



Horizon 2020 Energy Challenge (SC3)

Calls for proposals 2020

#H2020Energy
Info days

M^a Luisa Revilla
Energy NCP
CDTI

Research and
Innovation

Societal Challenge 3 - Secure, clean and efficient energy

TOTAL BUDGET M.€	
2019	2020
643,65	670,5

Calls for proposals LC-SC3-2019-2020

	Energy efficiency Building for Energy	Global leadership in renewables	Smart and clean energy for consumers	Smart citizen-centred energy system	Smart Cities and Communities	Smart Airports	Decarbonization of Fossil Fuels	Joint Actions Cross Cutting Issues	Batteries	Circular Economy
2019	113 M€	216 M€	15 M€	110,65 M€	83 M€		53 M€	33 M€	20 M€	
2020	86,5 M€	238 M€	47 M€	108 M€	60 M€	12 M€	29 M€	26 M€	30 M€	29 M€

Content

- **Horizon 2020 energy calls 2020**
- **Global leadership in renewables**
- **Smart citizen-centred energy system**
- **Smart Cities and Communities, Smart Airports**
- **Enabling near-zero CO2 emissions from fossil fuel power plants and carbon intensive industries**
- **Joint Actions; Cross-cutting issues**
- **Next generation Batteries**
- **Competitive, low carbon and circular industries**

Energy Challenge (SC3) calls 2020: Overview

Buildings in energy transition (B4E)

• 14 topics – total budget: 86.5 M€

Renewable energy (RES)

• 18 topics – total budget: 238 M€

Energy system and consumer (EC, ES)

• 10 topics – total budget: 155 M€

Smart Cities and Communities (SCC)

• 2 topics – total budget: 65 M€

Smart Airports (SA)

• 1 topic – budget: 12 M€

Decarbonisation of fossil fuels (NZE)

• 1 topic – budget: 29 M€

Cross-cutting issues (JA, CC)

• 3 topics – total budget: 26 M€

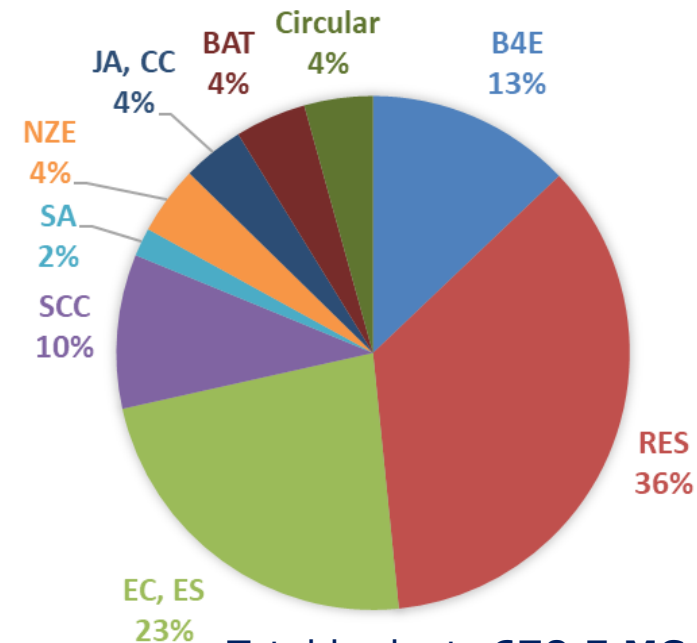
Batteries call (BAT)

• 2 topic – total budget: 30 M€

Circular economy call

• 2 topics – total budget: 29 M€

BUDGET ALLOCATION - ENERGY CALLS 2020



The calendar of the calls

Topic code	Opening date	Deadline to apply
B4E1, B4E5, B4E6, B4E7, B4E8, B4E9, B4E10, B4E12, EC4	16 Jul 2019	15 Jan 2020
RES9, RES19, RES27, RES28, RES33, RES35	3 Sep 2019	11 Dec 2019
EC3, ES3, ES4, ES5, ES10, ES11, ES12, SCC1, SA1	3 Sep 2019	29 Jan 2020
JA5, RES10	26 Sep 2019	26 Mar 2020
RES1, RES18, RES26, RES31, RES32, RES37, BAT8, BAT9	3 Dec 2019	21 Apr 2020
B4E2, B4E3, B4E4, B4E11, B4E12, B4E13, B4E14, EC1, EC2, EC5	5 Mar 2020	10 Sep 2020
CC1, CC7, CC9, NZE5, NZE6, RES3, RES20, RES25, RES34, RES36, SCC2	5 May 2020	1 Sep 2020



Global leadership in renewables

Next renewable energy solutions

- RES-1, RES-3

Renewable energy solutions at consumer scale

- RES-9, RES-10

Renewable energy solutions for energy system implementation

- RES-18, RES-19, RES-20, RES-31, RES-32, RES-33, RES-34, RES-35

Renewable fuels for transport

- RES-25, RES-26, RES-27, RES-36, RES-37

Market Uptake Support

- RES-28

Next generation renewable solutions

#H2020Energy
Info days

Research and
Innovation



Next Renewable energy solutions

The focus of these actions is to:

- Support research activities aiming at identifying **renewable energy breakthroughs** that will feed the innovation cycle and become the basis of the **next generation** of EU technologies.

- **RIA**

Research on pre-commercial renewable energy technologies that will form the backbone of the energy system by 2030 and 2050

- Up to TRL 3-4
- EU-funding: 2-4 M€/project
- Total budget: **45 M.€**

*Accelerate and reduce the costs of the next generation energy technologies;
advance knowledge base*

RES-1 Developing the next generation of renewable energy technologies

Support will be given to activities which focus on **converting renewable energy sources into an energy vector**, or the **direct application of renewable energy sources**.

- **Bottom-up** proposals addressing any renewable technology currently in the early phases of research. Activities also might include energy materials, catalysts, ..., as long as those are strictly connected to the energy conversion process

- Related sustainability aspects to be addressed: **lower environmental impact** etc.



- **RIA**

Storable chemical energy carriers from direct sunlight are required for future full decarbonisation of energy and transport

- *Up to TRL 3-4*
- *EU-funding: 2-4 M€/project*
- *Total budget: 10 M.€*

Targeted research activities with USA and/or China will accelerate technology development and strengthen partners' technology base

Mission Innovation 4 y 5

RES-3 International Cooperation with USA and/or China on alternative renewable fuels from sunlight for energy, transport and chemical storage

At least one of the following technology-specific challenges has to be addressed:

- Improved light-harvesting and efficient charge separation in photocatalytic systems
- Photoelectrochemical cells – PECs and catalyst development
- Improved light harvesting coupled with improved CO₂ reduction efficiency in synthetic biological systems
- Excluded is the use of external renewable electricity (including from PV or CSP)

Renewable energy solutions for implementation at consumer level

#H2020Energy
info days



Renewable energy solutions for implementation at consumer level






- Varying number of **consumers** involved (individual and residential buildings, industrial sites, district systems...)
- Where applicable, **all energy needs** of consumer taken into consideration (electricity generation, heating, cooling)
- **Significant part of the energy to be consumed at the place of production**

- **IA**

Need to develop
alternative thin-film
technologies based on
earth-abundant elements

- From TRL 4-5 to 6-7
- Budget/proposal: € 5-7 million
- Total budget: 20M.€

Expected Impacts

- Cost/environmental impacts -LCA 
- Efficiency 
- Life Time (>35 years) 
- Performance 
- Reliability and Recyclability 

RES-9 Next generation of thin-film photovoltaic technologies

- **Scope:** Demonstrate alternative Thin-film (including multilayer) technologies that can yield high-efficiency devices with:
 - expanded lifetime
 - simple fabrication processes
 - use of earth-abundant, low-cost materials complying with RoHS guidelines
- Business case & exploitation strategy should be included in proposal (LEIT).
- The topic is particularly suitable for SMEs

SET Plan IP on PV (relevant indicators & metrics)
Topic LC-NMBP-28



- **PCP** (see General Annexes D and E of Horizon 2020)
- Budget/proposal: € 8-15 million
- Total budget: 15M.€

RES-10 Pre-Commercial Procurement for a 100% Renewable Energy Supply

Expected Impact:

- Effective integration of RE technologies
- Reduced fragmentation of demand for RE
- Solutions in public buildings

- **Specific challenge:** Integration of technologies to achieve a 100% share of RE generated and consumed in existing public buildings. Requirements of EPBD & NZEB. Consortia of procurers with similar procurement needs.
- **Scope:** Novel components & configurations to generate in existing public buildings energy from RES so that 100% of the energy consumption of the building (electricity, heat and cooling) is fulfilled. Yearly energy demand to be followed to the largest extent possible

Renewable energy solutions for energy system level implementation

#H2020Energy
info days

Renewable energy solutions for energy system implementation - general

- To **reduce capital and operational costs**, to **increase reliability** and to **provide flexibility to the energy system**
- Solutions should be implemented at the **system level**, namely in those cases where the renewable energy that is inserted into the network, is to be transmitted and distributed to the end user and not, or only in minimal part, used for self-consumption
- **Reduce costs of key technologies for renewable energy conversion**



Deadline: 21 April 2020

RIA **Lump Sum**

Final TRL: 4-5

Budget: 8 M€

EU-funding: 2-4 M€/project

Expected impacts:

-cost of drilling 30% by 2030 ↓

-drill time/non productive time
20% by 2025 ↓

-total cost well completion 20% ↓

RES-18-2020 Advanced drilling and well completion techniques for cost reduction in geothermal energy

- **Specific challenge:** Cost reductions in well construction are needed by lowering well cost (in terms of €/MWh) and reducing drill time or non-productive time. Advanced drilling technologies, currently not used in geothermal well construction, should therefore be developed and optimized.
 - **Scope:** novel non-mechanical drilling technologies required for all types of geological formations to reach greater depths and higher temperatures (i.e. beyond 5 km and 250°C) or develop new mechanical-drilling operation technologies making use of digitisation, automation, machine learning, and innovative instrumentation.
- Risk assessment and lifetime analysis of new technologies are expected to be part of the work. Innovative systems to avoid and/or reduce discharge of geothermal fluids into the environment should be considered, as well as horizontal - multilateral wells clusters.
- Address relevant social acceptance and related socioeconomic issues.

RIA

Final TRL: 4-5

Budget: 8 M€

EU-funding: 2-4 M€/project

Expected impacts:

- Levelised Cost of Energy
- Market value of wind power for scope 1-4

RES-31-2020 Basic science technology development for offshore wind

- **Specific challenge:** Cost reductions are required to achieve an increase of offshore wind power to the energy mix by 2030. Need for better knowledge of basic wind energy science and related areas.
- **Scope:** One or more of the following research areas:
 1. Atmospheric multi-scale flow modelling
 2. Understanding and modelling key uncertainties and physical phenomena of offshore wind energy design and operation
 3. High performance computing and digitalisation
 4. Development and validation of models of structural damage and degradation for offshore wind turbines and/or for their components as functions of loads and environment;
 5. Numerical and test methods for accurate assessment of system and component reliability when introducing new materials and technologies;
 6. Other offshore balance of plant aspects related to the manufacturing, construction, installation and/or decommissioning of large-scale wind turbines.

!!! Onshore may also be covered when synergies may be exploited from including both.

“Material Science” – LC-NMBP-31-2020 – Materials for energy off-shore.



Deadline: 21 April 2020





RIA

Final TRL: 4-5

Budget: 8 M€

EU-funding: 2-5 M€/project

Expected impacts:

- Accelerate OE technology development 
- Reduction development costs 
- Exchange of knowledge 
- Scientific understanding 

RES-32-2020 New test rig devices for accelerating ocean energy technology development

- **Specific challenge:** Ocean energy technologies need increased performance and reliability to meet its full potential. New testing methodologies will help industries to take more quickly go/no-go decisions. A better understanding of basic ocean energy sciences is required to develop the research competences and the underpinning scientific knowledge for the testing methodologies.
- **Scope:**
 - The actions should generate one or more new test rig prototype devices including novel test procedures that should be used by multiple ocean energy technology developers, and facilitate design convergence. This will support improved testing of low TRL wave or tidal device components or sub-systems - and make accelerated life testing possible,
 - Proposals are expected to connect and integrate the various capacities and resources of the beneficiaries and other ongoing European and national projects in the proposed research areas.
 - Proposals are expected to clearly indicate how the science is contributing to accelerated cost reductions in ocean energy.

#H2020Energy

Research and
Innovation

- **IA**
- *Drive down the costs of floating wind farms and to fully commercialise and industrialise the technology*
- *to TRL 6-8*
- *Up to EUR 25 million*
- *Decrease LCOE and environmental impact while increasing market value of floating wind farms*

RES-19 Demonstration of innovative technologies for floating wind farms

- Proposals will demonstrate floating offshore wind innovations (blades, floaters, moorings, electrical subsystems and cabling, monitoring systems, and/or integrated systems, including whole wind turbines conceived for floating offshore), in view of scaling-up power rating to >10 MW.
- Different sea and weather conditions shall be considered.
- Proposals shall improve industrial design and manufacturing processes, installation methods and operation & maintenance.



- **IA**
- Match the thermal cycle of a CSP plant to the energy needs of a desalination system in an effective way
- to TRL 6
- EUR 6-10 million
- Decrease substantially CO₂ emissions from desalination;
strengthen international cooperation

RES-20 Efficient combination of Concentrated Solar Power and desalination (with particular focus on the Gulf Cooperation Council (GCC) region)

- Proposals will demonstrate efficient solutions that **couple the thermal cycle of a CSP plant to a water desalination system.**
- international cooperation is encouraged, in particular with Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The participation of organisations from these countries as partners in the project will be positively evaluated.
- Positive environmental impact, mainly in desalination plants.

- **IA**
- *Predict and measure the contribution of PV systems (including floating PV) to the power network; increase their lifetime, reliability and profitability*
- *from TRL 6-7 to TRL 7-8*
- *EUR 6-10 million*
- *Increase utility-friendly integration of PV generation at high-penetration levels*

RES-33 Increase performance and reliability of photovoltaic plants

- Proposals will develop and demonstrate technical solutions, processes and models which increase a PV system's operational stability and reliability.
- Proposals are expected to address specific objectives such as the reliability of system components, advanced and automated functions for data analysis, diagnosis and fault detection, forecasting and model-predictive control frameworks, ancillary services for the stability of the network; maintenance planning and/or reporting; interoperability of plants and components; business models; etc.



Deadline: 1 Sep 2020

- **IA**
- *Demonstrate innovative, socio-economically and environmentally sustainable hydropower solutions*
- *from TRL 6-7 to 7-8*
- *EUR 7-10 million*
- *Support the competitiveness of the European hydropower technology sector; support international cooperation with developing countries*

RES-34 Demonstration of innovative and sustainable hydropower solutions targeting **unexplored small-scale hydropower potential in Central Asia**

- Proposals will demonstrate equipment up to 10 MW installed capacity.
- Synergies between European research and industry partners and the Central Asian hydropower sector is sought.
- The demonstration activities shall take place in Central Asia (Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan or Uzbekistan), with participation of local partners.

- **IA**
- Reduce the cost and increase performance and reliability of CSP plants
- to TRL 6-8
- EUR 5-10 million
- Strengthen the competitiveness of the CSP technology; increase the prospects for CSP deployment in Europe

RES-35 Reduce the cost and increase performance and reliability of CSP plants

- Proposals will demonstrate innovations that **reduce the cost** and/or **increase the performance and/or the reliability** of CSP plants, in relation to any of the plant sub-systems.
- Proposals have to state to which R&I Activity (or Activities) of the SET Implementation Plan for CSP they contribute.
- The possible impacts on the environment of the proposed innovations shall be assessed during the execution of the project.

Renewable Fuels for Transport

#H2020Energy
info days

Objectives

- Competitiveness of the **next generation** of biofuels and renewable fuel technologies
- **Up-scaling of advanced biofuels for specific transport needs** in a cost-effective way
- European leadership in global development of specific **disruptive technologies** for a complete ultimate replacement of fossil fuels
- **Drop-in** renewable fuel solutions for fossil-fuel substitutions
- **Feedstock diversification**



Deadline: 11 Dec 2019

Increase reliability of large-scale production of advanced biofuels from seaborne feedstock

TRL 5 to TRL 6-7

IA

EUR 6 to 10 million

Enlarge the feedstock basis; improve the viability of technologies for sustainable fuels and energy production

LC-SC3-RES-27-2020

Demonstration of advanced biofuels production from aquatic biomass

- Demonstrate aquatic advanced biofuel pathways which improve economics of subsequent energy production, including upgrading and co-products valorization
- 100-1000 tons energy-driven integrated biorefinery from seaborne aquatic biomass such as macro-algae and/or fish residues
- demonstrate the full value chain with at least 70% energy output (fuel, heat and power) and environmental sustainability on Life Cycle assessment basis
- consider long-term potential for large scale biofuel production



Deadline: 21 Apr 2020

Increase renewable fuel competitiveness integrating with unexploited RES and using existing fuel infrastructure

TRL 3-4 to TRL 4-5

RIA

EUR 3 to 5 million

Reduce conversion energy losses & production costs of algal fuels/PtG/ PtL, Heat to G/L; improve fuel performance for efficiency, environment and society

LC-SC3-RES-26-2020

Development of next generation renewable fuel technologies from CO₂ and renewable energy (Power and Energy to Renewable Fuels)

- Develop next generation of renewable fuels for energy and transport
- improved energy efficiency
- improved cost of conversion of direct renewable energy (e.g., sunlight) or renewable electricity and /or heat to liquid or gaseous renewable fuels from CO₂
- fuels with very low engine-out emissions



Deadline: 21 Apr 2020

Increase sustainable land availability for dedicated biofuel production at large scale; contribute to MI IC 4

TRL 3-4 to TRL 4-5

RIA

EUR 2 to 4 million

Bring polluted land back to agricultural production and to low-iLUC risk liquid biofuels from energy crops; contribute to several SDGs

LC-SC3-RES-37-2020

Combined clean biofuel production and phytoremediation solutions from contaminated lands worldwide

- link phytoremediation strategies & clean liquid biofuel production
- optimize energy crops for different classes of known soil pollutants
- integrate in the conversion process to biofuels a strategy to extract pollutants in concentrated form
- optimize overall process in terms of cost and sustainability
- do pilot-scale, small trials for both clean biofuel production and phytoremediation
- establish international cooperation for a global challenge



Deadline: 1 Sep 2020

*Foster **disruptive innovation** for advanced biofuels and alternative renewable fuels in the transport & heating sectors; contribute to MI IC 4 to TRL 3*

RIA

EUR 2 to 5 million

Progress state-of-the-art; strengthen technology base; accelerate development of outperforming renewable fuels

LC-SC3-RES-25-2020

International cooperation with Japan for Research and Innovation on advanced biofuels & alternative renewable fuels

- involve Japanese organizations in the consortia for the development of disruptive catalytic technologies
- novel catalysts and linked lab-scale components/systems
- improved conversion efficiency, and specific marginal cost reduction
- low-cost bioenergy carriers, non-food/feed based advanced biofuels and alternative renewable fuels excluding H₂
- maximize GHG abatement



Deadline: 1 Sep 2020

Overcome cost barriers of feedstock supply or conversion of advanced biofuels and bioenergy; contribute to MI IC 4

TRL 3 to TRL 5

RIA

EUR 3 to 5 million

Progress state-of-the-art ; strengthen technology base; accelerate development of sustainable fuels; increase viability of advanced biofuels & bioenergy

LC-SC3-RES-36-2020

International cooperation with Canada on advanced biofuels & bioenergy

Involve Canadian organizations in the consortia for the development of

- the full supply chain of intermediate carriers, advanced biofuel, heat & power
 - sustainable biomass production & collection that facilitate bioenergy production and decrease feedstock supply costs
 - non-food/feed biomass including forestry, agricultural and their residues, organic fractions of municipal & industrial wastes
- thermo-, bio- & chemical biomass processing to advanced biofuels focusing on pre-treatment, conversion & reduction of the marginal cost

Market Uptake Support

#H2020Energy
info days

RES-28 Market Uptake support

- *While cost and performance characteristics of RES are improved there is still a lot of market potential to be exploited and a number of barriers must be overcome*
- CSA
- EUR 1-3 million
- *facilitate the wider uptake of renewable energy generation in the energy and industrial sectors and of RES consumption by 2030.*
- *Total Budget: €25 million*
- Barrierscover issues such as consumer acceptance, legal and financial challenges ... legislative and regulatory aspects limiting innovative energy solutions implementation at the grid levels and also at the community or citizen level. ... tools for better assessing the environmental, economic and social impact of renewable energy solutions is challenging ...massive deployment in the market ... energy markets outside the EU must not be forgotten....
- The proposal will develop solution(s) addressing one or more of the identified challenge(s), for the entire renewable energy sector or focusing on a specific energy market, such as electricity, heating, cooling or renewable fuels.
- For all actions, the consortia have to involve and/or engage relevant stakeholders and market actors who are committed to adopting/implementing the results. The complexity of these challenges and of the related market uptake barriers may call for multi-disciplinary approaches, which should include contributions from the social sciences and humanities.

Smart citizen-centred energy system

#H2020Energy
info days

Smart citizen-centred energy system

GRID

- **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-10 DC – AC/DC hybrid grid** for a modular, resilient and high RES share grid development **(IA)**

LOCAL SYSTEMS & ISLANDS

- **ES-3-2018-2020: Integrated local energy systems (Energy islands) (IA)**
- **ES-4-2018-2020: Decarbonising energy systems of geographical Islands (IA)**
- **ES-11 Rapid Relief through Transitions on Islands (IA)**
- **ES-12 Integrated Local Energy Systems (Energy Islands): International Cooperation with India (IA)**

Deadline: 29 Jan 2020

Smart citizen-centred energy system

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
ES-3	Local energy islands, integration of all energy vectors, increased share of renewable energy	IA	15 M€	5-6 M€
ES-4	Decarbonise energy system of geographical islands	IA	40 M€	5-7 M€
ES-5	Large-scale demonstration of innovative grid services through demand response, storage and small-scale (RES) generation, TSO–DSO–Consumer cooperation	IA	22 M€	20-22 M€
ES-10	DC – AC/DC hybrid grid for a modular, resilient and high RES share grid development	IA	14 M€	7 M€
ES-11	Replace fossil fuels with renewable energy on geographical islands	IA	4 M€	2-3 M€
ES-12	Local energy islands, Cooperation with India	IA	9 M€	5-6 M€



Common requirements

Applicants should demonstrate a good knowledge and compatibility with:

- Current **regulations**
- Available or **emerging standards** and **interoperability issues** (*see work of the Smart Grid Task Force and its Experts Groups in the field of Standardization - CEN-CLC-ETSI M/490*)
- Smart grid deployment, infrastructure and industrial **policy**
- A high level of **cyber security**; compliance with relevant EU security legislation, due regard of best available techniques
- **Regulatory environment** for privacy, data protection, data management and alignment of data formats (*see “My Energy Data” and its follow-up, General Data Protection Regulation and industry standards, Data Protection Impact Assessment Template*)



EC-3-2020: Consumer engagement and demand response

Challenge

- Put consumers/prosumers at the heart of the energy market
- New cost-effective solutions for consumers based on the next generation of energy services:
- Beneficial to RES integration into an efficient operation of the power system
- Better predict and incentivise consumer behaviour
- Engaging consumers/prosumers in demand-response mechanisms and other energy services, bringing a fair share of benefits to consumers and the energy system.

Scope

- Develop and test solutions and tools for demand response and energy services:

Using real consumption data to better predict consumer behaviour (digital twin) ; Focus on households, other type of consumers may be included. Target one or multiple type of loads, small-scale production, energy storage, aggregation; Preferably relying on advanced automation, ICT tools, communication protocols and interoperability ; Preferably including several energy vectors and sectors ; Address privacy, data protection and cybersecurity

- **Consumer perspective on the power system:** social science and humanities-related work is to be closely associated with the development of technological solutions
- **Services, customer information, engagement strategies should be designed and demonstrated taking into account the different types of consumers** (e.g. segmentation along different categories, e.g. social category, age, technology literacy, gender, etc.)
- Participation of **local energy communities, energy cooperatives, aggregators and consumers associations** is encouraged.
- Proposals are expected to include a task on developing a **business model and a clear path to finance and deployment** (delivery of affordable energy within 5 years)
- Proposals should include a task/work package on **analysis of obstacles to innovation** in the **current context and in future market design** context
- Proposals should foresee to **coordinate** with at least one project supported under **topic ES-5** as well as with similar EU-funded project through the **BRIDGE initiative** (consider additional coordination effort and budget)



TSO – DSO – Consumer: Largescale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation

Rationale (why?):

Demonstrate at a large-scale how markets and platforms enable electricity TSOs and DSOs to procure energy services from large-scale and small-scale assets connected to the electricity network.

Key objectives:

- will lead to the development of a seamless pan-European electricity market that makes it possible for all market participants (if necessary via intermediaries such as energy suppliers or aggregators) to provide energy services in a transparent and non-discriminatory manner;
- enables TSOs and DSOs to give incentives to connected consumers, buildings, devices (including small-scale generation) to improve predictability and anticipate problems, based on jointly developed grid-models;
- defines and tests 1) standardised products and key parameters for grid services; 2) the activation process for the use of assets for network services; 3) the settlement process for payment related to the services;

Key issues:

- The selected project should build on experience and best-practices from previous and ongoing projects (in particular those supported under the call LC-SC3-ES-5-2018-2020 in 2018), and aim to deliver one set of protocols and standards with respect to platforms for the procurement of grid services
- Include a credible business plan to ensure that the tested and demonstrated platforms and markets will continue operation (and further will be further replicated/developed by as many other TSOs and DSOs as possible) in real-life after the project ends
- Design and develop ICT systems and infrastructure that will facilitate open (non-proprietary) standardised and interoperable multi-party data-sharing and facilitate scaling-up, including across borders (at least in the EU), between all actors that use the markets and platforms for grid services



DC – AC/DC hybrid grid for a modular, resilient and high RES share grid development

Challenges:

- increasing complexity of AC based grid architectures; multiple grid planning scenarios; cascading effects due to faults/cyberattacks; the need to increase the share of renewables in the grid to meet the decarbonisation objectives.

Scope:

Design, modelling, simulation, development, demonstration, test and validation of DC-based grid architecture(s). The modular grid planning and development, the “firewall” effect against faults or cyberattacks and the accommodation of higher shares of renewables in a DC-based system will be part of the demonstration and validation exercise.

- Demonstration activities TRL 5-8
 - Different types of generation and loads (RES, battery storage and electric vehicle (EV), etc.)
 - Demonstration in at least two MS or AC
 - Tests in interconnected and isolated mode to/from the power grid
- Cross-cutting activities
 - barriers to innovation and market uptake: (technical (including, low-cost DC breakers, WBG), regulatory, safety, acceptance and suitable business models
 - Pathways to overcome them: (e.g. standardisation, such as of voltage levels), including recommendations

Expected Impact:

Facilitating planning and investments; increasing grid resilience; increasing penetration of RES; increasing the efficiency



Energy Islands: Integrated local energy energy systems

Challenges:

- 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.

Expected Impacts:

- 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.
- Involved local energy consumers and producers – energy communities

Decarbonising energy systems of geographical Islands

Challenges:

- 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:
 - High levels of local renewable energy sources penetration.
 - High integrated and digitalised smart grids and/or thermal networks based on high flexibility services from distributed generation, local power balancing, demand response and storage of electricity, h&C, water, etc.
 - Improved forecasting through comprehensive modelling of demand and supply

Expected Impacts:

- Facilitate the creation and/or increase the number of renewable energy communities
- Reduce significantly fossil fuel consumption.
- Large-scale replication on the same island and on other islands with similar problems
- Enhance stability of the power network of islands that are grid connected with the mainland.



LC-SC3-ES-11-2020:

Rapid Relief through Transitions on Islands

Challenges:

- Reduce rapidly electricity generation costs
- Fight against climate change

Scope:

- Demonstration of solutions on one island that is over 90% reliant on fossil fuels for generation electricity.
- Significantly reduce the annual fossil fuel demand and related GHG emissions
- Wider deployment in other islands
- Islands with a population of between 5,000 and 100,000 are encouraged.
- Involvement of all relevant local stakeholders and – Renewable Energy Communities
- Cooperation with the European Island Facility

Impacts:

- Contribute towards a significant increase in the number of islands of EU and AC that have a stable energy system generation at least 90% of their annual electricity demand from renewable energy sources.
- New opportunities for the European renewable energy production industries.

Smart Cities and Communities, Smart Airports

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
SCC-1	Smart Cities and Communities; Positive Energy Blocks/Districts; Interaction of buildings, larger energy systems and electro-mobility	IA	55 M€	15-20 M€
SCC-2	Positive Energy Districts and Neighbourhoods	ERA-NET	5 M€	5 M€

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
SA-1	Smart use of biofuels in airports and other relevant alternative fuels in aircraft, Smart Energy in airports	IA	12 M€	12 M€





LC-SC3-SCC-1-2020: Smart Cities and Communities

#H2020Energy
Info days

Research and
Innovation

Lighthouse projects

- 2 lighthouse cities and ≥ 5 fellow
- Industry, SMEs, Research
- By the deadline, all lighthouse cities **must have** a validated:
 - Actively participate → replication Sustainable Energy Action Plans (SEAP), or
 - Sustainable Energy (and Climate) Action Plans (SECAP), or
 - a similar, at least equally ambitious, plan
- A city can be funded as a lighthouse city **only once** under Horizon 2020

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**)

Definition Positive Energy Blocks/Districts

- **Actively manage** their energy consumption and energy flows
- Annual **positive energy balance**
- **Optimal use** of elements
- **Integral part** of the district/city energy system
- Scalable

Proposals should focus on

- **Mixed use** urban districts
- **Replication** potential
- Important role of **local communities** and **local governments**
- **Energy awareness**
- Promote **decarbonisation**, improving **air quality**
- **Smart Cities Information System** database (SCIS)



LC-SC3-SCC-2-2020: Smart Airports

#H2020Energy
Info days

Research and
Innovation



Scope:

Proposals will demonstrate novel concepts and effective solutions to stimulate the take-up of biokerosene and other relevant alternative fuels by aviation.

Airports:

Each proposal will contain **one Lighthouse Airport** where the demonstration actions will be implemented. This Lighthouse Airport will also collaborate closely with **two Fellow Airports**.



Two areas:

A) Smart use in airports and aircraft of biofuels and other relevant alternative fuels

The aim is to integrate sustainable bio-kerosene and other relevant alternative fuels in the fuelling infrastructure and associated fuel-handling logistics of the airport, including blending operations resulting in blends compliant with the ASTM standards.

B) Smart Energy in Airports:

Projects will demonstrate novel concepts and solutions aimed at improving the reduction of greenhouse gas emissions from the operations of the airports.



Eligible costs

Innovative elements of the projects needed to:

- Handle, logistics, blending, fuelling of low carbon fuels, all ground operations
- Foster innovative energy systems integration
- Complement the wider energy system to decrease GHG emissions
- Collaboration / Dissemination

Non Eligible costs

Costs of commercial technologies are not eligible, for example:

- Buildings: purchase, construction, retrofitting and maintenance
- Airport-level ICT platforms: purchase, development and maintenance
- Standard, commercially-available RES: purchase, development and maintenance

The procurement of low carbon fuels is not eligible

Enabling near-zero CO2 emissions from fossil fuel power plants and carbon intensive industries

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
NZE-6	Identification and geological characterisation of new prospective storage sites for CO2; CO2 storage pilots	RIA	14 M€	7-10 M€





Deadline: 1 Sep 2020

In order to store meaningful quantities of CO₂ to attain targets under the Paris Agreement, new storage sites will need to be characterised and appraised every year for the next 30 years

EUR 7-10 million

Call budget EUR 14 million

RIA

The pilots will expand European experience of CO₂ storage across a range of storage options, provide a baseline for cost estimation, increase public awareness and facilitate the development of operational storage sites

Deadline: 1 sept 2020

NZE-6-2020 Geological Storage

We need pilots to:

- assess the suitability of a storage location
- demonstrate geological storage to the public as a safe and effective CO₂ abatement technology
- prepare the way for subsequent larger scale activity

What needs to be done?

- Detailed characterization of new prospective storage sites, including 3D architecture of the storage complex
- Accurate estimation of storage capacity, modelling of injectivity and response to pressurization, analysis of faults and stress fields, overall risk assessment...
- Develop optimal strategies for monitoring, pressure management and mitigation of induced seismicity
- Involve end users and societal stakeholders

Joint Actions; Cross-cutting issues

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
JA-5	Long Term EU-Africa Partnership for Research and Innovation actions in the area of renewable energy; strategic and joint research and innovation actions and related research capacity building actions	RIA	15 M€	15 M€

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
CC-1	Social Sciences and Humanities, Energy citizenship	RIA	10 M€	1-3 M€
CC-7	European Energy & Climate Modelling Forum, model benchmarking and comparison	RIA	5 M€	5 M€



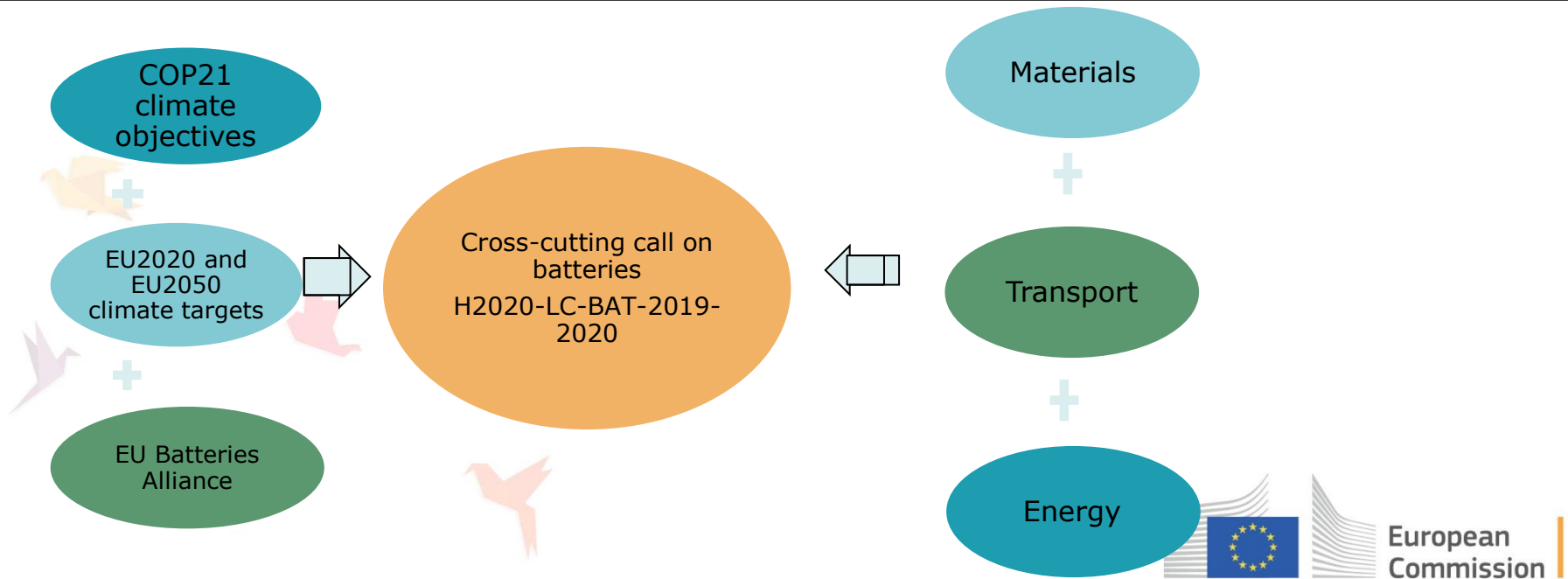
Next-generation batteries

#H2020Energy
Info days

Research and
Innovation

Next-generation Batteries

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
BAT-8	Next-generation battery technologies for stationary energy storage	RIA	20 M€	6-8 M€
BAT-9	Hybridisation of battery systems for stationary energy storage	RIA	10 M€	3-4 M€



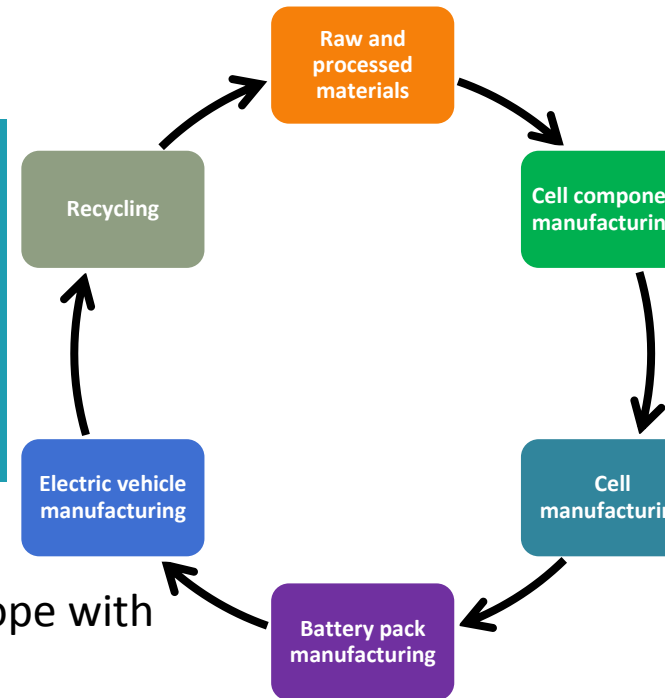


European Battery Alliance (EBA)

A cooperative platform gathering the European Commission + interested EU countries + the European Investment Bank + EIT InnoEnergy+ key industrial stakeholders and innovation actors

Objectives:

- To create a **competitive manufacturing value chain** in Europe with sustainable battery cells at its core .
- To capture a **battery market of up to €250 billion a year** from 2025 onwards





Deadline: 21 Apr 2020

EUR 6-8 million

Call budget EUR 20 million

TRL 3 to TRL 5

RIA

Project results are expected to :

-Assure best possible performance and lifecycle for the next-generation battery technologies at lowest cost, in particular by putting the energy storage cost on the path to fall below 0.05 €/kWh/cycle by 2030;

-Reduce the pressure on limited natural resources due to longer battery lifespan, improved recyclability and the use of more abundant and less harmful materials;

#H2020Energy

LC-BAT-8-2020: Next-generation batteries for stationary energy storage

- **Stationary applications** need:
 - ability to combine high power and heavy use,
 - going through multiple deep cycles per day
 - a long lifetime and maximum safety
- **Future battery systems** should have:
 - optimal sustainability throughout the entire supply chain,
 - substitution of critical raw materials,
 - Potential for second-life use and recycling
- Interest in **next-generation Li-ion** and **non-Li-ion batteries** is growing as for:
 - molten salt
 - metal-air, lithium-sulphur, sodium
 - flow batteries
 - solid state
 - new ion-based systems
- Many fundamental and technological obstacles remain to be overcome.



Deadline: 21 Apr 2020

EUR 3-4 million

Call budget EUR 10 million

TRL 4 to TRL 6

RIA

Project results are expected to :

-The project should contribute to **increased competitiveness** of electrical energy storage by balancing power needs with energy needs, providing a more efficient system with a **longer and better performing lifespan**, and by **optimising balance-of-plant and installation costs**.

-Project results should put the **energy storage cost** on the path to fall **below 0.05 €/kWh/cycle by 2030**.

LC-BAT-9-2020: Hybridisation of battery systems for stationary energy storage

- The objective is to develop and demonstrate optimised innovative battery storage **systems based on hybridisation**.
- The resulting storage system can be engineered **either by the twinning of distinct systems**, or **internal hybridisation** of cells and control systems.
- Focus should be on **cell and stack design**, on **advanced battery management systems** and on **high-level, hybrid storage control systems**.
- The hybrid storage systems may for example **be optimised for one or more** of the following **applications**:
 - Stand-alone provision of services to the **interconnected pan-European grid**,
 - Provision of services to **island grids**,
 - Provision of services in **weak distribution grids**,
 - Provision of services in **private grids** such as industrial parks,
 - Provision of **load levelling for EV charging** service stations.

Cross-cutting Call – Circular Economy

#H2020Energy
Info days

Research and
Innovation

Competitive, low carbon and circular industries

Topic code	Keywords	Instru- ment	Total budget	~ Budget / project
CC-9	Industrial (Waste) Heat-to-Power conversion	IA	14 M€	12-14 M€
NZE-5	Low carbon industrial production using CCUS	RIA	15 M€	15 M€

Cross-cutting Call – Circular Economy



Deadline: 1 Sep 2020

Some sectors have process emissions than cannot be further reduced without CCUS (e.g. steel, cement)

CO2 capture technologies exist and are already used at industrial scale... ..but need to be adapted to different applications and integrated in industrial installations

EUR 15 million

Call budget EUR 15 million

Bring TRL levels to 6-7

IA *Deadline: 1 sept 2020*

Impact is very much determined by the plan of what to do with the captured CO2,

International cooperation is encouraged, in particular with Mission Innovation countries such as China

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

- **Technical:** integration of CO2 capture in industrial installations; scalability; CO2 purity
- **Financial:** cost of capture; cost of integration
- **Safety:** transport and storage
- **Strategic:** business models; link with CO2 hubs and clusters
- **Societal readiness:** public awareness; explore barriers to acceptance



Deadline: 1 Sep 2020

EUR 12-14 million/project

Call budget EUR 15 million

Bring TRL levels to 6-7

Expected impact:

- *Improved cycles to achieve scalability to higher power levels, higher cost effectiveness, wider input temperature ranges, significantly reduced system size, allowing wider take up of heat recovery from more industrial processes*

- *Primary energy savings (GWh/year) in industry, potential primary energy savings in the power generation sector, assuming full deployment in EU Member States and (as far as data are available for the calculation of the impact) in Associated Countries*

LC-SC3-CC9-2020: Industrial (Waste) Heat-to-Power conversion

- High efficiency, low cost and compact systems
- Using innovative fluid: - Supercritical CO₂ (sCO₂) cycle - Organic cycle (like ORC)

Scope:

- Integrate industrial waste heat-to-power conversion system using one type of fluid (supercritical CO₂ or organic)
- demonstrate the system operation in industrial environment at an output power level ≥ 2 MW.

Resources for help

➤ **Funding & Tender Opportunities Portal:**

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home>

➤ **Research Enquiry Service:**

<http://ec.europa.eu/research/index.cfm?pg=enquiries>

➤ **Information Days for the H2020 Energy calls 2020:**

<https://ec.europa.eu/inea/en/news-events/events/horizon-2020-energy-info-days>

➤ **Information Days for the H2020 Energy calls 2019:**

- <https://ec.europa.eu/inea/en/news-events/events/horizon-2020-energy-info-day> (Energy system and Smart Cities and Communities)
- <https://ec.europa.eu/easme/en/horizon-2020-energy-efficiency/horizon-2020-energy-efficiency-information-day-main-takeaways> (Energy efficiency)
- <https://ec.europa.eu/inea/en/news-events/events/horizon-2020-energy-virtual-info-day> (Renewables, CCUS, Batteries)

➤ **Horizon 2020 Homepage:** <http://ec.europa.eu/programmes/horizon2020/>

Resources for help

Contexto Político:

SETIS: <https://setis.ec.europa.eu/>

ENERGY UNION: https://eur-lex.europa.eu/resource.html?uri=cellar:1bd46c90-bdd4-11e4-bbe1-01aa75ed71a1.0001.03/DOC_1&format=PDF

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

ACEI: https://eur-lex.europa.eu/resource.html?uri=cellar:3473410d-b7de-11e6-9e3c-01aa75ed71a1.0001.02/DOC_3&format=PDF

2050 long – term strategy: https://ec.europa.eu/clima/policies/strategies/2050_en

National Contact Points (NCPs)

NCPs are in the front line for providing specialist advice and on-the-ground guidance to potential applicants



Main services:

- Guidance on choosing relevant H2020 topics and types of action;
- Advice on administrative procedures and contractual issues;
- Training and assistance on proposal writing;
- Assistance in partner search.

Find your national NCP:

http://ec.europa.eu/research/participants/portal/desktop/en/support/national_contact_points.html

Network of Energy NCPs: www.C-energy2020.eu

SC3 en España



- ✓ **M^a Luisa Revilla (Representante + NCP CDTI):**
luisa.revilla@cdti.es
- ✓ **Cristina Garrido (NCP CDTI)**
Cristina.garrido@cdti.es
- ✓ **Virginia Vivanco (NCP IDAE):**
vvivanco@idaes.es
- ✓ **Cristina Trueba Alonso (NCP CIEMAT):**
cristina.trueba@ciemat.es

NEXT GENERATION BATTERIES - NCPs

Materiales para Baterías: Nieves Gonzalez – nieves.gonzalez@cdti.es

Baterías para movilidad: Julio Dolado – julio.dolado@cdti.es

Future Battery Technologies (FET): Borja Izquierdo - borja.izquierdo@fecyt.es

Baterías para estacionaria: contactar con los NCPs del SC3

**+ info sobre programas y ayudas
para la
internacionalización de la I+D+I española**

www.eshorizonte2020.es - www.cdti.es



@EsHorizonte2020 - @CDTIoficial