



# InfoDay

## *Horizon 2020 Energy Challenge*



**Agustín Escardino**  
*Policy Officer*  
*DG RTD*

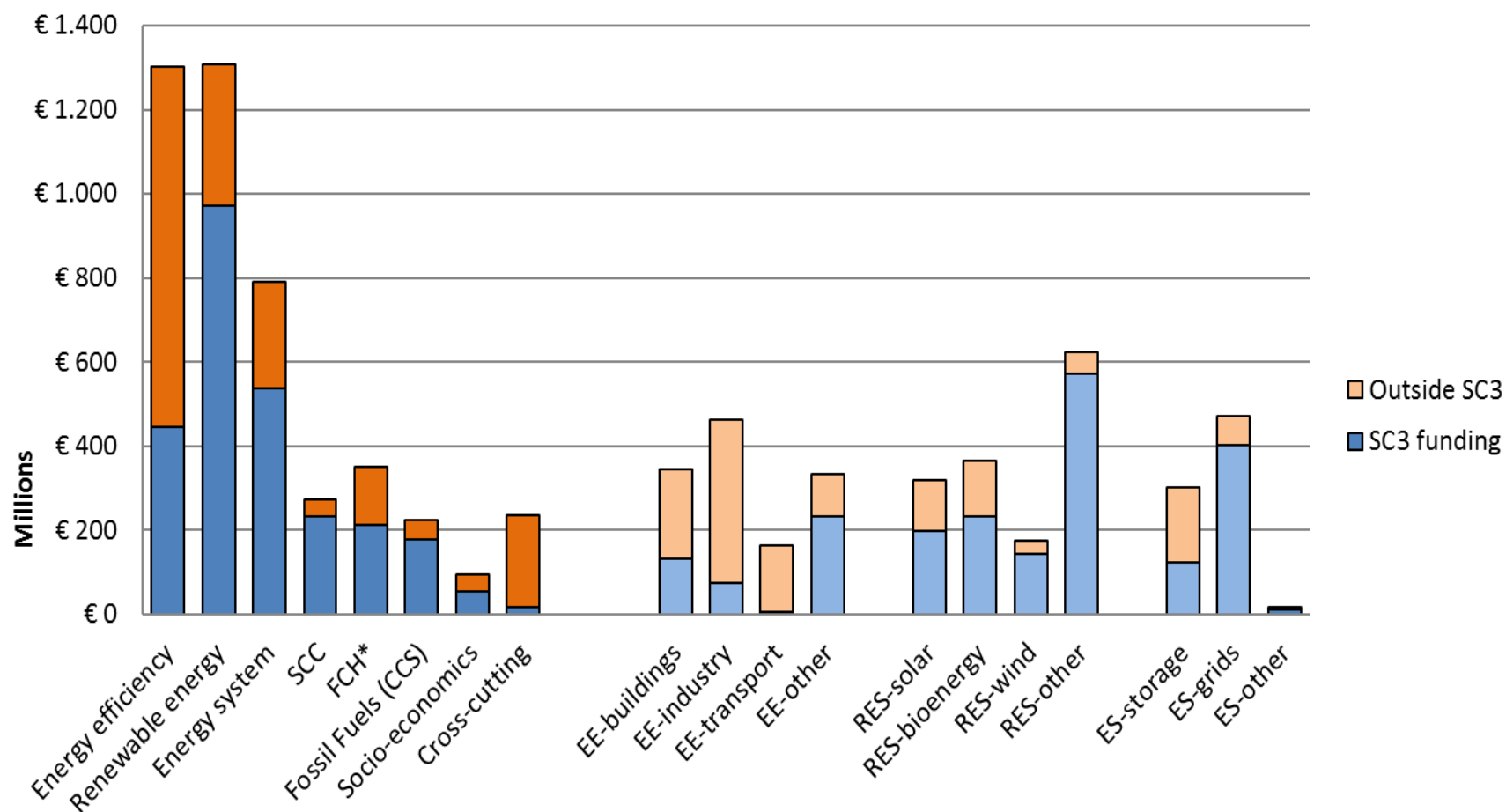
**#H2020Energy**

Research and  
Innovation



@CDTIoficial

# Energy across Horizon 2020



# Technological readiness levels

- Exploring emerging technologies ( $TRL \leq 3$ )
- Improving existing technologies ( $4 \leq TRL \leq 5$ )
- Demonstrating existing technologies ( $6 \leq TRL \leq 8$ )
- Helping market penetration (market uptake measures, financing tools) ( $TRL 9$ )



# CALENDAR OF THE CALLS

Call Identifier	Opening Date	Deadline to apply	Total Budget
RES 1	ALREADY OPEN	16 OCT 2018 (2nd stage 25/04/19)	€ 40 M
RES 14			
RES-8	ALREADY OPEN	11 DEC 2018	€ 125 M
RES-15			
RES-17			
RES-24			
RES-28			
RES-30			
EE-17	ALREADY OPEN	05 FEB 2019	€ 16 M
ES-1	ALREADY OPEN	05 FEB 2019	€183.65 M
ES-2			
ES-6			
ES-8			
SCC-1			



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



# *Global Leadership in Renewables*

## **HORIZON 2020**



**#H2020Energy**

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



## LC-SC3-RES-1-2019

### Developing the next generation of renewable energy technologies

- Bring **new energy solutions faster to commercialization** while lowering their environmental and climate impact, increase resource efficiency, and address social acceptance and socioeconomic issues.
- Subtopics:
  - Developing **new energy technologies**;
  - Innovative **materials for geothermal** heat exchangers;
  - Innovative **testing methods and design tools for wind energy**;
  - **Sustainable fuels** other than hydrogen;
  - Innovative very high efficiency **thin-film photovoltaics**.
- Upgrade to TRL 3 or 4
- Research and Innovation Action
- Budget: EUR 20 m (EUR 2-5 m per project)
- Two stage call
- Deadline: 16 Oct 2018 (First Stage)



#H2020Energy

Research and  
Innovation



@CDTIoficial



## LC-SC3-RES-14-2019

### Optimising manufacturing and system operation

- Optimisation of key processes in their respective value chains.
- Subtopics:
  - **Marine energy** (ocean and offshore wind): enable **predictive/preventive O&M**;
  - **Geothermal**: chemical and physical properties of **geothermal fluids** as transport media;
  - **Photovoltaics**: innovative **crystalline silicon wafer growth** techniques to produce high-efficiency solar cells and modules.
- From TRL 3-4 to TRL 4-5
- Research and Innovation Action
- Budget: EUR 20 m (EUR 4-5 m per project)
- Two stage call
- Deadline: 16 Oct 2018 (First Stage)



#H2020Energy

Research and  
Innovation



@CDTIoficial



LC-SC3-RES-8-2019

## Combining RES Tech. for a Renewable District Heating and/or Cooling System

- Cost-effective solutions for **DHC** satisfying at least 50% of the energy demand through **one or more renewable energy technologies**. The integration of sources of otherwise wasted excess heat is in the scope.
- Solutions should be demonstrated in real conditions within an operational district heating and/or cooling system
- Operators and final users to be engaged, their requirements to be considered
- Upgrade to TRL 6
- Innovation Action
- Budget: EUR 15 m (EUR 8-15 m per project)
- Deadline: 11 Dec 2018



#H2020Energy

Research and  
Innovation



@CDTIoficial





## LC-SC3-RES-15-2019

### Increase the competitiveness of the EU PV manufacturing industry

- Demonstrating **manufacturing/product innovation** for highly performing **PV technologies** (e.g. crystalline-silicon, thin-film and concentration PV).
- Pilot-line level, showing the potential to be **scaled up to GW-size**, high-yield-throughput and cost-effective industrial production.
- Optimization of one or more steps in the value chain.
- Enhanced durability and/or recyclability of the final product.
- From TRL 5-6 to TRL 6-7
- Innovation Action
- Budget: EUR 25 m (EUR 10-13 m per project)
- Deadline: 11 Dec 2018



#H2020Energy

Research and  
Innovation



@CDTIoficial



## LC-SC3-RES-17-2019: Demonstration of solutions based on renewable sources that provide flexibility to the energy system

- Increase the potential and performance of **dispatchable technologies** to provide flexibility services to the energy system.
- Subtopics:
  - **Bioenergy**: demonstration of the most cost-efficient **intermediate bioenergy carrier** with increased energy density, storage and trade characteristics and improved GHG performance;
  - **Hydropower**: improvement of the average annual overall **efficiency** of hydroelectric machinery;
  - **Concentrated Solar Power**: demonstration of innovative **thermal storage** systems.
- From TRL 5 to TRL 7
- Innovation Action
- Budget: EUR 40 m (EUR 12-15 m per project)
- Deadline: 11 Dec 2018



#H2020Energy

Research and  
Innovation



@CDTIoficial



LC-SC3-RES-24-2019

## Boosting pre-commercial production of advanced aviation biofuels

- Demonstrate pre-commercial production of sustainable and cost-competitive **advanced biofuels for aviation** to boost their market up-take.
- Large-scale production from **non-food/feed sustainable feedstock** and through certified pathways.
- 30 to 50 thousand tonnes of aviation biofuel and continuous plant operation of 1000 hr within the project will be included.
- Facilitate market entry and increase commercial capacity of advanced biofuels for aviation
- Deployment will allow the competitive production of bio-jet fuels on a commercial scale
- From TRL 5 to TRL 7
- Innovation Action
- EUR 20 m (EUR 15-20 m per project)
- Deadline: 11 Dec 2018



#H2020Energy

Research and  
Innovation



@CDTIoficial

## LC-SC3-RES-30-2019

### Demonstration of plug and play solutions for renewable off-grid electricity

- **Container-based solutions for renewable electricity production** (up to 100 kW), **storage** and distribution with better performance with respect to installation, commissioning, operation and maintenance costs.
- Features to be optimised:
  - **Versatility** of renewable energy sources;
  - **Plug and play** capabilities;
  - **Share of renewable** electricity sources.
- Demonstrations shall take place in at least two communities with diverse physical landscape and climate conditions in different continents.
- From TRL 6-7 to TRL 7-8
- Innovation Action
- Budget: EUR 15 m (EUR 5 m per project)
- Deadline: 11 Dec 2018



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



## LC-SC3-RES-28-2019 Market Uptake support

- Support for a broad range of issues, including:
  - **Harmonisation of regulations, life cycle assessment** approaches, **environmental impact** methodologies of renewable energy solutions;
  - Development of additional features for **RES** to be compliant with the electricity market requirements, making them '**market fit**';
  - Development of **insurance schemes** and **financing mechanisms**;
  - Development of support tools to facilitate **export markets**;
  - Development of tools or services using global **earth observation data** to support development and deployment of renewable energy sources;
- Coordination and Support Action
- Budget: EUR 15 m (EUR 1-3 m per project)
- Deadline: 11 Dec 2018



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



## LC-SC3-RES-28-2019

### Market Uptake support

- Determining conditions and defining options for **retrofitting existing energy and industrial installations**;
- Development of optimisation strategies regarding **cost, energy-performance and LCA** for bioenergy and sustainable renewable fuels in **upgraded energy and industrial installations**;
- Development of cost-effective **logistics, feedstock mobilisation strategies** and trade-centres for intermediate **bioenergy carriers**.



#H2020Energy

Research and  
Innovation



@CDTIoficial

## LC-SC3-RES-7-2019: Solar Energy in Industrial Processes

- Cover the **highest possible share of the heating and/or cooling demand** of one or more industrial processes by means of solar thermal energy
- In the case of **heating**, the process **temperature shall be higher than 150°C**
- **Individual industrial sites and/or industrial parks** (coupled to a district heating and/or cooling network) are in scope
- Contribution to relevant BREFs under the Industrial Emissions Directive
- Upgrade to TRL 4-5
- Research and Innovation Action
- Budget: EUR 10 m (EUR 3-5 m per project)
- Deadline: 27 Aug 2019
- SPIRE cPPP

*Large potential of applying solar energy for industrial purposes - Industrial processes might need to be adapted -Limited installation, O&M requirements - easy to operate*





## LC-SC3-RES-16-2019: Development of solutions based on renewable sources that provide flexibility to the energy system

*Increase the potential and performance of dispatchable technologies to provide flexibility services to the energy system*

*Penetration of a higher share of variable output renewables in the energy mix without affecting system stability*

*3 Sub-topics:*

- **Bioenergy** Development of **intermediate bioenergy carriers for energy and transport** from biogenic **residues and wastes** and **energy crops** from marginal lands not applicable to food or feed production, through feedstock flexible technologies at a **conversion cost reduced by at least 25% from the state-of-the-art**, with increased energy density storage and trade characteristics and improved GHG performance;

- From TRL 3-4 to TRL 4-5
- Research and Innovation Action
- Budget: EUR 15 m (EUR 3-5 m per project)
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial





## LC-SC3-RES-16-2019: Development of solutions based on renewable sources that provide flexibility to the energy system

- **Hydropower** Development of **low and ultra-low head and sea water resistant equipment** (such as for example bulb-pump turbines) guaranteeing at least **70% round-trip efficiency** and making low-head seawater storage and other low head applications of hydropower viable for example at unexplored locations (e.g. like at coastal dams and islands), by minimising at the same time potential impacts on fish
- **Virtual Power Plant** Increase the performance of an **integrated portfolio of renewable energy sources to operate together as a Virtual Power Plant**, capable of providing **flexibility and ancillary services** to the energy system. The solution has to be **competitive** compared to solutions combining variable output renewables with electrochemical storage.



#H2020Energy

Research and  
Innovation



@CDTIoficial



## LC-SC3-RES-23-2019: Development of next generation biofuel and alternative renewable fuel technologies for aviation and shipping

- **Non-food/feed drop-in biofuel** and alternative renewable fuel technologies for **aviation and shipping**
- Liquid jet-like biofuels and alternative renewable fuels from biogenic residues and wastes by chemical, biochemical and thermochemical pathways, or a combination
- Bunker fuel-like biofuels for shipping uses
- **Improved conversion efficiency, cost and feedstock supply**
- Reduce costs and improve fuel performance for environment and society
- From TRL 3-4 to TRL 4-5
- Research and Innovation Action
- Budget: EUR 20 m (EUR 3-5 m per project)
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



## LC-SC3-RES-29-2019: Converting Sunlight to storable chemical energy

- **Direct conversion of sunlight into storable chemicals** that can be stored for a virtually unlimited time
- **Performance breakthroughs**, including day and night continuous processes, and **cost reductions** are a must in order to unlock the potential of technologies converting sunlight to storable chemical energy
- Address the following related aspects: the potential **lower environmental impact** than the current technologies, possibly through a LCA analysis, **the better resource efficiency**, issues related to **social acceptance or resistance** to new energy technologies, related **socioeconomic and livelihood issues**, and prospective **market analysis**.
- Fully aligned to the "Converting Sunlight Innovation Challenge" identified as a priority in **Mission Innovation**
- Upgrade to TRL 4-5
- Research and Innovation Action
- Budget: EUR 6 m (EUR 2-3 m per project)
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial



# *Flexible operation of fossil fuel power plants and carbon intensive industries*

## HORIZON 2020



#H2020Energy

Research and  
Innovation



@CDTIoficial



## LC-SC3-NZE-4-2019

### Integrated solutions for flexible operation of fossil fuel power plants through power-to-X-to-power and/or energy storage

- Validation and pilot demonstration of the **integration of energy storage and/or use of excess energy (including via power-to-X-to-power) in fossil fuel power plants** and showing that EU emission limits for such installations can be met and even be reduced.
- This could include enabling the combustion system to deal with synthetic fuels and/or hydrogen enriched fuels, as well as a better integration of combined production of heat and power into the overall system.
- Upgrade to TRL 6-7
- Innovation Action
- Budget: EUR 20 m (EUR 6-10 m per project)
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial

## LC-SC3-NZE-5-2019-2020: Low carbon industrial production using CCUS

- Integrating **CO2 capture in industrial installations.**
- Projects will elaborate a detailed plan on how to use the results, i.e. the subsequent transport, utilisation and/or underground storage of the captured CO2.
- Projects should explore the socio-economic and political barriers to acceptance and awareness
- Ideal projects are in **areas with both a high concentration of CO2 emitting industries and a nearby capacity for geological storage.**
- Upgrade to TRL 6-7
- Innovation Action
- Budget: EUR 33 m (EUR 10-12 m per project)
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial



# *Storage*

# HORIZON 2020



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



## LC-BAT-2-2019

# Strengthening EU materials technologies for non-automotive battery storage

- Develop more **price competitive, better performant and highly safe battery solutions with improved lifetime.**
  - **Cost reductions:** a) below 0,05 € / kWh/cycle for stationary applications; b) at least 20% in all other cases.
  - **Cyclability:** a) for stationary energy storage to reach at least 5000 cycles at 80% of depth of discharge; b) significantly improved cyclability in all other cases.
  - Consider **sustainable materials**, packaging and cell design, environmental friendly production, **second life and recycling.**
- From TRL 4 to TRL 6
  - Research and Innovation Action
  - Budget: EUR 24 M (EUR 6-8 m per project)
  - Deadline: 25 Apr 2019

Proposals should demonstrate the expected impacts by including a business case and exploitation strategy for industrialisation.



#H2020Energy

Research and  
Innovation



@CDTIoficial





LC-BAT-3-2019

## Modelling and simulation for Redox Flow Battery Development

- Identify suitable **redox pairs and electrolyte chemistries for low-cost, high-efficiency and sustainable stationary** RFB systems that are optimised in terms of **redox potential, electrochemical reaction reversibility, chemical stability, solubility and material availability**.
- **Develop mathematical models** for numerical simulation and high-volume pre-selection of multi-species electrolyte flow and electrochemistry.
- The simulation models should be validated with **experimental examples from known chemistries and representative prototypes**, and show how new chemistries can be explored.
- Research and Innovation Action
- Budget: EUR 5 m (EUR <2 m per project)
- Deadline: 25 Apr 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial



LC-BAT-4-2019

## Advanced Redox Flow Batteries for stationary energy storage

- **Develop and validate RFB based on new redox couples and electrolytes** (e.g. organic or earth-abundant substances). Focus on:
  - Environmental sustainability;
  - High energy and power density;
  - Maximisation of lifetime and efficiency;
  - Minimisation of cost (including balance of plant components);
- To be reflected in KPIs.
- Validation of new designs must include testing of full-size prototypes in pilot facilities.
- The actions should contribute to accelerating the integration of large shares of intermittent renewables into the energy system – stationary electrical energy storage
- From TRL 3 to TRL 5
- Research and Innovation Action
- Budget: EUR 15 m (EUR 3-4 m per project)
- Deadline: 25 Apr 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial

# Smart Cities and Communities



#H2020Energy  
info day



# 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).



#H2020Energy

Research and  
Innovation



@CDTIoficial



# Positive Energy Building/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.



#H2020Energy

Research and  
Innovation



@CDTIoficial



# SCC-1: 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.
- The proposal should deliver :
  - **Effective Business models** for sustainable solutions
  - **Practical recommendations** on: **Regulatory, legal** aspects; **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 \* appropriate city planning measures to support large scale roll-out



#H2020Energy

Research and  
Innovation



@CDTIoficial



## Additional Information

### Contribution from the EU

Between EUR 15 to 20 m per project

BUDGET: EUR **83 m**

Deadline to apply: **05 February 2019**

### Eligibility 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



#H2020Energy

Research and  
Innovation



@CDTIoficial

# SCC – Funded Projects



## CALL 2014 SELECTED PROPOSAL SCC-01

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

## CALL 2015 SELECTED PROPOSAL SCC-01

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

## CALL 2016 - SELECTED PROPOSAL SCC-01

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



#H2O2Uenergy

Innovation



@CDTloficial





# SCC- Funded Projects

## CALL 2017 SELECTED PROPOSAL SCC-01

ACRONIMO	LEAD CITIES	FOLLOWERS CITIES
IRIS	<i>Utrecht (NL), Goteborg (SE), Nice Cote d'Azur (IT)</i>	Vaasa (FI), Alexandroupolis (GR), <b>Sta.Cruz de Tenerife (ES)</b> , Focsani
<b>MatchUP (Ayto Valencia)</b>	<b>Valencia (ES)</b> , Dresden (DE), Antalya (TK)	Ostend (BE), Herzliya (Israel), Skopje (FYROM), Kerava (FI)
<b>Stardust (F. Cener-Ciemat)</b>	<b>Pamplona (ES)</b> , Tampere (FI), Trento (IT)	Derry (UK), Kozani (GR), Litomerice (CZ)

## CALL 2018 SELECTED PROPOSAL SCC-01

ACRONIMO	LEAD CITIES	FOLLOWERS CITIES
CityxChange (NTNU-No)	<i>Trondheim (NO), Limerick (IE)</i>	<i>Alba Iulia(RO), Pisek (CZ), Sestao (ES), Smolyan (BU) and Voru (EE)</i>
<b>MAKING-CITY (F. CARTIF)</b>	<i>Groningen (NL) and Oulu (FI)</i>	<i>León (Spain), Bassano del Grappa (Italy), Kadiköy (Turkey), Poprad (Slovakia), Vidin (Bulgaria) and Lublin (Poland)</i>



INNOVATION

INNOVATION



@CDTIoficial

# Smart and clean energy for consumers





## LC-SC3-EC-1-2018-2019-2020: The role of consumers in changing the market through informed decision and collective actions

- Support **energy communities** to increase energy **efficiency** and/or optimise energy management to integrate a **higher share of renewable energy** by, for example, **distributed generation, distributed storage, and/or demand-response** aggregation.
- Identify and address regulatory barriers;
- Demonstrate that collectively organised energy-related actions are financially viable and attractive.
- Coordination and Support Action
- Budget: EUR 7.5 m (EUR 1-2 m per project)
- Deadline: 3 Sep 2019

In addition the proposals should cover:

- Solutions to address **split incentives**
- Demonstrate collective actions of energy consumers based on solutions and business approaches **using digital tools and technologies.**



#H2020Energy

Research and  
Innovation



@CDTIoficial





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

### Mitigating household energy poverty

- **Alleviating energy poverty** and developing a **better understanding of the types and needs of energy poor households and how to identify them**

Proposals should cover one or more of the following:

- Facilitate **behaviour change** and implementation of **low-cost energy efficiency**;
- Support the set-up of financial and non-financial support schemes for EE and/or small scale renewable energy investments for energy poor households;
- Develop, test and disseminate innovative schemes for energy efficiency/RES investments established by **utilities or other obligated parties.**

- Coordination and Support Action
- Budget: EUR 7.5 m (EUR 1-2 m per project)
- Deadline: 3 Sep 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial

# Smart citizen-centered energy system





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

- Developing and demonstrating **integrated solutions** which will allow the **distribution grid to function in a secure and stable manner with large shares of variable renewables**. Test at least two of the following elements:
  - **Flexibility measures** and grid services;
  - **Smart grid technologies, observability, automation, control;**
  - **Market mechanisms incentivising flexibility:** dynamic tariffs, tools to resolve congestion, ancillary services.
- Impacts:
  - Enhance flexibility of distribution grids;
  - Define the conditions of a well-functioning market that rewards flexibility;
  - Manage energy loads including EVs;
  - Integrate large shares of variable renewables.
- TRL 5-6
- Innovation Action
- Budget: EUR 37,3 m (EUR 6-8 m per project)
- Deadline: 5 Feb 2019
- INCO-Canadá



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



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

- Demonstrate at least four of the following points:
  - Tools for **communication and grid operations**;
  - **Prediction of var. RE production and DR**;
  - New **cross-border grid services**;
  - Well-functioning wholesale market, **real-time market coupling**;
  - **Cross-border flow, trading**, exploitation of large scale storage assets.
  - Demonstration in a regional context
  - Develop guidelines to avoid distortion resulting from non-harmonisation of regulations by countries
- Impacts:
  - Operation of transmission grids so as to bring additional flexibility;
  - Optimising infrastructure investments and making best use of large scale assets.

- TRL 5-8
- Innovation Action
- Budget: EUR 25 m (EUR 8-10 m per project)
- Deadline: 5 Feb 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial



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

- Proposals must address partially or entirely **only one** of **four sub-topics**:
  - *Advanced modelling tools for:*
    - the **modelling of the future electricity market** to study the design of **electricity pricing structure**;
    - **modelling and forecasting energy production by variable renewables**, associated frequency and voltage controls issues in the electricity grid and benefits associated with the use of storage.
- Research and Innovation Action
- Budget: EUR 28 m (EUR 2-4 m per project)
- Deadline: 5 Feb 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial





ES-6-2019

## Research on advanced tools and technological development

– Advanced tools for

- The design and **planning and operation of electricity grid infrastructure** including distribution and transmission level;
- The development of **grid predictive management** strategies with uncertainty;
- **Enhanced TSO / DSO collaboration** and coordination tools;
- Enabling technologies for reliable and resilient interconnected European electricity grids.



#H2020Energy

Research and  
Innovation



@CDTIoficial



ES-6-2019

## Research on advanced tools and technological development

– Technological developments:

- Develop a new generation of reliable, robust and cost-effective **energy storage technologies and storage management systems**, in particular batteries;
- Power electronics for batteries and **software to manage combined or hybridised decentralised energy systems**, also combining several energy vectors.



#H2020Energy

Research and  
Innovation



@CDTIoficial



ES-6-2019

## Research on advanced tools and technological development

- International Cooperation with non-EU/Associated country member of Mission Innovation on Mission Innovation Challenge 7 on Affordable Heating and Cooling for Buildings:
  - Develop **compact thermal energy storage** for electricity load shifting that will take up electricity from the grid at the peak times, to be used for heating, cooling or hot tap water at later times. Typical required charging power is 3 kW, for periods of up to three hours.



#H2020Energy

Research and  
Innovation



@CDTIoficial





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

- 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;**
- **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.
- For every million Euro of Horizon 2020 support the action should trigger energy transition investments worth at least EUR 10 million
- Coordination and Support Action
- BUDGET: EUR 5 m
- Deadline: 03 sept 2019



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



# *Energy efficiency*

# HORIZON 2020



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial

# Eficiencia Energética



**Edificios**



**Consumidores  
EE como recurso**



**Industria  
y servicios**



**Financiación  
de Eficiencia  
Energética**



**Autoridades  
públicas y  
apoyo político**

Acciones de  
Innovación

EE1  
EE4  
EE5

EE13

Acciones de  
Coordinación  
y apoyo

EE2  
EE3

EC1  
EC2

EE8  
EE6

EE9  
EE10  
EE11

EE16  
EE17  
EE18

Acciones de  
investigación  
e Innovación

EE14

**Deadline: 3 de  
septiembre 2019**



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial





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

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

- Demonstrate solutions addressing building fabric and/or technical systems that ensure **faster and more cost-effective deep renovations** that result in high energy performance.
- Innovations in **technology, design and construction methods**, as well as in business models.
- Development and improvement of **hybrid energy systems** using fossil fuel based heating systems coupled with RES based heating systems
- **Quick and simple installation** of components and systems, minimizing disruption for building occupants and the time spent on site.
- Upgrade to TRL 8-9
- Innovation Action
- Budget: EUR 12 m (EUR 3-4 m per project)
- Deadline: 3 Sep 2019



## LC-SC3-EE-2-2018-2019

### Integrated home renovation services

- Creating or replicating **innovative local or regional services**.
- 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.
- Proposals should improve economically viable business models, ultimately running without the need for public subsidies.
- Create **more demand for holistic approaches** as a result of improved offer by trustful market operators and better awareness from Homeowners
- Coordination and Support Action
- Budget: EUR 10 m (EUR 0.5-1.5 m per project)
- Deadline: 3 Sep 2019





## LC-SC3-EE-3-2019-2020

### Stimulating demand for sustainable energy skills in the construction sector

- Development a range of tools and initiatives, e.g.:
  - Mutual **recognition of energy skills** and qualifications in the **construction sector**;
  - National, regional or local initiatives **raising awareness of home and building owners**;
  - Support public authorities for the development of **new legislative frameworks**;
  - **Partnerships with producers and retailers of construction** products (e.g. DIY stores);
  - Initiatives reinforcing the **link** between **skills/education and energy performance/quality of construction**.
- Coordination and support action
- Budget: EUR 6 m (EUR 0.5-1 m per project)
- Deadline: 3 Sep 2019



## LC-SC3-EE-4-2019-2020: Upgrading smartness of existing buildings through innovations for legacy equipment

- Develop and demonstrate cost-effective technological solutions to **manage energy within existing buildings and interact with the grid** providing energy efficiency, flexibility, generation and storage based on user preferences and requests. Upgrading **existing buildings** (residential or tertiary) **using IT to offer services and control to the building users**.
- Besides the pilot demonstrations, proposals are expected to include clear **business model** development and a clear path to finance and deployment.
- **User-friendliness**: easy installation and maintenance, maximising consumer comfort (e.g. self-learning) and information on own consumption.
- TRL 6-8
- Innovation Action
- Budget: EUR 10 m (EUR 3-4 m per project)
- Deadline: 3 Sep 2019 (EeB)cPPP



## LC-SC3-EE-05-2018-2019-2020 : Next-generation of Energy Performance Assessment and Certification

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

- Definition and demonstration of innovative approaches for the **assessment of building energy performance**, focusing at first on **the reliable assessment of building intrinsic performances** (e.g. using inverse modelling) but working also towards **output-based assessments** using available building energy related data
- Involve relevant stakeholders (including national and regional certification bodies)
- Proposed approaches should be more **reliable** as well as **cost-effective** and **compliant** with relevant EU standards
- From TRL 6-7
- Innovation Action
- Budget: EUR 10 m (EUR 2-2,5 m per project)
- Deadline: 3 Sep 2019
- (EeB) cPPP



## LC-SC3-EE-06-2018-2019-2020: Business case for industrial waste heat/cold recovery

**Symbiosis in industrial parks and clusters- non-technological barriers.** EE by unlocking the market potential and supporting the demand and offer of high-quality energy services by addressing at least one of the following points:

- Coordination and Support Action
- Budget: EUR 5 m (EUR 1-2 m per project)
- Deadline: 3 Sep 2019
- (SPIRE) cPPP

- Development and testing of instruments facilitating, at customer/business level, **the actual implementation of energy cooperation** such as setting up appropriate process and business organisation, operation and plant design, cooperation mechanisms, related contractual and financial arrangements, better planning, good practices.
- Development and testing of replicable business models and service concepts, at service provider level, **for joint energy services** such as identification of horizontal energy services attractive for businesses, identification of the most relevant innovative technical solutions, setting up contractual and financial arrangements, best practices, cost reduction models.



## LC-SC3-EE-08-2018-2019: Capacity building programmes to support implementation of energy audits

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.
- Coordination and Support Action
- Budget: EUR 5 m (EUR 1-2 m per project)
- Deadline: 3 Sep 2019



# EE is an investment



Financing

## LC-SC3-EE-9-2018-2019: Innovative financing for energy efficiency investments

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
- Coordination and Support Action
  - Budget: EUR 4 m (EUR 1-1,5 m per project)
  - Deadline: 3 Sep 2019



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial

## LC-SC3-EE-10-2018-2019-2020: Mainstreaming energy efficiency finance

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).
- Coordination and Support Action
  - Budget: EUR 6 m (EUR 1-1,5 m per project)
  - Deadline: 3 Sep 2019



## 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

Budget: EUR 6 m

Deadline: 3 Sep 2019

### 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, Retrofitting of existing district heating/cooling, Industry and services, Urban Transport





## LC-SC3-EE-11-2018-2019-2020: Aggregation - Project Development Assistance

### 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**



# EE is an Energy Source



## LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource

Actions demonstrating and testing **innovative energy services in a real environment**, across **several market segments** and across **different actors in the value chain**.

They should cover **several** of the following areas/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

The tested BM and services demonstrated should **be sustainable** after the end of the project

- Innovation Action
- Budget: EUR 8 m (EUR 3-4 m per project)
- Deadline: 3 Sep 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial

## LC-SC3-EE-14-2018-2019-2020: Socio-economic research conceptualising and modelling energy efficiency and energy demand

Actions to deepen **the demand side-related parameters in existing models and to include new aspects and data sources.**

The actions should **complement the existing demand side energy models** by developing multiple-agent models and/or modelling segments and/or developing methodologies on how to improve and enhance the demand side aspects in modelling

The models and methodologies should:

- Be compatible with energy models used at European level
- Be more accurate
- Make use of new data sources, including big data
- Identify and refine the structure and patterns of demands
- Contribute to an enhanced demand-side model to be consistently used at European level

- Research and Innovation Action
- Budget: EUR 4 m (EUR 1-2 m per project)
- Deadline: 3 Sep 2019





## LC-SC3-EE-16-2018-2019-2020: Supporting public authorities to implement the Energy Union

- a) Support to **local and regional public authorities**
- b) Supporting the delivery of the **Energy Efficiency Directive**
- ✓ 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.
- Coordination and Support Action
- Budget: EUR 10 m (EUR 1- 1,5 m per project)
- Deadline: 3 Sep 2019



## LC-SC3-EE-17-2019: European City facility - European Cities as key innovation hubs to unlock finance for energy efficiency

Cities/municipalities/regions – driver for the energy transition:

- Tremendous **potential for building substantial pipeline of investment** projects across Europe
- Key role in **aggregating of smaller projects** into sizeable packages
- **Mobilisation** of significant amount of finance needed

Barriers for tapping full potential:

- Missing capacity of public authorities to transform longterm strategies (e.g. SEAPs)
- Limited resources to access (financial and legal) expertise
- Lack of sufficiently mature “investment concepts” to enable access to financing

- Coordination and Support Action
- Budget: EUR 16 m (EUR 16 m per project)
- Deadline: **5 Feb 2019**



#H2020Energy

Research and  
Innovation





## LC-SC3-EE-17-2019: European City facility - European Cities as key innovation hubs to unlock finance for energy efficiency

### Help overcoming barriers: 'European City Facility':

- **Financial support and services** to large number of cities/municipalities/regions
- Fast track, **tailor made, simplified, lump sums**
- At least **80% of support going directly to cities/municipalities/regions**
- To enable cities/ municipalities/regions **produce investment concepts** for project pipelines **with scale**



#H2020Energy

Research and  
Innovation



@CDTIoficial



## LC-SC3-EE-18-2019: Bioclimatic approaches for improving energy performance in buildings in Africa and Europe

Study the performance of a Selection of European and African local **bioclimatic buildings design approaches, local construction materials and techniques** to determine how they could be utilized to increase the energy performance, living quality and sustainability of buildings in targeted geographical zones in Africa and **their climatic and socio-economic conditions.**

- Coordination and Support Action
- Budget: EUR 1 m (EUR 1 m per project)
- Deadline: 3 Sept 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial



# *Cross-cutting* **HORIZON 2020**



**#H2020Energy**

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial





LC-SC3-CC-3-2019

## Support for the opening of low-carbon energy research databases in Europe

- Promote the **opening of research databases for low-carbon energy in Europe**, and to support a European-level approach to defining the development of future research data bases
- Proposals should also cooperate and complement the European Open Science Cloud initiative
- Coordination and Support Action
- Budget: EUR 2 m (EUR 0.5-1 m per project)
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



JOINT ACTIONS

# HORIZON 2020



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



## LC-SC3-JA-3-2019: European Pre-Commercial Procurement Programme for Wave Energy Research & Development

### Why Pre-Commercial Procurement Programme?

- Competitive process in phases to reduce the R&D risk for procurers and enable companies of all sizes to participate.
- Each EC co-financed PCP action focuses on **one jointly identified concrete challenge**, in the mid-to-long term innovation plans of the participating public purchasers, that requires new R&D.
- The consortium of procurers will procure R&D services from a number of companies, selected through the joint PCP call for tender, and will analyse and validate together alternative solution paths from competing suppliers to address the common challenge set forward by the group of procurers.
- In order to reduce fragmentation of public demand, the action shall be carried out as **a joint procurement**, which combines the procurement actions of all participating public procurers into a single procurement that is carried out jointly.



#H2020Energy

Research and  
Innovation



@CDTIoficial



## LC-SC3-JA-3-2019: European Pre-Commercial Procurement Programme for Wave Energy Research & Development

- Design, development and validation of cost-effective Wave energy convertors that can survive in a harsh and unpredictable ocean environment as the ocean through demand-driven Pre-Commercial Procurement.
- Open to proposals seeking to steer wave energy research and development in an effective way at a European level establishing convergence of wave energy technologies and to bring these technologies to the market.
- Pre-Commercial Procurement PCP
- Budget: EUR 20 m
- Deadline: 27 Aug 2019



#H2020Energy

Research and  
Innovation



@CDTIoficial



*Prizes*

**HORIZON 2020**



**#H2020Energy**

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



# What are Horizon 2020 Prizes

- Offer a cash reward to whoever can most effectively meet a defined challenge
- Incentive for innovation by prescribing the goal, but not how the goal should be achieved





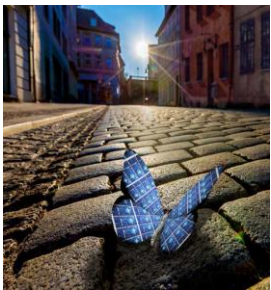
#H2020Energy

Research and  
Innovation



@CDTIoficial

# Current prizes

	Title	Budget	Submission by
	<u>CO2 reuse in innovative products</u> <a href="mailto:EC-CO2REUSE-PRIZE@ec.europa.eu">EC-CO2REUSE-PRIZE@ec.europa.eu</a>	€1.5 EUR million	3 April 2019
	<u>Low carbon hospital</u> Combined Heat and Power installation in a hospital using 100% renewable energy sources <a href="mailto:EC-LOWCARBON-PRIZE@ec.europa.eu">EC-LOWCARBON-PRIZE@ec.europa.eu</a>	€ 1.0 EUR million	3 April 2019
	<u>Photovoltaics meets history</u> Integrated Photovoltaic Energy System in a European protected historic urban district <a href="mailto:EC-PHOTOVOLTAICS-PRIZE@ec.europa.eu">EC-PHOTOVOLTAICS-PRIZE@ec.europa.eu</a>	€ 0.75 EUR million	26 September 2018

# CO2 reuse in innovative products

- To develop innovative products which reuse CO2 in order to significantly improve net CO2 emissions, while overcoming technical, commercial and/or financial barriers.
- €1.5 m







# CHP installation in a hospital using 100% renewable energy sources

- To develop an innovative solution integrating **at least three European renewable energy technologies into one energy system in a hospital**, while ensuring a 100% secure energy supply.
- A new CHP system
  - >2.000.000kWh
  - > 3700h operation
  - > Innovative storage solution
- €1 m



# Other opportunities



**#H2020Energy**



## Do not forget about bottom-up and other opportunities...

- InnovFin Energy Demonstration Projects
- Innovation Fund (starting in 2020)
- EIT InnoEnergy
- European Innovation Council
- COSME
- European Research Council
- Tenders / studies
- ...



#H2020Energy

Research and  
Innovation



@CDTIoficial



# De interés .....

- **WP 2018-2020:**

[http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-energy\\_en.pdf](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>

- **Partner Search:**

<http://www.partnersearch.c-energy2020.eu/>



✓ **M<sup>a</sup> Luisa Revilla (Representante + NCP CDTI):**

[luisa.revilla@cdti.es](mailto:luisa.revilla@cdti.es)

✓ **Virginia Vivanco (NCP IDAE):**

[vvivanco@idaes.es](mailto:vvivanco@idaes.es)

✓ **Cristina Trueba Alonso (NCP CIEMAT):**

[cristina.trueba@ciemat.es](mailto:cristina.trueba@ciemat.es)



#H2020Energy

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial



# Thank you!

**#H2020Energy**

**@inea\_eu**



**EU Participant Portal**

[www.ec.europa.eu/research/participants](http://www.ec.europa.eu/research/participants)



**#H2020Energy**

Research and  
Innovation



Centro para el  
Desarrollo  
Tecnológico  
Industrial

@CDTIoficial