

# Renewable energy technologies

## The next deadlines and topics



## Horizon 2020 Energy Virtual Info Day

#H2020Energy

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## Low Carbon Energy – 2016/2017 Calls

- Revision of the Work-Programme – July 2016
- 2 stage evaluation for LCE06, LCE07 and LCE31



## Topics of 2017 (1st Stage)

**Type of Action : Research and Innovation Actions (RIA)**

Topic	Activity	Budget (€)
LCE-06-2017	New knowledge and technologies	20,000,000
LCE-07-2016-2017	Developing the next generation technologies of renewable electricity and heating/cooling	64,500,000
LCE-31-2016-2017	Social Sciences and Humanities Support for the Energy Union	10,000,000
	<b>Total</b>	<b>94,500,000</b>

**Status : Submission opening foreseen 29th July 2016**

**Stage 2: August 2017**

## LCE-06-2017: New knowledge and technologies (1/3)

### Aims:

New knowledge and more efficient and cost-competitive energy technologies, including their conventional and newly developed supply chains, are required for the long run. It is crucial that these new technologies show evidence of promising developments and do not represent a risk to society.

### Focus:

- New renewable energy technologies: Developing the new energy technologies that will form the backbone of the energy system by 2030 and 2050
  - Excluding wind energy and sustainable fuels addressed in the other bullet points, and photovoltaic new materials addressed in topic NMBP-17-2016
- Wind energy: Improved understanding of the physics of wind as a primary resource and wind energy technology
  - to increase understanding of the underlying physics and to significantly improve the simulation capability for multi-scale wind flows, loads and materials failure.
- Sustainable Fuels: Diversification of renewable fuel production through novel conversion routes and novel fuels

## LCE-06-2017: New knowledge and technologies (2/3)

### Focus:

- Sustainable Fuels: Diversification of renewable fuel production through novel conversion routes and novel fuels - Diversify the sustainable fuel production taking into account long-term dependencies on fossil fuels of particular transport sectors by developing novel fuels and processes that in the long-term can bring down substantially transport fuel costs while overcoming sustainability constraints and feedstock limitations - biofuels produced from starch, sugar and oil fractions off food/feed crops are excluded
  - Development of novel microorganisms, enzymes and catalysts or a combination of these systems with improved performance for obtaining paraffinic biofuels or higher alcohols from lignocellulosic biomass;
  - Development of renewable alternative fuels from CO<sub>2</sub> in industrial waste flue gases through chemical catalytic conversion;
  - Development of renewable alternative fuels from H<sub>2</sub>O, CO<sub>2</sub> and energy from renewable, autonomous sources through micro-organisms, synthetic molecular systems or chemical synthesis, or a combination of these processes;
  - Development of middle distillate range biofuels (i.e. diesel and jet fuel) from liquid organic or lignocellulosic waste streams through advanced thermochemical conversion processes.



## LCE-06-2017: New knowledge and technologies (3/3)

### Impacts:

- To provide better scientific understanding and guidance enabling the players concerned,
- It is also expected that new, out-of-the-box or advanced innovative ideas will emerge that will provide new impetus to technology pathways, to new solutions, and to new contributions to the energy challenge in Europe or worldwide



## LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling (1/6)

### Aims:

- It is crucial that these new technologies show evidence of promising developments and do not represent a risk to society.

### Focus:

- Photovoltaics: Developing next-generation increased-efficiency high-performance perovskite PV cells and products
  - to further develop perovskite solar cells toward their theoretical power conversion efficiency and their commercially and environmentally viable fabrication
- Concentrated Solar Power (CSP): New cycles and innovative power blocks for CSP plants
  - to validate the feasibility of these concepts in relevant environment
- Solar Heating and cooling (SHC): Development of components for residential single-family solar-active houses
  - To cover at least 60% of the heat demand of a single family home, while minimizing the implications for the user in terms of operation and maintenance of the system



# LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling (2/6)

## Focus:

- Wind Energy: Reduction of environmental impact of wind energy
  - to develop potential mitigating strategies or alternative solutions and to increase public acceptance of wind energy, thereby shortening consenting procedures, on the basis of an increased scientific understanding of the social and environmental impact of wind turbines and (clusters of) wind farms both on and off-shore (including floating) and to identify solutions for improved wind turbines/farms with less impact
- Ocean Energy: Development of advanced ocean energy subsystems: innovative power take-off systems and control strategies
  - to improve performance of ocean energy devices and reduce the overall cost of ocean energy by means of the demonstration of innovative power take-off systems and control strategies
- Hydropower: Increasing flexibility of hydropower
  - New technologies, generators and turbine designs need to be developed to increase ramping rates and to allow start-stop-cycles to reach up to 30 times per day depending on head and volume





# LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling (3/6)

## Focus:

- Geothermal Energy: Deep Geothermal (medium-high temperature) - Materials for geothermal installations
  - to develop new materials and systems to increase efficiency and longevity of the installations, by securing the integrity of the well and of the equipment, with particular reference to the pumps
- Combined Heat and Power: Transforming renewable energy into intermediates
  - to develop viable processes and deliver possible economic benefits along the value chain via power-to-gas and/or power-to-liquid concepts for RHC, transport and storage applications, using hydrogen or syngas or liquid renewable carriers produced from excess electricity from PV or wind for biomass gasification or liquefaction or in biogas plants to enhance the yields of syngas or biogas as well as for waste carbon upgrading
- RES integration in the energy system: RES system support functions for the future energy system
  - to define and develop system support functions or ancillary services for the contribution of different RES technologies to stable and safe energy system operations in the best technical and economic way is needed.



## **LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling (4/6)**

- Address performance and cost targets together with relevant key performance indicators, expected impacts, as well as provide for development of explicit exploitation plans
- Technical issues, synergies between technologies, regional approaches, socio-economic and environmental aspects from a life-cycle perspective (including public resistance and acceptance, business cases, pre-normative and legal issues, pollution and recycling) need to be appropriately addressed wherever relevant



## LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling (5/6)

### Impacts for all excluding "RES integration in the energy system":

- Reduce the technological risks for the next development stages;
- Significantly increased technology performance;
- Reducing life-cycle environmental impact;
- Nurturing the development of the industrial capacity to produce components and systems and opening of new opportunities;
- Contributing to the strengthening the European industrial technology base, thereby creating growth and jobs in Europe;
- Reducing renewable energy technologies installation time and cost and/or operational costs, hence easing the deployment of renewable energy sources within the energy mix;
- Increasing the reliability and lifetime while decreasing operation and maintenance costs, hence creating new business opportunities;
- Contributing to solving the global climate and energy challenges



## LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling (6/6)

### **Impacts for "RES integration in the energy system":**

- Improving EU energy security;
- Making variable renewable electricity generation more predictable and grid friendly, thereby allowing larger amounts of variable output renewable sources in the grid;
- Bringing cohesion, coherence and strategy in the development of new renewable energy technologies;
- Contributing to solving the global climate and energy challenges;



# LCE-31-2016-2017: Social Sciences and Humanities Support for the Energy Union

## **Aims:**

- A number of cross-cutting issues need to be better understood, particularly those relating to socioeconomic, gender, sociocultural, and socio-political aspects of the energy transition.

## **Focus in 2017:**

- Socioeconomic incentive structures that encourage or discourage energy-responsible behaviour;
- Political, institutional, and organizational frameworks that condition and structure citizen participation, including questions of inclusiveness, gender, democracy, organizational formats and business models

## **Impacts:**

- provide a better understanding of these factors and their interrelations with technological, regulatory, and investment-related aspects
- further the completion of the Energy Union and particularly its research and innovation pillar



## Topics of 2017 (Single Stage)

**Type of Action : Research and Innovation Actions (RIA)[mainly]**

Topic	Activity	Budget (€)
LCE-08-2016-2017	Development of next generation biofuel technologies	10,000,000
LCE-21-2017 (CSA)	Market uptake of renewable energy technologies	15,000,000
	<b>Total</b>	<b>25,000,000</b>

**Status : Submission opening foreseen 20<sup>th</sup> September 2016**



## LCE-08-2016-2017: Development of next generation biofuel technologies

### Aims:

- Improving the technology competitiveness by upgrading the conversion efficiency and possibly diversifying the technology
- Improving the feedstock supply by reducing the supply costs and possibly diversifying the biomass feedstock

### Focus:

- Biofuels from CO<sub>2</sub> in industrial waste flue gases through biochemical conversion by autotrophic ( chemo and photo –autotrophic) micro-organisms
- Biofuels from organic fraction of municipal and industrial wastes through thermochemical, biochemical or chemical pathways with improved performance and sustainability;
- Biofuels from phototrophic algae & bacteria with improved performance and sustainability.



## LCE-08-2016-2017: Development of next generation biofuel technologies

### Impacts:

- The new developed technology pathways should improve the economic, environmental and social benefits of biofuels.
- Favourable energy and GHG balances are expected, as well as a significant cost reduction, which would permit these fuels to compete favourably with conventional biofuels.
- A favourable performance on secure and affordable energy supply and diversified, cheap feedstock supply are expected.
- In addition, positive impacts on enhancing Europe's competitiveness should be anticipated where appropriate





## LCE-21-2017: Market uptake of renewable energy technologies (1/3)

### Aims:

- To ensure the level of growth needed to deliver the technology deployment rates at least to the level planned in the National Renewable Energy Action plans and their necessary contribution to the 2020 RES targets

### Impacts:

- To increase the share of renewable energy in the future energy mix and to increase the share of sustainable advanced biofuels and renewable alternative fuels in the final EU transport energy consumption or facilitate those increases in the future

### Focus:

- Photovoltaics: Tackling the bottlenecks of high penetration levels of PV electricity into the electric power network:
  - To enable the effective and efficient integration of growing shares of PV power into the grid, the idea of PV producers becoming "prosumers" – both producers and consumers of energy – is gaining ground while "self-consumption" is becoming a major driver for the installation of small distributed PV systems.



## LCE-21-2017: Market uptake of renewable energy technologies (2/3)

### Focus:

- Heat Pumps: Accelerate the penetration of heat pumps for heating and cooling purposes:
  - Identification of the most promising cost reduction options for CAPEX, installation costs, and OPEX as well as development of EU wide scenarios of deployment; proposed prioritisation of R&I investments and development of solutions for innovative system integration and integrated power management for household/industrial buildings
- CSP: Facilitating the supply of electricity from CSP plants in Southern Europe to Central and Northern European countries
  - The challenge is to identify all issues (technological, legal, economic, political, social, financial, etc.) that may constitute an obstacle to the supply of renewable electricity on demand from CSP plants to Central and Northern European countries (other than those bottlenecks related to building new physical interconnections), and to identify possible solutions and propose options for addressing the issues in the context of a concrete project case.
- Sustainable Fuels: Facilitating the market roll-out of liquid advanced biofuels and liquid renewable alternative fuels:
  - The challenge is to enable commercialisation of advanced biofuels to help meeting the 10% target for Renewable Energy Sources in the EU transport energy consumption by 2020



## LCE-21-2017: Market uptake of renewable energy technologies (3/3)

### Focus:

- Wind energy: Increasing the market share of wind energy systems:
  - i) Develop spatial planning methodologies and tools for new onshore wind and repowering of old wind farms taking into account environmental and social impacts but also the adoption of the latest developments in wind energy technology;
  - ii) Identify the bottlenecks for further deployment in Europe and the regulations which limit the adoption of technological innovation and their deployment possibilities;
  - iii) Increase the social acceptance and support for wind energy in 'wind energy scarce regions' using, with solid involvement of social sciences and humanities and local communities and civil society to understand best practices and to increase knowledge about social and environmental impact of wind energy
- Geothermal energy: Tackling the bottlenecks of high penetration levels for geothermal energy systems:
  - The challenge is to assess the nature of public concerns and the elements that influence individual and group's perception of geothermal installations, to increase the understanding of the socio-economic dimension of geothermal energy, and to promote change in community responses to new and existing geothermal installations.



## Topics of 2017 (Single Stage)

Topic	Activity	Budget (€)
LCE-35-2017* (ERA-NET Cofund)	Joint Actions to foster innovative energy solutions in renewable energy technologies	26,000,000
LCE-36-2016-2017 (CSA)	Support to the energy stakeholders to contribute to the SET-Plan (geothermal energy)	600,000
	<b>Total</b>	<b>26,600,000</b>

**\* Topics with 2 cut-off dates: 16/02/2017 & 07/09/2017**

**Status : Submission opening foreseen 20<sup>th</sup> September 2016**

**Deadline  
7 September 2017**

## Topics of 2017 (Single Stage)

Topics (IA)	Activity	Budget (€)
LCE-10-2017	Reducing the cost of PV electricity	10,000,000
LCE-11-2017	Near-to-market solutions for reducing the water consumption of CSP Plants	12,000,000
LCE-12-2017	Near-to-market solutions for the use of solar heat in industrial processes	8,000,000
LCE-14-2017	Demonstration of large >10MW wind turbine	25,000,000
LCE-16-2017	2nd Generation of design tools for ocean energy devices and arrays development and deployment	7,000,000
LCE-17-2017	Easier to install and more efficient geothermal systems for retrofitting buildings	8,000,000
LCE-18-2017	EGS in different geological conditions	10,000,000
LCE-19-2016-2017	Demonstration of the most promising advanced biofuel pathways	15,000,000
LCE-20-2016-2017	Enabling pre-commercial production of advanced aviation biofuel	10,000,000
	<b>Total</b>	<b>105,000,000</b>

**Status : Submission opening foreseen 11<sup>th</sup> May 2017**



# IMPACTS

## **Short term:**

- Cost reduction;
- Increased performance;
- Reduced energy payback time;
- Improved deployment perspective;

## **Longer term:**

- Improve industrial leadership;
- Create jobs and growth;



## LCE-10-2017: Reducing the cost of PV electricity

### **Aims:**

- Reduction of their cost and the enhancement of their performance show ample margins for improvement and can considerably help reducing price and accelerating large-scale deployment of PV installations;

### **Focus:**

- From TRL 5-6 to 6-7
- Proposals are requested to address the reduction of the cost of PV electricity by optimising the PV system energy yield and lifetime and decreasing cost at module (encapsulation materials, glass, and antireflective layers, anti-soiling layers, module architecture, etc.), balance-of-system component (electronics, inverters, tracking systems, etc.) or system configuration levels.



## LCE-11-2017: Near-to-market solutions for reducing the water consumption of CSP Plants

### Aims:

- to drastically reduce water consumption as well as costs thereby contributing to achieving the SET-Plan targets for CSP;

### Focus:

- TRL 7 shall be achieved at the end of project activities
- Projects shall demonstrate cost-effective technical solutions which significantly reduce or replace the water consumption of CSP plants. The demonstration shall take place in a region with very good solar resource values (Direct Normal Irradiation > 2000 kWh/m<sup>2</sup> year).
- Engaging and involving local communities, and further investigating the roots of social acceptance or any resistance to CSP plants, so as to develop mitigating strategies or alternative solutions, should likewise be part of the project.





## LCE-12-2017: Near-to-market solutions for the use of solar heat in industrial processes

### **Aims:**

- To reduce the technical complexity and develop cost effective solutions;

### **Focus:**

- TRL 7 shall be achieved at the end of project activities
- Proposals shall demonstrate less complex and cost effective technical solutions which significantly increase the share of solar heat in industrial processes and which can be easily integrated into existing industrial plants.



## LCE-14-2017: Demonstration of large >10MW wind turbine

### Aims:

- To demonstrate and construct now a full scale >10MW turbine and provide proof of a significant cost reduction potential;

### Focus:

- TRL 7 shall be achieved at the end of project activities
- The development of large scale (>10MW) turbines will have intrinsically logistical requirements regarding handling, installation, operation and maintenance, constituting a large part of the levelised cost of energy (LCOE). Improved handling (storage, loading, transport, etc.) on land, in the harbours and/or at sea, as well as improved logistics around operations and maintenance have to be taken into account in this innovation action



# LCE-16-2017: 2nd Generation of design tools for ocean energy devices and arrays development and deployment

## Aims:

- To develop and demonstrate new advanced tools based on the first experiences of ocean energy arrays. Enabling technical risk reduction and attracting investors for future innovative array designs;

## Focus:

- TRL 6 shall be achieved at the end of project activities
- 2nd generation of advanced tools is foreseen which will have a significant positive effect on future devices and arrays.
- The action should clearly include an (economic) analysis of supply chains and (potential) markets and assess economic feasibility, develop a cost-benefit methodology and propose pricing methods. Eventually new or improved business and management models can be proposed.
- Aim to critically evaluate relevant legal, institutional and political frameworks and ask how, why and under what conditions these could act as a barrier or an enabling element for future deployment of ocean energy



## LCE-17-2017: Easier to install and more efficient geothermal systems for retrofitting buildings

### **Aims:**

- To demonstrate the cost-effectiveness and efficiency of geothermal systems for heating and cooling in individual installations being retrofitted;

### **Focus:**

- TRL 7 shall be achieved at the end of project activities
- Proposals shall target easy to install and efficient underground coupling systems for retrofitting existing types of buildings or adaptable to existing types of buildings, including historical buildings, to make geothermal energy a standard source of heat and cold in building renovation
- The difficulties in drilling in built environments must be taken into consideration and properly addressed
- This topic will contribute to the PPP on Energy-efficient Buildings



## LCE-18-2017: EGS in different geological conditions

### **Aims:**

- Enhanced geothermal systems (EGS) have to be demonstrated as cost-competitive whereby innovative solutions are needed to allow for applications in geologic systems with different characteristics and of different origin;

### **Focus:**

- TRL 7 shall be achieved at the end of project activities
- Proposals should aim at testing EGS systems to ensure reservoir productivity in different geological settings and energy production at competitive costs



## LCE-20-2016-2017: Enabling pre-commercial production of advanced aviation biofuel

### Aims:

- To enable commercial production of sustainable and cost-competitive advanced biofuels aimed for use in the aviation sector

### Focus:

- Moving technologies from TRL 5-6 to TRL 6-7
- The ultimate production target of aviation biofuel for the complete plant shall be in the range of several tens of thousand tonnes per year
- Biofuel must be fully compliant with international aviation fuel standards and therefore suitable for commercial flight operations.
- Address the entire value chain including the supply chain of sustainable biomass feedstock and the actual use of the produced biofuel in aviation
- Biofuels produced from starch, sugar and oil fractions of food/feed crops are excluded
- Industrial involvement in the consortium and explicit exploitation plans are a prerequisite (business plan, off-take agreement, etc...)



## Further Information

- **Horizon 2020 Helpdesk - Research Enquiry Service:**  
<http://ec.europa.eu/research/index.cfm?pg=enquiries>
- **National Contact Points (NCPs):**  
[http://ec.europa.eu/research/participants/portal/desktop/en/support/national\\_contact\\_points.html](http://ec.europa.eu/research/participants/portal/desktop/en/support/national_contact_points.html)
- **Enterprise Europe Network:**  
<http://een.ec.europa.eu/about/branches>
- **Participant Portal:**  
<http://ec.europa.eu/research/participants/portal/desktop/en/home.html>



# Thank you for your attention!

Find out more:

[www.ec.europa/research/horizon2020](http://www.ec.europa/research/horizon2020)