



THE EU FRAMEWORK PROGRAMME  
FOR RESEARCH AND INNOVATION

**HORIZON 2020**

**Competitive Low Carbon  
Energy 2014-2015 Call**

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## **Thematic scope of the Energy Challenge (according to the Horizon 2020 Specific Programme)**

- **Reducing energy consumption and carbon footprint by smart and sustainable use**

New concepts, non-technological solutions, technology components and systems for buildings, cities/districts, industry and individuals

- **Low-cost, low-carbon electricity supply**

innovative renewables, efficient and flexible fossil fuel power plants and carbon capture and storage, or CO<sub>2</sub> re-use technologies

- **Alternative fuels and mobile energy sources**

bio-energy; power and heat; surface, maritime and air transport; hydrogen and fuel cells; new options



## **Thematic scope of the Energy Challenge (according to the Horizon 2020 Specific Programme)**

- **A single, smart European electricity grid**

smart energy grid technologies, including storage; systems and market designs to plan, monitor, control and safely operate interoperable networks; standardisation issues; emergency conditions

- **New knowledge and technologies**

multi-disciplinary research for energy technologies (including visionary actions)

- **Robust decision making and public engagement**

tools, methods, models and perspective scenarios for a robust and transparent policy support

- **Market uptake of energy innovation**

applied innovation; promotion of standards; non-technological barriers; smart and sustainable use of existing technologies



# Call LCE: Competitive Low-carbon Energy

- New knowledge and technologies
- **Renewable electricity and heating/cooling**
- Modernising the single **European electricity grid**
- Providing the energy system with flexibility through enhanced **energy storage technologies**
- **Sustainable biofuels and alternative fuels** for the European transport fuel mix
- Enabling the decarbonisation of the use of fossil fuels during the transition to a low-carbon economy
- Supporting the development of a **European Research Area in the field of Energy**
- **Social, environmental and economic aspects of the energy system**
- **Cross-cutting issues**

# Call LCE: areas to be addressed

	AREA	TRL	TYPE
LCE 1	New knowledge and technologies	2 > 3-4	RIA
<b>Renewable electricity and heating/cooling</b>			
LCE 2	Developing the next generation technologies of renewable electricity and heating/cooling	3-4 > 4-5	RIA
LCE 3	Demonstration of renewable electricity and heating/cooling	5-6 > 6-7	IA
LCE 4	Market uptake of existing and emerging renewable electricity, heating and cooling technologies	7-9	CSA

# LCE-01 – 2014

## *Challenge*

- To bring more efficient and cost-competitive energy conversion technologies out of the lab

## *Impact*

- To provide impetus to new technology pathways
- To provide better scientific evidence to frame new strategic choices

## **LCE-02 – 2014 - Challenges**

- **PV:** *Developing next generation high performance PV cells and modules*
- **CSP:** *Making CSP plants more cost competitive*
- **Wind:** *Develop control strategies and innovative substructure concepts*
- **Ocean:** *Develop emerging designs and components*
- **Hydropower:** *Boosting peak power through sustainable hydropower*
- **Deep Geothermal:** *Development of new drilling technologies and concepts for geothermal energy*
- **Renewable Heating & Cooling:**
  - *Solar cooling systems*
  - *Improving efficiency of biomass CHP systems while widening the feedstock base*

## LCE-02 – 2015 - Challenges

- **PV:** *Developing very low-cost PV cells and modules*
- **CSP:** *Improving the environmental profile of the CSP technology*
- **Wind:** *Substantially reduce the costs of wind energy*
- **Ocean:** *Ensure efficiency and effective long term cost reduction and high levels of reliability and survivability*
- **Hydropower:** *Increasing flexibility of hydropower*
- **Deep Geothermal:** *Development of new technologies and concepts for geothermal energy*
- **Renewable Heating & Cooling:**
  - *Solar heating for industrial processes*
  - *Improving efficiency of low emission biomass CHP systems while widening the feedstock base [focus on boilers]*





# LCE-03 – 2014 - Challenges

- **PV:** *Accelerating the development of the EU Inorganic Thin-Film (TF) industry*
- **CSP:** *Improving the flexibility and predictability of CSP generation*
- **Wind:** *Demonstrating and testing of new nacelle and rotor prototypes*
- **Ocean:** *Demonstration of ocean energy technologies*
- **Renewable Heating & Cooling:**
  - *Shallow geothermal energy: Improved vertical borehole drilling technologies to enhance safety and reduce costs*



# LCE-03 – 2015 - Challenges

- **PV:** *PV integrated in the built environment*
- **Wind:** *Demonstrating innovative substructure and floating concepts*
- **Ocean:** *Demonstration of ocean energy technologies*
- **Deep Geothermal:** *Testing of enhanced geothermal systems in different geological environments*
- **Renewable Heating & Cooling:**
  - Demonstration of solar technologies for residential and non-residential buildings



## LCE-04 – 2014 & 2015 - Challenges

Ensuring the level of growth needed to deliver the EU targets for renewable energy, and creating the appropriate business environment for EU industrial leadership

→ *The challenges are*

- Ensuring sustained public acceptance
- Ensuring speedy and user friendly permitting procedures
- Implementing renewable energy policies, codes and legislations ... in a coordinated manner using best practice
- Capacity building and contributing to the further development of renewable energy policy, legislation and regulation
- Capacity building and facilitating the deployment of improved business models and innovative financing schemes for mobilising investments



# Call LCE: areas to be addressed

	AREA	TRL	TYPE
<b>Modernising the European electricity grid</b>			
LCE 5	Innovation and technologies for the deployment of meshed offshore grids	6-7 > 8	IA
LCE 6	Transmission grid and wholesale market		IA, RIA
LCE 7	Distribution grid and retail market		IA, CSA
<b>Energy storage technologies</b>			
LCE 8	Local/small scale storage	5 > 6	IA
LCE 9	Large scale storage	5 > 6-7	IA
LCE 10	Next generation technologies for energy storage	2 > 5	RIA

# Call LCE: areas to be addressed

	AREA	TRL	TYPE
<b>Sustainable biofuels and alternative fuels for transport</b>			
LCE 11	Developing next generation technologies for biofuels and sustainable alternative fuels	3-4 > 4-5	RIA
LCE 12	Demonstrating advanced biofuel technologies	5-7 > 6-7	IA
LCE 13	Partnering with Brazil on advanced biofuels	5-7 > 6-7	IA
LCE 14	Market uptake of existing and emerging sustainable bioenergy	7-9	CSA



# LCE-11 – 2014 - Challenges

Europe has limited biomass and land resources to cope with an increased demand for fuels and other uses. Thus, in the long-term perspective, new technologies of sustainable biofuels and alternative fuels need to be developed that radically improve the state-of-art.

→ *The challenges are*

- Improving conversion efficiency and/or enlargement of the biomass feedstock basis.
- Developing alternative fuels through use of new and sustainable resources from non-biomass non-fossil sources

# LCE-12 – 2014 - Challenges

New and advanced biofuels using sustainable feedstock need to reach the market

→ *The challenges are*

- Proving that advanced biofuels and bioenergy carriers technologies, are technically viable, environmentally and socially sustainable, and potentially cost-competitive at commercial scale.
- Developing logistic systems for a sound, safe and sustainable feedstock supply.



## LCE-13 – 2014 – Challenges

Fostering the development of advanced biofuels and accelerate their commercialisation both in Brazil and in Europe

→ *The challenges are*

- Exploiting synergies between Brazil and Europe in terms of scientific expertise, industrial capacity and resources.
- Proving that the integration of advanced biofuels technologies into existing sugarcane ethanol plants is technically feasible, cost competitive and environmentally and socio-economically sustainable at commercial scale. Joint work should build upon the Brazilian sugarcane ethanol model, and benefit from the Brazilian and European experience in biofuels.
- Developing or improving logistic systems for a sound and sustainable feedstock supply



# LCE-14 – 2014 - Challenges

Sustainable bioenergy technologies (both existing and emerging) need to further penetrate the market.

→ *The challenges are*

- Encouraging the EU farmers and foresters to produce also energy and energy intermediaries
- Setting up or strengthening sustainable local bioenergy supply chains
- Development of methodologies for the traceability of biomass feedstocks
- ...

# Call LCE: areas to be addressed

	AREA	TRL	TYPE
<b>Enabling the decarbonisation of the use of fossil fuels</b>			
LCE 15	Enabling decarbonisation of the fossil fuel-based power sector and energy intensive industry through CCS	4-5 > 6	RIA
LCE 16	Understanding, preventing and mitigating the potential environmental impacts and risks of shale gas exploration and extraction		RIA
LCE 17	Highly flexible and efficient fossil fuel power plants	3 > 4-6	RIA
<b>Supporting the development of a European Research Area in the field of Energy</b>			
LCE 18	Supporting Joint Actions on demonstration and validation of innovative energy solutions	5-6 > 6-7	ERA-NET
LCE 19	Supporting coordination of national R&D activities	2 > 5	CSA

# LCE-15 – 2014 & 2015 - Challenges

The application of CCS to industrial sectors other than power (e.g. steel, cement, lime, chemical industry, refining) is expected to deliver half of the global emissions reduction from CCS by 2050

→ *The challenges are*

- Geological storage
- Application of CCS to industrial sectors other than power, including bio-CCS

# LCE-16 – 2014 - Challenges

→ *The challenges are*

Addressing the associated environmental concerns, in particular through a better understanding and monitoring of the fracturing process and its environmental effects (including in the long term), treatment and recycling of flow-back and produced water, and mitigation of induced seismicity and emissions to air (including greenhouse gases).

## LCE-17 – 2015 - Challenges

With this growing share of renewable power, fossil fuel power plants will have to increasingly shift their role from providing base-load power to providing fluctuating back-up power

→ *The challenge is*

Operational flexibility for fossil fuel power (and CHP) plants



# LCE-18 – 2014 - Challenges

EU funding remains a limited part of the overall funding across Europe.

→ *The challenges are*

Coordinating the research efforts of the participating Member States, Associated States and Regions in the areas and challenges targeted in this 'Competitive low-carbon energy' call or in the 'Smart Cities and Communities' call and to implement a joint transnational call for proposals



# LCE-19 – 2014 - Challenges

EU funding remains a limited part of the overall funding across Europe.

→ *The challenges are*

*Achieving greater impact from scarce public and private resources through synchronisation of funding processes by fostering cross-border cooperation among partners supported by national projects and programmes.*

# Call LCE: areas to be addressed

	AREA	TYPE
	<b>Social, environmental and economic aspects of the energy system</b>	
LCE 20	The human factor in the energy system	RIA, CSA
LCE 21	Modelling and analysing the energy system, its transformation and impacts	RIA
	<b>Cross-cutting issues</b>	
LCE 22	Fostering the network of National Contact Points	CSA





# LCE-20 – 2014 - Challenges

Availability of skilled workforce.

→ *The challenges are*

*Foster European cooperation in this area by building European networks, both in the university based education sector and in the vocational education and training sector, establishing close links to business and research.*



## LCE-21 – 2014 - Challenges

Due to the interactions and interdependencies between the different actors, the available technologies and the impact of the different interventions on all levels from the individual to the whole energy system need to be better understood.

The choice of a particular portfolio of energy technologies has far reaching impacts not only on the energy system, but also on the environment, the economy and the society.

**→ *The challenges are***

*To provide model based decision support tools for the different actors in the energy system in order to facilitate handling the complex system*



# LCE-22 – 2014 - Challenges

Facilitate trans-national co-operation between National Contact Points (NCPs) within this Societal Challenge with a view to identifying and sharing good practices and raising the general standard of support to programme applicants, taking into account the diversity of actors that make up the constituency of this Societal Challenge