

InfoDay Horizon 2020 Energy Challenge



Nuno Quental Policy Officer DG RTD #H2020Energy

research unu



Energy across Horizon 2020





Technological readiness levels

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







Global Leadership in Renewables HORIZON 2020



#H2020Energy

Research and Innovation



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)







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)







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.
- Upgrade to TRL 6
- Innovation Action
- Budget: EUR 15 m (EUR 8-15 m per project)
- Deadline: 11 Dec 2018







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 costeffective 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







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 costefficient 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





esearch and nnovation



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.

- From TRL 5 to TRL 7
- Innovation Action
- EUR 20 m
 (EUR 15-20 m per project)
- Deadline: 11 Dec 2018







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





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





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.







Flexible operation of fossil fuel power plants and carbon intensive industries

HORIZON 2020





Research and Innovation



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-topower) 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





esearch and novation



LC-SC3-NZE-5-2019

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

- 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







Storage HORIZON 2020





Research and Innovation



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 6-8 m per project)
- Deadline: 25 Apr 2019







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





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 earthabundant 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.

- From TRL 3 to TRL 5
- Research and Innovation Action
- Budget: EUR 15 m
 (EUR 3-4 m per project)
- Deadline: 25 Apr 2019







Smart Cities and Communities





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).





Contribution from the EU

Between EUR 15 to 20 m per project

Deadline to apply: 05 February 2019





Research and Innovation



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 energyrelated actions are financially viable and attractive.

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







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

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







Smart citizen-centered energy system





Flexibility and retail market options for the distribution grid

- Develop and demonstrate integrated solutions with at least two of the following elements:
 - Flexibility measures and grid services;
 - Smart grid technologies, observability, automation, control;
 - Market mechanisms: 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 m
 (EUR 6-8 m per project)
- Deadline: 5 Feb 2019





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.
- 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 5-8 m per project)
- Deadline: 5 Feb 2019



Research and Innovation



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





Research and nnovation



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.







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.







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

esearcn ana novation



Energy efficiency HORIZON 2020





Research and Innovation



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





esearcn ana novation



LC-SC3-EE-2-2018-2019 Integrated home renovation services

- Creating or replicating innovative local or regional services 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.

- 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



#H2020Energy



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.
- 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
- Coordination and Support Action
- Budget: EUR 10 m (EUR 3-4 m per project)
- Deadline: 3 Sep 2019



Topics	Туре	Description	Deadline	Budget project	Budget 2019
LC-SC3-EE-05-2018- 2019-2020	IA	Next-generation of Energy Performance Assessment and Certification	03/09/2019	2-2.5	10 m
LC-SC3-EE-06-2018- 2019-2020	CSA	Business case for industrial waste heat/cold recovery	03/09/2019	1-2	10 m
LC-SC3-EE-08-2018- 2019	CSA	Capacity building programmes to support implementation of energy audits	03/09/2019	1-2	5 m
LC-SC3-EE-10-2018- 2019-2020	CSA	Mainstreaming energy efficiency finance	03/09/2019	1-1.5	6 m
LC-SC3-EE-11-2018- 2019-2020	CSA	Aggregation - Project Development Assistance	03/09/2019	0.5-1.5	6 m
LC-SC3-EE-13-2018- 2019-2020	IA	Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand- side as energy resource	03/09/2019	3-4	8 m
LC-SC3-EE-14-2018- 2019-2020	RIA	Socio-economic research conceptualising and modelling energy efficiency and energy demand	03/09/2019	1-1.5	4 m
LC-SC3-EE-16-2018- 2019-2020	CSA	Supporting public authorities to implement the Energy Union	03/09/2019	1-1.5	10 m
LC-SC3-EE-17-2019	CSA	European City facility - European Cities as key innovation hubs to unlock finance for energy efficiency	05/02/2019	16	16 m
LC-SC3-EE-18-2019	CSA	Bioclimatic approaches for improving energy performance in buildings in Africa and Europe	03/09/2019	1	1 m



Cross-cutting HORIZON 2020







DT-ICT-11-2019 Big data solutions for energy

- Develop/pilot and deploy a reference architecture for large-scale multi-party data exchange, management & governance and real-time processing in the energy sector and to translate this reference architecture into an open, modular data analytics toolbox for the safe and effective operation of grids and provision of innovative energy services.
- Increase the efficiency and reliability of the operation of the electricity network (e.g. by predictive maintenance), to optimize the management of assets connected to the grid, to increase the efficiency and comfort of buildings, and to de-risk investments in energy efficiency.
 - #H2020Energy

- Innovation Action
 - Budget: EUR 40 m
 (EUR 10 m per project)
- Deadline: 2 Apr 2019





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







Prizes HORIZON 2020







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







Current prizes

Title



	CO2 reuse in innovative products	€1.5	3 April 2019
	EC-CO2REUSE-PRIZE@ec.europa.eu	EUR	
		million	
1	Low carbon hospital	€ 1.0	3 April 2019
	Combined Heat and Power	EUR	
٠	installation in a hospital using	million	
	100% renewable energy sources		
-	EC-LOWCARBON-PRIZE@ec.europa.eu		
	Photovoltaics meets history	€ 0.75	26 September
	Integrated Photovoltaic Energy	EUR	2018
	System in a European protected	million	
	historic urban district		
A.	EC-PHOTOVOLTAICS-PRIZE@ec.europa.eu		

Submission by

Budget



Integrated Photovoltaic Energy System

- To develop the most suitable architectural and aesthetical design for photovoltaic energy system in combination with optimal technical solutions, with the least visible impact on and minimal intrusion to the structure of protected historical urban buildings in Europe.
- A new building integrated photovoltaic system
 - >50kWp
 - > 2000h operation
- €750 000 reward









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
 - >2.000.000kWhe
 - > 3700h operation
 - > Innovative storage solution
- €1 m









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







ARTIFICIAL PHOTOSYNTHESIS: FUEL FROM THE SUN

prize

The Challenge

Launched on 12th December 2017

SOLVE THE CHALLENGE

€5 million

Apply by **3 February 2021**



Artificial photosynthesis: fuel from the sun

- Develop the best fully functional prototype producing a sustainable fuel by combining sunlight, water and carbon via an artificial photosynthesis process.
- Award will be given after a grand final of the ten best prototype in which real life operation will be done







RESponsible Island Renewable geographic energy island

- Highlight the potential of renewables in decentralized energy grids by addressing energy needs for electricity, heating, cooling and transport.
- Within this context, the prize recognises realised achievements in renewables on geographic energy islands.
- Ist: 500 000€; 2nd: 250 000€; 3rd: 100 000€







Selection process



#H2020Energy





EU PARTICIPANT PORTAL



European Commission	n Participant Portal							
n Commission	Research & Innovation P	articipant Portal > Home						
ном	FUNDING OPPORTUNITIES	HOW TO PARTICIPATE	EXPERTS	SUPPORT -	Search	Q	LOGIN	REGISTI
	\succ	R			Hoi	rizon 2	020 Fur Starting from	and the second second
	On th	iis site you can find and se	cure fundin	g for projects u	inde <mark>r the</mark> follov	ving EU program	imes:	

- 2014-2020 Horizon 2020 research and innovation framework programme
- 2007-2013 7th research framework programme (FP7) and Competitiveness & Innovation Programme (CIP)
- · 3rd Health Programme, Asylum, Migration and Integration Fund, Consumer Programme, COSME, Internal Security Fund Borders, Internal Security Fund Police, Justice Programme, Promotion of Agricultural Products Programme, Rights, Equality and Citizenship Programme and Research Fund for Coal & Steel

Non-registered users

Registered users

search for funding

- submit your proposal
- sign the grant
- read the H2020 Online Manual & download the legal documents
- check if an organisation is already registered
- · contact our support services or check our FAQs
- manage your project throughout its lifecycle • register as expert advising the Commission







#H2020Energy

1 Where to	Commission	ers?	
European Commission	RESEARCH & INNOVATION Participant Portal ovation > Participant Portal > Partner Search		
Reference Documents Beneficiary Register Partner Search Financial Viability Self-Eneck SME Participation	Enter a keyword or a a organisations. Search	HOW TO broject ideas among the participants in past EU projects. soic of a past call for proposals, for finding related by ge graphical criteria or by types of organisation. artner search service see Online Manual.	
	Involvement of the organisation in EU funded programmes Keyword(s)	Organisation details Organisation name Details	w to ipate' tab
	enter (a) keyword(s) Topic enter a Topic	Organisation type	
2. Partner search	Call enter a Call Programme	Country - V City	
	- v	enter City PIC enter PIC number, e.g. 98765432	
#H2020Energy	Cantoba code Research and Innovation		•









- Submission via the Research & Innovation Participant Portal (electronic submission only)
- Registered user: Submit proposals, sign grant agreements, manage lifecycle etc.
- Very important: Start preparing the proposal as early as possible and submit on time



#H2020Energy



#H2020Energy

Research and



Not applying? Become an evaluator!







Evaluation process

Min. 3 experts per call

Proposals evaluated as submitted

Lower score if shortcomings are identified

Rejecting proposal if weaknesses are identified







What do the experts do?

Understand the call

Evaluate individually - remotely

Meet to reach consensus







Against what do they evaluate?

1. Excellence

2. Impact

3. Quality and efficiency





3



#H2020Energy



Grant agreement

Successful proposals are invited to start a Grant Agreement Preparation

Very tight deadline: max. 8 months

No negotiation phase = no substantial changes







Conclusions

- Large demand and strong competition
- Start preparing your proposals as early as possible
- Check FAQs on the Participant Portal
- Don't wait until the deadline to submit your proposal
- And if you are not submitting proposals, become an evaluator!







What evaluators want







Tip 1: It's competitive: RES-5-2018







Tip 2: Understand Call Conditions and Text







Tip 3: Leave no doubt on TRLs or State of the Art

Start: situation now

End: end of project







Tip 4: Impact is Essential

Substantiate the impacts: credibility is key

Dissemination & exploitation plan

1.5x Weighting for Innovation Actions





Tip 5: Sound Implementation







Tip 6: Simple to Digest



For non-native English speakers...





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









Thank you!

#H2020Energy @inea_eu

EU Participant Portal

www.ec.europa.eu/research/participants





