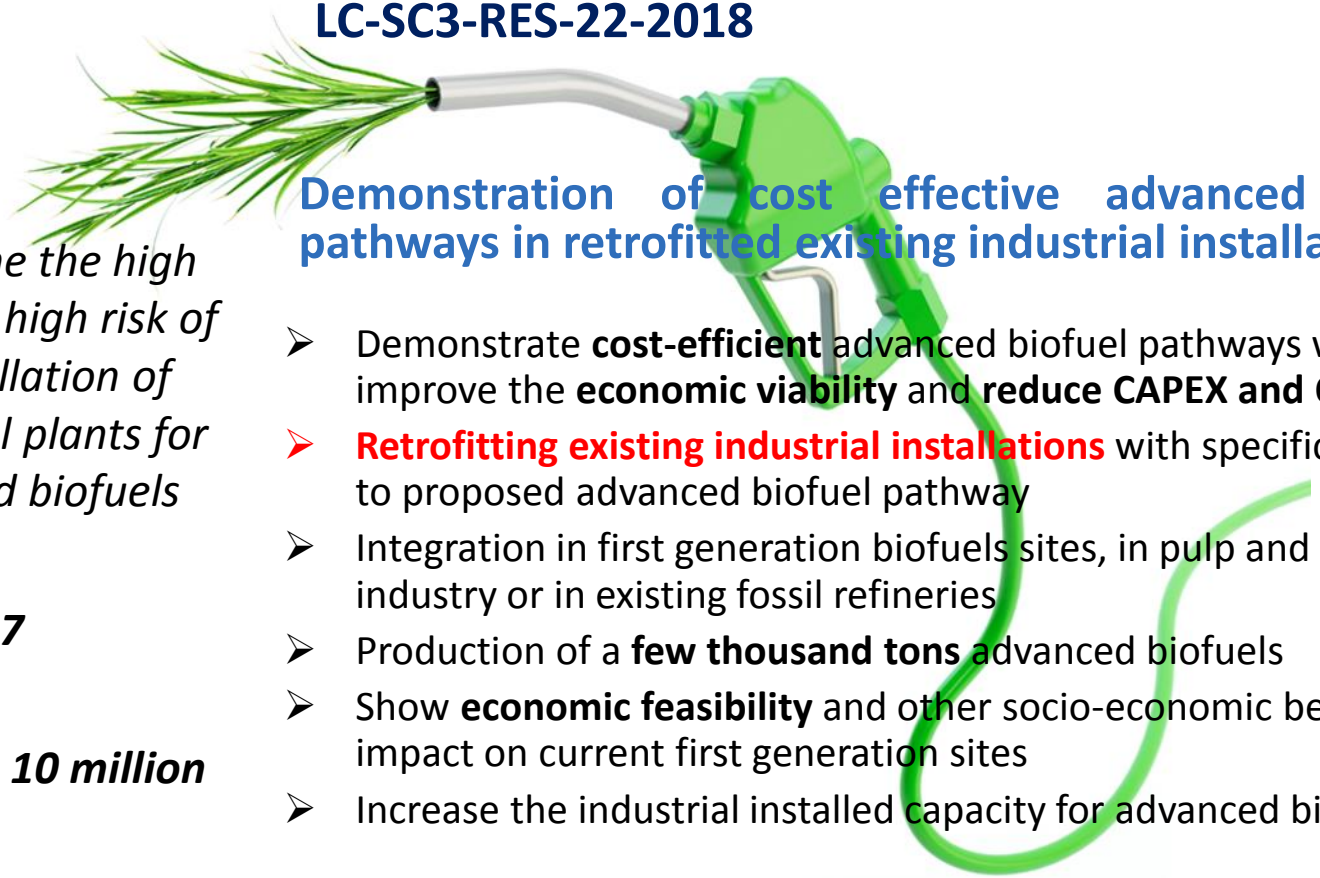
EUR 3 to 5 million

Development of next generation biofuels and alternative renewable fuel technologies for road transport

- **Non-food/feed drop-in biofuel and alternative renewable** fuel technologies
- Liquid diesel- and gasoline-like biofuels from biogenic residues and wastes by **chemical, biochemical and thermochemical pathways**, or a combination
- Liquid gasoline-like biofuels through **biogenic upgrading of biogas**
- Improved conversion **efficiency**, cost and feedstock supply, end use compatibility
- Reduce cost and improve fuel performance for environment and society

Renewable energy solutions for energy system level implementation

LC-SC3-RES-22-2018



Demonstration of cost effective advanced biofuel pathways in retrofitted existing industrial installations

Overcome the high cost and high risk of the installation of industrial plants for advanced biofuels

TRL 5 to 7

IA

EUR 8 to 10 million

- Demonstrate **cost-efficient** advanced biofuel pathways which improve the **economic viability** and **reduce CAPEX and OPEX**
- **Retrofitting existing industrial installations** with specific innovation to proposed advanced biofuel pathway
- Integration in first generation biofuels sites, in pulp and paper industry or in existing fossil refineries
- Production of a **few thousand tons** advanced biofuels
- Show **economic feasibility** and other socio-economic benefits like impact on current first generation sites
- Increase the industrial installed capacity for advanced biofuels

Deadlines

	2018		Deadlines
Next renewable energy solutions	RES-2		19/4/2018
Renewable energy solutions at consumer scale	Energy generation at building scale	RES-4 (2 stages) RES-5 RES-6	31/1/2018 (1st) 23/8/2018 (2nd) 13/2/2018
Renewable energy solutions for energy system implementation	Reduce costs of key technologies for renewable energy conversion	RES-11 (2 stages) RES-12 RES-13	31/1/2018 (1st) 23/8/2018 (2nd) 13/2/2018
Renewable fuels for transport	Drop-in fuel solutions for fossil-fuel substitution RES-21, RES-22	RES-21 RES-22	13/2/2018 5/4/2018
Market Uptake Support	RES-28		13/2/2018

Calls for proposals LC-SC3-2018-2019-2020

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- Joint Actions
- Cross-cutting issues

Smart citizen-centred energy system

GRID

- **ES-1-2019:** Flexibility and retail market options for the distribution grid (IA)
- **ES-2-2019:** Solutions for increased regional cross-border cooperation in the transmission grid (IA)
- **ES-5-2018-2020:** TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation (IA)
- **ES-6-2019:** Research on advanced tools and technological development (RIA)
- **ES-7-2018:** Pan-European Forum for R&I on Smart Grids, Flexibility and Local Energy Networks (CSA)

LOCAL SYSTEMS & ISLANDS

- **LC-SC3-ES-3-2018-2020:** Integrated local energy systems (Energy islands) (IA)
- **LC-SC3-ES-4-2018-2020:** Decarbonising energy systems of geographical Islands (IA)
- **LC-SC3-ES-8-2019:** European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts (CSA)

Smart citizen-centred energy system

GRID

- **ES-1-2019:** Flexibility and retail market options for the distribution grid (IA)
- **ES-2-2019:** Solutions for increased regional cross-border cooperation in the transmission grid (IA)
- **ES-5-2018-2020:** TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation (IA)
- **ES-6-2019:** Research on advanced tools and technological development (RIA)
- **ES-7-2018:** Pan-European Forum for R&I on Smart Grids, Flexibility and Local Energy Networks (CSA)

	TRL	EU Contribution per project M.€	Budget M.€	Deadline
ES-1-2019	5-8	6-8	37,30	05-feb-19
ES-2-2019	5-8	8-10	25,00	
ES-5-2018	5-8	13-17	30,00	05-abr-18
ES-6-2019		2-4	25,35	05-feb-19
ES-7-2018		3-4	3,00	05-abr-18

ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation - IA

Specific Challenge

- Network operators should procure balancing, congestion management and ancillary services from assets connected to the network both at transmission and at distribution level
- 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

Scope

- Demonstrate at a large-scale:
  - How markets and platforms enable **TSOs and DSOs to connect and procure grid services**
  - Procurement of **energy services from large-scale and small-scale** assets through a combination of **local markets with wholesale & balancing markets**,
  - Develop a **seamless pan-European electricity market**
  - Coordinate work with NRA's, ENTSO-E, the DSO organisations and other stakeholders

Expected impact

- 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.

TRL between 5-8
EU contribution: 13-17 M.€

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

Scope

- Set-up a **European Forum** composed of R&I policy makers, R&I actors and experts ('community') in the field of smart grids / storage and local energy systems that is representative of the EU-28 energy system. The goal is to **evolve towards a truly integrated pan-European R&I community** with a high level of synergies, spread and representativity over a recommended duration of 4 years
- A number of **regional workshops** where **exchanges of experience and capacities** between members of R&I community that are not used to collaborate will be organised where the key R&I challenges will be identified, discussed and structured

Expected impact

- Building a true pan-European R&I community in the field of smart grids & associated flexibility measures / energy systems
- Establish new collaboration 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

EU contribution: 3-4 M.€

Smart citizen-centred energy system

	TRL	EU Contribution per project M.€	Budget M.€	Deadline
ES-3-2018	5-8	5-6	26,30	05-abr-18
ES-4-2018	5-8	7-10	19,00	
ES-8-2019		10	10,00	05-feb-19

LOCAL SYSTEMS & ISLANDS

- **LC-SC3-ES-3-2018-2020:** Integrated local energy systems (Energy islands) (IA)
- **LC-SC3-ES-4-2018-2020:** Decarbonising energy systems of geographical Islands (IA)

GRIDG

- **LC-SC3-ES-8-2019:** European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts (CSA)

ES-3-2018-2020: Integrated local energy systems (Energy islands) - IA

Specific Challenge

- **Decarbonisation of local energy systems** on the **mainland** (e.g. isolated villages, small cities, urban districts, rural areas with weak or non-existing grid connections)
- **Decarbonisation and energy savings should result from an optimal combination** of these energy sources
- Local energy systems: local energy sources; local demand-response; local air quality
- **Storage of all energy vectors and intensive use of the latest technologies on power electronics, control and digitisation**

Scope

- Develop and demonstrate solutions which **analyse and combine**, in a well delimited system, **all the energy vectors that are present and interconnect them.**
- **High replication** potential across Europe.
- Local consumers, small to medium industrial production facilities and commercial buildings should be involved in the projects from the start.
- International cooperation is encouraged, in particular with **India**.

Expected impact

- Validate solutions for decarbonisation of the local energy system while ensuring a positive impact on the centralised energy infrastructure, on the local economy and local social aspects, and local air quality.
- Safe and secure local energy system that integrates significant shares of renewables.
- Benchmark technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens.

TRL between 5-8
EU contribution: 5-6 M.€

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

Specific Challenge

- Large-scale deployment of local renewable energy sources
- Decarbonise the energy system of the island, reduce greenhouse gases emissions and improve, or at least not deteriorate, air quality

Scope

- The proposed solutions will contribute to at least 4 of the following objectives:
  - High levels of **local renewable energy sources penetration**.
  - High **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**.
  - Achieve a very significant **reduction of the use of hydrocarbon** based energies.
  - Innovative approaches to **energy storage, electricity storage** in particular relying on batteries

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 on the same island and on other islands with similar problems
- Enhance autonomy for islands that are grid connected with the mainland.

TRL between 5-8
EU contribution: 7-10 M.€

BRIDGE INITIATIVE

- Es una iniciativa europea
- Poner en común proyectos de Demostración de H2020 en las áreas: SG & Energy Storage
- Crear visión estructurada de cuáles son los obstáculos a la innovación
- Compartir conocimientos entre proyectos

Reservar el 2% del presupuesto

DATA MANAGEMENT | **BUSINESS MODELS** | **REGULATIONS** | **CONSUMER ENGAGEMENT**

Calls for proposals LC-SC3-2018-2019-2020

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Why Smart Cities and Communities?

- Improving quality of live, competitiveness and sustainability
- Exporting European knowledge in a strong growth market estimated globally at €1.3 trillion in 2020
- 'Lighthouse project' approach continue

SCC - Smart Cities and Communities

5. Smart Cities and Communities	5/4/2018				5/2/2019				
	Action	Min	Max	Budget	Action	Min	Max	Budget	
SCC-1-2018-2019-2020: SCC	IA	14,5	20,0	43,0	IA	14,5	20,0	73,0	
				43,0				**73,0**	**116,0**

Specific Challenge

- COP21, EU Energy/Climate goals
- Necessary energy transition in cities

Scope

- Deploy and test **integrated innovative solutions** for **Positive Energy Blocks/Districts** in the Lighthouse Cities
- **Interaction and integration** between the **buildings**, the **users** and the larger **energy system**
- Implications of increased **electro-mobility,** its impact on the energy system and its integration in planning.
- Carry out extensive **performance monitoring** (ideally for more than 2 years)

SCC - Smart Cities and Communities

POSITIVE ENERGY BUILDINGS/DISTRICT - DEFINITION

- **Positive Energy Blocks/Districts** consist of **several buildings** (new, retro-fitted or a combination of both) that **actively manage their energy consumption** and **the energy flow between them and the wider energy system.**
- Positive Energy Blocks/Districts have an **annual positive energy balance**.
- They **make optimal use of elements** such as advanced materials, local RES, local storage, smart energy grids, demand-response, cutting edge energy management (electricity, heating and cooling), user interaction/involvement and ICT.
- Positive Energy Blocks/Districts are **designed to be integral part of the district/city energy system** and have a positive impact on it. Their design is intrinsically **scalable** and they are well embedded in the spatial, economic, technical, environmental and social context of the project site.

SCC - Smart Cities and Communities

The proposal should :

- Focus on mixed use urban districts and positively contribute to the overall city goals;
- Develop solutions that can be replicated/gradually scaled up to city level. The technical, financial, social, and legal feasibility of the proposed solutions should be demonstrated in the actual proposal.
- Make local communities and local governments (particularly city planning departments) an active and integral part of the solution, increase their energy awareness and ensure their sense of ownership of the smart solutions.
- Promote decarbonisation, while improving air quality.
- Incorporate performance DATA into the SCIS (Smart Cities Information System database)

The proposal should deliver :

- Effective Business models for sustainable solutions
- Practical recommendations on:
  - Regulatory, legal aspects and data security/protection
  - Gender and socio-economics (SSH)
  - Storage solutions (from short-term to seasonal)
  - Big data, data management and digitalisation
  - Electro-mobility: * its impact on energy system and * appropiate city planning measures to support large scale roll-out

SCC - Smart Cities and Communities

Eligible costs - those that concern the innovative elements of the project :

- connect and integrate buildings;
- enable Positive Energy Blocks/Districts;
- foster innovative systems integration;
- complement the wider energy system.

Non-eligible costs – cost of commercial technologies :

- Buildings: purchase, construction, retrofitting and maintenance;
- Electric vehicles and charging stations: purchase, installation and maintenance;
- City-level ICT platforms: purchase, development and maintenance;
- Standard, commercially-available RES: purchase, development and maintenance.

Elegibility Criteria:

- **2 lighthouse cities** + at least **5 followers cities (6-8M.€/city + 0,5-1 M.€/follower)**
- A city can be funded as a lighthouse city **only once** under Horizon 2020 .
- By the call deadline, all lighthouse cities **must have a validated**: SEAP, SECAP, or similar, at least equally ambitious, plan.

SCC- Selected Proposals

CALL 2014 SELECTED PROPOSAL SCC-01

ACRONIMO	LEAD CITIES	FOLLOWERS CITIES
GrowSmarter	*Stockholm (SE), Cologne (DE) and **Barcelona (ES)***	*Valetta, Suceava, Porto, Cork and Graz*
REMOURBAN (F.CARTIF)	***Valladolid (ES),** Nottingham (GR) and Tepebasi (TR)*	*Seraing, Miskolc*
TRIANGULUM	*Manchester (GR), Eindhoven (NL)and Stavanger (NO)*	*Prague, Leipzig and **Sabadell***

CALL 2015 SELECTED PROPOSAL SCC-01

ACRONIMO	LEAD CITIES	FOLLOWERS CITIES
SmartENcity (Tecnalia)	***Vitoria (ES)**, Tartu (Estonia), Sonderborg (DK)*	Lecce, Asenovgrad
REPLICATE (F.S.Sebastián)	***San Sebastian (ES)**, Florencia (IT) y Bristol (GR)*	Essen, Nilufer, Lausanne
SMARTER TOGETHER	*Lyon (FR), Munich (DE), Vienna (AT)*	**Santiago**, Sofía, Venecia, Kiev, Yokohama
SHARMLLM	*London (GR), Lisboa (PT), Milán (IT).*	Burdeos, Varsovia, Burgas

CALL 2016 - SELECTED PROPOSAL SCC-01

ACRONIMO	LEAD CITIES	FOLLOWERS CITIES
mySMARTlife (Liderada por F. Cartif)	*Nantes (France), Hamburg (Germany) and Helsinki (Finland)*	*Varna (Bulgaria), Bydgoszcz (Poland), Rijeka (Croatia) and **Palencia (Spain)***
Ruggedised	*Rotterdam (Netherland), Glasgow (UK) and UMEA (Suecia)*	*Brno (Czech Republic), Parma (Italia) and Gdansk (Polonia)*

SCC- SELECTED PROPOSALs – Call 2017

CALL 2017 SELECTED PROPOSAL SCC-01		
ACRONIMO	**LEAD CITIES**	**FOLLOWERS CITIES**
IRIS	*Utrech (NL), Goteborg (SE), Nice Cote d´Azur (IT)*	Vaasa (FI), Alexandroupolis (GR), **Sta.Cruz de Tenerife (ES),** Focsani
MatchUP (Ayto Valencia)	***Valencia (ES),*** *Dresden (DE), Antalya (TK)*	*Ostend (BE), Herzliya (Israel), Skopje (Fyrom), Kerava (FI)*
Stardust (F. Cener-Ciemat)	***Pamplona (ES),*** *Tampere (FI), Trento (IT)*	*Derry (UK), Kozani (GR), Litomerice (CZ)*

SCC-1-2018-2019: Projects are expected to **COOPERATE** with other SCC projects funded under H2020 as well as the EIP-SCC (earmark appropiate collaboration resources – **5% of the requested EU contribution**)

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Enabling near-zero CO2 emissions from fossil fuel

NZE-1: Pilots for advanced capture technologies (2018)

- *RIA; Deadline: 6.9.2018; indicative budget: EUR 20 million*

NZE-2: Pilots on CO2 conversion to fuels (2018)

- *RIA; Deadline: 6.9.2018; indicative budget: EUR 12 million*

NZE-3: Strategic planning for CCUS deployment (2018)

- *CSA; Deadline: 6.9.2018; indicative budget: EUR 2 million*

NZE-4: Integrated solutions for flexible power plants using power-to-X and energy storage (2019)

- *IA; Deadline: 27.8.2019; indicative budget: EUR 20 million*

NZE-5: CCS in industry (2019, 2020)

- *IA; Deadline (2019): 27.8.2019; indicative budget: EUR 33 million*

NZE-6: Geological storage pilots in different settings (2020)

Enabling near-zero CO2 emissions from fossil fuel

LC-SC3-NZE-1-2018

A significant reduction in the energy intensity of the CO2 capture process is needed to make CCS more cost-effective

TRL 5 to 7

RIA

EUR 5 to 10 million

Advanced CO2 capture technologies

- **Pilot demonstration of advanced technologies** or processes for **CO2 capture** that have a high potential for reduction of the energy penalty and cost
- Test and prove operating conditions, operational flexibility, reliability and cost efficiency
- Evaluate the **cost, technical requirements and operational/safety impacts on transport, storage and/or utilisation** as part of integration in a CCUS cluster
- Solutions should be **environmentally benign**
- Proposals must state **clear targets and KPIs for energy use, capture rate and cost of capture**

Enabling near-zero CO2 emissions from fossil fuel

Conversion of captured CO2, for example using hydrogen made from renewable energy, to produce fuels is a means to replace fossil fuels, as well a promising solution for seasonal energy storage.

However, the conversion process is highly energy intensive

TRL3-4 to TRL 5-6

RIA

EUR 3 to 4 million

LC-SC3-NZE-2-2018

Conversion of captured CO2

- Development of **energy-efficient, economically and environmentally viable CO2 conversion** technologies for chemical **energy storage or fossil fuel displacement**
- Solutions should allow for **upscaling in the short to medium term**
- **Life Cycle Assessment** (LCA) is an important part of the work
- Proposals must **state clear targets for energy use** in the conversion process, production costs and product yields
- **International cooperation** is encouraged, in particular with relevant **Mission Innovation countries such as China**

División Programas de la UE

MINISTERIO DE ECONOMÍA, INDUSTRIA Y COMPETITIVIDAD

CDTI Centro para el Desarrollo Tecnológico Industrial

Enabling near-zero CO2 emissions from fossil fuel

Roll-out of CCUS requires a growing network of industrial clusters, CO2 hubs and storage sites, connected by pipelines and shipping routes

Shared infrastructure will bring economies of scale

CSA

EUR 2 to 3 million

LC-SC3-NZE-3-2018

Strategic planning for CCUS development

- Elaboration of **detailed plans for CO2 gathering networks**, industrial clusters and storage sites
- Identification of **transport corridors**
- Perform initial **impact assessments**
- Develop **local business models** within promising start-up regions
- Assessment of **cost-effective storage capacity** in selected regions
- **Cooperation with industry and engagement with local stakeholders** is important
- Demonstrate how outputs will contribute to CCS roll-out in the short term (<3 years), medium term (3-10 years) and long term (>10 years)

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Joint Actions - overview

Support to the SET-Plan

- JA-1-2018 (ERA-NETs)
- JA-2-2018 (CSA for Implementation Plans)

Pre-commercial procurement for wave energy

- JA-3-2019: European Pre-Commercial Procurement Programme for Wave Energy Research & Development

EU-Africa cooperation on renewables

- JA-4-2018 (CSA for preparing a European Joint Programme)
- JA-5-2019 (European Joint Programme)

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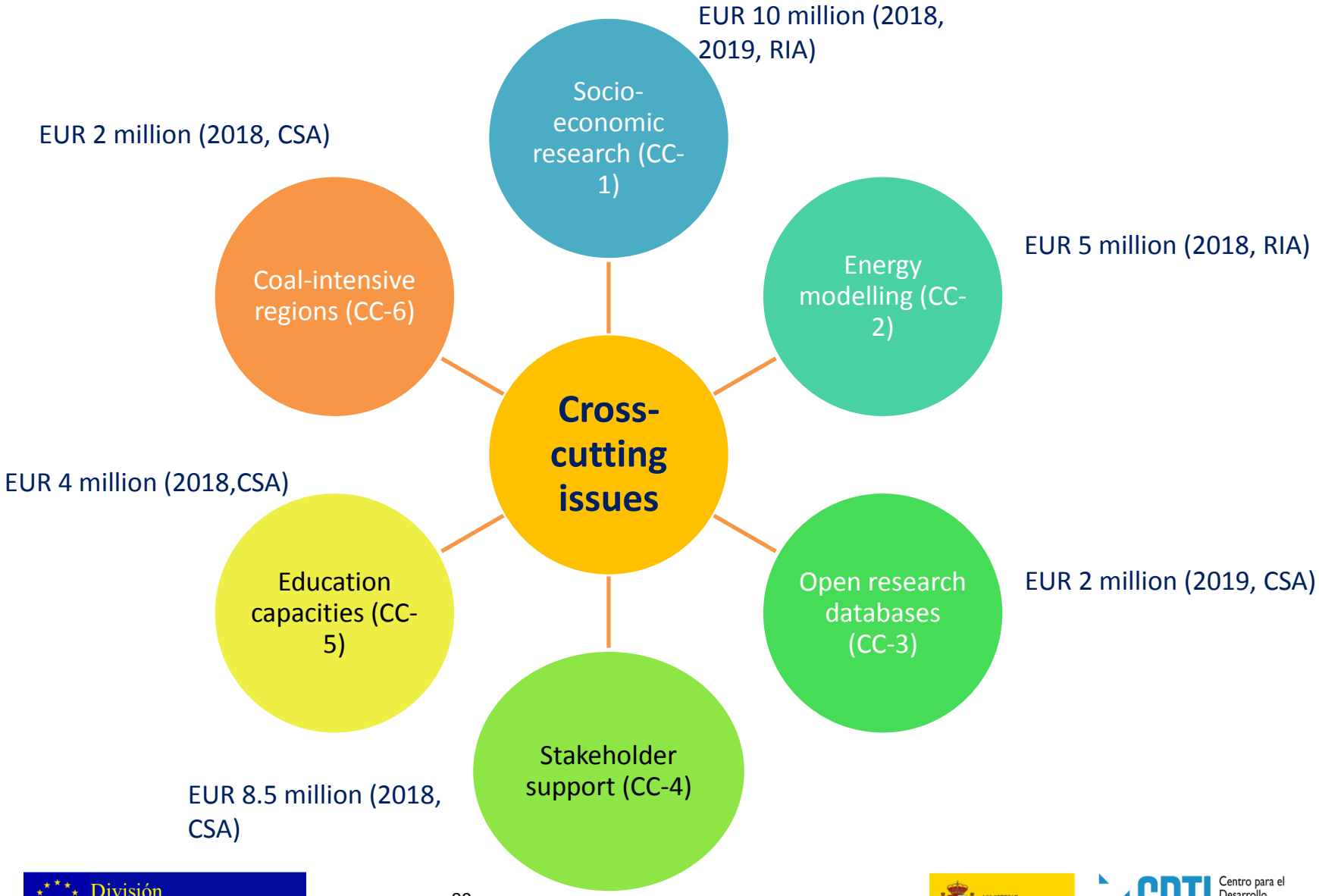
Cross-cutting issues



Cross-cutting issues

The clean-energy transition doesn't just pose technological and scientific challenges, it also requires a better understanding of cross-cutting socioeconomic, gender, sociocultural, and socio-political aspects.

RIA

EUR 1 to 3 million

LC-SC3-CC-1-2018-2019-2020

Social Science and Humanities (SSH) aspects of the Clean-Energy Transition

- **2018:** **Social innovation in the energy sector**, including with respect to urban areas (given the close proximity between citizens, businesses and institutions).
- Better understanding of **socioeconomic, gender, sociocultural, and socio-political factors** and their interrelations with technological, regulatory, and investment-related aspects;
- Practical recommendations for using the potential of social innovation to further the goals of the Energy Union, namely, to **make Europe's energy system more secure, sustainable, competitive, and affordable** for Europe's citizens;
- Practical recommendations for addressing the challenges of the clean-energy transition for Europe's carbon-intensive regions, especially **socioeconomic and political** ones.

Cross-cutting issues

Existing energy models do not fully encompass the challenges inherent in the low-carbon energy transition, as well as the resulting investment needs.

RIA

EUR 4 to 5 million

LC-SC3-CC-2-2018

Modelling for the transition to a Low-Carbon Energy System in Europe

- Better representation of **future aspects** of the European energy system: generation, demand, markets, behaviour;
- **Greater transparency** of tools, data, and model outputs, proposal for a collaborative research environment;
- Better representation of investment determinants and the **role of specific actors**, including deployment of innovative technologies; exploration of macroeconomic relationships.
- **New energy system modelling tools** capable of capturing the energy system transition to 2020, 2030 and 2050;
- **Enhanced transparency** of modelling tools, practices, and availability of data; greater openness to collaborative research and information on policy options;
- **Greater coherence** of modelling practices at regional, national and pan-EU levels;
- Better representation of **investment drivers and barriers**; clearer understanding of the macro-economic impacts of the energy transition.

Cross-cutting issues

Transition to a low-carbon energy system requires engagement of all stakeholders, foster cooperation between them, align their actions to the achievement of commonly agreed goals

CSA

EUR up to 1 million

LC-SC3-CC-4-2018

Support to sectorial fora

Support sector-specific stakeholder in the following areas:

- **SET-Plan European Technology Innovation Platforms** (PV; Ocean energy; Wind energy; Renewable Fuels and Bioenergy; Renewable Heating and Cooling (RHC); Zero emission fossil fuel power plants and energy intensive industry);
- **Hydropower sector**;
- **Energy-related SSH research**;
- Coordination of the **industrial participation in the SET Plan**.

Coordinated stakeholders' activities in the different sectors, providing specific and extensive advice to EU policymakers on energy-related research policy-making, continuing to foster social innovation and social dialogue in the energy field at European level, contributing towards the progress of the strategic research and innovation Implementation Plans identified in the context of the SET-Plan

Cross-cutting issues

Need for new skills to confront the energy transition adopting a systemic approach;

New or upgraded curricula and programmes;

More targeted and results-driven cooperation between universities and innovative businesses in Europe.

CSA

EUR 3 to 4 million

LC-SC3-CC-5-2018

Research, innovation and educational capacities for the energy transition

Coverage of **one or more of the following fields in combination with relevant social sciences and humanities** disciplines:

- Renewable energy;
- Energy storage;
- Smart and flexible energy systems;
- Carbon capture, utilisation and storage (CCUS).

✓ Efficient and effective **cooperation networks**;

✓ Challenge and **case-based modules**;

✓ At least three innovative and short university tools/programmes;

✓ Opportunities for student mobility between the academia and industry.

Cross-cutting issues

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CSA

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LC-SC3-CC-5-2018

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✓ Efficient and effective **cooperation networks**;

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✓ At least three innovative and short university tools/programmes;

✓ Opportunities for student mobility between the academia and industry.

Cross-cutting issues

Coal-intensive regions need a roadmap for transitioning to a cleaner energy system and a more diversified economy

Smart Specialisation Strategies allow access to EU Structural and Investment Funds while inter-regional cooperation helps to mobilize synergies.

CSA

EUR 1 to 2 million

LC-SC3-CC-6-2018

Transition in coal-intensive regions

- ✓ Support regional actors in **developing R&I strategies for smart specialisation**; develop synergies with EC Smart Specialisation Platform (giving special consideration to SET Plan goals);
- ✓ Provide **'blueprints' and tools for MS, AC and regions**; identify best practices and industrial roadmaps;
- ✓ Investigate social challenges including **re-skilling of workforce**;
- ✓ Provide guidance to regional actors on how to access European funds and programmes.
- ✓ New/deeper R&I cooperation between coal-intensive regions;
- ✓ Smoother transition to a more sustainable energy system;
- ✓ Short to medium term: contribute to SET Plan targets;
- ✓ Longer term: boost innovation-driven growth and competitiveness; create employment; safeguard environmental protection.

Índice

- Contexto Político y Regulatorio
- Energía en H2020
- WP 2018-2020*
- Resultados

Resultados Energía 2014-2016

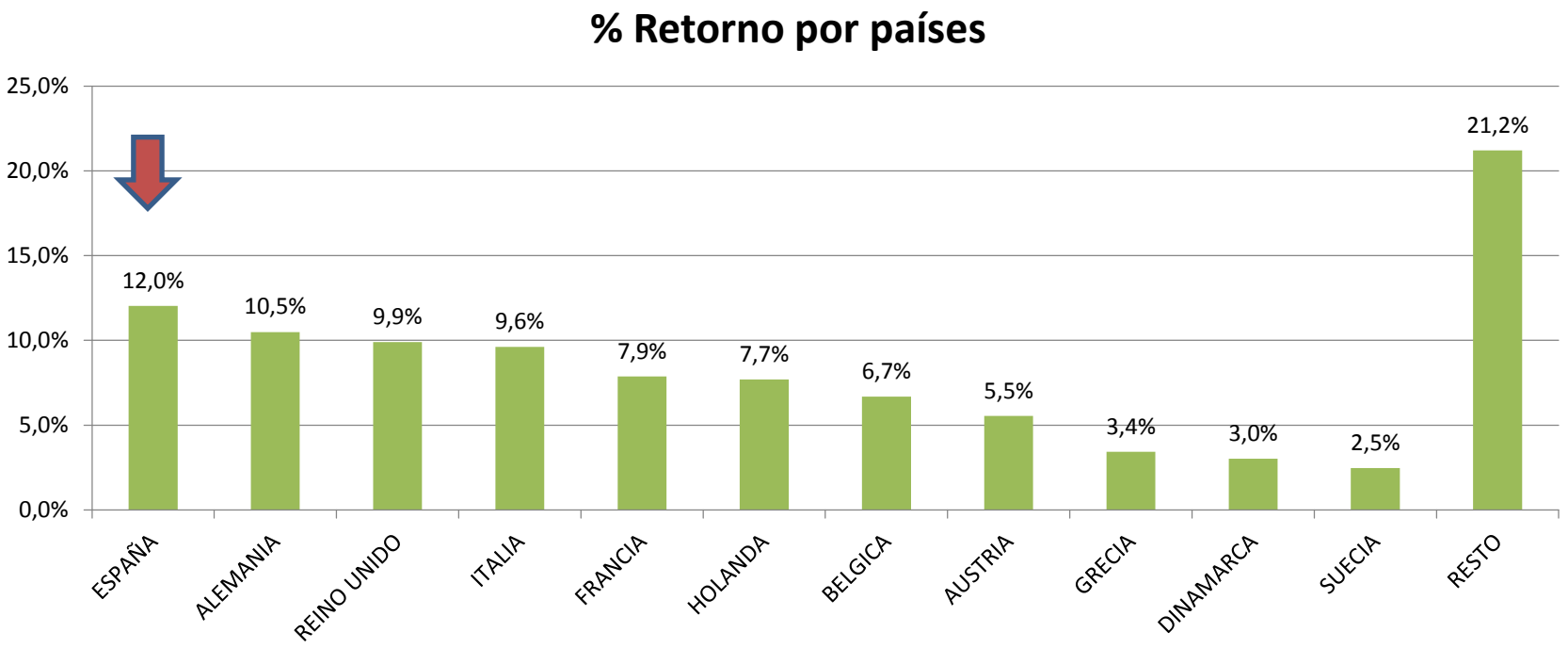
2012 propuestas, 1.100 con presencia ES (54,7%)
307 coordinadas ES (15,3%)

325 proyectos, 178 con presencia ES (54,8%)
48 coordinadas ES (14,8%)

Tasa de éxito ES 16,2% - En línea con la media europea 16,2%

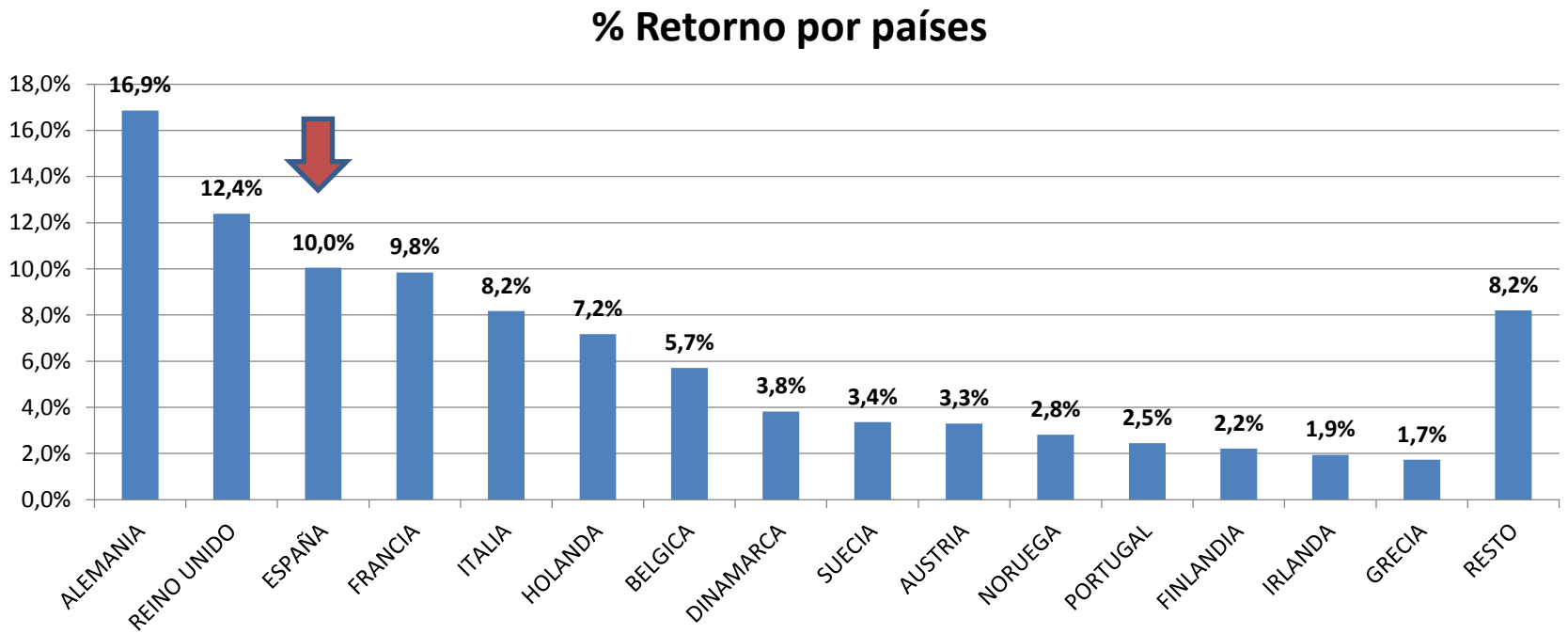
187,1 M€ para ESPAÑA. 3º puesto por detrás de Alemania y Reino Unido

H2020- SC 3-Energy Efficiency (EE)



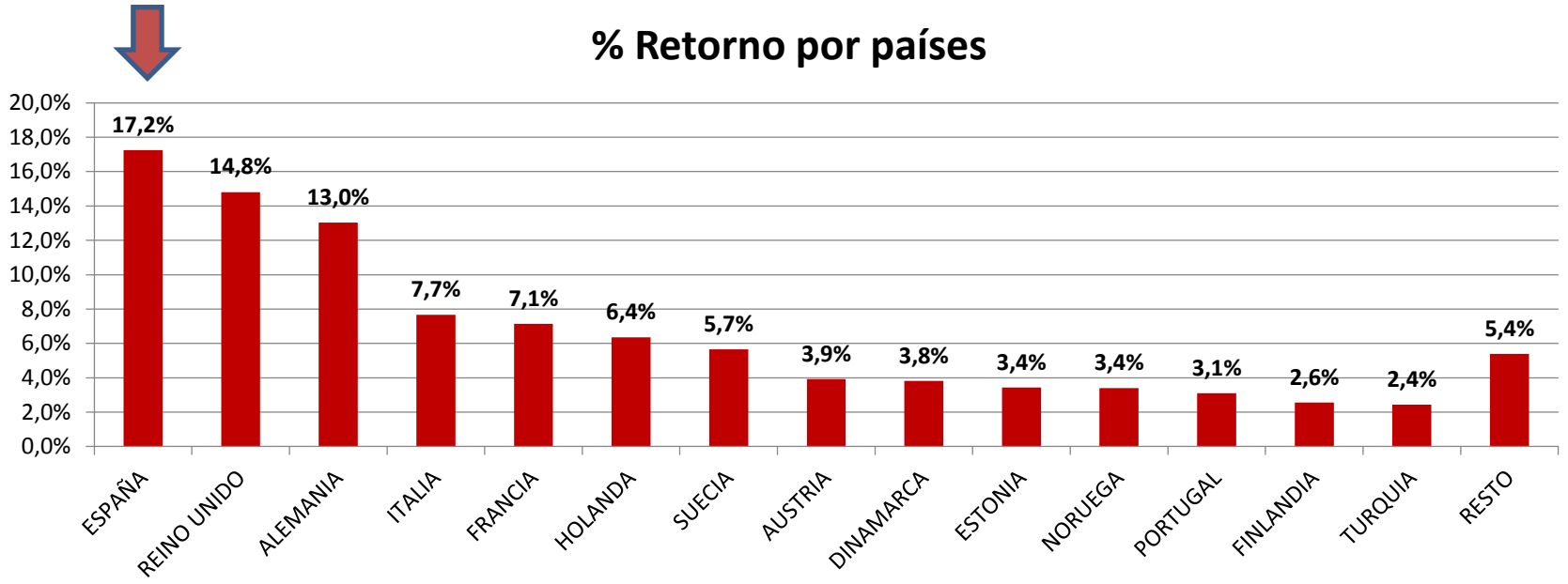
202,3 M.€ Adjudicados. España: 24,36 M.€ (12%)
En 65 propuestas de las 108 financiadas hay participación ES (60,2%)
ES lidera 18 proyectos (16,7%)
No incluye datos de la JTI-FCH

H2020- SC 3- Low Carbon Energy (LCE)



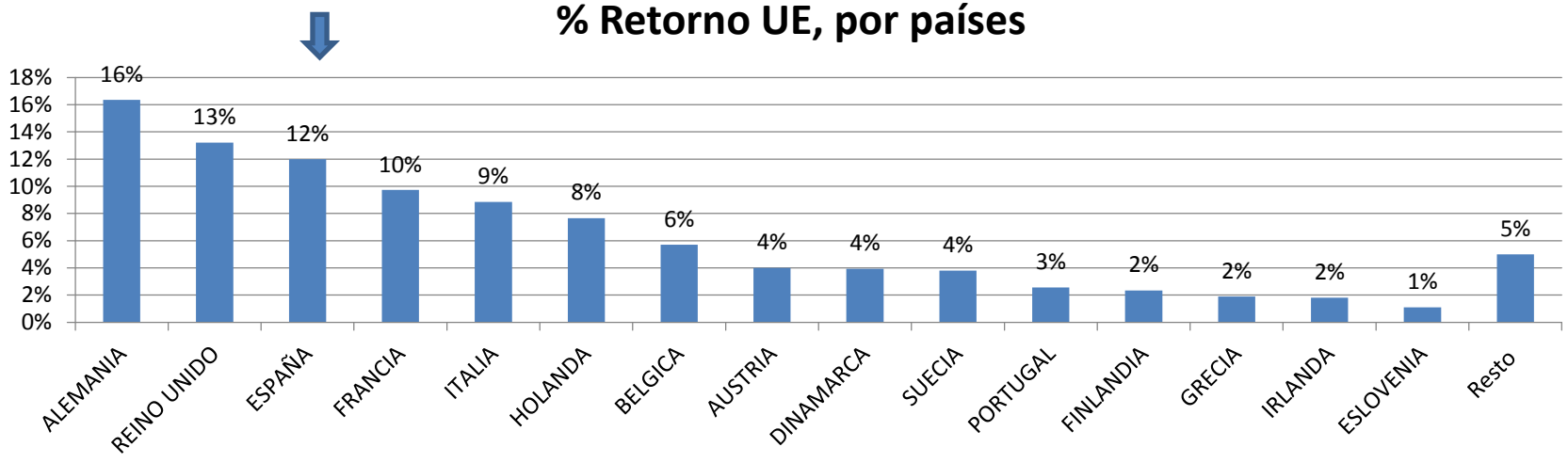
1.187 M.€ Adjudicados. España: 119,25 M.€ (10%)
En 93 propuestas de las 178 financiadas hay participación ES (52,2%)
ES lidera 26 proyectos (14,6%)
No incluye datos de la JTI-FCH

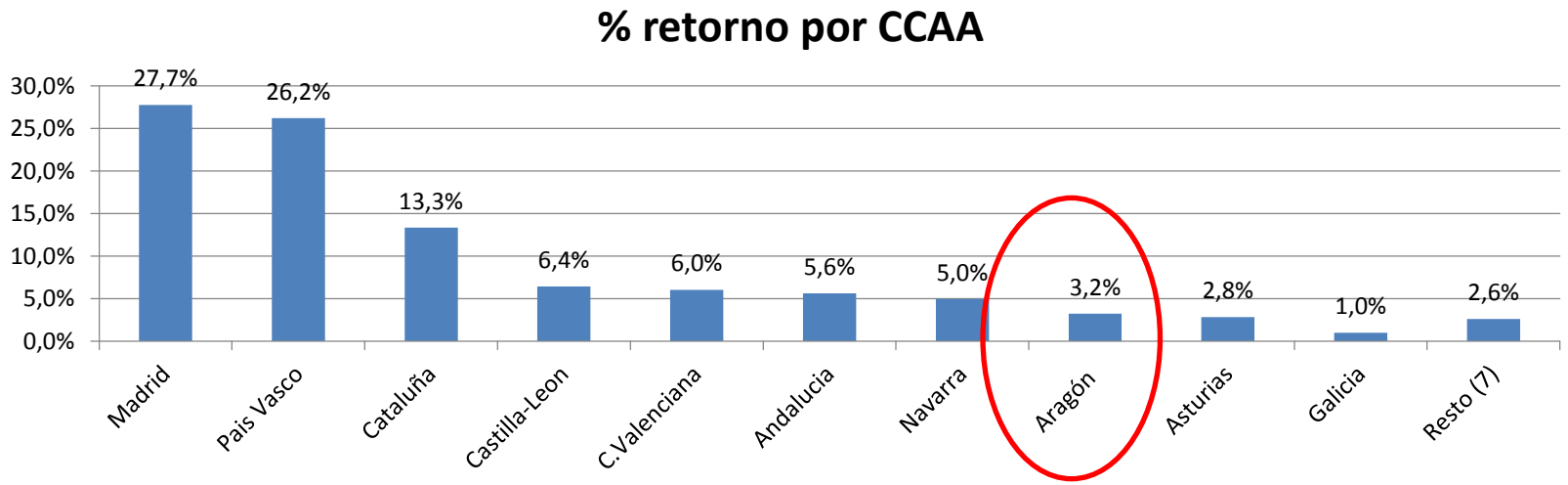
H2020- SC 3- Smart Cities and Communities (SCC)



240,8 M.€ Adjudicados. España: 41,5 M.€ (17,2%)
En 13 propuestas de las 17 financiadas hay participación ES (76,5%)
ES lidera 4 proyectos (23,5%)
No incluye datos de la JTI-FCH

Análisis RESULTADOS Calls ENERGY 2014-2016





De interés…

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WP 2018-2020:
http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-energy_en.pdf

Information Day Bruselas:
https://ec.europa.eu/easme/en/horizon-2020-secure-clean-and-efficient-energy-info-day?pk_campaign=energy-nwl-2017-10

Partner Search:
http://www.partnersearch.c-energy2020.eu/

C-Energy2020

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