

SC3 - Secure, clean and efficient energy



The 2018-2020 Work Programme of the Societal Challenge 3 consists of one main call for proposals titled: **“Building a low-carbon, climate resilient future: secure, clean and efficient energy”**, with an overall estimated budget over the three years equal to **1,77 Billion Euro**.

In order to reach the goals of the Paris Agreement, the "Clean Energy for all European" package, and the Strategic Energy Technology (SET)-Plan priorities, a series of Research and Innovation activities supported in this call should deliver: on the supply side, **cheaper and more performant generation technologies**; a **smarter, more flexible and resilient energy system**; on the demand side, **increased overall energy efficiency**; a **better understanding of the specific socio-economic contexts**; **increased market-uptake of innovations**, including the implementation of **energy policy**, the preparation for **rolling-out investments**, and the support for **capacity-building**.

The topics of SC3 are grouped within the following 8 thematic areas:



ENERGY EFFICIENCY



GLOBAL LEADERSHIP IN RENEWABLES



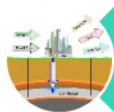
SMART AND CLEAN ENERGY FOR CONSUMERS



SMART CITIZEN-CENTRED ENERGY SYSTEM



SMART CITIES AND COMMUNITIES



ENABLING NEAR-ZERO CO₂ EMISSIONS FROM FOSSIL FUEL POWER PLANTS AND CARBON INTENSIVE INDUSTRIES



JOINT ACTIONS



CROSS-CUTTING ISSUES



Research and Innovation on **Fuel Cells and Hydrogen technologies** is not funded within this Societal Challenge (apart from [this topic](#)). For open topics on these technologies please visit the [Joint Undertaking - Fuel Cells and Hydrogen \(JU FCH2\)](#).



ENERGY EFFICIENCY

Energy efficiency needs to be considered as a source of energy in its own right. An ambitious approach to energy efficiency is needed across all the sectors, but the major challenge of the next decade – in line with the ACEI priority to decarbonise the EU building stock by 2050 – lies in **buildings**.

Digital smart technologies will be playing an increasingly important role. In this framework, this call supports both technology and business development and test it in real market & regulatory conditions to pave the way towards the uptake of innovative energy services enabled by energy decarbonisation, decentralisation and digitalisation.

Innovation is however also needed in the **financing of energy efficiency** where innovative financing schemes and approaches can help bridge the gap between project development and financing.

Upgrading buildings' energy performance and smartness			
Action	Topic	Opening date	Deadline(s)
IA	Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
CSA	Integrated home renovation services	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
CSA	Stimulating demand for sustainable energy skills in the construction sector	24/01/2019	03/09/2019
IA	Upgrading smartness of existing buildings through innovations for legacy equipment	24/01/2019	03/09/2019
CSA	Next-generation of Energy Performance Assessment and Certification	25/01/2018	04/09/2018
IA		24/01/2019	03/09/2019
Energy efficient industry and services			
Action	Topic	Opening date	Deadline(s)
IA	Business case for industrial waste heat/cold recovery: <i>Cost-benefit models for industrial waste heat/cold recovery</i>	25/01/2018	04/09/2018
CSA	Business case for industrial waste heat/cold recovery: <i>Symbiosis in industrial parks and clusters- non-technological barriers</i>	24/01/2019	03/09/2019
CSA	Capacity building programmes to support implementation of energy audits	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
Energy efficiency is an investment			
Action	Topic	Opening date	Deadline(s)
CSA	Innovative financing for energy efficiency investments	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
	Mainstreaming energy efficiency finance	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
	Aggregation - Project Development Assistance	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
Energy efficiency is an energy source			
Action	Topic	Opening date	Deadline(s)
CSA	Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource	25/01/2018	04/09/2018
IA		24/01/2019	03/09/2019
RIA	Socio-economic research conceptualising and modelling energy efficiency and energy demand: <i>make the energy efficiency first principle more operational</i>	25/01/2018	04/09/2018
RIA	Socio-economic research conceptualising and modelling energy efficiency and energy demand: <i>substantiate the demand side aspects in energy modelling</i>	24/01/2019	03/09/2019
Support for policy-driven innovations			
Action	Topic	Opening date	Deadline(s)
CSA	New energy label driving and boosting innovation in products energy efficiency	25/01/2018	04/09/2018
	Supporting public authorities to implement the Energy Union	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
	European City facility - European Cities as key innovation hubs to unlock finance for energy efficiency	01/08/2018	05/02/2019

RIA: Research and Innovation Action

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CSA: Coordination and Support Action

COFUND: Co-funding of regional, national and international programmes

PCP: Pre-Commercial Procurement



GLOBAL LEADERSHIP IN RENEWABLES

Actions in this area aim to produce solutions to support the worldwide large-scale deployment of renewable energy, its broader penetration in the energy and transport mix to significantly contribute to the decarbonisation of the global economy of the future. Actions will make **renewable energy solutions cost competitive** with their fossil equivalents, allowing them to participate in the energy and transport markets. They will support the **transition to a decentralized energy system** where the citizens are empowered to take an active role and become prosumers. In addition to the Energy Union strategy, actions will contribute to the broader EU policies and objectives of growth and jobs, promoting **production of more affordable energy** in Europe and sustaining European players to succeed in the global energy and transport markets, giving special consideration to **cooperation with strategic partner countries/regions**.

Next Renewables energy solutions			
Action	Topic	Opening date	Deadline(s)
RIA	Developing the next generation of renewable energy technologies	01/08/2018	16/10/2018
	Disruptive innovation in clean energy technologies	05/12/2017	25/04/2019
Renewable energy solutions for implementation at consumer scale			
Action	Topic	Opening date	Deadline(s)
RIA	Renewable energy system integrated at the building scale	31/10/2017	31/01/2018
			23/08/2018
IA	Increased performance of technologies for local heating and cooling solutions	31/10/2017	13/02/2018
IA	Demonstrate significant cost reduction for Building Integrated PV (BIPV) solutions	31/10/2017	13/02/2018
RIA	Solar Energy in Industrial Processes	07/05/2019	27/08/2019
IA	Combining Renewable Technologies for a Renewable District Heating and/or Cooling System	05/09/2018	11/12/2018
Renewable energy solutions for energy system level implementation			
Action	Topic	Opening date	Deadline(s)
RIA	Developing solutions to reduce the cost and increase performance of renewable technologies	31/10/2017	31/01/2018
			23/08/2018
IA	Demonstrate highly performant renewable technologies for combined heat and power (CHP) generation and their integration in the EU's energy system	31/10/2017	13/02/2018
IA	Demonstrate solutions that significantly reduce the cost of renewable power generation	31/10/2017	13/02/2018
RIA	Optimising manufacturing and system operation	01/08/2018	16/10/2018
			25/04/2019
IA	Increase the competitiveness of the EU PV manufacturing industry	05/09/2018	11/12/2018
RIA	Development of solutions based on renewable sources that provide flexibility to the energy system	07/05/2019	27/08/2019
IA	Demonstration of solutions based on renewable sources that provide flexibility to the energy system	05/09/2018	11/12/2018
Renewable Fuels for transport			
Action	Topic	Opening date	Deadline(s)
RIA	Development of next generation biofuels and alternative renewable fuel technologies for road transport	31/10/2017	13/02/2018
IA	Demonstration of cost effective advanced biofuel pathways in retrofitted existing industrial installations	05/12/2017	05/04/2018
RIA	Development of next generation biofuel and alternative renewable fuel technologies for aviation and shipping	07/05/2019	27/08/2019
IA	Boosting pre-commercial production of advanced aviation biofuels	05/09/2018	11/12/2018
Market Uptake Support			
Action	Topic	Opening date	Deadline(s)
CSA	Market Uptake support	31/10/2017	13/02/2018
		05/09/2018	11/12/2018

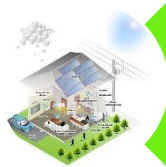
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SMART AND CLEAN ENERGY FOR CONSUMERS

The Clean Energy for all Europeans package places **consumers firmly at the centre of the energy transition**, with consumers considered as active market players in the energy system. The future consumer should be **better informed and more aware**, and have an **increased capacity to fully engage in energy markets**.


Although the energy transition is expected to lead to a number of benefits for consumers, **energy poverty** continues to affect the quality of life of a significant number of European citizens. In combination with financial interventions and building retrofitting, low-cost measures at the household level and use of renewable energy are key solutions in alleviating energy poverty. We should also test today what are the **right incentives that can be put in place** so as to reward consumers when playing a role in increasing the share of variable renewables in the electricity mix.

Action	Topic	Opening date	Deadline(s)
CSA	The role of consumers in changing the market through informed decision and collective actions	25/01/2018	04/09/2018
		24/01/2019	03/09/2019
	Mitigating household energy poverty	25/01/2018	04/09/2018
		24/01/2019	03/09/2019



SMART CITIZEN-CENTRED ENERGY SYSTEM

A first group of topics is expected to **increase the capacity of the European electricity grid to host a larger share of variable renewables** so as to accelerate its decarbonisation. For this purpose, stronger engagement of consumers is needed, more flexibility services for both distribution and the transmission grids, higher levels of regional cooperation at transmission levels and well-functioning retail and wholesale markets that are capable of financing necessary investments. A second group of topics is expected to **impact on the decarbonisation of energy systems on geographical islands and at local levels on the mainland** taking advantage of the availability of local renewables resources, the specificity of the demand and of the local energy networks to design and demonstrate low carbon local energy system.

Action	Topic	Opening date	Deadline(s)
IA	Flexibility and retail market options for the distribution grid	05/09/2018	05/02/2019
IA	Solutions for increased regional cross-border cooperation in the transmission grid	05/09/2018	05/02/2019
IA	Integrated local energy systems (Energy islands) 	05/12/2017	05/04/2018
IA	Decarbonising energy systems of geographical Islands	05/12/2017	05/04/2018
IA	TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation	05/12/2017	05/04/2018
RIA	Research on advanced tools and technological development	05/09/2018	05/02/2019
CSA	Pan-European Forum for R&I on Smart Grids, Flexibility and Local Energy Networks	05/12/2017	05/04/2018
CSA	European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts	05/09/2018	05/02/2019

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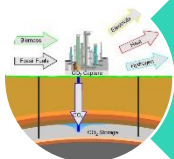
PCP: Pre-Commercial Procurement



SMART CITIES AND COMMUNITIES



To achieve the necessary energy transition in cities, it is essential to **increase energy systems integration** and to **push energy performance levels** significantly beyond the levels of current EU building codes and to realize Europe wide deployment of Positive Energy Districts by 2050.

Action	Topic	Opening date	Deadline(s)
CSA	Smart Cities and Communities	05/12/2017	05/04/2018
		05/09/2018	05/02/2019



ENABLING NEAR-ZERO CO2 EMISSIONS FROM FOSSIL FUEL POWER PLANTS AND CARBON INTENSIVE INDUSTRIES

Carbon Capture & Storage (CCS) is one of the key promising technologies that can reduce CO2 emissions in the power generation sector. In order to realise its potential, **CCS needs to become a cost-competitive technology and prove its safety**. Key challenges are the demonstration of the full CCS chain, the reduction of the energy penalty and cost of capture, the detailed appraisal of cost-effective storage capacity in selected regions, and establishing the necessary infrastructure for CO2 transport. New solutions for **the conversion of captured CO2** (Carbon Capture & Utilisation – CCU) **to useful products** such as fuels or chemicals **will create new markets for innovative industrial sectors**.

Action	Topic	Opening date	Deadline(s)
RIA	Advanced CO2 capture technologies	15/05/2018	06/09/2018
RIA	Conversion of captured CO2 	15/05/2018	06/09/2018
CSA	Strategic planning for CCUS development	15/05/2018	06/09/2018
IA	Integrated solutions for flexible operation of fossil fuel power plants through power-to-X-to-power and/or energy storage	07/05/2019	27/08/2019
IA	Low carbon industrial production using CCUS 	07/05/2019	27/08/2019



JOINT ACTIONS

The objective of topics included in this area is to facilitate the **creation or continuation of energy R&I public partnerships** between the European Commission and/or countries and regions in Europe and beyond.

Action	Topic	Opening date	Deadline(s)
ERA-NET COFUND	Joint programming actions to foster innovative energy solutions	15/05/2018	11/09/2018
CSA	Support to the realisation of the Implementation Plans of the SET Plan	15/05/2018	11/09/2018
PCP	European Pre-Commercial Procurement Programme for Wave Energy Research & Development	14/11/2018	27/08/2019
CSA	Support action in preparation of a Joint Programming activity	31/10/2017	31/01/2018
EJP COFUND	Joint Programming with EU and African partners for a R&I actions in the area of renewable energy	14/11/2018	27/08/2019

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CROSS-CUTTING ISSUES

The objective of topics included in this area is to facilitate the **creation or continuation of energy R&I public partnerships** between the European Commission and/or countries and regions in Europe and beyond.

Action	Topic	Opening date	Deadline(s)
RIA	Social Sciences and Humanities (SSH) aspects of the Clean-Energy Transition: <i>Social Innovation in the energy sector</i>	15/05/2018	06/09/2018
RIA	Social Sciences and Humanities (SSH) aspects of the Clean-Energy Transition: <i>Challenges facing carbon-intensive regions</i>	07/05/2019	27/08/2019
RIA	Modelling in support to the transition to a Low-Carbon Energy System in Europe	15/05/2018	06/09/2018
CSA	Support for the opening of low-carbon energy research databases in Europe	14/11/2018	27/08/2019
CSA	Support to sectorial fora	05/12/2017	19/04/2018
CSA	Research, innovation and educational capacities for energy transition	15/05/2018	06/09/2018
CSA	Transition in coal intensive regions	15/05/2018	06/09/2018

Other opportunities for Energy research and innovation across Horizon 2020

Specific topics in other parts of H2020 and Joint Undertaking

- LEIT ICT: Interoperable and smart homes and grids
- LEIT ICT: Big data solutions for energy
- SC7 Secure societies: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks
- FET Proactive: Emerging paradigms and communities - disruptive micro-energy and storage technologies
- Call of the Fuel Cells and Hydrogen 2 JU

Bottom-up activities

- European Research Council
- European Innovation Council (SME Instrument, Fast-Track-to-Innovation, FET, Prizes)
- Marie Skłodowska-Curie Actions

H2020 Inducement Prizes

- Horizon prize for CO₂ reuse
- Horizon prize for Combined heat and power installation in a hospital using 100% renewable energy sources
- Horizon prize for Integrated Photovoltaic System in European Protected Historic Urban districts
- Horizon prize for Fuel from the Sun: Artificial Photosynthesis

Societal Challenges and LEIT

- SC2: Bioeconomy, Blue Growth
- SC4: Electric vehicles, Batteries, Energy-efficient transport
- SC5: Cities, Earth observation, raw materials, climate change mitigation strategies
- SC7: Cybersecurity, Critical energy infrastructure
- LEIT: Materials
- LEIT: PPPs on Energy-efficient Buildings and SPIRE
- LEIT: Information and Communication Technologies
- LEIT: Space (GALILEO)

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The policy context

GLOBAL COMMITMENTS:



<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>



https://ec.europa.eu/clima/policies/international/negotiations/paris_en#tab-0-0



United Nations
Framework Convention on
Climate Change

http://unfccc.int/paris_agreement/items/9485.php



<http://mission-innovation.net/>

EUROPEAN POLICIES:



Energy Union

<https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union>



Clean Energy for All Europeans

<https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans>



Accelerating Clean Energy Innovation

https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v6_0.pdf



Strategic Energy Technology (SET) Plans

<https://ec.europa.eu/energy/en/topics/technology-and-innovation/strategic-energy-technology-plan>



Circular economy

http://ec.europa.eu/environment/circular-economy/index_en.htm



Digital single market

<https://ec.europa.eu/digital-single-market/>