



EN

Horizon 2020

Work Programme 2018-2020

10. Secure, clean and efficient energy

IMPORTANT NOTICE ON THIS WORK PROGRAMME

This Work Programme covers 2018, 2019 and 2020. The parts of the Work Programme that relate to 2019 (topics, dates, budget) have, with this revised version, been updated. The changes relating to this revised part are explained on the Participant Portal. The parts that relate to 2020 are provided at this stage on an indicative basis. Such Work Programme parts will be decided during 2019.

(European Commission Decision C(2018)4708 of 24 July 2018)

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Introduction

The Energy Union, one of the ten priorities of the Juncker Commission, is the EU's major vector for and contribution to a global transition to a climate-neutral economy. The 2015 Paris Agreement, which the EU helped broker, set a clear and ambitious direction of travel for investment into low-carbon innovation. The clean energy transition will help modernise the European economy and thus contribute to both growth and job creation. The Commission has proposed a number of measures to achieve this goal, most recently the 'Clean Energy for all Europeans' package of measures of November 2016 which pursues three overarching goals: (i) energy efficiency first, (ii) Europe as a leader in renewables, and (iii) a fair deal to consumers. The Research, Innovation and Competitiveness component of this package is presented in the Communication on "Accelerating Clean Energy Innovation" (ACEI)¹.

This work programme part supports research, demonstration, innovation and market-uptake actions across different low-carbon energy sectors, notably in the core priorities identified in the Energy Union Strategy²: renewable energy; smart energy systems; energy efficiency; and, as an additional priority, Carbon Capture Utilization and Storage (CCUS). Within these areas, a special focus is put on three of the four strategic research and innovation priorities highlighted in the ACEI Communication which are primarily addressed by the "Secure, Clean and Efficient Energy" Societal Challenge of Horizon 2020 – decarbonising the EU building stock by 2050; strengthening EU leadership on renewables; and developing affordable and integrated energy storage solutions³. The context for operationalising and implementing these priorities, as well as other relevant issues addressed in this work programme part, is the EU Strategic Energy Technology Plan (SET Plan). It seeks to maximise synergies between EU and national public R&I support for clean energy, and to leverage private funding, for priorities across 10 key actions which cover those identified in the ACEI Communication.

At the international level, the Commission pushes the acceleration of energy innovation through the Mission Innovation Initiative⁴ which was launched at COP21 and currently comprises 23 members which together account for the largest part of the global CO₂ emissions and clean energy R&I efforts. This work programme part includes a number of specific actions⁵ which directly target an increased international cooperation of EU Member States and Associated Countries in the context of Mission Innovation. This also includes, in line with the spirit of the Paris Agreement which emphasises the need for global cooperation on technology development and transfer, cooperation with African countries on renewable

¹ COM (2016) 763

² COM (2015) 80

³ In line with the commitment in that Communication, more than EUR 2 billion are earmarked across different work programme parts (mainly Societal Challenge 3, LEIT-NMBP and Societal Challenge 4) for a great number of topics which address these four priority areas in a comprehensive way.

⁴ <http://mission-innovation.net/about/>

⁵ E.g. topics LC-SC3-RES-1-2019, LC-SC3-RES-3-2020, LC-SC3-RES-4-2018, LC-SC3-RES-5-2018, LC-SC3-RES-25-2020, LC-SC3-RES-29-2019, LC-SC3-RES-30-2019, LC-SC3-ES-1-2019, LC-SC3-ES-6-2019, LC-SC3-NZE-2-2018, LC-SC3-NZE-5-2019-2020

energies⁶. In this context, active participation of Outermost Regions could facilitate such cooperation given their strategic position close to the African continent. A number of topics included in this work programme are also in line with priorities of IEA Technology Collaboration Programmes (TCPs)⁷ and proposals are invited to explore collaboration and synergies with TCPs.

In addition to the Energy Union, this work programme part also contributes, inter alia, to the EU digital single market, the EU transport policy (see the Commission's "Europe on the move" package, adopted on 31 May 2017), Commission's "Jobs, Growth and Investment" agenda, its "Blue Growth" initiative, as well as to the EU's research and innovation policy. As regards the latter, this work programme part fully embraces the "Open Innovation, Open Science, Open to the World". Activities target a more bottom-up, user-centred energy system which is a driver for more innovation and made possible thanks to other innovations, notably the digitisation of core aspects of the energy market. A greater emphasis on open innovation and open science should lead to more opportunities, especially for smaller companies, to bring research results to the marketplace.

This work programme part addresses research, innovation and market uptake activities in and across specific energy sectors as well as activities to maximise synergies between EU and national public support for clean energy R&I, aiming also at increasing leverage of private funding. It contributes in its entirety to the Horizon 2020 spending targets on climate action and sustainable development, addressing in particular the Sustainable Development Goals (SDGs) 7 ("Ensure access to affordable, reliable, sustainable and modern energy for all"), 11 ("Make cities inclusive, safe, resilient and sustainable") and 13 ("Take urgent action to combat climate change and its impacts").

Efforts to secure Europe's technological leadership must be complemented by substantial production capabilities and technology supply chains across Europe. Industrial participation in the programme is therefore crucial.

The transformation of the energy system encompasses technological, societal, cultural, economic and environmental aspects. In line with the policy priorities, this work programme part puts a particular emphasis on enabling consumers to actively participate in the energy transition which is facilitated through the progressing digitisation. In this context, the integration of different social sciences and humanities fields, as well as a responsible research and innovation approach⁸, is of high importance.

The huge majority of activities included in this work programme part contribute to the focus area "Building a low-carbon, climate resilient future" which pools relevant activities across different work programmes with the objective to stimulate the development of solutions capable of achieving carbon neutrality and climate resilience. As regards energy storage, the Energy Challenge contributes to the call for proposals "Building a low-carbon, climate

⁶ Topics LC-SC3-JA-4-2018 and LC-SC3-JA-5-2020

⁷ <https://www.iea.org/tcp/>

⁸ http://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

resilient future: Next-generation Batteries" (call identifier H2020-LC-BAT-2019-2020) which is part of the same focus area. In addition, this work programme part also includes activities which contribute to the focus areas "Connecting economic and environmental gains – the Circular Economy" and co-funds activities of the focus areas "Digitising and transforming European industry and services" and "Boosting the effectiveness of the Security Union".

This work programme part incorporates the findings of the Horizon 2020 Interim Evaluation⁹ - for example, it focusses resources on a more limited number of activities, steps up the involvement of civil society in R&I activities, and strengthens activities as regards breakthrough, market-creating innovations.

This work programme part also encourages synergies between Horizon 2020 and other European Union funds, such as European Structural and Investment Funds (ESIF) that can increase the impact of both funds in terms of scientific excellence and place-based socio-economic development respectively¹⁰.

The activities in this work programme part will also make the best use of the services offered by the EU Flagship Programmes on Earth Observation (Copernicus) and on Satellite Navigation (Galileo and EGNOS¹¹).

The priorities taken up in this work programme part are based on a broad stakeholder consultation, notably in the context of the SET-Plan 10 key actions¹² and the Communication "Accelerating Clean Energy Innovation", but also through a targeted consultation on policy supporting actions and market uptake, or inputs from stakeholder associations (e.g. Strategic Research Agendas of Technology and Innovation Platforms).

Activities specifically targeting Fuel Cells and Hydrogen are not supported under this work programme part, but through calls for proposals of the Fuel Cells and Hydrogen JU¹³. However, as regards topics included under the areas "Energy Efficiency", "Smart citizen-centred energy" and "Smart Cities and Communities", system costs related to the integration of mature hydrogen based technologies for the purpose of integrated demonstration in a topic are eligible.

Open research data

Grant beneficiaries under this work programme part will engage in research data sharing by default, as stipulated under Article 29.3 of the Horizon 2020 Model Grant Agreement

⁹ https://ec.europa.eu/research/evaluations/index_en.cfm?pg=h2020evaluation

¹⁰ Examples are the development and equipment of innovation infrastructures or the fostering of innovation skills through ESIF that enable the participation in a Horizon2020 project, or the transfer of knowledge and technologies resulting from Horizon2020 projects to firms that can, thanks to ESIF support, develop it further, test, prototype, etc. towards innovations fit for market take-up. ESIF can also be used to expand the support and advisory services for potential Horizon2020 participants. ESIF can also help deploying innovative solutions emanating from Horizon2020, e.g. through public procurement.

¹¹ Geostationary Navigation Overlay Service

¹² <https://setis.ec.europa.eu/>

¹³ <http://www.fch.europa.eu/>

(including the creation of a Data Management Plan). Participants may however opt out of these arrangements, both before and after the signature of the grant agreement. More information can be found under General Annex L of the work programme.

Contribution to focus area(s)

Focus Area 'Building a low-carbon, climate resilient future' (LC): EUR 2005.35 million

Focus Area 'Connecting economic and environmental gains - the Circular Economy' (CE): EUR 12.00 million

Focus Area 'Digitising and transforming European industry and services' (DT): EUR 30.00 million

Focus Area 'Boosting the effectiveness of the Security Union' (SU): EUR 20.00 million

Call - BUILDING A LOW-CARBON, CLIMATE RESILIENT FUTURE: SECURE, CLEAN AND EFFICIENT ENERGY

H2020-LC-SC3-2018-2019-2020

This call includes the contribution of the Horizon 2020 Societal Challenge "Secure, clean and efficient energy" to the focus area "Building a low-carbon, climate resilient future" which underpins the goals of the Paris Agreement and the "Clean Energy for all European" package, including the Communication "Accelerating Clean Energy Innovation" (COM (2016) 736) and the SET-Plan priorities, with concrete R&I actions focussing on the accelerated transformation of the energy system, and other sectors, towards carbon neutrality and climate resilience. Activities also fully contribute to the Sustainable Development Goals and the Horizon 2020 spending targets on Sustainable Development and climate action.

Achieving climate neutrality in the energy sector – while ensuring at the same time a more efficient energy use, a secure supply of energy, affordable prices and low environmental impact – is a complex endeavour which requires R&I activities on multiple fronts. Activities supported in this call should deliver:

- on the supply side, cheaper and more performant generation technologies (e.g. renewable energy technologies) which are better integrated in various levels of the energy system;*
- a smarter, more flexible and resilient energy system (including affordable and integrated energy storage solutions), taking into account current and future climate change adverse impacts;*
- on the demand side, increased overall energy efficiency (e.g. in the EU's building stock) and provision of means to enable consumers to play a more active role in the energy transition;*
- a better understanding of the specific socio-economic contexts in which the energy transition takes place which will allow to address obstacles in a more effective way;*
- increased market-uptake of innovations, including the implementation of energy policy, the preparation for rolling-out investments, and the support for capacity-building.*

Energy efficiency

Energy efficiency needs to be considered as a source of energy in its own right. It is one of the most cost effective ways to support the transition to a low carbon economy, to prompt further investment opportunities and to create growth and employment. Putting energy efficiency first will bring down costs for consumers, reduce our import dependency and redirect investments towards the kind of infrastructure that are smart and sustainable.

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 2050¹⁴ – lies in buildings. Buildings represent 40% of energy used in the EU and the construction industry provides 18 million direct jobs in Europe, while SMEs contribute to 70% of the value added in the EU building sector. Renovating buildings adds almost twice as much value as the construction of new buildings and represents multiple benefits for building owners, occupants and the whole society. Proper valuation of these multiple benefits, supported under this call, will help to change business approach to buildings renovation ensuring flows of financing and massive investments. This, in turn, will improve living/working conditions of the Europeans, spur economic growth and create jobs.

With the transition to a decentralised and decarbonised energy system, digital smart technologies will be playing an increasingly important role. Not only that they will enable buildings and equipment in buildings to become interactive elements by optimising energy consumption, distributed generation and storage in the home and vis-à-vis the energy system. They will also trigger new business opportunities and revenue streams for up-graded, innovative energy services which valorise energy savings and flexible consumption. 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. That way, active consumers will not only be able to benefit from cost reductions but also from a bigger variety of services that bring along a more comfortable, convenient and healthier living environment.

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.

Actions included in this call contribute to the specific objectives, targets and relevant Implementation Plans¹⁵ of the SET Plan action 5.1 and 5.2. In particular, topic LC-SC3-EE-1-2018-2019-2020 aims at development and deployment of the materials and technologies for energy efficiency solutions for buildings renovation including renovation of buildings heating and cooling systems. As regards industrial energy efficiency, topic LC-SC3-EE-6-2018-2019-2020 has been designed to address the cross-cutting priority of SET Plan Action 6: maximising the recovery of industrial excess heat/cold in a cost efficient manner. The choice of a cross-cutting priority rather than a sector-specific one has been taken in order to maximise EU added value of the funded projects.

Upgrading buildings' energy performance and smartness

Proposals are invited against the following topic(s):

¹⁴ COM (2016) 763

¹⁵ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

LC-SC3-EE-1-2018-2019-2020: Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation ¹⁶

Specific Challenge: The market for deep renovation of buildings needs to be transformed in terms of technologies, processes and business models. The multiple benefits of improved energy efficiency are well known, but more action is needed for Europe to achieve the higher rates of renovation that would reduce energy use and decarbonize the building stock in order to meet long-term climate and energy targets. In particular, deep renovations need to become more attractive to all relevant stakeholders, more reliable in terms of performance, less disruptive for occupants (especially in residential buildings), less time-consuming, less energy-intensive from a life cycle perspective, more environmentally friendly regarding applied materials and more cost-effective. There is a need to demonstrate and roll out holistic consumer-centred solutions that involve the whole value chain, ensuring high levels of comfort and a high quality of the indoor environment.

Scope: Proposals should demonstrate solutions addressing building fabric and/or technical systems that ensure faster and more cost-effective deep renovations that result in high energy performance. Proposals should include innovations in technology and in design and construction methods with low embodied energy and on-site works organisation, industrialization and lowering cost of energy retrofitting and they should take into account any architectural constraints. They should also include innovations in business models and the holistic integration of disciplines across the value chain. Proposals should also consider energy efficient and low carbon solutions to retrofit building-level heating and cooling systems and the integration of on-site renewable energy generation¹⁷, energy storage systems which allow for optimisation and flexible consumption, and, if relevant, integration with district heating and cooling systems. Proposals could address drivers of building renovation that go beyond a desire to reduce energy consumption and related energy costs. For example, decisions to renovate may sometimes coincide with structural repairs. They could also consider further development and improvement of hybrid energy systems using fossil fuel based heating systems coupled with RES based heating systems as well as the integration of highly-efficient buildings and local energy system solutions such as District Heating and Cooling, including hybrid solutions.

Solutions should include quick and simple installation of components and systems, minimizing disruption for building occupants and the time spent on site. Proposals should include monitoring and displaying of real time energy performance and other relevant data and consider the ways in which consumers and others could access and make use of such information. Solutions should ensure high levels of occupant comfort (thermal, visual and acoustic) and indoor environmental quality (e.g. air quality, humidity) if possible based on bio-based materials, as well as low risk of moisture-related problems, summer overheating

¹⁶ It is expected that this topic will continue in 2020.

¹⁷ possible synergies with RES-3-2018: Renewable energy system integrated at a building or an industrial site, RES-4-2018: Increased performance of technologies for shallow geothermal heating and cooling solutions and their integration in the energy system, RES-5-2018: Demonstrate significant cost reduction for built-in PV solutions for "(nearly) Zero Energy Buildings"

and other harmful unintended consequences, and should address the multiple benefits of energy efficiency. Proposals should demonstrate solutions that aim for large scale roll-out according to defined business models and financial schemes for owners.

Projects are expected to bring the technology to TRL level 8-9 (please see part G of the General Annexes).

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- High energy performance in the renovated buildings;
- Measurable cost reduction compared with a typical renovation (i.e. a renovation that meets current minimum requirements of existing building regulations) or major energy performance improvement at comparable cost;
- Reduction of time needed on site for renovation works by 20% compared to current national standard practice;
- Demonstration of the effectiveness and replicability of the proposed solutions to lead to an increased rate of renovation for defined building typologies in several districts/cities/regions.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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

Specific Challenge: Many project promoters – public authorities, individuals or businesses – lack the skills and capacity to set up, implement and finance ambitious low-energy and clean

energy building projects. In addition, many project developers still face obstacles in raising the necessary up-front costs for their projects – particularly as the small-size of investments and the lack of turnkey solutions increase implementation cost – and lack access to attractive and adequate financing products from the market.

Scope: This topic aims at creating or replicating innovative local or regional "integrated home renovation services". The developed services should cover the whole "customer journey" from technical and social diagnosis, technical offer, contracting of works, structuring and provision of finance (e.g. loans or EPCs), to the monitoring of works and quality assurance. Such integrated services should be operational at the end of the project and create more demand for holistic approaches as a result of improved offer by trustful market operators and better awareness from homeowners. They should also support the streamlining of standards and practices into consistent and transparent processes investors can rely on, and by doing so help connect the supply of finance with demand for it.

Proposals should build upon the promising experiences of integrated renovation services emerging in Europe¹⁸ and aim at developing / improving economically viable business models, ultimately running without the need for public subsidies.

Projects funded under this topic will optimise the services required along the renovation process (based on a thorough analysis of the local needs and actors in place), improve trust and awareness of homeowners towards such services, reduce renovation costs and time on-site through standardised approaches (e.g. optimized business processes, standardised contractual arrangements, branding of the proposed services etc.), mainstreaming innovative technical solutions adapted to the local context, help improve their legal and regulatory environment, and overall improve financing conditions for energy renovation.

The services can be developed through dedicated operators (new public or public/private entity or mandated private operator) and/or through an improved co-ordination between existing local actors.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Implementation and upscale of economically viable business models, ultimately running without the need for public subsidies. Data evidence made available to market actors. Proof of the replication of these initiatives by other market actors;
- Availability of adequate financing offer for integrated renovation services;

¹⁸ Please see the examples of good practice in chapter 3 of the Commission Staff Working Document 'Good practice in energy efficiency' (SWD(2016) 404 final)

- Strong and trustworthy partnerships with local actors (e.g. SMEs, ESCOs, financial institutions, energy agencies, NGOs) and quality of the proposed services recognized by market actors;
- Development of large, locally-developed investment pipelines for home renovation, connecting the supply of finance with demand for it (in million Euro of investments within the first 5 years);
- Uptake of home energy renovation at local level and corresponding primary energy savings triggered (in GWh/year).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-3-2019-2020: Stimulating demand for sustainable energy skills in the construction sector¹⁹

Specific Challenge: Based on results of the BUILD UP Skills initiative, in particular the National Qualification Platforms and Roadmaps, as well as the qualification and training schemes developed in various Member States, the challenge is now to act at market level and to support legislative changes that will stimulate the demand for energy skills.

The objective is to increase the number of skilled building professionals and/or blue collar workers across the building design, operation and maintenance value chain (designers, architects, engineers, building managers, technicians, installers, blue collar workers including apprentices, and other building professionals), with a specific focus on the engagement of SMEs. Recourse to skilled professionals/workers both for renovations and new constructions of buildings and district scale solutions should be made more attractive and easier for companies and home owners alike.

Scope: The focus of submitted proposals should be on the direct stimulation of demand for energy skills in construction. This is calling for the development, up-scaling and combination of a range of tools and initiatives, e.g.:

- Tools facilitating the mutual recognition of energy skills and qualifications in the construction sector: development of sustainable energy skills passports/registers for workers at regional/national level and support for their take up at EU level, mobile

¹⁹ It is expected that this topic will continue in 2020

applications facilitating the comparison of workers' skills and qualifications between countries (e.g. by enabling the direct comparison of learning outcomes);

- National, regional or local initiatives raising awareness of home and building owners and tenants about the benefits of sustainable energy skills and providing financial incentives for renovations done using skilled workers/professionals;
- Support to public authorities for the development of new legislative frameworks, e.g. requirements for skilled workers in public procurement;
- Partnerships with producers and retailers of construction products (e.g. DIY stores) to raise awareness of the salesforce and of consumers about energy efficient products, skilled workers and good practice in construction/renovation;
- Initiatives reinforcing the link between skills/education and energy performance/quality of construction e.g. tools showing the reduction of the performance gap as result of an increase quality of the works.

Proposals need to be focused and are not necessarily required to address the whole range of professions and crafts involved in the building sector. They may however consider the entire design chain (e.g. manufacturers). If the proposal addresses specifically design, material life cycles and embodied energy shall be considered. Adequate consideration should also be given to improved appreciation of the end user's needs including the quality of indoor environment (thermal and visual comfort, acoustics, air quality, etc.) as well as improved operation and maintenance.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Measurable energy savings and/or renewables production resulting from improved skills;
- Investments in sustainable energy triggered by the project (in million Euro);
- Increased number of certification schemes for energy efficiency skills;
- Improved mutual recognition of sustainable energy skills between Member States and neighbouring countries;
- Improved collaboration and understanding across different trades and professional groups;

- Increased market acceptance of sustainable energy skills;
- Legislative changes stimulating the demand for energy skilled construction workers/professionals;
- Demonstrated reduction in the gap between designed and actual energy performance through improved quality of construction.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-4-2019-2020: Upgrading smartness of existing buildings through innovations for legacy equipment²⁰

Specific Challenge: An essential part of Europe's clean energy transition is the changing role of buildings from consuming energy to actively controlling and optimising indoor environment while contributing to energy system flexibility by ensuring distributed energy generation from renewable energy sources, energy storage, facilitate smart charging of EVs, load reduction through energy efficiency and load shifting through demand response. Innovative technologies will enable smart buildings to interact with their occupants and the grid in real time and to manage themselves efficiently, so as to become an active element of the energy system. Intelligent and connected devices, smart sensors and controllers, supported by the development of new business models for new energy services, will create new opportunities for energy consumers.

Today in the EU, the existing building stock represents the main challenge for a more efficient energy use, in buildings as well as across the whole energy system. The smart readiness of buildings may evolve faster for devices and systems easily replaced and installed, than for other parts of the building's equipment such as HVAC and DHW systems due to higher costs of replacement, longer lifecycles and difficulties related to integration in buildings. This installed equipment remains highly relevant for buildings interactions with the energy system, making its upgrade to higher levels of smartness an essential step. The revised Energy Performance of Buildings Directive introduces a Smart Readiness Indicator (SRI) to reflect the level of services offered by a smart building. Once established, this indicator will give a framework to assess the smart readiness of buildings and building units to adapt operation to the needs of the occupant and the grid and to improve energy efficiency and overall performance.

²⁰ It is expected that this topic will continue in 2020.

Scope: Proposals should 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. These solutions should be aimed to upgrade existing buildings, either residential or tertiary, using automation and IT to offer new services and control to the building users, thereby improving their comfort and increasing their satisfaction. This upgrade should translate into improvements in the areas put forward by the revised EPBD, in relation to the smart readiness indicator.

Proposals should demonstrate how the smart systems, smart controls and smart appliances can be integrated seamlessly in existing buildings to interface and/or to control the major energy consuming domestic appliances that are already installed. These pilots should involve several types of domestic appliances and technical building systems with longer lifecycles (boilers, radiators, DHW preparation, motors for ventilation, windows opening and shading; lighting etc.) and with shorter lifecycles (dryers, washing machines, fridges, etc.), testing several types of control modes (ON/OFF, power modulation, etc.) possible for a given type of appliance. Recharging points for electric vehicles and other forms of energy storage should also be incorporated in the pilots. The proposed solutions should not adversely affect the original functionalities, product quality, lifetime, as well as warranties of the appliances.

Besides the pilot demonstrations, proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

These business models and exploitation strategies should target the broad uptake of the proposed smart systems into specific building typologies in Europe and their integration with evolving electricity markets, e.g. dynamic pricing or other services and information offered by energy suppliers and/or aggregators. Integrations with other energy networks (e.g. DHC) can also be considered.

The solutions should focus on cost-effectiveness and user-friendliness: easy installation and maintenance, maximising consumer comfort (e.g. self-learning) and information on own consumption (e.g. recommendations to the user in order to maximise savings) as well as on gains from its contribution to grid operation.

These solutions should build on innovative technologies, initiatives and approaches contributing to building smartness: semantics, data models, data layers, protocols, software building blocks, APIs, middleware, solutions for smart services, standards, relevant industrial consortia or technology initiatives, etc. Interoperability is essential to ensure the required smart readiness, in particular integration with legacy equipment, user-friendliness and broad market uptake.

A realistic estimate should be provided on the total energy savings/year and on the impact of the innovations demonstrated in the project on the total power available for cost effective demand response actions. The projects should involve technology providers (e.g.

manufacturers of appliances, movable envelope components, smart control/ home systems providers), energy services providers (aggregators and/or suppliers and/or ESCO's), user representatives, electricity system operators and other actors as relevant.

The activities are expected to be implemented at TRL 6-8 (please see part G of the General Annexes).

The Commission considers the proposals requesting a contribution from the EU of between 3 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Upgrade of existing buildings to higher smartness levels, including a significantly enlarged base of existing building equipment and appliances monitored by energy management systems and activated through demand response actions;
- Reduction in energy consumption and costs, exceeding the additional consumption from IT and its cost.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gas emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-5-2018-2019-2020: Next-generation of Energy Performance Assessment and Certification²¹

Specific Challenge: Under the Energy Performance of Buildings Directive²², all EU countries have established independent energy performance certification systems supported by independent mechanisms of control and verification. However, current practices and tools of

²¹ It is expected that this topic will continue in 2020.

²² Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

energy performance assessment and certification applied across Europe face a number of challenges.

Assessment processes and certificates have to become more reliable, user-friendly, cost-effective, have comparable good quality and be compliant with EU legislation in order to instil trust in the market and incite investments in energy efficient buildings. They have to increasingly reflect the smart dimension of buildings and at the same time, facilitate convergence of quality and reliability of Energy Performance Certificates (EPCs) across the EU. The building energy performance methodologies should also ensure a technology neutral approach, be transparently presented making use of International and European standards, in particular the ISO/CEN standards developed under Commission mandate M/480²³ aimed at enabling the presentation of national and regional choices on a comparable basis.

Next-generation energy performance assessment schemes will value buildings in a holistic and cost-effective manner across several complimentary dimensions: envelope performances, system performances and smart readiness (i.e. the ability of buildings to be smartly monitored and controlled and, to get involved in demand-side management strategies). The assessment should be based on an agreed list of parameters/indicators, such as e.g. calculated annual final energy use, share of renewable energy used, past (climate corrected) final energy consumptions and energy expenditure, comfort levels or the level of smartness. The assessment methods should increasingly take into account output measures of performance (actual measured data) making use of available and increasing number of building energy related data from sensors, smart meters, connected devices etc.. These new schemes should contribute to improving the effectiveness of certificates, by demonstrating how these could be strengthened, modernised and best linked to integrated national/regional certification schemes within a framework that aids compliance checking and effectiveness of financial support.

Scope: 2018 (Coordination and support action):

Proposals should involve relevant stakeholders (including national and regional certification bodies) to stimulate and enable the roll-out of next-generation of energy performance assessment and certification, with a view to achieve enhanced reliability, cost-effectiveness and compliance with relevant EU standards and the Energy Performance of Buildings Directive. Proposals should develop strategies to encourage convergence of EPC practices and tools across the EU so as to ensure a comparable level of high quality, independent control and verification. The applicability of assessment and the certification schemes should be assessed through a broad set of well-targeted and realistic cases, featuring various locations, building types, climatic conditions and field practices including existing national EPC schemes. The assessment will aim at demonstrating the potential of an EU-wide uptake

²³ ISO/EN 52000-1, 520003-1, 520010-1, 52016-1, 52017-1, and 52018-1. 52022-1, EN 12098-1, EN 12098-3, EN 12098-5, EN 12831-1, EN 12831-3, EN 15232-1, EN 15316-1, EN 15316-2, EN 15316-3, EN 15316-4-1, EN 15316-4-2, EN 15316-4-3, EN 15316-4-4, EN 15316-4-5, EN 15316-5, EN 15378-1, EN 15378-3, EN 15459-1, EN 15500-1, EN 16798-3, EN 16798-5-1, EN 16798-5-2, EN 16798-7, EN 16798-9, EN 16798-13, EN 16798-15, EN 16798-17, EN 16946-1, EN 16947-1, EN ISO 10077-1, EN ISO 10077-2, EN ISO 10211, EN ISO 12631, EN ISO 13370, EN ISO 13786, EN ISO 13789, EN ISO 14683 and EN ISO 6946, ISO/EN 52017-1 and ISO/EN 52022-1.

of the proposed assessment and certification schemes, along well-defined criteria. Embedding the EPCs and their recommendations in broader concepts such as energy audits, wider-buildings related databases (e.g. national EPC databases, national housing surveys, EU Building Stock Observatory) and one-stop-shops including administrative, financial and supply side information and linking EPCs to related concepts such as buildings renovation passports, individual buildings renovation roadmaps or building logbooks should also be considered.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019 (Innovation action):

Proposals should address the definition and demonstration of innovative approaches for the assessment of building energy performance, focusing at first on the reliable assessment of building intrinsic performances (e.g. using inverse modelling) but working also towards output-based assessments using available building energy related data²⁴. Proposals should involve relevant stakeholders (including national and regional certification bodies). The proposed approaches should be more reliable as well as cost-effective and compliant with relevant EU standards²⁵, in order to allow for an EU-wide deployment. Such approaches should rely on the combination of existing and proven technology components (starting from TRL 6-7, please see part G of the General Annexes) with well-structured methodologies and protocols that can lead to the definition of new certification schemes. They could also consider implications when using EPCs in building passports and renovation roadmaps.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 2.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: 2018 (Coordination and support action):

Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);

²⁴ The projects relevant for building energy data gathering and computing will be funded through: 1) large scale IoT pilot DT-ICT-10-2018: Interoperable and smart homes and grids; 2) big data pilot DT-ICT-11-2019: Big data solutions for energy.

²⁵ CEN standards (provide ref) and EN ISO 52000-1/CEN (provide ref) standard, EN ISO 52000-1.

- Increased convergence of good quality and reliable energy performance assessment and certification and uptake and compliance with EU Directives and related standards;
- Increased rate of application and compliance of EPCs and independent control systems with the provisions of EU and national legislation, in a defined region;
- Increase of EPCs databases for compliance checking and verification, linking with financing schemes and building stock characteristics research etc.

2019 (Innovation action):

Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Improved user-friendliness of EPCs in terms clarity and accuracy of the information provided;
- Enhanced user awareness of building energy efficiency;
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Energy efficient industry and services

Proposals are invited against the following topic(s):

LC-SC3-EE-6-2018-2019-2020: Business case for industrial waste heat/cold recovery²⁶

Specific Challenge: Energy and fuels represent an important part of the production costs in several Resource and Energy Intensive Industries (REII). While a lot of technical progress has already been done in REII to reduce the energy consumption of the main industrial processes, significant parts of the input-energy are still lost in the form of waste heat/cold by gas, liquid or solid streams. Wide-scale deployment of industrial waste heat/cold recovery is hindered, among others, by the lack of financial/ economic justification for the required equipment and, at times, by the limited industrial applicability (i.e. process re-integration). Often, it is

²⁶ It is expected that this topic will continue in 2020.

forgotten that directly or after an intermediate transformation step, the sources of heat/cold losses of a given industry can be a valuable resource for other industries and buildings/ District Heating and Cooling operators and that they could be of commercial interest for the waste heat/cold producer. Furthermore, other energy cooperation activities between industries can also contribute to increase their energy efficiency. Thus physical clustering (e.g., of buildings and processes, energy exchange, collective production) and/ or service clustering (e.g., joint contracting) can deliver a more stable cumulative demand, economy of scale for larger installations with higher efficiencies and smaller spatial footprint and an optimised demand response.

Scope: 2018 (Innovation action):

Cost-benefit models for industrial waste heat/cold recovery:

Proposals should develop integrated cost-benefit simulation tools that, based on the characterization of processes, heat/cold streams and other relevant variables, can determine the best utilisation options of recovered waste heat/cold and/ or surplus renewable energy from industrial and eventual other sources (when available). Proposals should also consider the possibility to contribute to efficient use/system integration of renewable energy sources through e.g. heat/cold storage and flexible production.

The proposals are expected to put forward simulation tools that would allow industrial sites/parks to determine the most financial attractive option for using their recovered waste heat/cold and/or surplus renewable energy. This should be based on, inter-alia, waste heat/cold recovery (and storage if necessary) costs (including equipment and process adaptation), retail and/ or whole sale energy prices, (new contracts) administrative and legal costs, (external connecting) infrastructure costs, internal and external demand, waste heat/cold as source of flexibility in electricity system. Other relevant variables should also be included, inter-alia, characterisation of barriers and opportunities on the DHC side (e.g. competition with other heat/cold sources, thermal storage, regulatory conditions). The simulation tools are expected to be flexible enough to allow a large number of different types of industrial sites/parks to use it, i.e. should allow many energy intensive process characterizations irrespective of the industrial sector and geographic location, and should also take into account supply-demand dynamics.

The simulation tools should be validated through demonstration in real operating conditions in industrial facilities.

Proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

Proposals are expected to look at relevant business models for the collaboration outside the plant/industrial park and have strong communication and dissemination components in order to reach many industries, large private facilities and public authorities.

This topic contributes to the roadmap of the Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) cPPP.

The activities are expected to be implemented in the range of TRL 4-8 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019 (Coordination and support action):

Symbiosis in industrial parks and clusters- non-technological barriers

Proposals should improve the energy efficiency of industrial parks districts and clusters by unlocking the market potential and supporting the demand and offer of high-quality energy services by addressing at least one of the following points:

- The development and testing of instruments facilitating, at customer/ business level, the actual implementation of energy cooperation such as setting up appropriate process and business organisation, operation and plant design, cooperation mechanisms, related contractual and financial arrangements, better planning, good practices. Proposals need to include capacity building activities such as skills development and engagement of senior and executive management (e.g. CEO, CFO, energy managers) of companies from industrial parks and other related stakeholders.
- The development and testing of replicable business models and service concepts, at service provider level (i.e. ESCOs or other relevant 3rd party organisations such as DHC operators), for joint energy services such as identification of horizontal energy services attractive for businesses, identification of the most relevant innovative technical solutions, setting up contractual and financial arrangements, best practices, cost-reduction models. Proposals need to include capacity building activities such as sharing skills, know-how and specific expertise of ESCOs or other 3rd party organisations that would boost the market uptake for such joint energy services contracting in industrial parks.

This topic contributes to the roadmap of the Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) cPPP.

Proposals need to also address legal issues in order to adapt regulatory and legal frameworks at local, regional and national level. Issues related to the sustainability of the proposed symbiosis in case one or more of the involved parties are changing activity (including leaving the park) should be taken into account. Proposals are expected to ensure applicability of the solutions to other industrial parks/ business sectors while strong communication and dissemination components will be needed in order to reach many industries, industrial park managers and ESCOs.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: 2018 (Innovation action):

Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Accurate prediction and holistic modelling of industrial waste heat/cold and/or surplus renewable energy from industrial or other sources from different geographical and market settings;
- Better impact of the various factors/ variables on the cost-benefits of industrial waste heat/cold and/or surplus renewable energy from industrial or other sources;
- Valorisation in assessments of cost-benefit of industrial waste heat/cold and/or surplus renewable energy from industrial and eventual other sources;
- Number of industrial sectors/ sites/ parks, public authorities (including energy agencies), large private facilities (e.g. sport and shopping centres, non-energy intensive industrial parks) and DHC operators aware, interested and supporting the implementation of waste heat/cold and/or surplus renewable energy from industrial and eventual other sources recovery/use for process re-integration or commercial use, depending on the outcome of the simulations;
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

2019 (Coordination and support action):

Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Number of (operational and organisational separated) plant sites (within one industrial park) and the number of industrial parks where businesses commit to energy cooperation;

- Number of relevant stakeholders (e.g. ESCOs, industrial park managers) aware of and/or interested in/ implementing joint energy services;
- Number of policies and legal frameworks created and/ or adapted to facilitate energy cooperation among businesses.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action, Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-7-2020 - Increasing energy efficiency of small data centres

LC-SC3-EE-8-2018-2019: Capacity building programmes to support implementation of energy audits

Specific Challenge: The Energy Efficiency Directive, in its art.8, requires Member States to develop programmes encouraging SMEs to undergo energy audits and to implement the recommended energy-saving measures. SMEs represent enormous energy saving potential. However, the lack of expertise, time and capital, including energy audit supporting scheme, often prevents SMEs from implementing energy conservation measures or from getting access to the energy services market.

The effectiveness of energy audit recommendations is influenced by people's behaviours and the improvement of enterprises' energy cultures. The availability of reliable energy consumption data is of utmost importance to monitor the impact of energy saving measures and behaviours. The actions should lead SMEs to become fully aware of the multiple benefits resulting from energy audits as well as facilitating their actual implementation. Moreover, capacity building programmes should also support implementation of the recommended energy-saving measures both for small and large enterprises.

Scope: Proposals should focus on one, or more, of the following issues:

- Staff trainings and capacity buildings programmes, facilitating SMEs to undergo energy audits and to implement the recommended energy-saving measures, shall be developed according to SMEs specificities (size, sectors, lifetime of the company etc.) and highlighting the financial aspects. Programmes should aim at bridging the gap between demand and supply side (SMEs, auditors, finance institutions, managing authorities of supporting schemes). An active participation of both managerial and operational staff must be ensured. The proposed solution should be tailored to national/local conditions in order to ensure the effective uptake by the SMEs.

- Capacity building to support the take-up of audits recommendations and undertake the actions necessary to reduce energy consumption (maintenance or investments in new equipment but possibly also behavioural actions) in the companies required to undergo energy audits (large enterprises). Development and implementation of corporate policy measures involving all actors (from decision makers/corporate board members to employees in each department) willing to undertake more efficient energy-related actions (motivations, behaviour change, mitigation of perceived risks and barriers). Evaluation of the total costs of building investments, in terms of financial, environmental and health impact.
- Initiatives supporting Member States in empowering or establishing national supporting schemes for SMEs providing appropriate incentives to undergo energy audits and/or to implement the recommended energy-saving measures.

Proposals should demonstrate how the proposed activities will be continued commercially beyond the project lifetime. Involvement of relevant multiplier organisations is also encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Market stakeholders with increased skills/capability/competencies (to be measured in number of people with increased capacity) and long-lasting training schemes;
- Number of people/enterprises with enhanced energy culture documenting why and how changes are an effect of particular measures taken as consequence of energy audits, as well in terms of the sustainability of the behavioural change;
- Policies and strategies created/adapted at national level (to be measured in number of initiatives/actions taken to improve/create audit supporting schemes and/or number of SMEs supported in the implementation of energy audit).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Energy efficiency is an investment

Proposals are invited against the following topic(s):

LC-SC3-EE-9-2018-2019: Innovative financing for energy efficiency investments

Specific Challenge: There is a need to set up innovative financing schemes at regional or national level in order to create the conditions for adequate supply of private finance for energy efficiency investments. Innovative financing schemes for energy efficiency aim to progressively maximise the leverage ratio of public funds to private finance. This is in line with the "Smart Finance for Smart Buildings"²⁷ initiative that aims at using public funds more effectively.

Scope: Proposals should address the development or replication and implementation of innovative financing schemes for energy efficiency investments. They can involve different types of organisations, ownership structures and financing models such as dedicated credit lines; guarantee facilities; factoring/forfaiting schemes; on-bill (e.g. utility-financed) or on-tax financing schemes; citizen financing (e.g. crowd-funding) for energy efficiency; finance models for the deep renovation of buildings, addressing both property and rental markets; finance models for different industry sectors and cross-sectorial initiatives; financing solutions integrating existing market-based instruments relevant for energy efficiency (e.g. carbon finance instruments, including those under the European Emissions Trading System; energy efficiency obligations, including white certificates; etc.); or schemes based on project aggregators or clearing houses at regional or national level, which should support project development and match demand and supply of energy efficiency finance. These schemes should address the provision of finance as well as the structuring of demand, in particular at regional/national level, and target specific areas (e.g. energy-intensive industries, buildings etc.). Proposals should justify how the proposed schemes complement already available funding and how they are tailored and innovative for the targeted regions and market segments; as well as clearly demonstrate the market potential, as well as business case and financial viability of the scheme (including investment sizes targeted, expected savings, transaction and management costs, expected returns etc.).

Proposals should address one or more of the following points:

- Establishment of new innovative, operational financing schemes;
- Replication of previously successful solutions e.g. developed and implemented under various project development assistance (PDA) facilities under the Horizon 2020 and Intelligent Energy Europe programmes (including MLEI PDA or ELENA);

²⁷ https://ec.europa.eu/energy/sites/ener/files/documents/1_en_annexe_autre_acte_part1_v9.pdf

- Establishment of regional/national aggregators which are able to develop large (standardized) project pipelines;
- Creation of EU or regional/national energy efficiency investment roundtables/platforms to organise dialogue with and between the relevant stakeholders and (among others) develop roadmaps, propose improvements in the legal frameworks and develop and validate template documents and contracts leading to a better understanding of the market. Proposals should include a clear action plan to communicate across Europe towards potential replicators.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Delivery of innovative financing schemes that are operational and ready to finance energy efficiency investments;
- Regional/national aggregators with demonstrated/traceable capacity to set up large-scale pipeline of (standardized) sustainable energy investments (in terms of number of and/or amount of investment);
- EU or regional/national energy efficiency investment roundtables/platforms providing a comprehensive range of support and/or services to facilitate access to energy efficiency finance.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-10-2018-2019-2020: Mainstreaming energy efficiency finance²⁸

Specific Challenge: Energy efficiency is not yet considered as an attractive investment by the financial sector which limits the possibility to use external private finance on top of equity of project owners and available public funding. The lack of statistical data on the actual energy and costs savings achieved by energy efficiency investment projects, as well as on payment default rates, results in financial institutions attributing high risk premiums to energy efficiency investments.

Energy efficiency represents high transaction costs for rather small investments, which is not financially very attractive. Technical and legal standardisation is highly needed at all steps of the investment value chain in order to simplify transactions and increase the confidence of financial institutions. The lack of standardisation of projects also prevents securitisation of energy efficiency assets (loans or equity) so that financial institutions are not able to refinance their debt on the capital markets²⁹.

Whereas energy efficiency investments are usually expected to be paid back exclusively through the reduction of the energy bill, there is increasing evidence that non-energy benefits play a key role in the decision to invest in energy efficiency. This includes for instance increased building value, lower tenant turnover or vacancy rates etc. These benefits need to be quantified through data collection and monetised in order to evolve the parameters used by financiers to assess an energy efficiency investment.

Scope: Proposals should address at least one of the following issues:

- Development, demonstration and promotion of frameworks for the standardisation and benchmarking of sustainable energy investments. This could include for example, but not exclusively, labelling schemes, project rating methodologies and risk assessment tools, standardised legal and financial structures of assets (loans, guarantees, energy performance contracts etc.) in order to develop securitisation for energy efficiency based financial products. Proposals integrated in a broader approach such as socially responsible investment should focus on the energy component;
- Capacity building for banks and investors at the national and local level, in particular on underwriting sustainable energy investments;
- Gathering, processing and disclosing large-scale data on actual financial performance of energy efficiency investments, in order to create a track record for energy efficiency in different sectors (buildings, industry, transport, etc.) Proposals should build upon or complement the work of the Energy Efficiency Financial Institutions Group (EEFIG) e.g. the De-risking Energy Efficiency Platform³⁰;

²⁸ It is expected that this topic will continue in 2020.

²⁹ A successful example of standardisation enabling securitisation is the PACE market in the USA

³⁰ <https://deep.eefig.eu/>

- Further integration of non-energy benefits in project valuation, in particular in the building sector, leading to evolution of existing financial products or creation of new targeted products;
- Targeting institutional investors (e.g. public pension schemes) in order to increase the share of their funds invested in energy efficiency, or to develop specific funds or investment products. Supporting the integration of energy efficiency in portfolio management strategies for institutional investors and/or fund managers, including through re-definition of fiduciary duties;
- Exploring the impact of revised risk ratings and requirements for energy efficiency on financial regulations (Basel III, Solvency II).

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Number of financial institutions and other stakeholders reached as well as their potential volume of investment concerned;
- Frameworks, standardisation, benchmarking, standardised descriptions and data evidence of financial returns of energy efficiency investments agreed and accepted by the market;
- Higher allocation of institutional investments to energy efficiency; standardisation of assets enabling securitisation; development of a secondary market for energy efficiency assets (in million Euro of investment within 5 years after the end of the project);
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (million Euro).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-11-2018-2019-2020: Aggregation - Project Development Assistance³¹

Specific Challenge: Investors and lenders need to gain more confidence on investment projects related to energy efficiency which are still seen as risky and fragmented. EU added value can be realised in particular where projects introduce innovation to the market regarding project aggregation and financing solutions minimising transaction costs and engaging the private finance community. EU added value could also be realised where projects demonstrably remove legal, administrative and other market barriers for mainstreaming large scale sustainable energy investment schemes.

Scope: Project Development Assistance (PDA) will be provided to public and private project promoters such as public authorities or their groupings, public/private infrastructure operators and bodies, energy service companies, retail chains, large property owners and services/industry. The action will support building technical, economic and legal expertise needed for project development and leading to the launch of concrete investments, which are the final aim and deliverable of the project.

Proposals should focus on one or more of the following sectors:

- existing public and private buildings including social housing, with the aim to significantly decrease energy consumption in heating/cooling and electricity;
- energy efficiency of industry and service;
- energy efficiency in all modes of urban transport (such as highly efficient transport fleets, efficient freight logistics in urban areas, e-mobility and modal change and shift); and
- energy efficiency in existing infrastructures such as street lighting, district heating/cooling and water/wastewater services.

The proposed investments will have to be launched before the end of the action which means that projects should result in signed contracts for sustainable energy investments to that effect, e.g. construction works, energy performance contracts, turnkey contracts.

Whilst proposals may address investments into distributed, small-scale renewable energy sources in combination with energy efficiency, the main focus should lie on capturing untapped high energy efficiency potentials.

Proposals should include the following features:

- an exemplary/showcase dimension in their ambition to reduce energy consumption and/or in the size of the expected investments;

³¹ It is expected that this topic will continue in 2020.

- deliver organisational innovation in the financial engineering (e.g. on-bill financing schemes, guarantee funds, or factoring funds) and/or in the mobilisation of the investment programme (e.g. bundling, pooling or stakeholder engagement);
- demonstrate a high degree of replicability and include a clear action plan to communicate experiences and results towards potential replicators across the EU;
- build on the experiences from previous PDA projects³².

This PDA facility focuses on small and medium-sized energy investments of at least EUR 7.5 million to EUR 50 million. Large scale investments are covered by the ELENA facility.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, the impacts listed below, using quantified indicators and targets wherever possible:

- Delivery of a series of sustainable energy investment projects and innovative financing solutions and/or schemes;
- Every million Euro of Horizon 2020 support should trigger investments in sustainable energy worth at least EUR 15 million;
- Primary energy savings, renewable energy production and investments in sustainable energy triggered in the territory of participating parties by the project (respectively in GWh/year and in million Euro of investments);
- Demonstration of innovative and replicable investment financing solutions, documenting feedback/uptake from potential replicators.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

³² Records of all PDA projects can be found in CORDIS under the topics EE-20-2014/2015 and EE22-2016/2017. All fact sheets can also be retrieved directly from: https://ec.europa.eu/easme/sites/easme-site/files/20160805_mlei_projects-factsheets_final.pdf

LC-SC3-EE-12-2020 - Innovation procurement for energy efficiency

Energy efficiency is an energy source

Proposals are invited against the following topic(s):

LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource³³

Specific Challenge: Energy Efficiency services (e.g. Energy Performance Contracting (EPC)) are available on the market already for quite some time. However, there is a big untapped potential in sectors and with actors not yet engaged in services triggering energy, CO₂ and cost savings. At the same time, new technologies have emerged opening the door for new types of services which use ICT to better control and steer energy consumption according to market and system needs and to the availability of renewable energy; others are able to integrate energy services with non-energy benefits such as comfort. By bundling various services and benefits, additional target groups, sectors and financial resources can be accessed. Actions are also needed to structure and label the quality of demand side service providers (like ESCOs aggregators and energy cooperatives) and improve their accessibility for end energy users.

Finally, ICT-tools and big data generated by smart meters, smart devices and sensors will help monitor and verify energy savings and flexibility and thus provide for appropriate remuneration of optimised consumption. A particular challenge for energy services of this kind is that while they aim to involve different services (e.g. system services) and benefits (e.g. comfort) towards increasing their viability, they should nevertheless result in real, measurable energy savings and performance improvements of the overall energy system.

Scope: 2018 (Coordination and support action):

Actions should allow different market actors to get together and focus on developing integrated concepts and models which

- enhance and refine successful energy performance contracting models and/or;
- include pay-for-performance schemes and/or;
- include customer individualized energy services as a result of better understanding of customer behaviour and needs derived of new data analytics tools;
- engage new sectors and actors and/or;
- integrate energy efficiency services with other energy services like distributed generation and demand response and including storage/hybrid energy systems and/or non-energy related services; these should be endorsed by relevant stakeholders and validated (for example tested around existing projects or projects under development);

³³ It is expected that this topic will continue in 2020.

- factor in potential legal and contractual aspects (e.g. in relation to existing contracts or warranty, safety and data security issues linked to existing and newly deployed equipment).

Proposed actions should cover at least two (but not necessarily all) of the relevant areas and aspects identified below:

- Energy service models (like EPC) and services that target new sectors and new actors;
- Business models which work equally for energy efficiency and other services, building on contractual arrangements across different actors (ESCOs, aggregators, DSOs, energy cooperatives, obliged parties under the Energy Efficiency Obligation Schemes implementing art 7 EED and eventually the consumers) which traditionally cover different use cases business interests and different revenue;
- "Pay for performance"-schemes which focus on permanently reducing power consumption in particular at peak times, thus attracting new sources of financing;
- The use of 'big data' generated by smart meters, equipment, sensors and tools for standardised processes enabling a more accurate and dynamic measurement and verification of energy savings and flexible consumption, also in order to ex-ante identify and develop business opportunities;
- Additional non-energy features that support the up-take of innovative energy efficiency services and technologies;
- Improving the accessibility and quality of demand side service providers while enhancing their access to the market.

Proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

The Commission considers that proposals for Coordination and Support Actions requesting a contribution from the EU of between EUR 1 million and 2 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019 (Innovation action):

Projects should focus on demonstrating and testing innovative energy services in a real environment, across several market segments and across different actors in the value chain. To be economically viable, these services need to be able to rely on sound measurement and verification methodologies. They should cover several but not necessarily all of the relevant areas and aspects identified above, blending in innovative manner different revenue streams coming from different market segments and they should in all cases include innovative verification and monitoring measures. Moreover, they should demonstrate how potential legal

and contractual aspects (e.g. in relation to existing contracts or linked to the use of equipment) have been accounted for.

Proposals should demonstrate that the tested business models and services are self-sustainable after the end of the project. The upfront investments in energy efficiency measures (e.g. upgrading of building energy performance) and in smart building systems should be paid back at least in part by revenues coming from energy savings and remunerated flexibility.

The Commission considers that proposals for Innovation Actions requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Where possible and appropriate, the actions should cooperate with the projects funded under the topics: DT-ICT-10-2018: Interoperable and smart homes and grids, DT-ICT-11-2019: Big data solutions for energy in the WP 5.i ICT, and LC-SC3-ES-6-2018-2020: LC-SC3-ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Improved viability of innovative energy services.

In addition, proposals are expected to demonstrate, the impacts listed below, using quantified indicators and targets wherever possible:

- A growing offer and up-take of services that combine energy efficiency with other energy services, technologies and non-energy benefits;
- A growing up-take of innovative data gathering and processing methods in the monitoring and verification of energy savings and flexibility;
- The application of methods and concepts to ensure that: (i) innovative energy services are reliable and verifiable, (ii) service providers are trustworthy and accessible.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-14-2018-2019-2020: Socio-economic research conceptualising and modelling energy efficiency and energy demand³⁴

Specific Challenge: In the Energy Union Strategy, Energy Efficiency was recognised as a resource in its own right which should be enabled to compete on equal terms with generation capacity and to have primary consideration across all policies³⁵. However, the structure of energy demand as well as the real value beyond the fuel's cost and the (energy and non-energy) impacts of energy efficiency are still not well understood with the effect that benefits of energy efficiency are not sufficiently taken into account in financial and political decision making, and planning, while prices of fossil fuels remain relatively low.

The topic addresses three different dimensions of this challenge with the aim to trigger actions which

1. make the energy efficiency first principle more operational (2018);
2. substantiate the demand side aspects in energy modelling (2019).

Scope: 2018:

The research projects should help to make the Energy Efficiency First principle more concrete and operational and to better understand its relevance for energy demand and supply and its broader impacts across sectors and markets. In particular, it needs to be analysed how energy efficiency programmes along the efficiency chain, i.e. end-use, operation, transmission and generation/utilisation of resources, can compete in reality with supply side investments (e.g. additional generation capacities or import capacities) including at the level of countries and having in mind limited public budgets. It would also be necessary to describe and assess how it interacts with and correlates to other policy objectives, at a policy level as well as at the level of implementation.

Actions which conceptualise and assess the impacts and model the energy efficiency first principle, in particular as regards:

- its role and value in the energy system (e.g. for planning of generation assets and networks adequacy etc.) and the energy market (participation in capacity market, participation and impact on prices and costs on wholesale and balancing/reserve markets);
- its role and value in financing decisions (considering as well that in some Member States retail prices do not reflect real costs);

³⁴ It is expected that this topic will continue in 2020.

³⁵ Communication from the Commission A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy /* COM/2015/080 final

- its economic and social impacts;
- its correlation and interaction with other policy objectives (e.g. renewable energy, demand response);
- existing best practices worldwide where energy efficiency projects are given priority over additional supply side measures.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and 1.5 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019:

The aim of the action is to deepen the demand side-related parameters in existing models and to include new aspects and data sources (e.g. by tapping DSOs modelling for forecasting of distributed loads). In general, it is to be expected that the introduction of smart meters and smart equipment will lead to more accurate consumption data providing for a more holistic mapping of the demand side and thus for better projections inside energy policy development and a more effective regulatory framework.

The action should complement the existing demand side energy models by developing multiple-agent energy models and/or modelling segments and/or developing methodologies on how to improve and enhance the demand side aspects in modelling.

These models and/or methodologies should:

- be compatible with the energy models most commonly used at European level;
- model more accurately those aspects not yet sufficiently considered in the existing models;
- make use of new data sources, including big data as for example generated by smart meters, smart buildings and smart equipment;
- identify and refine the structure and patterns of demand and how it will develop;
- contribute to an enhanced demand-side model to be consistently used at European level.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and 2 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: 2018:

Actions are expected to support policies aiming to promote and implement the "energy efficiency first-principle" based on a sound assessment of the concept and its impacts. To this end, actions should lead to a better understanding of:

- all relevant aspects linked to the "energy efficiency first-principle";
- its impacts (e.g. technical, economic, socio-economic, and ecological etc.) on the relevant sectors and markets;
- its potential across the different policy areas and sectors;
- its consideration and valorisation in modelling and assessments; and
- its interaction with other policy objectives both at policy level (e.g. climate and renewable policies, circular economy) and at the level of concrete application (e.g. design of buildings).

2019:

Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible

- More accurate and holistic mapping and modelling of the demand side and to a better assessment of energy consumption trends for different categories of economic agents.
- More accurate follow-up of energy efficiency measures implemented at the demand side;
- Better assessment of demand-side policy needs at European level.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Support for policy-driven innovations

Proposals are invited against the following topic(s):

LC-SC3-EE-15-2018: New energy label driving and boosting innovation in products energy efficiency

Specific Challenge: The energy label is a key driver for innovation in the energy efficiency area. For more than 20 years the tangible results of the transformation of the European market are being observed, where only the products with the highest energy efficiency parameters and innovative solutions to save energy are being commercialised. The energy label stimulates a real competition in innovation among product manufacturers. However the current energy label has a closed scale from A+++ to D, so once the majority of products reach the highest classes, the label no longer stimulates further innovation. Therefore, the Commission has proposed that, in future, labels will be 'rescaled' (as well as go back to A-G

scale), i.e. existing products will be re-categorised in lower classes so that the top classes are empty and provide new stimulus for innovation. The ‘empty top-class’ label will be the strongest and continuous innovation trigger. Rescaling of labels would take place approximately every ten years or faster, if technology development and innovation has been faster than expected. This rescaling, will be a challenging operation in terms of organisation and provision of information to the concerned market actors, requiring technical guidance, communication and training campaigns, including during the transitional periods³⁶ in order that the new scale is correctly applied by manufacturers leaving enough space for future innovations. Customers' confusion should be avoided by replacing labels displayed on the affected products within a short timeframe in order to ensure consumer choice to be directed to the highest class innovative products.

Scope: The proposed action should cover one or more of the following points:

1. Raise the capacity of manufacturers and, in particular, retailers (e.g. through a comprehensive training methodology, involving a series of hands-on applications in each Member State) to fulfil their obligations providing and displaying respectively the correct label at the point of sale;
2. Develop and roll out tailored and effective actions focusing on awareness-raising and information campaigns to alert market actors (businesses, public procurement personnel, consumers etc.) of label rescaling, with a view to increasing understanding of labels and routing purchase decisions towards higher efficiency products. These actions should also address any additional references that may exist on the rescaled label (e.g. QR code);
3. Exchange of best practices in relation to these campaigns, including through the recommendation of common key messages to the respective target groups.

All relevant stakeholders necessary for the successful implementation of the action should be involved (e.g. manufacturers, retailers, public procurement personnel and consumers).

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (million Euro);
- Number of stakeholders (e.g. public procurement personnel, businesses and consumers) informed by actions aiming at improving the understanding of rescaled labels,

³⁶ A period during which old (before the rescaling) and new rescaled labels for the same products would both be present in shops.

minimising any risk of confusion (at least 5 million stakeholders per million Euro of EU funding);

- Number of manufacturers, suppliers and retailers engaged by actions aiming at improving their understanding of rescaled labels, minimising the risk of confusion (at least 5 000 market actors per million Euro of EU funding);
- Reduced compliance costs, maximise legal certainty and minimise errors during the transition periods for suppliers and dealers.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-16-2018-2019-2020: Supporting public authorities to implement the Energy Union³⁷

Specific Challenge: The delivery of the Energy Union targets requires the full engagement of the public sector at all governance levels.

Local and regional public authorities have a crucial role in setting ambitious energy efficiency strategies, for instance in the framework of the Covenant of Mayors for Climate & Energy and Smart Cities & Communities or the Clean Energy for All islands initiative. The political commitment at local level should be enhanced and the focus should turn to implementation and effective monitoring of concrete energy efficiency solutions and actions, which can contribute to modernise and decarbonise the European economy. Synergies should be sought, whenever possible, with local and regional air quality plans³⁸ and air pollution control programmes³⁹ to reduce costs since these plans rely to a large extent on similar measures and actions⁴⁰.

Support should continue and be reinforced in building capacity of public authorities and empowering them to take up their role of energy transition leaders at regional and local level, by permanently improving their skills as public entrepreneurs and supporters of market transformation towards more efficient energy systems.

³⁷ It is expected that this topic will continue in 2020.

³⁸ Directive 2008/50/EC

³⁹ Directive 2016/2284

⁴⁰ Second State of the Energy Union, page 13.

At national level, the Energy Efficiency Directive has triggered numerous positive developments in the Member States by setting targets to incentivise and enable investment in energy efficiency programmes across all sectors. However, Member States have yet to fully implement the Directive and additional support in building capacity and know-how is needed.

Scope: a) *Support to local and regional public authorities*

Proposers should aim to focus their proposed action on one of the following points:

- Deliver higher quality and consistency of energy efficiency measures implemented through enhanced coordination of different administrative levels. Actions should lead to politically approved and jointly applied monitoring and verification schemes of energy efficiency measures across local and regional authorities, enhanced and better coordination of the energy efficiency measures implemented and more efficient use of public spending in energy efficiency;
- Support public authorities in the development of transition roadmaps that clearly outline the path to the European long-term 2050 targets and inform the ongoing implementation of SEAPs/SECAPs or similar plans and the development of future plans/targets for 2030 and beyond. Actions should link closely to the Covenant of Mayors and/or Smart Cities and Communities initiatives;
- Innovative ways to enable public engagement in the energy transition, developing interface capacities within public authorities to engage with civil society;
- Deliver large-scale and action-oriented peer-to-peer learning programmes targeting cities and/or regions, with a strong replication potential European-wide. Proposals should develop transparent, effective and compelling programmes, building on existing initiatives and real needs and ensure embedded conditionalities such as institutionalisation of the skill base and impact monitoring. Programmes should deliver public entrepreneurs able to drive the sustainable energy transition in their respective territories within the Covenant Mayors and beyond.

b) *Supporting the delivery of the Energy Efficiency Directive*

Support will be provided to actions that are assisting Member States to fulfil their obligations under the Energy Efficiency Directive and help with its efficient implementation taking into account existing effective practices and experiences from across Europe. Actions may address, for example, the harmonisation of energy savings calculations under Article 3, implementing Energy Efficiency Obligation Schemes or alternative measures and setting up effective and consistent monitoring and verification systems under Article 7 or the removal of barriers to higher efficiency of the generation, transmission, distribution systems including demand response under Article 15.

Proposals should link into existing, relevant initiatives such as ManagEnergy and target a specific sector with high energy saving potential such as buildings, transport mobility, heating and cooling, or water infrastructure operation etc., as seen relevant by applicants.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings, renewable energy production and investments in sustainable energy triggered in the territory of participating parties by the project (respectively in GWh/year and in million Euro);
- Number of public officers with improved capacity/skills;
- Number of policies influenced through the action;
- Number of Member States with improved implementation of Art 7. (Energy Efficiency Obligation schemes or alternative measures) / Energy savings achieved through successfully implemented Energy Efficiency Obligation schemes or alternative policy measures;
- Number of Member States with improved and consistent monitoring and verification systems for energy savings across governance levels.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-17-2019: European City Facility - European cities as key innovation hubs to unlock finance for energy efficiency

Specific Challenge: Mobilising investment in energy efficiency and renewables is key for Europe's energy transition. The European Commission proposed the Smart Financing for Smart Buildings (SFSB) initiative in the recently published Clean Energy for All Europeans winter package.

For the SFSB to succeed it is essential to boost project aggregation and build a substantial pipeline of energy efficiency investment projects across Europe. Cities and communities are the place where economic, social and environmental transformation actually happens. Cities and communities play a key role in aggregating smaller projects into sizable packages and in mobilising the significant amount of finance needed for the energy transition.

However, despite a tremendous potential, too few cities and communities in Europe succeed in developing and scaling up investment packages. A high degree of organisational, technical and financial innovation is needed to reach significant scale. A key gap is the lack of capacity of public authorities, especially of small and medium-sized municipalities to transform their overall long-term strategies, e.g. Sustainable Energy Action Plans (SEAPs) or similar, into

credible investment concepts. Public authorities have limited resources, in particular, to access financial, technical and legal expertise needed to collect additional data, develop an investment programme of scale (e.g. pooling projects and/or bundling with neighbouring constituencies) and design finance strategies which demonstrate sufficient maturity to enable access to different finance routes, i.e. to develop their 'investment concept'.

These concepts would allow a large number of cities and communities to start the process for mobilising the investments in sustainable energy. When relevant, such concepts could be combined with other EU financing streams and services to trigger the expected investment (e.g. EFSI⁴¹, ESIF⁴², PDA⁴³, National Investment Platforms).

Scope: Proposals are expected to set up and run a 'European City Facility' which offers financial support and services to cities and municipalities or their groupings:

- The European City Facility should offer financial support to develop innovative investment concepts within a limited period of time, covering, inter-alia: a clear identification of the potential project pipeline, legal analysis, governance analysis, a description of how the investments will be financed and a design of the process to launch the investments.
- Proposals should foresee to provide support to third parties ('support scheme') as described in part K of the General Annexes of the Work Programme. At least 80% of the budget should directly benefit cities, municipalities or their groupings.
- Proposers should demonstrate the ability to run a support scheme at large scale in accordance with Horizon 2020 standards and that they are able to select the most cost-efficient and appropriate city and community applications taking account, inter alia, the scale of the potential investment and the number of inhabitants covered.
- Proposers should be deeply rooted in the ecosystems of municipal sustainable energy planning and the challenge of finance of energy efficiency. Proposers should demonstrate that they are able to mobilise a critical mass of cities/municipalities or their groupings and have a sound and inclusive outreach strategy to cities and communities across Europe.
- Proposals should foresee services to underpin European added value and earmark appropriate resources (maximum 10% of the requested EU contribution) for common actions that will underpin European added value.
- In order to qualify for support through the European City Facility, cities and communities or their groupings should provide proof of political commitment, demonstrate, additionally to existing planning processes and resources, a minimum population covered (single or in groupings of municipalities) and an ambitious scale of

⁴¹ European Fund for Strategic Investments

⁴² European Structural and Investment Funds

⁴³ Project Development Assistance, e.g. ELENA-EIB, EASME PDA

potential investment and level of energy savings based on politically approved SEAPs, SECAPs⁴⁴ or plans of similar ambition, describe the investment sectors targeted, the type of financial solutions envisaged, the governance to develop the investment concept, and include a plan for long-term capacity building within the public administration, a plan on how they will engage with representatives of the key segments and citizens and a commitment for monitoring for 2 years.

The Commission considers that proposals requesting a contribution from the EU of around EUR 16 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Demonstration and documentation of increased leveraging of finance into energy efficiency investments by public authorities;
- Overall, the action should trigger for every million Euro of Horizon 2020 support sustainable energy investments worth at least EUR 20 million;
- Number of investment concepts delivered, and number of concepts that turned into tangible investments after the provided support;
- Number of public authority staff with increased capacity for developing investible energy efficiency projects;
- Innovation uptake by potential replicators;
- Primary energy savings, renewable energy production and investments in sustainable energy triggered by participating public authorities after the support of the action (respectively in GWh/year and in million EUR of investments).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

⁴⁴ Sustainable Energy and Climate Action Plan

LC-SC3-EE-18-2019: Bioclimatic approaches for improving energy performance in buildings in Africa and Europe

Specific Challenge: Africa is going through a rapid urbanisation phase and it is anticipated that, by 2030, there will be more people living in urban than rural areas. On the other hand, the housing supply is already far from meeting the highly growing demand in cities and the expectations of home owners, in terms of performance, comfort and health. One of the reasons for this situation is the insufficient use of construction materials and technologies, which are adapted to local climate and economic contexts. Imported materials and technologies, which are not always suitable for local conditions, are replacing the traditional and local building designs, construction techniques and materials. Poor indoor thermal conditions, in particular overheating, and high demand for expansive active cooling, are often the result together with an increased buildings' energy footprint. Use of cheap and low-quality materials to cut down construction costs and lack of knowledge about their performance are other problems related to this issue. There is a need to increase the knowledge about the benefits of using bioclimatic buildings design approaches, local materials, and construction techniques suitable to local contexts.

Scope: Proposals should study the performance of a selection of European and African local bioclimatic building designs, local construction materials and techniques to determine how they could be utilized to increase the energy performance, living quality and sustainability of buildings in targeted geographical zones in Africa and their climatic and socio-economic conditions. Proposals should promote innovations, including bioclimatic approaches, to enable adaptation of local materials and techniques to current building design and construction practices and lifestyles. They should include maximizing passive cooling, passive ventilation, natural light gains and suitability for specific local climate conditions (e.g. stark rains). They should investigate how sustainable supply chains of local materials could be established or improved to cope with fast paces of construction, contributing to the support of local businesses. They should foster exchange and mutual learning between European and African stakeholders (policy-makers, architects, auditors, building sector private companies) for better regulation and implementation of locally adapted bioclimatic construction approaches.

Proposals should include the following activities:

- Identification and documentation of African and European affordable buildings designs, construction techniques and materials suitable for a selection of local climatic and socio-economic contexts in Africa, based on bioclimatic construction approaches.
- Exchange activities around the topic of fostering low-cost, high performance, locally adapted bioclimatic construction approaches for African and European policy-makers and on the development of building policies, standards, regulations, certificates and other relevant instruments and support measures in a selection of geographical zones in Africa.

They could also include the organization of one or several study visits to demonstration sites for African policy-makers and other key stakeholder including the construction sector. South-south cooperation is also encouraged.

- Investigation of the measures (in particular policy ones) that could effectively support the development of sustainable and cost-effective supply chains of local construction materials, in order to enhance their competitiveness and contribute to the growth of local businesses.

The Commission considers that proposals requesting a contribution from the EU of around EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate that they will trigger as many as possible of the impacts listed below:

- Increased use of affordable, locally-adapted bioclimatic construction approaches in buildings in Africa with high energy performance and increase living comfort;
- Expected (potential for) energy savings (kWh) in buildings thanks to the improved techniques;
- Number of documented locally-adapted bioclimatic affordable building design, construction techniques and materials;
- Number of participating policy-makers and other key stakeholders with increased knowledge;
- Number of exchange meetings and/or study visits;
- Number of new legislative, regulatory, standardisation, certification schemes or other support measures launched or under preparation;
- Investments aiming to develop or deploy affordable, locally-adapted bioclimatic buildings design, construction techniques and materials;
- Promotion of effective sustainable supply chains of local construction materials;
- Number of workers with increased related skills in the bioclimatic construction sector.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Global leadership in renewables

The Energy Union Strategy has set the target for the EU to achieve global leadership in renewable energies. Increased R&I efforts for renewable energy are indispensable hence renewables are identified as a core R&I priority in the Energy Union Strategy and the "Accelerating Clean Energy Innovation" Communication. The "Clean Energy for all Europeans" package underpins the EU's ambition by a number of legislative proposals and non-legislative initiatives, notably the recast of the Renewable Energy Directive which creates the enabling framework for Member States to unlock their renewables' potential and collectively reach a share of at least 27 % in the Union final energy consumption by 2030 in a cost-effective way.

The Energy Union priorities, also in the area of renewable energy, are jointly implemented by the stakeholder community, national authorities and the Commission through the key actions of the EU Strategic Energy Technology Plan (SET Plan), notably action 1 ("Performant renewable technologies integrated in the system) and action 2 ("Reduce costs of technologies"). To attain these goals, ambitious R&I targets have been set in agreement with the sectorial stakeholders, for renewable technologies with great potential for cost-reductions, performance improvements and large-scale deployment worldwide – off-shore wind energy, the next generation of solar photovoltaics (PVs), ocean energy, concentrated solar power (CSP), deep geothermal energy and bioenergy. Furthermore, goals were set to increase renewable penetration in the heating and cooling sector and to strengthen market take-up of renewable fuels needed for sustainable transport solutions. While it is expected that the Member States will take coordinated actions towards the priorities and targets set by the SET-Plan, a strong and concerted effort also from the EU is needed to sustain the technological and economic leading position in some renewable technologies and to catch up in areas where the EU is lagging behind. Projects supported in this area contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan actions 1, 2 and 8⁴⁵.

Activities fully reflect the "Open Science, Open Innovation and Open to the World Strategy" – supporting open science and the new approach of the European Open Science Cloud (EOSC) by providing access to relevant research results while moving up the TRL scale innovative solutions; providing support opportunities for opening markets to innovative solutions and for turning research results into successful products; being open to the world, proactively exploring international cooperation activities in the precompetitive research phase, and fostering local market adaption via frugal innovation of available technologies for emerging global markets.

The challenge is to create an EU industrial renewable energy sector which is economically sustainable and competitive in European and global markets in the long-term. For this purpose, this area supports activities across the full innovation chain, from identifying breakthrough technologies to supporting the entire portfolio of renewable energy technologies at laboratory scale, dedicating support to validation in relevant environment of most

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For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

promising technologies, finally supporting market up take introduction with collaborative and not purely technological activities. It features tailored approaches, taking into account technology-specific challenges, potential, cultural aspects, levels of maturity, risk, and competitiveness aspects.

This call includes 4 lines of interventions:

1. breakthrough technology development,
2. renewable energy solutions for implementation at consumer scale (encompassing generation of energy in all its form, starting from electricity only generation to also encompass combined heating and cooling solutions, from domestic to industrial and district scale),
3. renewable energy solutions for implementation at the energy system level (oriented to reduce the costs of electricity generated, to optimise system operation and improve processes and components manufacturing, to provide flexibility to the system), and
4. renewable fuels for transport (aiming both feedstock and process improvements and supporting road, aviation and shipping sectors in particular).

In addition, specific actions with an international dimension are set out, notably in the context of the "Mission Innovation" initiative. A special focus is also on adapting emerging renewable energy technologies to the African context by fostering cooperation and concerted actions with the Member States and Associated countries (see area "Joint actions" of this work programme part). Activities are complemented by the Horizon Prize on Artificial Photosynthesis which is included in the "European Innovation Council (EIC) Pilot" part of the work programme.

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 in the broader sense (i.e. including the use of the renewable source and all the features needed for performing in a complex and integrated energy system) cost competitive with their fossil equivalents, allowing them to participate in the energy and transport markets on a level playing field. 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 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.

Proposals are invited against the following topic(s):

LC-SC3-RES-1-2019-2020: Developing the next generation of renewable energy technologies⁴⁶

Specific Challenge: The renewable energy technologies that will form the backbone of the energy system by 2030 and 2050 are still at an early stage of development today. Bringing these new energy conversion solutions, new renewable energy concepts and innovative renewable energy uses faster to commercialisation, taking into account social acceptance and secure and affordable energy supply, is challenging. These new technologies must not only have a commercial potential but they should also have a lower environmental impact and lower greenhouse gases emissions than the current renewable energy technologies.

Due to the pre-competitive nature of the research activities of this type, particular emphasis is put on including international cooperation opportunities, whenever relevant to the proposal and the domain, in particular in the context of the Mission Innovation Challenges⁴⁷.

Scope: Proposals are expected to bring to TRL 3 or TRL 4 (please see part G of the General Annexes) renewable energy technologies that will answer the challenge described. Beside the development of the technology, the proposal will have to clearly address the following related aspects: the potential lower environmental and climate impact on a life cycle basis, the better resource efficiency, issues related to social acceptance or resistance to new energy technologies, related socioeconomic and livelihood issues.

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.

One of the following technology-specific sub-topics has to be addressed:

- Developing the new energy technologies that will form the backbone of the energy system by 2030 and 2050. The challenge is to develop energy technologies currently in the early phases of research. It is crucial that these new, more efficient, and cost-competitive energy generation and conversion technologies, demonstrate their potential value in the future European energy system. Developments in sectors other than energy may provide ideas, experiences, technology contributions, knowledge, new approaches, innovative materials and skills that are of relevance to the energy sector. Cross-fertilisation could offer mutually beneficial effects;

⁴⁶ It is expected that this topic will continue in 2020.

⁴⁷ <http://mission-innovation.net/our-work/innovation-challenges/>

- Innovative materials for geothermal heat exchangers to maximize energy transfer and improve the overall conversion efficiency of a geothermal system;
- Innovative testing methods and design tools for acceleration of wind energy technology development and increased life time extension;
- Sustainable fuels other than hydrogen for energy and transport application through ground-breaking conversion technologies, addressing for example development of novel microorganisms, enzymes, catalysts, photosensitizers and separation techniques, improvement of biomass and microalgae yields, and development of novel technologies of combined indirect and direct artificial photosynthesis with chemical/biochemical/biological systems;
- Innovative very high efficiency thin-film photovoltaics concepts considering advanced, sustainable and low-cost materials and processes.

Novel technology solutions for grid integration, storage, fuel cells and hydrogen – (other than integral to the technology solution developed), energy efficiency and smart cities will not be supported under this topic but in the relevant parts of this work programme part and other H2020 work programme parts.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: On its completion, the project is expected to advance the knowledge and prove the technological feasibility of the concept including the environmental, social and economic benefits. The proposal should show its contribution towards establishing a solid European innovation base and building a sustainable renewable energy system contributing to the decarbonisation of our economies. The proposed solutions are expected to contribute to strengthening the EU leadership on renewables.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-2-2018: Disruptive innovation in clean energy technologies⁴⁸

Specific Challenge: The challenge is to take exceptionally promising and innovative energy solutions with high potential impact to real breakthrough and market application. Boosting the breakthrough of particular promising technologies requires both a focused and adaptive approach, to secure that investment brings innovation that is taken up by the market - or discontinues an investment that has too limited expected impact. Specific fields where

⁴⁸ This pilot is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

disruptive rather than incremental innovation is needed are the integration of renewable energy into smart buildings, and sustainable fuels. A specific challenge is to develop efficient fully transparent photovoltaic (PV) cells that only absorb light in the non-visible part of the spectrum, so that they can be integrated on a wide scale as windows in buildings. Another specific challenge is to enable production of sufficient quantities of liquid fuels that do not compete with food for land, do not displace land uses, are cost competitive to fossil fuels and substantially reduce greenhouse gas emissions.

Scope: Proposals are invited in (only) one of the following two sub-topics:

- Photovoltaic windows ('transparent' solar cells): development of transparent and economically viable PV cells for integration in building applications. Projects should demonstrate a prototype 'PV window' which allows the visible light to pass through unhampered, and has the potential to achieve the lifetime and conversion efficiency of commercial PV modules (resp. 25 years and at least 12%).
- Bionic leaf technology: advanced renewable fuel production through biological conversion of CO₂ and renewable hydrogen in the presence of inorganic catalysts. The process is based on first using solar energy to split water molecules and then using bacteria to consume the hydrogen together with CO₂ to produce fuel, and currently has an efficiency of 10%. Projects should advance the overall efficiency of the process for existing or new biosynthetic systems up to 15% under ambient air conditions by enhancing the water splitting efficiency and improving the engineering of bacteria and their interface with the catalysts in order to boost their growth at all conditions.

Proposals are expected to bring the technologies from TRL 3 to at least 5. Proposals need to demonstrate a clear technology development roadmap for their solutions, including a strong exploitation plan presenting their business opportunities and impact potential. The technological development risks need to be clearly identified and relevant mitigation measures given. Life cycle analysis shall be considered.

Projects selected under this pilot will follow a stage-gate approach based on milestones and periodic reviews. A first review by the Commission - with the help of independent experts - will take place after 6 months, based on an assessment by InnoEnergy⁴⁹ of the feasibility and innovation potential of the proposed solution or application, analysing a.o. the business and innovation strategy, the technology readiness level of the proposed application, the consortium's freedom to operate (e.g. background, foreground, IP), and the market. This review will lead to a first go/no go decision.

Throughout the duration of the Grant Agreement, and agreed therein, Inno Energy will be involved in providing support to innovation and business development, including completing the market uptake supply chain, using external expertise, with the aim to strengthen the consortium's innovation performance.

⁴⁹ <http://www.innoenergy.com/>

The Commission considers the proposals requesting a contribution from the EU of between 2 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Transparent, visually non-intrusive PV windows have a significant market potential, because they could be fitted to existing buildings, without the need to cover large new areas to collect solar energy; every glass surface could produce solar power. As such PV windows block much of the infrared radiation, they would cut down on air conditioning needs, further reducing energy use and operating costs in buildings.

An economically viable bionic leaf technology with increased efficiency well beyond the state-of-the-art has significant market potential and environmental impact, because it will enable development of sustainable fuel for transport that will completely replace fossil fuels and their best alternatives. Converting 50% of all industrial CO₂ emissions into fuels using this process at an efficiency of only 15% would avoid half of today's transport GHG emissions. Moreover, this will improve Europe's energy security while at the same time create economic growth.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-3-2020: International Cooperation with USA on alternative renewable fuels for energy and transport

LC-SC3-RES-29-2019: Converting Sunlight to storable chemical energy⁵⁰

Specific Challenge: To replace fossil energy with sustainable alternatives that provide the same flexibility and convenience of use, we need to store sustainable energy on a large scale and for a long time in new kind of energy storage compounds. This can be done by direct conversion of sunlight into storable chemicals that can be stored for a virtually unlimited time. At present, these processes can be performed at the level of small prototype devices at high cost. Therefore, research and innovation are needed to bring these approaches from infancy to maturity. The production of clean forms of storable chemical energy from direct sunlight is the next step.

Performance breakthroughs, including day and night continuous processes, and cost reductions are a must in order to unlock the potential of technologies converting sunlight to storable chemical energy.

This challenge is fully aligned to the "Converting Sunlight Innovation Challenge"⁵¹ identified as a priority in Mission Innovation.

⁵⁰ It is expected that this topic will continue in 2020.

⁵¹ <http://mission-innovation.net/our-work/innovation-challenges/converting-sunlight-challenge/>

Scope: Proposals are expected to address renewable energy technologies that will answer the challenge described in the "Converting Sunlight Innovation Challenge" of Mission Innovation, bringing them up to TRL 4 or 5. Beside the technological development, the proposal will have to clearly address the following related aspects: the potential lower environmental impact than the current technologies, possibly through a LCA analysis, the better resource efficiency, issues related to social acceptance or resistance to new energy technologies, related socioeconomic and livelihood issues, and prospective market analysis. The proposal needs to consider all three dimensions of sustainability, resource efficiency and scalability, i.e. not using materials which are uncommon, dangerous or scarce that could disable its future concept to be used at large scale.

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;
- Thermochemical pathways to energy rich chemicals (using concentrated solar light); and
- Design and engineering of devices, systems or prototypes integrating together the different processes, with day and night control and applicability for the production of chemical energy rich carriers.

The area of electrolyzers efficiently utilizing a renewable electricity input, such as provided by photovoltaics, wind turbines or other sustainable means, is not covered by this challenge.

The proposal must have a plausible pathway to scale the technology to the terawatt scale by 2050, a plausible potential for an EROI > 10 (EROI: Energy returned on energy invested) and the full recyclability of the conversion devices in the context of a circular economy must be ensured.

As part of Mission Innovation actions, the project will be required to contribute towards the activities of the "Converting Sunlight Innovation Challenge". Beside solving the technical challenge, the consortium is expected to budget the participation in the development of the Challenge work plan through activities such as dissemination, exchange of researcher and networking as well as through contributing in official meetings.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 3 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects will not only contribute to mitigating climate change through the production of storable chemical energy from the sun, but also enhance energy security and provide opportunities for economic development across the globe.

Projects should show its contribution towards establishing a solid European innovation base and building a sustainable renewable energy system.

Contributing to Mission Innovation aims, projects will deepen the international collaboration in clean energy research and development.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Renewable energy solutions for implementation at consumer scale

The focus of these actions will vary, depending on the number of consumers involved, from individual and residential buildings, to industrial sites and district systems. Solutions explored under this line of intervention consider holistically the consumer energy needs, from electricity generation to heating and cooling services, aiming to develop near-zero fossil energy solutions for buildings and districts. The solutions should allow for a significant part of the energy to be consumed at the place of production, fostering the emergence of the energy prosumers and therefore enabling the consumer participation into the energy transformation.

Energy generation at building scale

Proposals are invited against the following topic(s):

LC-SC3-RES-4-2018: Renewable energy system integrated at the building scale

Specific Challenge: An increased penetration of renewable energy in the energy mix and the decarbonisation of the heating sector are amongst the most important priorities set in the Energy Union Strategy⁵². To this aim, solutions that integrate several technologies based on one or more renewable energy sources (and their combination with energy storage systems where necessary) should be made available and the highest possible share of renewable energy should be achieved. This integration requires innovative approaches, due consideration of the implications for the user and a proper assessment of the cost-effectiveness. This specific challenge is in line with the objectives of the SET-Plan, of Innovation Challenge n. 7 ("Affordable Heating and Cooling of Buildings") of Mission Innovation and the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Scope: The proposal will provide a combination of different renewable energy technologies to cover the highest possible share of electricity, heating and cooling needs of a multi-family residential or commercial or public or industrial building (in the case of the industrial building, the project is not expected to address the energy needs of the industrial process).

Since the final application will be operated by users and installed by installers, their needs and requirements (e.g. in terms of space that the users are willing to provide for the installation of the different components of the system) shall be taken into account and the relevant expertise in terms of social sciences and humanities has to be included in the consortium.

⁵² COM(2015) 80

Attention should be paid to reducing emissions of air pollutants.

Proposals are expected to bring the integrated technologies solutions from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to develop solutions that will reduce the dependence on fossil fuels for providing electricity, heating and cooling in buildings. Cost competitiveness with traditional solutions is expected to be achieved by 2025 considering also the effect of economies of scale.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-5-2018: Increased performance of technologies for local heating and cooling solutions

Specific Challenge: Renewable, local energy sources have a great potential to drastically reduce the use of primary energy for both heating and cooling in residential and commercial buildings. In order to stimulate the uptake of solutions that harness these sources, it is necessary to make existing technologies more performant and therefore more cost-efficient and attractive for the market. In addition, innovation in resource mapping, monitoring and control tools have the potential to improve the design and the operation of heating and cooling systems thus reducing investments and operation costs and increasing the systems' performance. This specific challenge is in line with the objectives of the SET-Plan, of Innovation Challenge n. 7 ("Affordable Heating and Cooling of Buildings") of Mission Innovation and the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Scope: The proposal is expected to address one or more of the following aspects:

- Optimisation of the different components of a renewable heating and cooling system;
- Development of tools and systems to optimize the design and monitoring of the different components of a heating and cooling system;
- Development of integrated control systems for the smart operation of a heating and cooling system.

The proposed systems will harness renewable local energy sources to supply heating and cooling in residential and small and larger commercial buildings as they have different heat/cold needs. The definition of residential building includes single houses and apartment blocks.

Attention should be paid to reducing emissions of air pollutants.

Proposals are expected to bring the technologies from TRL 5-6 to 6-7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to lead to either a significant performance increase, in the order of 10-20%, in terms of available heat/cold or to a reduction in the investment and operation costs or to a combination of both aspects, reducing the dependence on fossil energy for heat and cooling in buildings.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-6-2018: Demonstrate significant cost reduction for Building Integrated PV (BIPV) solutions

Specific Challenge: BIPV need to satisfy multiple building functions such as mechanical rigidity and structural integrity; primary weather impact protection including rain, snow, wind, etc.; energy economy, such as shading, daylighting, thermal insulation; fire protection, noise protection, in addition to architectural and aesthetic considerations, so as to replace roofs, facades and shading devices. At the same time, a control system for building management functions, grid-feeding, self-consumption and local storage needs to be considered.

Scope: Support will be given to solutions that address: a) new BIPV product concepts to meet these requirements and cost-efficient production techniques reducing their additional cost by 75% by 2030 compared to 2015 levels (⁵³ *Annex I. BIPV detailed targets*) and; b) demonstration of these concepts into a BIPV energy system that guarantees the building functionalities and energy needs on a life-cycle basis. Proposals will involve multidisciplinary consortia including the PV manufacturing industry. The building materials industry, certification bodies and market actors who are committed to adopting/implementing the results will also be included where relevant.

Proposals will also address standardization issues.

Proposals are expected to bring the technology from TRL 5-6 to 6-7 (please see part G of the General Annexes).

⁵³ https://setis.ec.europa.eu/system/files/integrated_set-plan/declaration_of_intent_pv.pdf

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to contribute to the implementation of policies towards Zero-Energy Buildings. By achieving a substantial reduction of the BIPV costs which would trigger the penetration of BIPV in the building sector, they are also expected to contribute to the creation of new opportunities and the diversification of the European PV manufacturing industry.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Renewable energy solutions at the district level and for industrial processes
Proposals are invited against the following topic(s):

LC-SC3-RES-7-2019: Solar Energy in Industrial Processes

Specific Challenge: The potential of applying solar energy for industrial purposes is still largely untapped. Using solar energy to provide the heat or cooling necessary to industrial processes that need high reliability and high quality heat and cooling and continuous operation requires innovative advances in solar energy technology. Also, industrial processes might need to be adapted to the use of the solar resource. Industrial actors expect solutions with limited installation, maintenance and operation requirements and which are easy to operate. This challenge is also in line with the roadmap of the SPIRE cPPP.

Scope: Support will be given to solutions that cover by means of solar thermal energy the highest possible share of the heating and/or cooling demand of one or more industrial processes. In the case of heating, the process temperature shall be higher than 150°C. Individual industrial sites and/or industrial parks (coupled to a district heating and/or cooling network) are in the scope.

Proposals are expected to bring the technologies to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: An increased decarbonisation of the industrial sector, a reduced dependency on fossil fuels and a reduction of emission of air pollutants are expected. Furthermore, the project should create significant visibility to the potential of applying solar thermal energy in industrial processes, especially in those EU countries where such systems currently have very limited or no application. The knowledge generated by the project should contribute to the development of relevant BREFs under the Industrial Emissions Directive.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-8-2019: Combining Renewable Technologies for a Renewable District Heating and/or Cooling System

Specific Challenge: There is a large potential to integrate substantial shares of renewable energy generation in district heating and/or cooling systems. Innovative approaches are needed to exploit this potential in the different geographical regions of Europe, also considering the options of combining two or more renewable energy technologies and integrating excess heat. The operators and users expect the systems to be reliable and to have limited installation and running costs. This challenge is in line with what identified priorities in the context of the SET-Plan.

Scope: Support will be given to cost-effective solutions for district heating and/or cooling systems which allow satisfying at least 50% of the energy demand of the system by the use in the district of one or more renewable energy technologies. The integration of sources of otherwise wasted excess heat is in the scope.

The solutions should be demonstrated in real conditions within an operational district heating and/or cooling system.

The consortium is expected to engage operators and final users (in particular if the users need different supply temperatures) so that they can contribute for an optimal and cost-effective design. The requirements of the final users (e.g., in terms of metering) for the day-to-day operation shall be taken into account.

Proposals are expected to bring the technologies to TRL 6 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 15 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: A reduced dependency of district heating and/or cooling systems on fossil fuels and reduced greenhouse gas emissions are expected, as well as reduced emissions of air pollutants. Furthermore, the project should improve the attractiveness of "renewable" district heating and/or cooling systems, especially in those EU countries where such systems currently have very limited or no application.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-9-2020: Next generation of thin-film photovoltaic technologies

LC-SC3-RES-10-2020: Pre-Commercial Procurement for a 100% Renewable Energy Supply

Renewable energy solutions for energy system level implementation

The focus of these actions is 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

Proposals are invited against the following topic(s):

LC-SC3-RES-11-2018: Developing solutions to reduce the cost and increase performance of renewable technologies

Specific Challenge: Achieving or maintaining global leadership in renewable energy technology requires that the innovative solutions are also affordable. Therefore cost reductions remain a crucial necessity for existing or new technologies. This specific challenge is in line with the sectorial cost reduction targets stated in the respective Declarations of Intent of the SET Plan⁵⁴, where applicable.

Scope: Proposals will address one or more of the following issues:

- a. *Floating Wind* – Technology development including reliable, sustainable and cost efficient anchoring and mooring system, dynamic cabling, installation techniques, and O&M concepts;
- b. *Onshore Wind* - Disruptive technologies for the rotor, generator, drive train and support structures for the development of the advanced or next generation wind energy conversion systems;
- c. *Ocean*: New integrated design and testing of tidal energy devices with behavioural modelling to achieve extended lifetime and high resistance in marine environment;
- d. *Geothermal*: Novel drilling technologies need to be developed to reach cost-effectively depths in the order of 5 km and/or temperatures higher than 250°C;
- e. *CSP*: Novel components and configurations for linear focusing and point focusing technologies need to be developed and tested;
- f. *Hydropower*: Novel components for hydropower hydraulic and electrical machinery which allow efficient utilization also in off-design operation conditions, especially during ramp up and ramp down phases and reduce related machinery wear and tear;

⁵⁴ <https://setis.ec.europa.eu/implementing-integrated-set-plan/no-1-renewables-ongoing-work>

- g. *Bioenergy*: Improve small and medium-scale combined heat and power (CHP) from biomass to reduce overall costs of investments and operation through achieving at the same time high resource efficiency and high overall and electrical conversion performance.

Proposals are expected to bring technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes). Beside the development of the technology, the proposal will have to clearly address the following related aspects where relevant: potentially lower environmental impacts, issues related to social acceptance or resistance to new energy technologies, related socioeconomic issues.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The proposed solution will reduce the CAPEX and/or OPEX of energy generation from any of the mentioned renewable sources making it comparable to generation costs from competing fossil fuel sources.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-12-2018: Demonstrate highly performant renewable technologies for combined heat and power (CHP) generation and their integration in the EU's energy system

Specific Challenge: Progressive replacement of fossil fuels used in the heat and power sectors by means of renewable energy sources can increase energy security, energy price stability as well as independence from imported sources. However, to unlock the full potential of renewable heat and power solutions to significantly contribute to the energy system, improvement of individual technologies performance and their incorporation into the energy system is needed.

Scope: Proposals will address one of the following sub-topics:

- a. *Biomass based combined heat and power (CHP)*: Demonstration of technically feasible and cost-effective installation of medium to large-scale CHP through retrofitting of existing fossil-fuel driven CHP or power plants, as such plants are already integrated in the energy grid. Project will address the transformation of existing fossil fuel power plants >10 MW electrical to CHP plants with the use of sustainable biomass feedstock. Transformations have to demonstrate their overall cost benefits over new biomass-based CHP installations and show at least their state-of-the-art requirements for continuous operation and prove advances in combustion emission reduction. Commercial operation of the plant with biomass after the end of the project is to be envisaged.

- b. *Geothermal*: Allowing geothermal plants to respond cost-effectively to the heat and to the power demand of the network would facilitate the integration of RES in the energy system. Flexible geothermal units are needed to respond to the demand. In addition, adding heat storage to geothermal plants and/or adding other auxiliary heat sources (e.g. sustainable biomass, solar thermal) to geothermal sources, might be important to increase flexibility and allow for better response to variable heat and power demand. Proposals are expected to propose technologies for either more flexible geothermal plants or more efficient geothermal plants or a combination of these two aspects. Associating other renewable heat sources to geothermal and adding storage is not a necessary condition.

The proposals are expected to bring the technology from TRL 5 to TRL 7-8 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The successful demonstration of the proposed solutions will reduce the cost of combined heat and power generation from renewable sources, making it competitive to alternative fossil fuel based solutions. The proposed solutions are expected to lead to subsequent commercial industrial projects, thus increasing the EU industrial capacity for renewable power and heat generation at a lower installation cost. This will allow decarbonisation of the power and heat sector.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-13-2018: Demonstrate solutions that significantly reduce the cost of renewable power generation

Specific Challenge: The cost of electricity generation from renewable sources has significantly come down in the recent years, often putting PV and onshore wind at parity with fossil fuel generated electricity. However, additional efforts are needed to bring the costs of electricity generation from other renewable sources to a competitive level and allow their broader penetration in the EU energy mix, as agreed with the sectorial stakeholders in the context of the SET-Plan.

Scope: Proposals will address one of the following sub-topics:

- a. *Offshore wind*: Focus will be on the development and validation of new manufacturing, installation and/or operation and maintenance techniques, introduction of new materials. The whole value chain, including dismantling, recycling and retrofitting procedures, will be involved to avoid over-engineering. Issues for improved production will be identified. All aspects of health and environmental impact issues will be taken into account.

- b. *Deep geothermal*: Focus will be on the demonstration of cost efficient technologies to limit the production of emissions and/or to condense and re-inject gases, Turning the emissions into commercial products could contribute to cost reduction but it is not a necessary condition.
- c. *CSP*: Focus will be on the demonstration in operational environment of CSP solutions based on novel heat transfer fluids and/or of solutions which make an innovative use of a heat transfer fluid that is already used in other CSP applications.

The proposals are expected to bring the technology from TRL 5 to TRL 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The successful demonstration of the proposed solutions will make electricity generation from renewable sources capable to compete in the electricity market on a level playing field.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Optimize processes and manufacturing
Proposals are invited against the following topic(s):

LC-SC3-RES-14-2019: Optimising manufacturing and system operation

Specific Challenge: Renewable electricity technologies still require optimisation in several key processes of the respective value chains in order to achieve a more efficient conversion of their primary energy source into electricity, as agreed with the sectorial stakeholders in the context of the SET-Plan and stated in the respective Declarations of Intent.

Scope: Proposals will address one of the following sub-topics:

- *Monitoring system for marine energy (ocean and offshore wind)*: New intelligent sensors, fault detection and communication systems for accurate condition and structural health monitoring will enable predictive and preventive Operation and preventive Maintenance processes, crucial for innovative wind and ocean farm control and the realization of virtual power plants. Sufficient knowledge of potential failures and the right tools to detect and locate failures are crucial.
- *Geothermal fluids*: Better understanding of the chemical and physical properties of these fluids (including super-hot and hot fluids) as transport media is necessary to optimize site development and operation.

- *Photovoltaics*: Development of innovative crystalline silicon wafer growth techniques to produce high-efficiency solar cells and modules.

Proposals are expected to bring the technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The improved performance of manufacturing processes and system operation is expected to lead to increased efficiency of the system and/or reduced operational costs of the renewable technologies.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-15-2019: Increase the competitiveness of the EU PV manufacturing industry

Specific Challenge: The EU PV manufacturing industry has faced strong foreign competition in the last years, which has led to a dramatic reduction of its production capacity. The challenge is to develop innovative manufacturing solutions, spanning the entire production chain, that substantially improve competitiveness of the EU PV manufacturing industry and help regain a part of the potentially increasing worldwide PV market, while creating more secure and sustainable supply chains for the EU PV market. This challenge is in line with the priority identified in SET-Plan for an Initiative for Global Leadership in PV⁵⁵.

Scope: Demonstrating manufacturing innovation as well as product innovation for highly performing PV technologies (e.g. crystalline-silicon, thin-film and concentration PV). Innovative solutions will be demonstrated at pilot-line level, showing the potential to be scaled up to GW-size, high-yield-throughput and cost-effective industrial production of high-efficiency cells and modules. Possible examples range from the optimization of one or more steps in the value chain (by e.g. increased automation, laser processing, etc.) to the tailored development of production equipment, to the enhanced durability and/or recyclability of the final product, to the demonstration of production routes for cells and modules based on innovative materials and/or architectures (e.g. perovskite/crystalline-silicon tandem cells).

Proposals are expected to bring the technology from TRL 5-6 to 6-7 (please see part G of the General Annexes).

⁵⁵ <https://setis.ec.europa.eu/implementing-integrated-set-plan/no-1-renewables-ongoing-work>

The Commission considers that proposals requesting a contribution from the EU of between EUR 10 to 13 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Successful projects are expected to trigger new investments in the EU PV industry, via the establishment of pilot lines which target innovative/optimised production processes and/or tailored development of equipment for mainstream power PV technologies. The proposed solutions are expected to show the potential for cost and performance competitiveness of the final product.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Provide flexibility to the energy system

Proposals are invited against the following topic(s):

LC-SC3-RES-16-2019: Development of solutions based on renewable sources that provide flexibility to the energy system

Specific Challenge: Supporting the balancing of the power grid and increasing the flexibility of the energy system is possible through dispatchable renewable energy sources, such as for example bioenergy and hydropower. The specific challenge is to increase the potential and performance of dispatchable technologies to provide flexibility services to the energy system by improving their technological characteristics.

Scope: Proposals will address one of the following sub-topics:

- *Bioenergy carriers:* Development of intermediate bioenergy carriers for energy and transport from biogenic residues and wastes and energy crops from marginal lands not applicable to food or feed production through feedstock flexible technologies at a conversion cost reduced by at least 25% from the state-of-the-art, excluding the feedstock cost, and with increased energy density, storage and trade characteristics, where relevant, and improved GHG performance. The state-of the art for conversion costs per technology will be clearly presented in the proposal with cost figures and versatility of use where appropriate.
- *Hydropower:* Development of low and ultra-low head and sea water resistant equipment (such as for example bulb-pump turbines) guaranteeing at least 70% round-trip efficiency and making low-head seawater storage and other low head applications of hydropower viable, for example at unexplored locations (e.g. like at coastal dams and islands), by minimising at the same time potential impacts on fish.
- *Virtual Power Plant:* Increase the performance of an integrated portfolio of renewable energy sources (namely a combination of variable output and dispatchable renewable sources) to operate together as a Virtual Power Plant, capable of providing flexibility and

ancillary services to the energy system. The solution has to be competitive compared with solutions combining variable output renewables with electrochemical storage.

Proposals are expected to bring the technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The increased flexibility of the energy system will allow the penetration of a higher share of variable output renewables in the energy mix without affecting system stability.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-17-2019: Demonstration of solutions based on renewable sources that provide flexibility to the energy system

Specific Challenge: : Supporting the power grid balancing and increasing the flexibility of the energy system is possible by means of dispatchable renewable energy sources. The specific challenge is to increase the potential of renewable dispatchable technologies in providing flexibility to the energy system. Different technologies are suitable to address this challenge.

Scope: Proposals will address one of the following sub-topics:

- a. *Intermediate bioenergy carriers:* Focus will be on the demonstration of the most cost-efficient intermediate bioenergy carrier pathways for energy and transport, which improve the economic viability of the subsequent energy production by addressing solid, liquid and gaseous intermediate bioenergy carriers from biogenic residues and wastes with increased energy density, storage and trade characteristics where relevant. Reduced conversion costs and improved energy efficiency and GHG performance of the intermediate bioenergy carrier pathway will be demonstrated. Production at a scale of up to 5000 tons and process feasibility through applications to fuel production including for the heavy duty, maritime and aviation sectors, as well as to combined heat and power generation, are to be included.
- b. *Hydropower:* Focus will be on the improvement of the average annual overall efficiency of hydroelectric machinery. Projects are expected to provide high availability of hydropower plants and to maximise performance of hydropower plants of all sizes. The aim is adapting to variable speed generation the hydropower plants (new, refurbished and uprated and especially existing ones); it is important that by optimising maintenance intervals for all hydro plants (especially those delivering balancing power because of the related dynamic operation, dynamic loads and increased wear and tear) the outage time

will be minimised. Digitalisation measures to increase the potential of hydropower in providing flexibility to the energy system can be included.

- c. *Thermal energy storage in Concentrated Solar Power (CSP) plants:* The focus will be on the demonstration of innovative storage systems for CSP plants. The thermal energy storage solutions proposed will have to achieve much higher storage densities than current mainstream solutions (i.e. at least two times higher) while guaranteeing similar performance in terms of cycles.

Proposals are expected to bring the technology from TRL 5 to TRL 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 12 to 15 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The developed technologies will allow plant and system operators to operate successfully in the modern power markets and to make a significant contribution to European renewable energy objectives and policies.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-30-2019: Demonstration of plug and play solutions for renewable off-grid electricity

Specific Challenge: For off-grid communities, research and development is needed to bring down the cost of renewable electricity solutions in diverse geographic and climate conditions by improving at the same time their performance in respect of robustness, reliability, network stability and autonomous operation. Existing micro-grid solutions do not fully respond to the needs of communities in respect of investment costs, versatility, plug and play capabilities, easy installation and connection to the renewable energy source, easy and cost-saving logistics as well as maximisation of the renewables share.

Scope: Container-based integrated solutions for sustainable and long-term renewable electricity production, storage and distribution which demonstrate better performance than state-of-the-art solutions with respect to the overall installation, commissioning, operation and maintenance costs. The following parameters and features are expected to be optimised:

- Versatility of renewable energy sources to utilise (e.g. photovoltaics, wind, micro-hydropower, bioenergy);
- Plug and play capabilities towards the external electricity sources as well as storage options;
- Maximising the share of renewable electricity sources vis-à-vis diesel generation;

- Demonstrated solutions should support power demand of decentralised communities up to 100 kW, in line with targets of Mission Innovation Challenge Nr. 2.

A plug and play prototype should be fully demonstrated, including single shipment of the core system in an intermodal container. Local installation of the fully operational system by the local community should also be demonstrated. Demonstrations shall take place in at least two communities with diverse physical landscape and climate conditions, which are located in different continents. Those demonstrations should use different renewable energy sources locally available. Necessary power generation equipment shall be shipped together with the container; nevertheless, the project should also allow for integration of existing renewable electricity installations in loco by also providing necessary hardware and software interfaces, including those for remote operation and maintenance training. The container should include equipment for energy management and metering as well as system monitoring for demand response optimisation. Renewable drop-in solutions for commercially available equipment developed primarily for fossil fuel use (e.g. biodiesel in combination with diesel generators) are not in scope of the demonstration.

Furthermore, projects proposals should foresee to exchange information with the BRIDGE project⁵⁶ and to elaborate on the suitability of the demonstrated solutions for crisis intervention after disasters.

This topic will contribute to the Challenge #2 (Off-grid access to electricity) of Mission Innovation.

Proposals are expected to bring the technology from TRL 6-7 to 7-8.

The Commission considers that proposals requesting a contribution from the EU of about EUR 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Successful projects will demonstrate the attractiveness of renewable integrated container solutions for off-grid communities in diverse physical landscape and climate conditions by lowering the overall costs of the renewable energy generation and energy system components while ensuring their robustness, reliability, sustainability and autonomous operation.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-18-2020: Demonstration of the solutions based on renewable sources that provide flexibility to the energy system

LC-SC3-RES-19-2020: Demonstration of floating wind farms

⁵⁶ <https://www.h2020-bridge.eu>

LC-SC3-RES-20-2020: Efficient combination of concentrated solar power (CSP) and desalination (with particular focus on the Gulf Cooperation Council (GCC) region) 68
Renewable Fuels for transport)

Renewable Fuels for transport

The actions address the competitiveness of the next generation of biofuels and renewable fuel technologies as well as the up-scaling of advanced biofuels for specific transport needs in a cost-effective way. Furthermore, they aim at achieving 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
Proposals are invited against the following topic(s):

LC-SC3-RES-21-2018: Development of next generation biofuels and alternative renewable fuel technologies for road transport

Specific Challenge: Current biofuel and renewable fuel technologies are still not competitive compared to technologies of fossil fuel alternatives. This impedes their further development and market penetration. The specific challenge is to increase the competitiveness of next generation biofuel and renewable fuel technologies while diversifying the fuel supply pathways.

Scope: Support will be given to next generation non-food/feed drop-in biofuel and alternative renewable fuel technologies for energy and transport, which improve substantially beyond the state-of-the-art the performance as regards conversion efficiency, cost and feedstock supply, as well as end use compatibility. Proposals have to address one of the following:

- liquid diesel- and gasoline-like biofuels from biogenic residues and wastes through either chemical, biochemical and thermochemical pathways, or a combination of them;
- liquid gasoline-like biofuels through biogenic upgrading of biogas.

Proposals are expected to bring the technology from TRL 3-4 to 5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects are expected to reduce costs and improve performance of renewable fuels, notably as regards the efficiency, the environment and the society. The proposed solution will contribute to strengthening the EU leadership in this area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-22-2018: Demonstration of cost effective advanced biofuel pathways in retrofitted existing industrial installations

Specific Challenge: Commercialization of advanced biofuels depends on up-scaling of the technologies. The specific challenge is to overcome the high cost and high risk of the installation of industrial plants for advanced biofuels. This challenge is in line with priorities identified in the context of the SET-Plan⁵⁷ for commercialization of advanced biofuels.

Scope: Proposals will demonstrate cost-efficient advanced biofuel pathways which improve the economic viability and reduce capital expenditure (CAPEX) and operating expenses (OPEX). This is to be done through retrofitting of existing industrial installations with necessary innovation specific to the proposed advanced biofuel pathway. Proposals will address integration in first generation biofuels sites, in pulp and paper industry or in existing fossil refineries with production of advanced biofuels at a scale of a few thousand tons through upgrading the existing sites with innovative installations. The economic feasibility and other socio-economic benefits including the impact on current first generation sites will be included and clearly demonstrated. Proposals will provide information about the expected CAPEX and OPEX improvements.

Proposals are expected to bring the technology from TRL 5 to 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to increase the industrial installed capacity for advanced biofuels, and show the socio-economic benefits.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Upscaling renewable fuels production

Proposals are invited against the following topic(s):

LC-SC3-RES-23-2019: Development of next generation biofuel and alternative renewable fuel technologies for aviation and shipping

Specific Challenge: Decarbonising the aviation and shipping transport sectors, which are expanding fast and increasing the overall fossil fuel consumption, relies on biofuel and renewable fuels. The specific challenge is to increase the competitiveness of next generation

⁵⁷ <https://setis.ec.europa.eu/implementing-integrated-set-plan/renewable-fuels-and-bioenergy-ongoing-work>

biofuel and renewable fuel technologies in aviation and shipping, compared to fossil fuel alternatives.

Scope: Proposals will develop next generation non-food/feed drop-in biofuel and alternative renewable fuel technologies for aviation and shipping transport, which improve substantially beyond the state-of-the-art the performance regarding conversion efficiency, cost and feedstock supply by addressing:

- liquid jet-like biofuels and alternative renewable fuels from biogenic residues and wastes through chemical, biochemical and thermochemical pathways, or a combination of them; and
- bunker fuel-like biofuels for shipping uses.

Proposals are expected to bring the technology from TRL 3 to 5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to reduce costs and improve performance of renewable fuels for aviation and shipping regarding the efficiency, the environment and society. The proposed solution is expected to contribute to achieving European leadership in this area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-24-2019: Boosting pre-commercial production of advanced aviation biofuels

Specific Challenge: The aviation transport sector is growing fast and is expected to be responsible for more than 10% of the global greenhouse gas emissions by 2050. Advanced biofuels achieve direct emission reductions and, as drop-in fuels, are the most attractive alternatives for reducing the carbon foot-print of aviation in the long-term. Due to the absence of a market, the specific challenge is to boost commercial availability of advanced biofuels for aviation. This challenge is in line with the specific targets for commercialization of advanced biofuels identified in the Declarations of Intent in the context of the SET-Plan⁵⁸.

Scope: Proposal will demonstrate pre-commercial production of sustainable and cost-competitive advanced biofuels for aviation for boosting their market up-take. Proposals will address large-scale production of aviation biofuels from non food/feed sustainable feedstock and through certified pathways according to international aviation fuel standards and thus

⁵⁸ <https://setis.ec.europa.eu/implementing-integrated-set-plan/renewable-fuels-and-bioenergy-ongoing-work>

suitable for commercial flight operations. 30 to 50 thousand tonnes of aviation biofuel and continuous plant operation of 1000 hr within the project will be included.

Proposals are expected to bring the technology from TRL 5 to 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to facilitate the market entry and increase the commercial capacity of advanced biofuels for aviation. In particular, it is expected that pre-commercial plant(s) for advanced biofuels for aviation will be accomplished and the deployment of their technologies will allow the competitive production of biojet fuels on a commercial scale.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Diversifying feedstock

LC-SC3-RES-25-2020: International cooperation for Research and Innovation on advanced biofuels and alternative renewable fuels

LC-SC3-RES-26-2020: Development of next generation biofuel and alternative renewable fuel technologies from CO₂ and renewable energy (Power and Energy to Fuels)

LC-SC3-RES-27-2020: Demonstration of advanced biofuels production from aquatic biomass

Market Uptake Support

Proposals are invited against the following topic(s):

LC-SC3-RES-28-2018-2019-2020: Market Uptake support⁵⁹

Specific Challenge: Since the adoption of RES Directive in 2009, most Member States have experienced significant growth in renewable energy production and consumption, and both the EU and a large majority of Member States are on track towards the 2020 RES targets. The "Clean Energy for all Europeans" package adopted at the end of 2016 introduces further targets towards 2030 and introduces modifications in the energy market design that will empower individuals or communities to participate actively to the energy system transformation. Renewable energy technologies have the opportunity to play a crucial role in this transition, leading to an increased share of renewable energy consumed in the EU and to a more active role for the consumers. However, introducing and deploying at large scale new and improved technologies entails a number of challenges, notably as regards their initial high

⁵⁹ It is expected that this topic will continue in 2020.

cost, the consumer acceptance and the legal and financial barriers arising from bringing novel solutions to a technical environment with already reliable solutions in place.

Scope: The proposal will develop solutions which can be easily implemented for overcoming barriers to the broad deployment of renewable energy solutions. In particular, the proposal will address one or more of the following issues:

- Recommendation for 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", such as developing the possibility to provide additional services to the grid such as peak power and having an active role in electricity balancing/reserve market;
- Support sharing of best practice between public funding bodies for the cross-border participation in RES electricity support schemes, increasing the use of the "RES co-operation mechanisms" foreseen in the legislation;
- Development of insurance schemes to be available to developers in Europe and worldwide to mitigate risks, such as in geothermal drilling and offshore installation;
- Development of innovative financing mechanisms, schemes and sharing of best practices for cost-effective support for uptake of renewable sources, such as through the use of Public Procurement of Innovative Solutions instrument or smartly designed tenders;
- Development of support tools to facilitate export markets, especially for technologies where export market potential is much higher than internal market e.g. for hydropower. The focus will be on capacity building for market activities in developing and emerging countries, including identifying research needs, within the objectives of developing country- specific technologies and solutions, and/or adapting existing ones, taking into account local aspects of social, economic and environmental sustainability. Participation of developing and emerging countries is encouraged, in particular if these countries have identified energy as a priority area for their development and whenever common interest and mutual benefits are clearly identified.
- Development of tools (methods and models) for environmental impact assessments of renewable energy projects;
- Development of tools or services using global earth observation data, (such as those available through COPERNICUS), to support development and deployment of renewable energy sources;
- Determining conditions and defining options for retrofitting existing energy and industrial installations (first generation biofuels, pulp and paper, fossil refineries, fossil firing power and Combined Heat and Power (CHP) plants) for the complete or partial integration of bioenergy, with concrete proposals for such retrofitting for the different

cases of bioethanol, biodiesel, bio-kerosene, intermediate bioenergy carriers and other advanced biofuels and renewable fuels and biomass based heat and power generation, on the basis of the assessment of the capital expenditure (CAPEX) reduction and market benefit;

- 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.

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 calls for multi-disciplinary research designs, which should include contributions also from the social sciences and humanities. Where relevant, regional specificities, socio-economic, spatial and environmental aspects from a life-cycle perspective will be considered. Where relevant, proposals are expected to also critically evaluate the legal, institutional and political frameworks at local, national and European level and how, why and under what conditions these (could) act as a barrier or an enabling element.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that the solution proposed will contribute to:

- Facilitate the introduction of these technologies and increase the share of renewable energy in the final energy consumption;
- Lead to substantial and measurable reductions for project developments, whilst still fully addressing the needs for environmental impact assessments and public engagement;
- Develop more informed policy, market support and financial frameworks, notably at national, regional and local level, leading to more cost effective support schemes and lower financing costs for RES facilities.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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.

Such a transition requires consumers to change their energy consumption behaviour and increase their uptake of different forms of active demand solutions and services, including collective actions. To this end, remaining regulatory and market barriers for consumers should be addressed and innovative engagement and support schemes should be made more readily available to consumers, allowing for improved understanding of the benefits of engaging actively in the energy system. At the same time, it is important to develop a better understanding of the drivers of consumer acceptance and behaviour change in relation to energy efficiency.

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. Energy distributors under the energy efficiency obligation schemes, and public authorities play a central role in delivering energy efficiency measures and providing sustainable solutions to affected households.

Consumers may also play in the future an important role in engaging in clean energy, in particular in the decarbonisation of the electricity system which currently integrates 30% of production from renewable energy sources. We should therefore already test today what are the right incentives that can be put in place so as to reward them when playing a role in increasing the share of variable renewables in the electricity mix by, for example, by differing their consumption depending on the availability of this 'green' electricity. To be successful, the R&I community should not look only at consumers from an electricity grid perspective but make particular effort to understand how consumers consider, use and value the electricity grid and the services it provides to them.

Activities supported in this area contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan action 3⁶⁰.

Proposals are invited against the following topic(s):

LC-SC3-EC-1-2018-2019-2020: The role of consumers in changing the market through informed decision and collective actions⁶¹

Specific Challenge: A precondition for active demand is for consumers to be aware of their own potential to permanently or temporarily reduce energy consumption; and moreover, for them to know how to offer this potential to the market and what it would represent in terms of monetary value by bringing benefits to the energy system.

⁶⁰ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

⁶¹ It is expected that this topic will continue in 2020.

Different forms of collective action have the potential to assist consumers in forming critical mass and to facilitate increased uptake of energy efficiency & active demand solutions and services. Although collective actions on energy efficiency have emerged in recent years, a lack of awareness on the potential benefits of such actions, together with regulatory barriers, continues to hamper their full development and uptake.

Finally, important challenges involve installed appliances (such as boilers for space and/or water heating) of which a big share is inefficient and fossil-fuel based, resulting in increased fuel consumption and fuel costs for households. Informing consumers of the potential energy savings and their monetization, as well as other benefits such as increased comfort and improved air quality, can result in increased motivation for replacing inefficient appliances, thereby permanently reducing consumption.

Scope: **2018:**

The proposed action should develop activities informing and motivating consumers to change old and inefficient installed appliances with the highest energy saving potential (e.g. boilers, local space heaters, air heaters) to more efficient and clean energy heating and/or cooling solutions. While financial aspects (cost savings, payback period) would be the main motivating factor and therefore should be presented in a precise and credible manner, other aspects such as increased comfort and aesthetics, safety, improved air quality, or possible participation in demand-response should be the integral part of the actions in order to unlock the full potential of multiple benefits of energy efficiency improvements.

2019:

The proposed action should set up and/or support energy communities (consumer cooperatives, consumer collective purchase groups, and/or other consumer driven collective actions) to increase energy efficiency and/or optimise energy management to integrate a higher share of renewable energy (generated locally or provided from the grid) within the community by, for example, combining collective solutions to distributed generation, distributed storage, and/or demand-response aggregation. The focus of the proposed action should be on households, however, this does not preclude the complementary involvement of non-residential buildings.

The proposed action should cover the following points:

- Identify and address regulatory barriers and contractual conditions with utilities, suppliers, grid operators, technology providers etc. for cooperative actions, possibly linking activities with structural solutions involving public authorities;
- Demonstrate that collectively organised energy-related actions are financially viable and attractive to the consumer-members of the energy community.

In addition, the proposed action could cover the following points, as relevant:

- Identify and implement solutions to address split incentives (e.g. allowing tenants to set up/join the consumer driven collective action);
- Demonstrate collective actions of energy consumers based on the solutions and business approaches using digital tools and technologies (such as digital platforms or blockchain transactions). If the proposed action includes smart home/IoT solutions, it should link to the developments under the call DT-ICT-10-2018: *Interoperable and smart homes and grids*.

Relevant for both years:

The proposed actions should address the risk of "rebound effects" and propose measures to counteract them, where relevant. All relevant stakeholders necessary for the successful implementation of the action should be involved and relevant consumer organisations, in particular, should be either directly involved or their support demonstrated in the proposal. Proposed actions should also take issues of consumer data ownership and data privacy into account, where relevant. The proposed actions are invited to build on experiences and lessons learned in other relevant projects and programmes⁶².

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets, wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Contribution to reducing regulatory barriers and improving contractual conditions;
- Increase domestic uptake of energy efficient products and services;
- Involvement of at least 5.000 consumers per million Euro of EU funding.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

⁶² This should include e.g. LIFE projects, the implementation of Air Quality Plans and the implementation of Operational Programmes under ESIF, H2020 projects, Intelligent Energy Europe projects, and other relevant national, local, or regional initiatives.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EC-2-2018-2019-2020: Mitigating household energy poverty⁶³

Specific Challenge: European households continue to spend an increasing share of income on energy, leading to higher rates of energy poverty and negatively affecting living conditions and health. Recent estimates suggest that more than 50 million Europeans are affected by energy poverty⁶⁴. Although roots of this phenomenon lie mainly in low incomes and poor thermal efficiency of buildings, energy efficiency measures at the household level and increased use of renewable energy are key tools in addressing energy poverty and can bring energy savings, leading to lower fuel costs and improved living conditions. The issue is in part exacerbated by a lack of sufficient knowledge on how to identify energy poor households.

In this context, the role of local and national authorities, related networks and initiatives⁶⁵, and availability of support schemes are important to ensure the sustainability and larger scale uptake of the measures.

Energy Efficiency Obligation Schemes⁶⁶ can also be used to promote social aims, such as tackling energy poverty. The obligated parties (utilities) have potentially at their disposal the necessary data and means to identify energy poverty among their customers and effectively address it by fulfilling in this way the energy efficiency obligation. Building the capacity of the obligated parties is needed in order to spread such schemes across the EU.

Scope: Actions should contribute to actively alleviating energy poverty and developing a better understanding of the types and needs of energy poor households and how to identify them, taking into account gender differences where relevant, building on any existing initiatives such as the European Energy Poverty Observatory.

The proposed action should cover one or more of the following:

- Facilitate behaviour change and implementation of low-cost energy efficiency measures tailored for energy poor households (e.g. provision of information and advice, energy efficiency services such as draught proofing or optimisation of existing building technology systems, as well as energy efficiency devices & kits such as low-energy lighting);
- Support the set-up of financial and non-financial support schemes for energy efficiency and/or small scale renewable energy investments for energy poor households. These actions should be embedded in, and add value to, structural frameworks and activities

⁶³ It is expected that this topic will continue in 2020.

⁶⁴ Energy poverty generally refers to 'a situation where individuals or households are not able to adequately heat or provide other required energy services in their homes at affordable cost'

⁶⁵ E.g. Covenant of Mayors, European Energy Poverty Observatory, SEAPs.

⁶⁶ Stemming from art 7 of the Energy Efficiency Directive

involving local, regional, and national authorities, and/or networks such as the Covenant of Mayors;

- Develop, test and disseminate innovative schemes for energy efficiency/RES investments established by utilities or other obligated parties under Article 7.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

The proposed actions are invited to build on experiences and lessons learned in other relevant projects and programmes⁶⁷.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets, wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project in (million Euro);
- Contributions to policy development and to best practice development on energy poverty;
- Support schemes established for energy efficiency and/or small-scale renewable energy investments and to be sustained beyond the period of EU-support.
- Involvement of at least 5.000 consumers per million Euro of EU funding.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EC-3-2020 - Consumer engagement and demand response

Smart citizen-centred energy system

The EU's energy policy package "Clean Energy for all Europeans" (adopted by the Commission on 30 November 2016) puts the citizen in the centre of the EU's energy system.

⁶⁷ This should include e.g. LIFE projects, the implementation of Air Quality Plans and the implementation of Operational Programmes under ESIF, H2020 projects, Intelligent Energy Europe projects, and other relevant national, local, or regional initiatives.

Actions are needed to support the best implementation of this ambitious legislative proposal. Therefore this section of the Work Programme on Integrated Energy Systems aims, among others, at preparing and testing solutions to support the new proposals for directives and regulations which are shaping the energy system of the future. In addition, the energy transition proposed in "Clean Energy for all European" insists on the importance to decarbonise heating and cooling, electricity and transport.

Therefore two main lines of actions are proposed:

1. Electricity markets and consumers, interacting with other energy vectors with topics LC-SC3-EC-3-2020 (in the "Smart and clean energy for consumer" area) as well as topics LC-SC3-ES-1-2019, LC-SC3-ES-2-2019, LC-SC3-ES-5-2018-2020 and LC-SC3-ES-6-2019;
2. Decarbonisation of local energy systems whether on islands or on the continent with topics LC-SC3-ES-3 2018-2020, LC-SC3-ES-4-2018-2020 and LC-SC3-ES-8-2019.

These two lines of actions also contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan action 4.1 on 'An optimised power grid' and 4.2 on 'Integrated local and regional energy systems'⁶⁸.

Common requirements regarding proposals relevant to "Electricity markets and consumers, interacting with other energy vectors" (topic LC-SC3-EC-3-2020 of the previous section, as well as topics LC-SC3-ES-1-2019, LC-SC3-ES-2-2019, LC-SC3-ES-5-2018-2020 and LC-SC3-ES-6-2019)

Since the associated directives and regulations will be negotiated with the Parliament and the Council in the coming years, it is important to ensure coherence and organise a feedback from the R&I projects towards policy makers. We will therefore pursue the BRIDGE initiative⁶⁹ which integrates and structures feedback of projects along, for the time being, four lines:

1. Business models
2. Customer engagement
3. Data management
4. Regulation

Ongoing projects of the 2014, 2015 and 2016 calls have delivered first results and the relevant Innovation Actions from the 2018 to 2020 will also be asked to contribute (i.e. topic LC-SC3-ES-6-2019-2020 is a priori not concerned). Relevant regulatory issues should be analysed also in the context of the future electricity market design.

⁶⁸ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

⁶⁹ <http://www.h2020-bridge.eu/>

Proposers should demonstrate in the content of their proposal a good knowledge and compatibility with current regulations, available or emerging standards and interoperability issues applying to their technologies, in particular in connection to ongoing work in the Smart Grid Task Force and its Experts Groups in the field of Standardization (e.g. follow-up activities to the CEN-CLC-ETSI M/490), regulatory environment for privacy, data protection, data management and alignment of data formats (e.g. the work of the ad-hoc group on “My Energy Data” and its respective follow-up), cyber security, smart grid deployment, infrastructure and industrial policy (<http://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force>).

Projects dealing with data handling and management should comply with the provisions of the General Data Protection Regulation⁷⁰ and industry standards, especially the Data Protection Impact Assessment Template⁷¹. A high level of cyber security should be guaranteed in compliance with relevant EU security legislation⁷² and with due regard of best available techniques for ensuring the highest level of protection⁷³.

The topics in this area should contribute to test a certain number of approaches proposed in the legislative package 'Clean Energy for All European' and develop technologies and solutions which will enable these approaches to be implemented under economic conditions.

Overall, the topics proposed should also contribute to the 2030 Climate-Energy objectives (40% GHG reduction with respect to 1990, at least 27% of renewables by 2030).

A first group of topics (LC-SC3-ES-1-2019, LC-SC3-ES-2-2019 and ES-5-2018-2020) 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 (i.e. cooperation between a group of neighbouring countries) at transmission levels and well-functioning retail and wholesale markets that are capable of financing necessary investments.

A second group of topics (LC-SC3-ES-3-2018-2020, LC-SC3-ES-4-2018-2020 and LC-SC3-ES-8-2019) 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.

Proposals are invited against the following topic(s):

⁷⁰ Regulation (EU) 2016/679

⁷¹ Supported by the Commission Recommendation 2014/724/EU

⁷² Directive (EU) 2016/1148

⁷³ Best Available Techniques for data protection and security regarding the ten minimum functional requirements for smart metering which were proposed in the Commission Recommendation 2012/148/EU.

LC-SC3-ES-1-2019: Flexibility and retail market options for the distribution grid

Specific Challenge: Today, a large share of variable generation electricity sources are connected to distribution grids that were originally designed to distribute electricity supplied by large centralised power generation plants through the transmission grid. In view of the expected growth of variable electricity production, and a shift towards more electrified heating, cooling and transport sectors, new approaches have to be found for managing electricity distribution grids in order to ensure affordability of energy, security and stability of supply, while avoiding massive investments in infrastructures. Electricity storage, in particular relying on batteries, power to heat/cold, power to X, vehicle to grid and other storage solutions will play a key role in providing services to the grid and improve and reinforce the networks capacities.

Scope: Proposals will develop and demonstrate integrated solutions which will allow the distribution grid to function in a secure and stable manner with large shares of variable renewables. A combination of at least two of the following elements will be tested:

- Flexibility measures and electricity grid services provided by storage of electricity (including batteries and vehicle to grid technologies), power to-X (in particular power to heat), demand response⁷⁴ and variable generation enabling additional decarbonisation;
- Smart grids technologies for an optimum observability and tools for higher automation and control of the grid and distributed energy sources, for increased resilience of the electricity grid and for increased system security, including under extreme climate events;
- Market mechanisms incentivising flexibility or other market tools should be defined and tested, for mitigating short-term and long-term congestions or other problems in the network (e.g. dynamic network tariffs and solutions to reduce the costs of energy transition, non-frequency ancillary services). Solutions should demonstrate the necessary cooperation with other system operators and particularly TSOs by facilitating the integration of wholesale and retail markets.

Replicability and scalability of solutions is desirable to ensure the maximum impact of the use of the project results.

Proposals should include a task on the analysis of obstacles to innovation under the current context but also under the future market design context and foresee the coordination on policy relevant issues and obstacle to innovation (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative⁷⁵. An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort.

⁷⁴ Proposers who want to address specifically demand-response should consider topic LC-SC3-EC-3-2020

⁷⁵ <http://www.h2020-bridge.eu/>

Proposals should build upon the insights and results of projects that have already been selected in this field under H2020 (information can be found on the BRIDGE web site⁷⁶) and demonstrate their innovative character.

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

Proposers can apply under the following two sub-topics:

1. Flexibility and retail market options for the distribution grid
2. Flexibility and retail market options for the distribution grid: International cooperation with Canada.
In several international contexts such as the Clean Energy Ministerial, the Mission Innovation initiative launched at COP21, the International Energy Agency Implementing Agreement on Smart Grids (ISGAN), bi-lateral discussions between Canada and the EU identified this topic as being of common interest owing to its potential for decarbonisation. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation with Canada is required under this topic. The cooperation must be under the form of a Coordination Agreement between the Horizon-2020-funded project with a project with similar scope and sizeable efforts supported by Canadian funding authorities (see also Eligibility and admissibility conditions).

Proposals must clearly indicate to which sub-topic they apply.

TRL will range typically between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimated levels of TRL at the beginning and at the end of the project.

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 to 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects are expected to develop and demonstrate solutions which contribute to at least 2 of the following impacts:

- Enhance flexibility of distribution grids which are expected to operate in an overall context of 50% electricity production from renewables in 2030 (EU28 average, see⁷⁷);
- Contribute to define the conditions of a well-functioning electricity market which creates business case for stakeholders willing to provide such flexibility and allow to sustain the necessary investments (e.g. variable price strategies);
- Improve the capability to manage future energy loads including electrical vehicles;

⁷⁶ <http://www.h2020-bridge.eu>

⁷⁷ EU Reference Scenario 2016: Energy, transport and GHG emission trends to 2050

- Improve distribution grid operations which guarantee security of supply and the use of flexibility products while integrating large shares of variable renewables avoiding unnecessary investments by solving congestion.

In the case of sub-topic 2) International cooperation with Canada, the expected impacts of the cooperation to be substantiated in the proposal are to deliver mutual benefits and added value (i.e. in addition of the sum of the results of the two projects).

Proposals are invited to identify and substantiate to which of the above impacts they contribute and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-2-2019: Solutions for increased regional cross-border cooperation in the transmission grid

Specific Challenge: Today wholesale prices may vary significantly across the different market zones in Europe showing that the wholesale market is not operating under optimal conditions while some interconnectors are underutilised. More cooperation between TSOs and between TSOs and energy producers who are providing cross-border services, in particular at regional level (i.e. involving a group of countries), is an element that is promoted in the future market design to contribute to improving this situation.

Scope: Proposals will demonstrate integrated hardware and software solutions for cross border flows in the transmission grid in a regional context.

Proposals are required to integrate at least four of the following points:

- Improvements of the tools for communication and grid operations, in particular for intraday and real-time markets involving several TSOs in the context of regional cooperation; tools to analyse and simulate risks of the system at regional level;
- Better prediction of production from variable renewables and demand response forecast at regional level;
- Definition and testing of new cross border grid services called by an increasing share of renewables (flexibility, balancing, decrease of system inertia, congestion, etc.);
- Mechanisms to ensure a well-functioning wholesale market, efficient techniques for coupling real time markets;
- Enhance cross border flow and trading, enhanced exploitation of assets such as large bulk storage systems, hydropower plants, large scale batteries installations, etc;

- Demonstration in a regional context. Priority should be given to regions where this cross-border cooperation between TSOs is being less effective. The demonstration should be supported by the experience of more advanced regions (intra-EU and inter-EU); when dealing with EU-border countries, special attention should be paid to reduce external energy dependence through more efficient cooperation;
- Develop guidelines to avoid distortion resulting from the non-harmonisation of regulations between countries.

Proposals should include a task on the analysis of obstacles to innovation under the current context but also under the future market design context and foresee the coordination on policy relevant issues and obstacle to innovation (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative⁷⁸. An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort are recommended.

Proposals should build upon the insights and results of projects that have already been selected in this field under H2020 (information can be found on the BRIDGE web site⁷⁹) and demonstrate their innovative character.

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

TRL will range typically between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to contribute to enhance regional cooperation:

- in the operation of transmission grids so as to bring additional flexibility in the context of an increasing share of variable renewables;
- in optimising infrastructure investments and making best use of large scale assets that are bringing flexibility;
- in an improved functioning of the wholesale market across borders;
- in the development of future common approaches to grid services.

⁷⁸ <http://www.h2020-bridge.eu>

⁷⁹ <http://www.h2020-bridge.eu>

Proposals are invited to identify and substantiate to which of the above impacts they contribute and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-3-2018-2020: Integrated local energy systems (Energy islands)⁸⁰

Specific Challenge: The fast growth of the energy production from renewable energy sources offers new and economically attractive opportunities for decarbonising local energy systems on the mainland (e.g. isolated villages, small cities, urban districts, rural areas with weak or non-existing grid connections). It is also a technological and financial challenge for the electricity network. Decarbonisation and energy savings should result from an optimal combination of these energy sources. In this context, storage of all energy vectors, including possibilities offered by batteries and electric vehicles, and intensive use of the latest technologies on power electronics, control and digitisation will certainly play an increasingly important role. Local energy systems may also show economically interesting conditions to boost local energy sources and activate local demand-response. Innovative approaches can result in attractive business cases for both districts and remote areas, including outermost regions. At the same time, decarbonisation has to go hand-in-hand with the improvement of local air quality and the acceptance by citizens.

Scope: Proposals will develop and demonstrate solutions which analyse and combine, in a well delimited system, all the energy vectors that are present and interconnect them where appropriate.

Proposals should present a preliminary analysis of the local case as part of the content of the proposal and propose to develop solutions and tools for the optimisation of the local energy network, but having a 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.

TRL will range typically between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.

Proposals should include a task on the analysis of obstacles to innovation and foresee the coordination on policy relevant issues (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative⁸¹. An indicative budget share of at least 2% is recommended for the research work

⁸⁰ It is expected that this topic will continue in 2020.

⁸¹ <http://www.h2020-bridge.eu/>

associated with these issues and an additional 2% for the coordination effort are recommended.

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

In several international contexts such as the Clean Energy Ministerial, the Mission Innovation initiative launched in COP21, the International Energy Agency Implementing Agreement on Smart Grids (ISGAN), bi-lateral discussions between India and the EU identified this topic as being of common interest owing to its potential for decarbonisation. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with India.

Expected Impact: The supported projects are expected to contribute to:

- 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;
- enhance the involvement of local energy consumers and producers, create energy communities in the development and the operation of local energy systems and test new business models;
- validate approaches to safe and secure local energy system that integrates significant shares of renewables (electricity, heating, cooling, water, wastes, etc.). For variable renewables, this entails the development of an accurate prediction system for the local generation of energy and adequate solutions to match the generation with local consumption as a function of time;
- benchmark technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens.

Proposals are invited to identify and substantiate to which of the above impacts they contribute and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands⁸²

Specific Challenge: Energy prices on geographical island are typically 100% to 400% higher than on the mainland; therefore the large-scale deployment of local renewable energy sources brings economic benefits and, at the same time, contributes to 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 at least 4 of the following objectives:

- Achieve high levels of local renewable energy sources penetration;
- Achieve highly integrated and digitalised smart grids based on high flexibility services from distributed generation, demand response and storage of electricity, heat, water, etc.;
- Develop synergies between the different energy networks (electricity, heating, cooling, water, transport, etc.);
- Achieve a very significant reduction of the use of hydrocarbon based energies (ideally achieve carbon neutral primary energy for all non-transport uses). Modelling, forecasting of demand (e.g. for touristic/non-touristic seasons) and supply (e.g. based on weather, wind, sun, etc.);
- Innovative approaches to energy storage, electricity storage in particular relying on batteries (including avoidance or delay of costly grid upgrades of existing grids).

Projects should also deliver:

- Effective business models for sustainable solutions;
 - o Practical recommendations arising from project experience on:
 - o regulatory, legal aspects and data security/protection;
 - o gender and socio-economics (Social Sciences and Humanities);
 - o storage solutions (from short to seasonal);
 - o big data, data management and digitalisation;
- Contributions to environmental sustainability, in particular in view of the specificities of islands ecosystems.

The TRL will range typically between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.

Proposals should include a task on the analysis of obstacles to innovation under the current context and foresee the coordination on policy relevant issues (e.g. regulatory framework,

⁸² It is expected that this topic will continue in 2020.

business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative⁸³. An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort are recommended.

If relevant, synergies should be established with ongoing and planned work on islands in the 'Clean Energy for EU islands' initiative⁸⁴.

The Commission considers that proposals requesting a contribution from the EU of between EUR 7 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The projects are expected to contribute to

- developing RES-based systems (including heating and cooling and storage) that are cheaper than diesel generation;
- reduce significantly fossil fuel consumption;
- large-scale replication on the same island and on other islands with similar problems;
- enhance autonomy for islands that are grid connected with the mainland (existing diesel generators shall be used primarily as security back-up in the long term).

Proposals are invited to identify and substantiate to which of the above impacts they contribute and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life. Proposals are also invited to identify if they impact on future investment perspectives (see also topic LC-SC3-ES-8-2019).

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation⁸⁵

Specific Challenge: The legislative proposals on the energy market that the Commission adopted on 30 November 2016 (the so-called winter package), in particular the Electricity Directive, promotes that network operators procure balancing, congestion management and ancillary services from assets connected to the network both at transmission and at

⁸³ <http://www.h2020-bridge.eu/>

⁸⁴ <http://ec.europa.eu/energy/en/news/clean-energy-eu-islands-launched-malta>

⁸⁵ It is expected that this topic will continue in 2020.

distribution level, based on cooperation among them.⁸⁶ This will enable more efficient and effective network management and optimisation, for the benefit of increased demand response and the ability to integrate increasing shares of renewables. TSOs and DSOs will use the same pool of resources: actions by both can mutually affect each other. In cooperation with market participants, they have to define the services they want to procure, and have to set up ways to procure them in a coordinated manner.

Scope: The focus is on projects that demonstrate at a large-scale how markets and platforms enable electricity TSOs and DSOs to connect (in particular through data communications and common architectures) and procure energy services from large-scale and small-scale assets connected to the electricity network through a combination of local markets (in particular for congestion management), with wholesale & balancing markets, in a way that will increase cost-efficiency in (future) network operations and that creates consumer benefits. The markets and platforms should enable the integration of relevant digital technologies like Internet-of-Things, Artificial Intelligence, cloud and big data services. The projects selected will define and test in real-life demonstrations of integrated system-based markets and platforms for (a set of) grid services that can be used and procured by DSOs and TSOs in a coordinated manner, in markets that they jointly set up (but don't necessarily need to operate themselves), in a way that:

- 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 parameters⁸⁷ 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;
- facilitates scaling up the platforms and markets to spread its wider use and to increase liquidity, in particular by facilitating integration of small-scale and large-scale assets, and by integrating new services into existing platforms and/or links new services to existing markets as much as possible, by allowing to integrate future network services that support the energy network transition (e.g. those needed in scenarios with large RES penetration) and by being compatible across borders in line with EU rules on market coupling and balancing;

⁸⁶ see a.o. the proposed Guideline on Electricity Balancing, Article 32 of the proposal for a Directive on the internal electricity market, COM(2016)864, 2016/0380(COD), Article 53 of the proposal for a Regulation on the internal electricity market, COM(2016)861, 2016/0379(COD)

⁸⁷ where such parameters don't exist yet at EU level

- allows procurement based on the specific location and grid conditions (if necessary);

Selected projects also will:

- Define the needs of network operators for system operation, and turn these into services and products, based on interaction with suppliers, aggregators and energy service companies, that test what services can be provided by what assets;
- Test the needs of network operators and technological capabilities of the assets, including to ensure reliability of supply (e.g. duration, ramp-up/ramp-down, islanding);
- Identify the relevant system data that enable market participants to better assess and forecast the need for grid services and publish such data (as much as possible);
- Test innovative ways to promote consumer participation, engagement and perception, such as peer-to-peer trading, and innovative ways to reduce transaction costs, such as via distributed ledgers (blockchain);
- investigate the possibilities for innovative pricing and compensation (including through local markets) for consumers that provide the grid services, taking into account tariff and tax systems;

In relation to the organisation, selected projects are expected to:

- Make use of cascading funds for the incorporation of developers of innovative energy services (in particular for household consumers) by SME's.
- Coordinate their work with NRA's, ENTSO-E, the DSO organisations and other stakeholders and take into account the experience from other projects through cooperation in the BRIDGE initiative⁸⁸ and work with Digitisation of Energy projects, funded under the following topics:
 - o SU-DS04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks;
 - o DT-ICT-10-2018: Interoperable and smart homes and grids;
 - o DT-ICT-11-2019: Big data solutions for energy. as well as with the projects funded under topic LC-SC3-EE-13-2018-2019-2020: *Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource* where innovative consumer energy services will be developed and tested regarding their business viability and consumer acceptance.

TRL will range typically between 5 and 8 (see part G of the General Annexes).

⁸⁸ <http://www.h2020-bridge.eu/>

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

The Commission considers that proposals requesting a contribution from the EU of between EUR 13 to 17 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Solutions will contribute to a smart, secure and more resilient energy system through demonstrating cost-efficient model(s) for electricity network services that can be scaled up to include networks operated by other TSOs and DSOs, and that will be replicable across the EU energy system and provide the foundations for new network codes, particularly on demand-response. In so doing they will contribute to opening up significant new revenue streams for consumers to provide grid services, and increase the share of RES in the electricity system.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-6-2019: Research on advanced tools and technological development

Specific Challenge: A number of tools and future technologies need to be developed, matured and tested to cover gaps and/or to prepare the energy system of 2030 and beyond.

Scope: Proposals must address only one of the 4 following sub-topics whereby not necessarily all points listed in a sub-topic need to be addressed:

1. Advanced modelling tools for:
 - o the modelling of the future electricity market to study and analyse the impact and the design of electricity pricing structure from the wholesale markets, to real time markets (balancing and congestion management) and retail markets;
 - o modelling and forecasting energy production from variable renewables, associated frequency and voltage controls issues in the electricity grid and benefits associated with the use of storage.
2. Advanced tools for
 - o the design and planning and operation of electricity grid infrastructure including distribution and transmission level, taking into account environmental concerns, such as air quality, and footprints and the new constraints from variable renewable generation, the place and role of storage and flexibility; the optimisation of the use of existing electricity assets and network capacity;

- o the development of grid predictive management strategies with uncertainty (forecasting plus stochastic grid management tools), improving the maintenance of electricity assets (distribution and transmission) as well as the associated data management;
- o Enhanced TSO / DSO collaboration and coordination tools, secure data exchange across networks along whole the value chain, ICT tools for cross-border trading for nearly real-time balancing; definition of minimum set of specifications to allow automated digital cross-border electricity market.
- o Enabling technologies for reliable and resilient interconnected European electricity grids, making use of the specific features and the strategic role of the European Global Navigation Satellite Systems Galileo and EGNOS.

3. Technological developments:

- o Develop a new generation of reliable, robust and cost-effective energy storage technologies, storage management systems, in particular batteries, able to provide high specific energy rates, large number of life cycles, fast response to the electrical network demands and low maintenance;
- o Power electronics for batteries and software to manage combined or hybridised decentralised energy systems, also combining several energy vectors: a key focus is on significant cost reduction of these key components for homes, districts and larger systems which have the potential to accelerate significantly the energy transition of the electricity network.

4. International Cooperation with non-EU/Associated country member of Mission Innovation⁸⁹ on Mission Innovation Challenge 7 on Affordable Heating and Cooling for Buildings:

- o 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. Integration into the building heating system and in the smart electricity grid is a key development element together to the storage materials and technologies.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Proposal must clearly indicate which sub-topic 1, 2, 3 or 4 they are targeting.

⁸⁹ Australia, Brazil, Canada, Chile, People's Republic of China, India, Indonesia, Japan, Mexico, Republic of Korea, Saudi Arabia, United Arab Emirates, United States

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

1. Expected Impact: Advanced modelling tools are expected to: increase the knowledge on how to design of price structure and magnitude in order to be able to finance e.g. infrastructure and research and innovation; enhance the accuracy of the prediction of electricity production from variable renewables and better qualify and quantify associated issues and remedies
2. Advanced tools are expected to develop new approaches to electricity grid planning, monitoring and maintenance that are better suited to today's future characteristics of the grid and enable savings on infrastructure costs.
3. The technological developments are expected to reduce costs of key technology components to allow European Industry to keep and extend its leadership in power electronics for stationary battery systems of all sizes (from home to utility scale) and the integration of battery systems with high shares of renewable electricity and eventually also heating and cooling.
4. Contribute to the objectives of mission innovation and provide efficient innovative small scale power to heat/cool flexibility measures that can be deployed in a large number of buildings so as to enable the grid to operate with large share of variable renewable energy

Proposals are invited to include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-7-2018: Pan-European Forum for R&I on Smart Grids, Flexibility and Local Energy Networks⁹⁰

Specific Challenge: According to the JRC Smart Grid Projects Outlook 2014⁹¹, the majority of cooperation takes place between organisations from a limited number of Member States while 15 analysed countries (NO, CH, IE, PL, HU, SK, LT, RO, LV, HR, BG, LU, CY, EE, MT) account for less than 5 % of the R&I funds altogether.

Scope: The action should set-up a European Forum composed of R&I policy makers, R&I actors and experts ('community') in the field of smart grids / storage and local energy systems

⁹⁰ This activity directly aimed at supporting public-public partnerships with Member States and Associated Countries, technology platforms with industrial partners is excluded from the delegation to INEA and will be implemented by the Commission services.

⁹¹ http://ses.jrc.ec.europa.eu/sites/ses.jrc.ec.europa.eu/files/u24/2014/report/Id-na-26609-en-n_smart_grid_projects_outlook_2014_-_online.pdf

that is representative of the EU-28 energy system. The goal is to evolve towards a truly integrated pan-European R&I community with a high level of synergies, spread and representativity over a recommended duration of 4 years.

Actions should be proposed to establish and spread the state of the R&I in the field in Europe. A number of regional workshops where exchanges of experience and capacities between members of R&I community that are not used to collaborate will be organised where the key R&I challenges will be identified, discussed and structured. Advantage should be taken of other events and conferences, preferably well-known and occurring on a regular basis, to organise such workshops.

Beyond workshops, a methodology should be put in place that will allow developing the elements stated in the paragraph above on a long term perspective relying on diversified but combined means (virtual meeting, use of social media, setting up discussion groups, establishing collaborative working spaces). These new links, new knowledge and potential future collaboration should materialise through the delivery of reports (e.g. at regional and EU level).

The European Technology and Innovation Platform Smart Networks for Energy Transition (ETIP SNET), ongoing Horizon 2020 projects (e.g. the BRIDGE project⁹²) in the field, and existing associations with a true pan-European dimension will have an important role to play. This action should also contribute to widen the representativity of European associations in the field which have weaknesses in their EU coverage.

The consortium should be composed of a limited number of relevant beneficiaries offering the possibility to invite ad-hoc R&I policy makers, actors and experts when needed. The consortium should achieve a well-balanced representation at EU level.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported project is expected to contribute to:

- Building a true pan-European R&I community in the field of smart grids & associated flexibility measures / energy systems;
- Establish new collaboration on a long-term perspective which has a potential to develop into industrial collaborations;
- Building, in the long-term, solidarity and trust for a well-functioning and resilient pan-European energy system (e.g. contributing to risk preparedness).

Type of Action: Coordination and support action

⁹² <http://horizon2020-story.eu/contact/>

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-8-2019: European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts

Specific Challenge: Mobilising investment in energy efficiency and renewables is key for Europe's energy transition. In 2017 the European Commission and 14 EU Member States signed a political declaration to launch the new 'Clean Energy for EU Islands' initiative. Its aim is to help islands reduce their dependency on energy imports by making better use of their own renewable energy sources and embracing more modern, socially inclusive and innovative energy systems.

Europe's more than 2200 inhabited islands can be considered living-labs which can deliver a pipeline of energy investment projects across Europe. Energy transitions on islands often benefit from low opportunity costs due to the existing high prices of conventional liquid fuels in contrast to the variety of renewable sources they may have available.

However, despite tremendous potential, too few islands in Europe succeed in developing and scaling up investment packages. A high degree of organisational, technical and financial innovation is needed to reach significant scale. A key gap is the lack of capacity for islands to transform their overall long-term ambitions into a credible set of plan(s) and project outlines, i.e. investment concepts, that serve as the basis for concrete projects. In particular, local initiatives and/or public authorities on islands have limited resources to access the analytic, financial and legal expertise needed to collect additional data and develop an investment programme of scale i.e. pooling projects and/or developing financing strategies which demonstrate sufficient maturity to enable access to different sources of finance often mobilised locally on the island.

In order for islands to be microcosms of economic, social and environmental transformations they may often require assistance in designing coherent set of projects and selecting the most cost-effective option from the life-cycle perspective, aggregating smaller projects into island-size packages and in mobilising the significant amount of finance needed for a full energy transition. This may also include communication and engagement actions among island inhabitants to identify acceptable projects, which also can lead to projects co-ownership and mobilisation of local financing.

The investment concepts would allow a large number of islands and regions to access the various innovative financing streams which are being structured (e.g. PDA, ESIF Financial Instruments, National Investment Platforms), to increase the absorption rates of EFSI and to access private finance.

Scope: Proposals are expected to set up and run a 'European Islands Facility' which offers expertise and/or financial support and services to islands:

- The Islands Facility should offer expertise and/or financial support to develop, within a limited period of time, innovative cost-effective investment concepts based on (or the development of – if they do not yet exist) a transition plan and a coherent set of projects that will lead to a decarbonised, efficient and resilient island energy system using local energy flows and resources;
- The Islands Facility should be able to provide, inter-alia: translation of ambitions into a holistic energy transition plan, assistance in modelling of the energy transition on the island(s), a clear identification of the individual potential project pipeline(s), legal analysis and support, a description of how the investments will be financed and, if relevant, how the financing will be mobilised locally, advice on available funds and a design of the process to launch the investments. It can also cover the support for information and engagement actions among the islands inhabitants in the view of ensuring their acceptance, projects participation and co-ownership, also mobilising local financing;
- The Islands Facility should develop in-house expertise to coordinate, support the implementation and critically evaluate the outcomes on the above-mentioned issues, i.e. preparation of energy transition plans, modelling of the energy transition on the islands, identification and financing of project pipelines, legal analysis, so that it will create synergies between requests for assistance from different islands;
- Besides the technical assistance, the Islands Facility will maintain a public, searchable portal with the energy transition plans and project proposals that it has supported and developed, share and spread knowledge and best practices based on a sound and inclusive outreach strategy, with the aim to engage as many islands as possible in the energy transition;
- Proposals should foresee to provide support to third parties ('support scheme') as described in part K of the General Annexes of the Work Programme. At least 30%, and up to 70%, of the budget should be directly allocated for spending to island cities, municipalities or their groupings;
- Proposals should demonstrate that they are deeply rooted in the ecosystem of island communities, of sustainable energy planners and project initiators, and of the financing community of energy efficiency and energy system transformations;
- Proposals should include a strategy to include contributions from 3rd parties to its funding such as local, regional or national authorities (while maintaining autonomy in its activities), and a strategy to continue its work after the granted budget is finished;
- Proposals should demonstrate that they are able to mobilise a critical mass of islands and set up the support scheme of the Islands Facility in accordance with H2020 standards;
- Proposals have to foresee services to underpin European added value and earmark appropriate resources (at least 30%, and up to 70%, of the requested EU contribution) to

make experts available directly to the islands, provide the necessary quality control over the experts' outputs, and ensure that the results are used by other islands;

- Proposals should demonstrate how they are able to select and prioritise islands for support under this facility, based on the following requirements: in order to qualify for support through the Islands Facility, islands must demonstrate proof of political commitment, an ambitious scale of potential investment and level of energy savings relevant to the island, investment sector targeted and type of financial solution envisaged, governance to develop the investment concept, a plan for long-term capacity building within the public administration, a plan on how they will include citizens and other stakeholders, and a commitment for monitoring for 2 years;
- Proposals should include a task to establish links and synergies with R&I projects selected under LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands under the BRIDGE initiative.

The Commission considers that proposals requesting a contribution from the EU of 10 million EUR would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Demonstration and documentation of increased leveraging of finance into energy transition investments by public authorities;
- Overall, for every million Euro of Horizon 2020 support the action should trigger energy transition investments worth at least EUR 10 million;
- Number of investment concepts delivered, and number of concepts that turned into tangible investments after the provided support;
- Number of public authority staff with increased capacity for developing investible energy transition projects;
- Innovation uptake by potential replicators;
- Primary energy savings, GHG reductions, renewable energy production and investments in sustainable energy triggered by participating public authorities after the support of the action (respectively in GWh/year and in million EUR of investments).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-9-2019: ERA-NET Co-Fund Enhanced cooperation in Digitalisation of Energy Systems and Networks⁹³

Specific Challenge: Beyond direct efficiency gains and cost savings, digitalization holds the potential to catalyse fundamental, system-wide changes in Energy Systems and Networks. As digitalisation advances, a highly and cross-sectoral interconnected system of energy systems and infrastructures can emerge, with increasing opportunities for integration of renewables and efficient energy management. Electricity is likely to be the first energy sector impacted, digitisation enabling stronger connections to the heating and cooling sector, in particular in buildings and the mobility sector.

Digitalisation can also foster enhanced the participation of stakeholders in local, regional and European value chains. Local communities and prosumers may gradually begin to leverage the opportunities for their involvement in energy communities and energy transactions and boost European innovation and businesses.

In order to achieve this, energy stakeholders must work hand in hand with highly innovative newcomers and lateral thinkers that have a “digital mindset” (e.g.: the block chain community) and also integrate the know-how and experience from other sectors. The approach should also engage potential customers such as infrastructure operators, local industries or communities and end-users in value chains from the local and regional up to the European and global levels.

Therefore, support is needed for the development of future digital platforms, applications and business which maximize benefits for European citizens while incentivising a sustainable, secure and resilient energy system where data protection is guaranteed. Coordinated transnational Research, Demonstration and Innovation actions has the potential to make a large impact.

Scope: Proposals should coordinate national (or regional) energy and Information and Communication Technology (ICT) research, demonstration and innovation programs and pool the necessary financial resources with a view to implementing joint calls for proposals resulting in grants to third parties with EU co-funding in this area.

The scope of activities should include

- The establishment of transnational innovation ecosystems for technology, systems and services that support designing, implementing and testing technical and business services for the future energy systems, building on available ICT platforms and tools; these should enable the participation of SME's and start-ups and develop scalable, customizable and replicable solutions applicable from local through interregional and up to global level.

⁹³ This activity directly aimed at supporting public-public partnerships with Member States and associated countries, technology platforms with industrial partners and earth observation networks is excluded from the delegation to INEA and will be implemented by the Commission services.

- The coordination and linking of living labs⁹⁴ that facilitate the development and testing of prototypes, bringing innovative solutions from TRL4 (proof of concept) to TRL7. This shall enable the sharing of development and test facilities, allowing testing with hundreds of nodes representing real life operating conditions including failures, behaviour and misuse of the solution, as well as gaining experiences for the design of new market and business models.
- Connect networks of procurers in different countries and regions, which gather potential buyers and users of the solutions at an early stage, in order to help to understand the needs and requirements for more and more software dominated solutions.
- Activities to connect start-ups and investors to reflect on market driven applications.
- Establish methodologies and transnational process chains in conformance with European standards, such as SGAM/M490 and ISO/TR 28380, to implement and achieve interoperability of electronic data exchanges in heterogeneous energy-related ICT systems.
- Coordinate their work with NRA's, ENTSO-E, the DSO organisations and other stakeholders and take into account, build on, and work with Digitisation of Energy projects, funded under the following topics:
 1. LC-SC3-ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation
 2. DT-ICT-11-2019: Big data solutions for energy;
 3. DT-ICT-10-2018: Interoperable and smart homes and grids;
 4. SU-DS04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks;
 5. LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource.

Proposals should make use of state of the art innovation methodology (such as co-creation, design thinking, policy lab) to the community of solution designers to ensure high quality and highly dynamic communication between involved stakeholder groups. Proposals should include the set-up of a knowledge platform and promote transnational mutual learning.

Requirements in terms of funding rates for the ERA-NET Co-fund instrument can be found in the General Annexes of the work programme.

⁹⁴ A living lab is a user-centered, open-innovation ecosystem often operating in a territorial context (e.g. city, agglomeration, region), integrating concurrent research and innovation processes (co-creation), potentially relying on a public-private-people partnership.

The Commission considers that proposals requesting a contribution in the range of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Overall, proposals are expected to enhance the collaboration of regional and national ICT and energy programs and their stakeholder communities, to leverage associated research and innovation / development funds and existing tools and outcomes from former European initiatives like e.g. the Internet of Energy projects FINSENY⁹⁵ and FINESCE⁹⁶ and contribute to the objectives of SET-Plan Action 4 on 'Increasing the resilience and security of the energy system'⁹⁷. Proposals should also contribute to develop need driven implementation environments on regional and local levels.

More specifically, proposals are expected to:

- Accelerate the development of transnational innovation ecosystems, promote the engagement of innovative SME's and start-ups in digital energy systems and solutions, contribute to create new business opportunities, growth and jobs in European regions;
- Foster the emergence of transnational initiatives and living labs, rationalise the use of test facilities, produce robust approaches to the use of digital systems;
- Activate networks of procurers so as to reach the critical mass needed to develop global solutions that can be customised to local / regional needs;
- Emulate local innovation forces and close to market thinking of start-ups and investors;
- Promote the development of interoperable solutions enabling wider impact and use of applications, systems and services.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Smart Cities and Communities

Proposals are invited against the following topic(s):

LC-SC3-SCC-1-2018-2019-2020: Smart Cities and Communities⁹⁸

Specific Challenge: The COP21 Paris Agreement recognises the role of cities and calls on them to rapidly reduce greenhouse gas emissions and adapting to climate change. The EU is committed to implementing the 2030 Agenda for Sustainable Development, including Sustainable Development Goal 11 ("Make cities inclusive, safe, resilient and sustainable").

⁹⁵ <http://www.fi-ppp-finseny.eu/>

⁹⁶ <http://www.finesce.eu/>

⁹⁷ <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan/implementation-plans>

⁹⁸ It is expected that this topic will continue in 2020.

Many forward-looking cities have set themselves climate goals whose achievement rests on wide scale roll out of highly integrated and highly efficient energy systems.

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 2050⁹⁹.

This call will also contribute to the specific objectives of the SET Plan action 3.2 - Smart cities and communities - focussing on positive-energy blocks/districts¹⁰⁰.

Scope: Integrated innovative solutions for Positive Energy Blocks/Districts will be developed and tested and performance-monitored in the Lighthouse Cities. Projects will consider the interaction and integration between the buildings, the users and the larger energy system as well as implications of increased electro-mobility, its impact on the energy system and its integration in planning.

Lighthouse Cities will closely collaborate with the Fellow Cities¹⁰¹ and should act as exemplars helping to plan and initiate the replication of the deployed solutions in the Fellow cities, adapted to different local conditions.

As a sustainable energy transition will see increased electro-mobility, its impact on the energy system needs to be understood and well integrated in planning.

Definition: Positive Energy Blocks/Districts consist of several buildings (new, retro-fitted or a combination of both) that actively manage their energy consumption and the energy flow between them and the wider energy system. Positive Energy Blocks/Districts have an annual positive energy balance¹⁰². They make optimal use of elements such as advanced materials, local RES, local storage, smart energy grids, demand-response, cutting edge energy management (electricity, heating and cooling), user interaction/involvement and ICT.

Positive Energy Blocks/Districts are designed to be integral part of the district/city energy system and have a positive impact on it. Their design is intrinsically scalable and they are well embedded in the spatial, economic, technical, environmental and social context of the project site.

⁹⁹ See also: *Communication on Accelerating Clean Energy Innovation* - http://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v6_0.pdf

¹⁰⁰ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

¹⁰¹ Formerly called Follower cities

¹⁰² *The data filled in the BEST table (available at the participant portal) will be used by the evaluators to assess and compare the level of ambition of the technical measures for Positive Energy Blocks/Districts of the project proposals.*

To increase impact beyond the demonstration part of the project, each Lighthouse City and Fellow City will develop, together with industry, its own bold city-vision for 2050¹⁰³. The vision should cover urban, technical, financial and social aspects. Each vision should come with its guide for the city on how to move from planning, to implementation, to replication and scaling up of successful solutions.

Proposals should also:

- Focus on mixed use urban districts and positively contribute to the overall city goals;
- Develop solutions that can be replicated/gradually scaled up to city level. The technical, financial, social, and legal feasibility of the proposed solutions should be demonstrated in the actual proposal.
- Make local communities and local governments (particularly city planning departments) an active and integral part of the solution, increase their energy awareness and ensure their sense of ownership of the smart solutions. This should ensure sustainability of Positive Energy Blocks/Districts;
- Promote decarbonisation, while improving air quality.
- Incorporate performance monitoring (ideally for more than 2 years) of deployed solutions from the earliest feasible moment. All relevant performance data must be incorporated into the Smart Cities Information System database (SCIS)¹⁰⁴.

Projects should also deliver:

- Effective business models for sustainable solutions;
- Practical recommendations arising from project experience on:
 - o regulatory, legal aspects and data security/protection;
 - o gender and socio-economics (Social Sciences and Humanities);
 - o storage solutions (from short-term to seasonal);
 - o big data, data management and digitalisation;
 - o electro-mobility: i) its impact on energy system and ii) appropriate city planning measures to support large scale roll-out;

Eligible costs are primarily those that concern the innovative elements of the project needed to:

¹⁰³ Building on and further concretising their i) Sustainable Energy Action Plans (SEAP) or ii) Sustainable Energy (and Climate) Action Plans (SECAP) or iii) a similar, at least equally ambitious plan. These shall be approved by the corresponding authorities by the end of the project.

¹⁰⁴ <http://www.smartcities-infosystem.eu/>

- connect and integrate buildings;
- enable Positive Energy Blocks/Districts;
- foster innovative systems integration;
- complement the wider energy system.

Costs of commercial technologies are not eligible, for example:

- Buildings: purchase, construction, retrofitting and maintenance;
- Electric vehicles and charging stations: purchase, installation and maintenance;
- City-level ICT platforms: purchase, development and maintenance;
- Standard, commercially-available RES: purchase, development and maintenance.

Projects are expected to cooperate with other Smart Cities and Communities projects funded under Horizon 2020^{105 106} as well as the European Innovation Partnership on Smart Cities and Communities (EIP-SCC)¹⁰⁷.

Therefore, proposals should foresee a work package for cooperation with other selected projects and earmark appropriate resources (5% of the requested EU contribution) for coordination and communication efforts and research work associated with cross-cutting issues.

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million¹⁰⁸ would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Typically, projects should have a duration of 48 to 60 months.

Expected Impact: Projects should contribute to:

- Meeting EU climate mitigation and adaptation goals and national and/or local energy, air quality and climate targets, as relevant;
- Significantly increased share of i) renewable energies, ii) waste heat recovery and iii) appropriate storage solutions (including batteries) and their integration into the energy system and iv) reduce greenhouse gas emissions;
- Lead the way towards wide scale roll out of Positive Energy Districts;

¹⁰⁵ <http://ec.europa.eu/inea/en/horizon-2020/h2020-energy/projects-by-field/smart-cities-and-communities>

¹⁰⁶ For the website of the Lighthouse project group, please refer to the Frequently Asked Questions (FAQ).

¹⁰⁷ <http://ec.europa.eu/eip/smartcities/>

¹⁰⁸ Indicatively, EUR 6 to 8 million for a Lighthouse city and between EUR 0.5 and 1.0 million for a Fellow city.

- Significantly improved energy efficiency, district level optimized self-consumption, reduced curtailment;
- Increased uptake of e-mobility solutions;
- Improved air quality.

The higher the replicability of the solutions across Europe, the better.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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

CCS is one of the key promising technologies that can reduce CO₂ emissions in the power generation sector and the only pathway for very stringent GHG emission reductions from energy and/or carbon intensive industries that generate CO₂ as part of their production processes.

In order to realise its potential, CCS needs to become a cost-competitive technology and prove its safety (mainly regarding pipeline transportation and storage), so that it could start to be commercially deployed and thus contribute to the low-carbon transition of the European economy. 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 (CCU) to useful products such as fuels or chemicals will create new markets for innovative industrial sectors and can play a role in supporting the deployment of CCS by offsetting the high costs of capture and storage.

The integration of flexible fossil fuel power generation and storage (including through power-to-X-to-power) will contribute to a smart, secure and more resilient power system.

The Energy Union priorities, also in the area of enabling near-zero CO₂ emissions from fossil fuel power plants and carbon intensive industries, are jointly implemented by the stakeholder community, national authorities and the Commission through the key actions of the EU Strategic Energy Technology Plan (SET Plan), notably action 9 (CCUS) and action 4 (resilience, security and smartness of the energy system). To attain these goals, ambitious R&I targets have been set in agreement with the sectorial stakeholders. In action 9, the focus is on cost-reductions, new technologies and proliferation of pilots and demonstrators. In action 4, goals were set to increase the flexibility of fossil fuel power plants. While it is expected that the Member States will take coordinated actions towards the priorities and targets set by the SET-Plan, a strong and concerted effort also from the EU is needed to sustain the technological and economic leading position in some technologies and to catch up in areas where the EU is lagging behind. Activities supported in this area contribute to the

specific objectives, targets and relevant Implementation Plans of the SET Plan action 9 and 4¹⁰⁹.

Proposals are invited against the following topic(s):

LC-SC3-NZE-1-2018: Advanced CO2 capture technologies

Specific Challenge: Commercial deployment of CCS requires a significant reduction of the energy intensity of the CO2 capture process for power plants or other energy-intensive industries, and a substantial decrease of the cost of capture. A continuous effort is needed to develop and demonstrate new and advanced capture technologies, including new materials.

Scope: The objective is the validation and pilot demonstration of advanced CO2 capture technologies that have shown a high potential for reduction of the energy penalty and a significant overall improvement of cost-efficiency of the whole capture process, but that are not yet commercial. Projects will test operating conditions and operational flexibility, and provide proof of the reliability and cost-effectiveness of these concepts, whilst at the same time evaluating the cost, technical requirements and operational and safety impacts on the associated transportation infrastructure, storage or utilisation of CO2, as part of their integration in a CCS cluster based on a whole system approach. The proposal should state credible and clearly defined targets and key performance indicators (KPIs) for the energy penalty reduction, the capture rate and the relative incremental operating costs of the capture process. Environmentally benign technologies have to be pursued and their environmental impact addressed in the project also in view of future scaling up.

Proposals are expected to bring technologies to TRL 5-7 (please see part G of the General Annexes). Technology development should be balanced by an assessment of the societal readiness towards the proposed innovations, including by identifying and involving relevant end users and societal stakeholders and analysing their concerns and needs using appropriate techniques and methods from the social sciences and humanities.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 5 to 10 million (depending on the degree of demonstration) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Significant, step-change advances in reductions in energy penalty and thus in the fuel-dependent cost of CO2 capture, facilitating safe and economic integration into industrial clusters - which will lower the barriers to the wider uptake of CCS, in particular for those sectors vulnerable to carbon leakage.

Type of Action: Research and Innovation action

¹⁰⁹

For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-SC3-NZE-2-2018: Conversion of captured CO₂¹¹⁰

Specific Challenge: Conversion of captured CO₂, for example using hydrogen made from renewable energy, to produce fuels is not only a means to replace fossil fuels, but also a promising solution for seasonal energy storage. There are still relevant and significant scientific and technological challenges to be able to exploit the CO₂ as a chemical and fuel feedstock in a systematic manner, the main challenge being that the chemical utilisation of CO₂ is limited by its low energy content, and the conversion process is highly energy intensive.

Scope: Development of energy-efficient and economically and environmentally viable CO₂ conversion technologies for chemical energy storage or displacement of fossil fuels that allow for upscaling in the short to medium term. Projects have to substantiate the potential for the proposed CCU solution(s) as CO₂ mitigation option through conducting an LCA in conformity with guidelines developed by the Commission or the relevant ISO standard. Proposals have to define ambitious but achievable targets for energy requirements of the conversion process (including catalytic conversion), production costs and product yields, that will be used to monitor project implementation.

Proposals are expected to bring technologies that have reached at least TRL 3-4 to TRL 5-6 (please see part G of the General Annexes). Technology development has to be accompanied by an assessment of the societal readiness towards the proposed innovations. Relevant end users and societal stakeholders will be identified in the proposal, and their concerns and needs will be analysed during the project using appropriate techniques and methods from the social sciences and humanities, in order to create awareness, gain feedback on societal impact and advancing society's readiness for the proposed solutions.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 3 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with relevant Mission Innovation¹¹¹ countries such as China¹¹².

Expected Impact: New solutions for the conversion of captured CO₂, either from power plants or from carbon-intensive industry, to useful products such as fuels or chemicals for

¹¹⁰ This topic contributes to the roadmap of the SPIRE cPPP and to the focus area "Connecting economic and environmental gains – the Circular Economy".

¹¹¹ <http://mission-innovation.net/our-work/innovation-challenges/>

¹¹² A Co-funding mechanism is in place in China; see <https://ec.europa.eu/programmes/horizon2020/en/news/eu-china-research-and-innovation-co-funding-mechanism-first-call-launched-china>

energy storage (CCU) that will create new markets for innovative industrial sectors, diversify the economic base in carbon-intensive regions, as well as contribute to achieving a Circular Economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-3-2018: Strategic planning for CCUS development

Specific Challenge: Establishing the necessary infrastructure for safe and cost-effective CO₂ transport and storage is of high importance in Europe. Early CCS projects will most likely explore CO₂ storage sinks in the vicinity of capture points, and the required infrastructure will therefore most likely be initiated at national level in CO₂ hubs and industrial clusters in order to achieve economies of scale by sharing CO₂ transport and storage infrastructure. A cross border transport infrastructure is ultimately necessary to efficiently connect the CO₂ hubs and industrial clusters to sinks.

Scope: Elaboration of detailed plans for comprehensive European CO₂ gathering networks and industrial clusters linked to CO₂ storage sites via hubs, pipeline networks and shipping routes, with due attention to national and border-crossing permitting and regulatory issues. Mapping and understanding the nature and longevity of emission sources, identification of transport corridors and performing initial impact assessments, and developing local business models for delivery of CO₂ capture, transport, utilisation and/or storage (including the separation of capture, transport, utilisation and storage responsibilities) within promising start-up regions. Industrial clusters may include for example power producers, cement and steel factories, chemical plants, refineries and hydrogen production facilities. A hubs-and-clusters approach could also include the coupling of hydrogen production and CCS, possibly using common infrastructure. The assessment of cost-effective ('bankable') storage capacity in selected regions is a key component of strategic planning, as it will provide additional certainty that the required CO₂ storage capacity will be available when needed. Due attention has to be given to regions with potential for early onshore storage development (including enhanced oil recovery). Close cooperation with industrial players, as well as engagement with local stakeholders, is paramount. This includes identifying and involving relevant end users and societal stakeholders and analysing their concerns and needs using appropriate techniques and methods from the social sciences and humanities.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Timely strategic planning will enable and accelerate the roll-out of a CCS infrastructure consisting of capture points and clusters, intermediate hubs, CO₂ conversion facilities, safe and cost-effective CO₂ transport and storage. Projects should pave the way for

the development of operational storage sites as from the early 2020's, in particular linked to carbon-intensive industry. Proposals should clearly demonstrate how their outputs will contribute to achieving these expected impacts in the short term (up to 3 years), medium term (3-10 years) and long term (more than 10 years).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

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

Specific Challenge: With a growing share of energy produced from renewable resources (RES), fossil fuel power plants will have to increasingly shift their role from providing base-load power to providing fluctuating back-up power (i.e. ramping up and down) in order to control and stabilise the grid. These strong fluctuations result not only in increased wear-and-tear, but (more importantly) also in a lower efficiency and hence higher greenhouse gas emissions per unit of produced electricity. Severe ramping up and down can be limited through load-levelling i.e. storing power during periods of light loading on the system and delivering it during periods of high demand.

Scope: Validation and pilot demonstration of the integration of energy storage and/or use of excess energy (including via power-to-X-to-power in fossil fuel power plants and showing that EU emission limits for such installations can not only still be met, but that emissions of air pollutants can even be reduced. This could include the enabling of 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.

Proposals are expected to bring technologies to TRL 6-7 (please see part G of the General Annexes). Technology development has to be complemented by activities to create awareness, gain feedback on societal impact and advancing society's readiness for the proposed solutions.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Solutions will contribute to a smart, secure and more resilient power system through the integration of energy storage for the purpose of load levelling in fossil fuel power generation. Results of the project(s) should allow a smoother operation of these plants at optimal efficiency and environmental performance in order to better adapt to an energy systems that will increasingly be dominated by intermittent renewable energy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-5-2019-2020: Low carbon industrial production using CCUS¹¹³

Specific Challenge: CCUS in industrial applications faces significant challenges due to its high cost and the fierce international competition in the sectors concerned. However, these sectors currently account for 20% of global CO₂ emissions, and in the 2 degree scenario, should represent half of the stored CO₂ by 2050. Relevant sectors with high CO₂ emissions are for example steel, iron and cement making, oil refining, gas processing, hydrogen production, biofuel production and waste incineration plants.

Scope: Projects will focus on integrating CO₂ capture in industrial installations, whilst addressing the full CCUS chain. 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. Important aspects to address are of technical (e.g. the optimised integration of capture plant with industrial processes; scalability; CO₂ purity), safety (e.g. during transportation and storage), financial (e.g. cost of capture; cost of integration) and strategic nature (e.g. business models; operation and logistics of industrial clusters and networks).

Projects are expected to bring technologies to TRL 6-7 (please see part G of the General Annexes). Technology development has to be balanced by an assessment of the societal readiness towards the proposed innovations. Relevant end users and societal stakeholders will be identified in the proposal, and their concerns and needs will be analysed during the project using appropriate techniques and methods from the social sciences and humanities, in order to create awareness, gain feedback on societal impact and advancing society's readiness for the proposed solutions. Projects should also explore the socio-economic and political barriers to acceptance and awareness with a view to regulatory or policy initiatives.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 10 to 12 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with relevant Mission Innovation¹¹⁴ countries such as China¹¹⁵.

Expected Impact: Successful, safe and economic demonstration of integrated-chain CCUS from relevant industrial sources such as mentioned in the specific challenge will accelerate the learning, drive down the cost and thus help break the link between economic growth and the demand for industrial output on one hand, and increasing CO₂ emissions on the other hand.

¹¹³ It is expected that this topic will continue in 2020.

¹¹⁴ <http://mission-innovation.net/our-work/innovation-challenges/>

¹¹⁵ A Co-funding mechanism is in place in China; see <https://ec.europa.eu/programmes/horizon2020/en/news/eu-china-research-and-innovation-co-funding-mechanism-first-call-launched-china>

The impact of projects under this call will to a large extent be determined by the extent to which the results will be exploited, i.e. the plan on how the captured CO₂ will be actually utilised and/or stored, either in the project or planned as a future phase. This will be evaluated based on the maturity and quality of the proposed post-capture solutions. Projects under this call that are carried out in areas where there is both a high concentration of CO₂ emitting industries and a nearby capacity for geological storage are considered prime sites for hub and cluster developments, and will generate the highest impact on full-scale deployment in the medium to longer term.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-6-2020: Geological Storage Pilots

Joint Actions

The Commission Communication "Towards an Integrated Strategic Energy Technology (SET) Plan"¹¹⁶ reiterates that achieving the objectives and ambitions of the Energy Union requires more effective coordination of research and innovation (R&I) activities to avoid unnecessary duplication of funding and efforts. Partnerships between organisations in the public sector, or between public and private sector entities involved in funding energy R&I activities, are a crucial means of achieving this goal. The Communication also calls for more joint actions, and specifically mentions Horizon 2020 instruments as a concrete way to support this objective.

Public funding is essential in supporting new technologies in their early stages, and has been fundamental in the past in providing the EU with a competitive edge in various energy technologies. But public funding accounts for only around 19% of all energy R&I funding in the EU (excluding the nuclear sector), with the rest provided by the private sector. And of this, only 4% is funding from EU R&I programmes, with the rest coming from national R&I programmes¹¹⁷. It is therefore crucial that public funding is used as effectively as possible.

The SET Plan provides the strategic framework for the best possible use of this funding. Topics in this section complement the activities of other public funders in Europe by focusing on activities with clear European Union added value, and in particular on those with a high potential to leverage funding from other sources and therefore maximise the reach of Horizon 2020. This is a crucial objective of the SET Plan as well as the overall goal of the European Research Area.

This section of the Work Programme provides support for joint actions and public partnerships between European, national and regional funding agencies and procurers through the use of several Horizon 2020 instruments.

¹¹⁶ C(2015) 6317

¹¹⁷ SWD(2017) 32, 2014 figures.

Topic LC-SC3-JA-1-2018 supports ERA-NET Cofund actions. Topic LC-SC3-JA-2-2018 provides support for the execution of the Implementation Plans produced by the SET Plan Temporary Working Groups, which are expected to be endorsed by the SET Plan Steering Group during 2017 and the beginning of 2018. Topic LC-SC3-JA-3-2018 makes use of procurement to push forward the research and development of wave energy solutions.

Topics LC-SC3-JA-4-2018 and LC-SC3-JA-5-2020 are linked to Africa and the opportunities it presents for European research and industry. R&I cooperation in this area will reinforce the EU commitments under the Paris Agreement, the Agenda 2030 on Sustainable Development and the Cotonou Agreement. This initiative contributes to achieving the Sustainable Development Goal on energy by ensuring access to affordable, reliable, sustainable and modern energy for all. It will also contribute to the priorities set up by the EU-Africa High Level Policy Dialogue on Science, Technology and Innovation.

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. These public partnerships will have as a goal to contribute to the objectives and ambitions of the Energy Union and the Strategic Energy Technology (SET) Plan, and to continue developing a European Research Area in energy.

Proposals are invited against the following topic(s):

LC-SC3-JA-1-2018: Joint programming actions to foster innovative energy solutions¹¹⁸

Specific Challenge: The EU needs to accelerate the transformation of its energy system by bridging the gap between research and commercial deployment with innovative solutions. Bridging this gap often requires substantial volumes of investment which cannot be allocated by individual countries or by the European Commission on their own. Mobilising the necessary investment can only be achieved by pooling together financial resources from multiple countries, the Commission, and the private sector. This is a challenge because the funding landscape is complex.

One of the objectives of the SET Plan is to create funding synergies on such a big scale by organising joint programming actions between the entities responsible for public funding programmes and the Commission. ERA-NETs are a key instrument for joint programming actions within the SET Plan, and they also contribute to achieving the objectives of the European Research Area (ERA). In addition, they can play a key role in achieving the goal of the Energy Union of moving away from a fragmented system characterised by uncoordinated national policies and towards an integrated European R&I approach which accelerates the transformation of the energy system.

¹¹⁸ This activity directly aimed at supporting public-public partnerships with Member States and Associated Countries, and technology platforms with industrial partners is excluded from the delegation to the Innovation & Networks Executive Agency (INEA) and will be implemented by the Commission services. In the case of energy efficiency, the activity is not excluded from the delegation to the Executive Agency for SMEs (EASME).

Areas suitable for ERA-NETs will be identified by Member States' / Associated Countries' representatives in the SET Plan governance bodies (in particular the Joint Actions Working Group). They will then be developed from the early stages in close collaboration with the European Commission and with input from the Programme Committee as needed. This collaboration will ensure that proposed ERA-NETs are in line with energy R&I and SET Plan policy objectives.

Scope: Actions should aim at coordinating the efforts of participating Member States, Associated Countries and Regions towards achieving SET Plan objectives and, where they exist, executing the Implementation Plans jointly developed by SET Plan countries' representatives, industry and research organisations within the SET Plan priority areas numbers 1 to 9¹¹⁹. In establishing their thematic scope, proposals will also take into due consideration support already provided through other topics in this work programme part. As for their technology development scope, proposals can support projects addressing any stage of the innovation chain through joint calls.

Proposals should pool the necessary financial resources from participating national or regional research programmes with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding. Proposers are requested to also implement other joint activities, including additional joint calls without EU co-funding.

Proposals shall include provision for at least one joint call without EU funding on top of the compulsory co-funded joint call.

Proposals shall specify which additional activities will be carried out as part of the action in accordance with the definition given in General Annex D.

It is expected that actions funded through this topic will bring together national and regional programme owners and programme managers who represent diverse conditions and approaches from the EU.

Participation of legal entities from third countries is also encouraged in the joint calls and in additional joint activities, on the basis of common interest and mutual benefit. Participants from these countries may request a Union contribution (on the basis of the ERA-NET unit cost) for the coordination costs of additional activities.

Expected Impact: It is expected that actions will help to:

- Establish long-lasting joint programming research efforts between Member States/Associated Countries/Regions in areas of common interest;
- Accelerate the time to commercial deployment of affordable, cost-effective and resource-efficient technology solutions which decarbonise the energy system in a sustainable way;

¹¹⁹

C(2015)6317, pp.10-13: SET Plan Priorities n°.1 to n°.9 https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v8_0.pdf C(2015)6317, pp.10-13: SET Plan Priorities n°.1 to n°.9 https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v8_0.pdf

- Reduce the environmental impact of the energy system;
- Make a measurable contribution to the objectives of the Energy Union, the SET Plan, and the European Research Area;
- Achieve a funding leverage effect of at least 5:1 between national, regional and private sector contributions, on the one hand, and EU contributions on the other.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-2-2018-2019: Support to the realisation of the Implementation Plans of the SET Plan¹²⁰

Specific Challenge: The Strategic Energy Technology Plan of the European Union focusses on ten actions structured around the Energy Union R&I priorities. Its goal is to accelerate the transformation of the European energy system making it more sustainable, secure and competitive as a fundamental enabler of a low carbon economy. This strategy relies on a strengthened partnership among SET Plan countries and the stakeholders from both the industrial (including the European Technology and Innovation Platforms, ETIPs) and research communities (including the European Energy Research Alliance, EERA). In 2016, the SET Plan adopted a set of ambitious targets for its ten actions through a wide participatory process and the corresponding Implementation Plans will be finalised in 2017 and beginning of 2018.

Scope: Proposals will support, when appropriate, the execution/realisation of a SET Plan Implementation Plan prepared by one of the following SET Plan Temporary Working Groups (TWGs):

2018:

- Solar thermal energy (CSP / STE);
- Offshore wind;
- Photovoltaics (PV);
- Ocean energy;
- Deep geothermal systems; and
- Driving ambition in carbon capture and storage deployment.

2019:

¹²⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Renewable fuels & bioenergy.

Proposals should take into consideration the coordination needs of each specific sector and the emerging policy priorities for their implementation. Proposals should count with the participation of research organisations and/or companies (industry) committed in principle to execute all or some of the SET Plan related R&I activities specified in the corresponding Implementation Plan as endorsed by the SET Plan Steering Group¹²¹. In this sense, proposals shall detail, to the extent possible, the financial contributions from public and private funding sources at national level needed for the execution of those R&I activities, and explain which processes or mechanisms will be put in place to actually execute and monitor the R&I activities.

Furthermore, proposals shall also establish and implement a dissemination plan to communicate their output (in connection to the achievement of specific SET Plan targets). Regardless of other communication means, all outputs shall be fed into the SET Plan information system (SETIS).

In addition, proposals will ensure the coordination of the outcome of the relevant outputs of ongoing R&I actions listed in the Implementation Plan contributing to the achievement of the SET Plan targets.

The actions financed under this topic will be coordinated with the SET Plan Steering Group through the SET Plan secretariat.

The Commission considers that proposals requesting a contribution from the EU in the range of 1 EUR million per SET Plan Implementation Plan would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts that should be justified on the basis of the number and volume of the R&I to be coordinated. The specific characteristics and the different needs for support among the different SET Plan Implementation Plans needs to be considered. The duration of the projects should allow for a stable and continuous implementation of the R&I actions addressed (indicative duration: 3 years).

Expected Impact: The expected impact will be the achievement of the research and innovation goals of the Energy Union through the implementation of the integrated Strategic Energy Technology (SET) Plan, in particular the execution of the SET Plan Implementation Plans endorsed by EU Member States and SET Plan Associated Countries.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

¹²¹ <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan/implementation-plans>

LC-SC3-JA-3-2019: European Pre-Commercial Procurement Programme for Wave Energy Research & Development¹²²

Specific Challenge: The challenge is the design, development and validation of cost-effective Wave energy convertors that can survive in a harsh and unpredictable ocean environment as the ocean through demand-driven Pre-Commercial Procurement. The challenge is open to proposals seeking to steer wave energy research and development in an effective way at a European level establishing convergence of wave energy technologies and to bring these technologies to the market.

Scope: In the past years, Member States and the European Commission have been working closely together to use their public resources via previous Ocean ERA-NET Cofund actions but like to reinforce their cooperation to address the challenge through a different funding instrument. In this European PCP action it is the aim to elevate experience with national public procurement approaches at a European level to bring European Wave Energy Research and Development more efficiently into the direction of commercialization.

The proposed action is to be structured along the following phases:

Preparation phase: The participating users/buyers of R&D service should agree on common performance levels and associated specifications for the wave energy systems. The action should introduce the ocean energy phase gate procedure on a European level.

They will plan the research and the design of actions covering a broad variety of issues. The PCP will consist of several building blocks addressing different sub-challenges. The funding of the participating programme owners (national and/or regional) and the European Union will be used for different stages in the wave energy technology development. The results of phase 1 should lead to calls for tenders (for the procurement of R&D services) which focus on clearly identified technologies which contribute to the development of commercial wave energy devices. The procurement should be also open for developers, researcher organisations which are not located in the participating countries/regions.

The expected outcomes at this stage: 1) completed tender documents, 2) signed joint procurement agreement confirming the collaboration modus including the financial commitment of the buyers group and 3) final confirmation of the lead procurer.

Execution stage: The action will take care for the implementation of the Pre-Commercial Procurement and of the PCP contracts. The results will be shared within the European industry to accelerate technology development and the establishment of guidelines and standards to facilitate the transferability of the knowledge creation. The research and specification work should lead to at least 3 prototypes tested in an environment close to expected performance. At the end of the action at least one of the prototypes should be ready for testing in an operational environment at commercial scale.

¹²² This activity directly aimed at supporting public-public partnerships with Member States and associated countries, and technology platforms with industrial partners and earth observation networks and will be implemented by the Commission services.

Proposals have to describe the jointly identified challenge, indicating how it fits into their mid-to-long term innovation plans, why solutions currently available on the market or under development are not meeting their needs. Activities have to include: (1) networking related to preparation, management and coordination and (2) joint research activities related to the validation of PCP strategy.

The consortium should have at least three legal entities established in different member states or H2020 associated countries. In the consortium the participation of minimum two 'public procurers' is required. Other entities might be considered which can have a clear added value in the preparation and/or execution of the PCP or in coordination and networking activities.

Please see part E of the General Annexes for the specific proposal requirements for PCP actions.

The Commission considers that PCP proposals requesting a contribution from the EU of between 15 and 20 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission a selection of proposals requesting other amounts.

Expected Impact:

- Convergence of wave energy technologies, acceleration of technology development, proof-of-concept and validation of wave energy technology for the benefit of the wave energy sector and as such improved knowledge transfer.
- Pool resources at national and EU levels dedicated to Research and Development and provide effectively a significant developmental boost of wave energy technology.
- More effective use of public resources for Research and Demonstration.

Type of Action: Pre-Commercial Procurement

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-4-2018: Support action in preparation of a Joint Programming activity¹²³

Specific Challenge: Providing sustainable and affordable energy to sub-Saharan Africa is critical to the development of a region that accounts for 13% of the world's population, but only 4% of its energy demand. Sub-Saharan Africa's energy resources are more than sufficient to meet its demands, but they are unevenly distributed and under-developed (IEA, 2014).

Building local capacities and promoting research, including applied research, are recognized to be essential pillars in the development of sustainable energy in Africa. Africa-EU research

¹²³ This activity directly aimed at supporting public-public partnerships with Member States and Associated Countries, technology platforms with industrial partners is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

cooperation in this area can contribute substantially to further technology take-up in the region. It can also strengthen the market position of involved European institutions through increased knowledge and competitive capacity.

Several initiatives in the past decade have launched support projects aiming to promote research addressing African energy challenges. The participation of African researchers in related calls has however remained limited. African scientists and researchers in general are underrepresented in the international arena: there are only few scientific publications or patent applications related to renewable energy, and limited participation in international conferences. In addition to the limited exposure the international scientific community, limited research capacities both in the sense of human capital and financial resources hinder better representation of African researchers in abovementioned funding schemes.

Following the EU commitments under the Paris Agreement, Agenda 2030 on Sustainable Development and Cotonou Agreement, research and innovation cooperation in the field of renewable energy generation technologies between EU and Africa needs to be strengthened and further developed. Coordination of the existing bilateral activities between European and African countries is advisable. The challenge is bringing together the national funding agencies of EU member states and African states interested in developing joint research activities between the two continents to create synergies and to push forward common research and innovation cooperation in the field of renewable energy generations.

Scope: The proposal will be the preparatory step towards the action to be supported under topic LC-SC3-JA-5-2020. The consortium has to bring together the core relevant European funding agencies and African partners already involved research and innovation cooperation actions.

The fields of activities to be programmed will cover the research and development of new or the adaptation of renewable energy generation technologies to the African environmental, social and economic conditions, of providing affordable access to renewable energy and of improving the innovation cycles.

The objectives will be the development a common strategic joint research and innovation programme on renewable energy technology and to establish its organisational principles that could lead to a Joint Programme. The common strategic joint programme needs to create synergies with existing African-European programmes such as the Africa-EU Energy Partnership, the EU Energy Initiative, the Africa Renewable Energy Initiative and the EU-Africa Research and Innovation Partnership.

The estimated duration to achieve these objectives is approximately 12 months.

Expected Impact: The expected impact will be firstly the achievement of the joint commitments necessary to propose and to implement a Joint Programme, secondly the identifications through its strategic joint programme of the essential research and innovation activities needed to reinforce and to boost European and African research cooperation.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-5-2020: Joint Programming with EU and African partners for a R&I actions in the area of renewable energy

Cross-cutting issues

Proposals are invited against the following topic(s):

LC-SC3-CC-1-2018-2019-2020: Social Sciences and Humanities (SSH) aspects of the Clean-Energy Transition¹²⁴

Specific Challenge: The clean-energy transition doesn't just pose technological and scientific challenges; it also requires a better understanding of cross-cutting issues related to socioeconomic, gender, sociocultural, and socio-political issues. Addressing these issues will help to devise more effective ways of involving citizens and to better understand energy-related views and attitudes, ultimately leading to greater social acceptability as well as more durable governance arrangements and socioeconomic benefits.

Scope: In 2018, proposals should be submitted under the theme "Social innovation in the energy sector" and in 2019 under the theme "Challenges facing carbon-intensive regions". They should address one or several of the questions listed under the respective sub-topics below. All proposals should adopt a comparative perspective, with case studies or data from at least three European Union Member States or Associated Countries.

2018:

Social innovation¹²⁵ in the energy sector: The energy transition has given rise to various forms of social innovation, such as the emergence of energy cooperatives or that of energy "prosumers" consuming but also producing energy. Urban areas have emerged as major hubs for these trends, given the close proximity between citizens, businesses and institutions, facilitating linkages between sectors and the emergence of new business and service models, as well as associated governance arrangements. These issues need to be studied in more detail, with a particular focus on the following questions:

- What characterizes successful examples of social innovation in the energy sector?
- What enabling conditions facilitate social innovation in the energy sector and how can it be encouraged? What factors work against it?

¹²⁴ It is expected that this topic will continue in 2020.

¹²⁵ Social innovations are defined "as new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. In other words they are innovations that are not only good for society but also enhance society's capacity to act. See, *Empowering people, driving change*, Bureau of European Advisers (BEPA), Brussels (2011), p. 33.

- In what way does social innovation contribute to the preservation of livelihoods and the development of new business and service models in the energy sector?
- In what way does social innovation contribute to making energy more secure, sustainable and affordable? Does social innovation lead to greater competitiveness and if so, how?
- Under what conditions does social innovation lead to greater acceptance of the transition towards a low-carbon energy system?

2019:

Challenges facing carbon-intensive regions: The transition to a low-carbon energy system and economy poses particular challenges for regions that are still heavily dependent on fossil-fuel-based industries or the extraction of fossil fuels themselves ("coal and carbon-intensive regions"). At the same time, this transition offers major opportunities for developing new lines of business and for increasing the competitiveness of structurally weak regions. Focusing on the past 5-10 years up to the present, particular attention should be focused on the following issues:

- What are the principal socio-economic challenges facing coal and carbon-intensive regions today and what effect have these had on livelihoods and the sustainability of local and regional economies?
- What coping strategies have emerged in recent years? What are the principal differences between regions that are coping well and those that are not?
- To what extent have coal and carbon-intensive regions experienced outward migration in recent years and in what way has this affected their social and demographic composition?
- What effect, if any, have these changes had on the rise of populism and of anti-democratic attitudes in the regions concerned?

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The proposed research will:

- provide a better understanding of socioeconomic, gender, sociocultural, and socio-political factors and their interrelations with technological, regulatory, and investment-related aspects, in support of the goals of the Energy Union and particularly its research and innovation pillar;¹²⁶

¹²⁶ As expressed in the "Accelerating Clean Energy Innovation" Communication (COM [2016] 763)

- yield practical recommendations for using the potential of social innovation to further the goals of the Energy Union, namely, to make Europe's energy system more secure, sustainable, competitive, and affordable for Europe's citizens;
- yield practical recommendations for addressing the challenges of the clean-energy transition for Europe's coal and carbon-intensive regions, including socioeconomic and political ones.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-2-2018: Modelling in support to the transition to a Low-Carbon Energy System in Europe

Specific Challenge: The energy system in Europe will follow a transition to a low-carbon future in accordance with the COP21 agreements and the European Union targets and objectives set for 2020, 2030 and 2050. Energy models that are currently used to plan, support and verify the energy policies at national and European level do not fully encompass and integrate all the new challenges posed by this transition, such as decentralisation and variability in electricity supply, the need for flexibility, short-and long-term market dynamics, integration of the energy systems, the deployment of innovative technologies and the interaction between increasing numbers of independently acting agents in liberalised markets. In addition, energy models do not always capture the determinants, barriers (including financing-related issues) and (macroeconomic) impacts of the necessary investments to secure the low-carbon transition.

Civil society is looking for improved access to the assumptions, tools and results underlying the assessment of policy options. Researchers are also looking for enhanced possibilities for open collaborative research and the use of open data sources. An enhanced transparency of modelling tools and a wider availability of data used and generated by the modelling exercises would improve access and understanding of the challenges ahead. In addition, Europe needs to continuously promote networks and platforms for dialogues on energy modelling across relevant actors and institutions in order to progress the scientific knowledge in the field and to reinforce the interaction between researchers and policy makers.

The challenge is therefore to develop new knowledge on energy system modelling to set up an open space for researchers at national and European levels to collaboratively innovate and progress in using modelling tools to understand and predict the requirements of the transition towards a low-carbon energy system. The aim is to support the development of effective and efficient policy measures, to increase consistency and comparability of modelling practices and their use in defining low-carbon transition pathways at regional, national and European level.

Scope: Proposals must target the development of a suite of modelling tools and scenario building exercises that will contribute to a better understanding of the issues below. Proposals will address all of the following issues:

1. A better representation of recent and future aspects of the European energy system in transition. For power generation, it includes aspects such as decentralisation, variability, the need for flexibility, and real market functioning. For demand, it includes the behaviour of individuals and communities of actors. It should also help address issues such as the integration of energy sectors (electricity, heating/cooling and gas).
2. Greater transparency and access to assumptions, data, model outputs and to tools used in modelling exercises. A collaborative environment for research on modelling, scenario and pathways development including ex-post validation and inter-comparison exercises should be proposed. Interaction with energy transition modelling activities in member states and with energy and climate policy makers.
3. A better representation of the investment determinants, barriers (energy market and regulatory failures) and impacts of actors: individuals, communities, private and public actors and cover the deployment of innovative technologies. This should help represent policy measures that address barriers and market failures. The exploration of energy and macroeconomic relationships, including via the investment channels, would also create a clearer understanding of macro-economic impacts of the low-carbon transition.

The organisation of an annual conference on energy modelling, bringing together the relevant experts and policy-makers, would be an important asset.

The Commission considers the proposals requesting a contribution from the EU of between 4 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to contribute to:

- a. A better adequacy of energy system modelling approaches to model the transition to a low-carbon energy system and to encompass the new challenges posed by the energy transition driven by the Energy Union with its targets and objectives for 2020, 2030 and 2050;
- b. Improve the understanding of energy systems by enhancing the transparency of modelling engines and practices and making data and knowledge more widely available. Increase the sharing of modelling infrastructures and databases;
- c. Increase openness to collaborative research on energy system modelling as well as the provision of more complete information on policy options and their assessment to civil society and decision-makers.

- d. Better representation of the determinants, barriers and impacts of investments by actors: individuals, communities, and private and public actors. Allow better design and representation of policy measures that address barriers and market failures;
- e. Promote a coherence of modelling practices at regional, national and European levels, allowing an assessment of cross-border effects and the comparison and integration of individual approaches;
- f. Provide a clearer understanding of the macro-economic impacts of the low-carbon transition.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-3-2019: Support for the opening of low-carbon energy research databases in Europe¹²⁷

Specific Challenge: Recent advances in the collection and exploitation of large data sets open the possibility for major industrial and social innovations. The European Open Science Cloud initiative aims to maximise the incentives for sharing data and to increase the capacity to exploit them, to ensure that data can be used as widely as possible.

Increasing aspects of research in the transition to a low-carbon energy system in Europe rely on the collection, analysis and processing of large data sets. Insights, information and knowledge are increasingly extracted from data sets in individual sectors and in the combination of data from different sectors.

The challenge is to 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; this action focuses on the area of low-carbon energy. As the energy transition combines different scientific disciplines, particular attention has to be paid to agreed metadata in order to allow for the joint exploitation of data from these disciplines.

Scope: Proposals will develop together with energy research communities several of the items below:

- Development and use of data management practices that follow findable, accessible, interoperable, re-usable (FAIR) principles, and to the validation of data quality measures;
- Coordination of existing data repositories and databases, including those from SETIS and from the IEA;

¹²⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Access to tools to manage energy data with FAIR principles; promotion of open source access of such tools;
- Access to analytics to exploit energy data; promotion of open source access of such tools;
- Capacity building of data experts for the domain of low-carbon energy research;
- New research topics based on the analysis of large data sets in the energy domain;
- Trans-disciplinary research combining data from different domains and at different scales;
- Development of partnerships with industry to promote the opening of large datasets of interest to foster research into future technologies and services.

A broad coverage of the issues mentioned above is encouraged.

Recommendations that will be produced by the ongoing study on "*Opportunities and barriers for opening of research databases in low-carbon energy research*" should be taken into account¹²⁸.

Proposals should also follow developments of the European Open Science Cloud initiative, and plan to cooperate with and complement this activity.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Increasing/extending/widening the use of low-carbon energy research databases, particularly those from publicly financed R&I projects.
- Development of a critical mass of open research databases in Europe, and of researchers equipped with the know-how for the deployment, maintenance and exploitation of these.
- Easy and open access to these databases and to tools for their elaboration and exploitation, leading to increased efficiency of research investments.
- Strengthening of data-intensive research on low-carbon energy in Europe;
- Strengthening the development of industrial applications of data-intensive processes.

Type of Action: Coordination and support action

¹²⁸ To be published in the first half of 2018 on <https://bookshop.europa.eu/en/home/>

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-4-2018: Support to sectorial fora¹²⁹

Specific Challenge: The transition to a low-carbon energy system poses a unique set of policy, technological and scientific challenges, changes the fundamental nature of the interrelations between all actors in our societies (from energy incumbents to regulators and citizens), and requires the engagement of all stakeholders. Not only is there a need to find novel approaches to the development and application of technological or social processes as they relate to the energy transition, but also to a better understanding of how these changes impact people's behaviour, pervasive values, cultures of practice and modes of communication. It also entails the need to engage all stakeholders, foster cooperation between them, align their actions to the achievement of commonly agreed goals.

Scope: Proposals will have to support sector-specific stakeholder fora along the following lines:

1. Support the coordination of stakeholders' activities in the context of the *SET-Plan European Technology Innovation Platforms* (especially towards the progress of the strategic R&I Implementation Plans identified in the different technological areas in the context of the SET-Plan Key Actions), in particular in the area of
 - a. PV;
 - b. Ocean energy;
 - c. Wind energy;
 - d. Renewable Fuels and Bioenergy;
 - e. Renewable Heating and Cooling (RHC); and
 - f. Zero emission fossil fuel power plants and energy intensive industry.
2. All relevant stakeholders of the *hydropower sector* will be brought together in a forum including workshops and online discussion groups in order to identify research and innovation needs and priorities, to share knowledge at the European level between basic science, the research and industrial value chain, civil society and European and national authorities, to support the discussion with up-to-date information. The forum will produce a synthesis of expected research developments and research needs for the coming decades in a technology roadmap and research and innovation agenda in the hydropower sector, targeting an energy system with high flexibility and renewable share.

¹²⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

3. Building on the platform for *energy-related SSH research* that was set up during the pilot phase, the dialogue among different SSH stakeholders - as well as with other energy-research communities, fostering interdisciplinarity as well as knowledge and information sharing – should be continued and enhanced. This includes promoting the generation of novel, evidence-based research designed to inform and influence relevant policy processes, particularly in the context of the Energy Union and the transition to a low-carbon energy system. The platform will be sought after by European policymakers as a source of specific expertise and advice on how best to integrate SSH aspects in energy-related policymaking.
4. Taking into account that private investment is the most important contributor to the Energy Union's Research and Innovation priorities, this action will support the coordination of the industrial participation in the SET Plan. It will in particular focus on the execution of the implementation plans of the SET Plan nine non-nuclear priority actions to reach the strategic targets agreed by the SET Plan Steering Group to enhance European competitiveness in clean energy innovation. In order to reach this goal, the action will promote collaboration and the development of cross thematic synergies among actors who are interested in bringing new clean energy innovations to the market, in particular from the European industry-driven associations and initiatives such as the European Technology and Innovation platforms (ETIPs), European Joint Technology Initiatives or other relevant public-private partnerships, and importantly the industrial actors identified in the 13 non-nuclear SET plan implementation plans. A key task of this action will be to help further define adequate financial strategies to mobilise investments from different sources to fulfil the implementation plans. In line with the SET Plan principles, financial resources will come mainly from industry and national public funds. The use of complementary European funds will be promoted whenever relevant (e.g. from ESIF and the risk sharing facility InnovFin EDP recently significantly enlarged in terms of funding and scope to channel undisbursed funds from NER300 and to prepare the future Innovation Fund). The focus of the action will be European, establishing links with the corresponding sectorial fora in Europe and with other international initiatives in the clean energy domain, such as Mission Innovation.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Coordinated stakeholders' activities in the different sectors, providing specific and extensive advice to EU policymakers on energy-related research policy-making, continuing to foster social innovation and social dialogue in the energy field at European level, contributing towards the progress of the strategic research and innovation Implementation Plans identified in the context of the SET-Plan.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-5-2018: Research, innovation and educational capacities for energy transition

Specific Challenge: The energy sector is evolving rapidly creating new job opportunities while requiring new skills and expertise to be developed. The challenges are significant. Over the coming years, the growing low-carbon energy sector requires many employees to be educated, trained or re-skilled. At the same time, energy innovation creates a massive need for new talents, able to cope and conduct the energy transition with a systemic approach. Therefore curricula and programmes, including the modules organised in operating environment, need to be upgraded or new ones developed.

Due to their interdisciplinary work in research, innovation, education and training, universities are core stakeholders in Europe's energy transition towards a low carbon society. They also are important change agents that will be instrumental in responding to the above mentioned challenges.

In order that European universities contribute fully to the objectives of the Energy Union and to the SET Plan¹³⁰ they need to cooperate further with innovative businesses and offer appropriate curricula/programmes¹³¹. To do so silos need to be broken between energy technologies and interdisciplinarity that is conducive to addressing the challenges of the whole energy system needs to be fostered. The appropriate skills for tackling the energy transition, going beyond separate technologies and incorporating social, entrepreneurial/managerial and market aspects of the energy system, need to be developed.

In addition, solutions need to be clearly targeted, oriented to meet skills needs quickly, easily replicable in other domains and scalable to other European universities/institutions. For this purpose it is crucial to have active networks in place among universities and between universities and business.

Scope: Proposals will cover one or more of the following fields:

- Renewable energy,
- Energy storage,
- Smart and flexible energy systems,
- Carbon capture, utilisation and storage (CCUS).

Proposals will combine the relevant scientific and technological elements of these fields with relevant social sciences and humanities in a way that is balanced and provides an

¹³⁰ <https://ec.europa.eu/energy/en/topics/technology-and-innovation/strategic-energy-technology-plan>

¹³¹ The SET Plan Education and Training Roadmap can serve as a general reference document
<https://setis.ec.europa.eu/setis-output/education-training-roadmap>

interdisciplinary approach (e.g. involving SSH scientists as partners; including SSH scientific subjects as parts of interdisciplinarity, developing special SSH curricula or similar).

Proposals will deliver all the following, addressing the specific needs of the SET Plan objectives and its Implementation Plans:

- Efficient and effective cooperation networks both among European universities and between European universities and business;
- Challenge and case-based modules that are linked to European university programmes (at least three per programme) to teach students about operational problems combining the social, technological and industrial dimensions;
- At least three innovative (such as using digitisation) and short (3-4 months) university tools/programmes in the chosen field or fields, which are replicable and scalable in Europe, and respond rapidly to urgent European industry needs and the rapidly evolving European energy landscape;
- Opportunities for student mobility between the academia and industry.

The networks will also address needs for training the trainers. However, except for piloting, the actual teaching or training the trainer activities remain outside the scope of this topic. Modules and programmes will only be developed in English.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The funded proposals are expected to lead to a generation of researchers and engineers who are equipped to develop, improve and deploy new energy technologies, thereby contributing to meeting the challenges of the energy transition.

At the same time, the capacities of the European universities in energy research, innovation and education will be enhanced, as will their ability to engage with industry, cities, regions and other key societal actors. This will increase European universities' abilities to facilitate the swift deployment of technological and non-technological innovations in the energy sector.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-6-2018: Transition in coal intensive regions

Specific Challenge: The implementation of the EU Energy Union transition towards a low-carbon economy poses significant technological, economic and social challenges, in particular for coal-intensive regions that have to prepare for the reduction or phasing-out of coal

production, both due to market-driven trends and environmental policies. These regions need an effective roadmap to make the necessary transition to a more diversified economic base and a more sustainable energy system, while safeguarding the social cohesion for communities and regions dependent on coal production.

Smart Specialisation strategies, which are also a precondition for benefiting from European Structural and Investment Funds, are expected to help organise the structural changes. The involvement of the private sector, researchers and local governments in the process of 'entrepreneurial discovery' is a key challenge in itself. Developing joint strategies, built on complementarities and respective strengths, can be valuable for better realising the individual and combined potential of coal-intensive regions.

Scope: The objective is to support European coal-intensive regions to design research and innovation strategies to facilitate their transition towards a sustainable energy system. The proposed action will assist policy makers to develop, implement and review their strategies by providing information, developing methodologies, expertise and advice. Main deliverables are a set of blueprints and tools for Member States, Associated Countries and regions. Special consideration will be given to the Implementation Plans jointly developed by European countries, as part of the EU's Strategic Energy Technology Plan (SET Plan).

Specific issues to be addressed include:

- Assist regional actors in developing Research and Innovation strategies for smart specialisation, including the development of public R&I capacities, consistent with the SET Plan;
- Investigate relevant social challenges including the re-skilling needs of the workforce;
- Identification and exchange of best practices, including industrial roadmaps from coal towards new technologies and transformation strategies for coal based combined heat and power production to low carbon electricity and district heating generation;
- Guidance to regional actors for the access to available European funds and programmes, such as; (a combination of) the European Fund for Strategic Investments (EFSI), Cohesion Policy funds and Horizon 2020, and leveraging additional national public and private co-financing.

The project should develop synergies and complementarities to the European Commission's Smart Specialisation Platform on Energy (S3PEnergy)¹³².

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

¹³² <http://s3platform.jrc.ec.europa.eu/s3p-energy>

Expected Impact: The proposed action should lead to new and deepened cooperation in R&I between coal intensive regions that will facilitate their transition to a more sustainable energy system. This cooperation should in the short to medium term contribute to reach the targets set in the SET Plan and stimulate investment in the low-carbon energy sector, with the long term aim to boost innovation-driven growth and industrial competitiveness, create opportunities for employment, meet the COP21 targets and safeguard environmental protection.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - BUILDING A LOW-CARBON, CLIMATE RESILIENT FUTURE: SECURE, CLEAN AND EFFICIENT ENERGY

Opening date(s), deadline(s), indicative budget(s):¹³³

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
LC-SC3-RES-11-2018 (RIA)	30.00			31 Jan 2018 (First Stage)
LC-SC3-RES-4-2018 (RIA)	27.50			23 Aug 2018 (Second Stage)
LC-SC3-JA-4-2018 (CSA)	1.00			31 Jan 2018
LC-SC3-RES-12-2018 (IA)	30.00			13 Feb 2018
LC-SC3-RES-13-2018 (IA)	45.00			
LC-SC3-RES-21-2018 (RIA)	25.00			
LC-SC3-RES-28-2018-2019-2020 (CSA)	15.00			

¹³³ The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.

The Director-General responsible may delay the deadline(s) by up to two months.

All deadlines are at 17.00.00 Brussels local time.

The deadline(s) in 2020 are indicative and subject to separate financing decisions for 2020.

The budget amounts for the 2019 budget are subject to the availability of the appropriations provided for in the draft budget for 2019 after the adoption of the budget 2019 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2020 budget are indicative and will be subject to separate financing decisions to cover the amounts to be allocated for 2020.

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Secure, clean and efficient energy

LC-SC3-RES-5-2018 (IA)	10.00	
LC-SC3-RES-6-2018 (IA)	30.00	
Opening: 05 Dec 2017		
LC-SC3-ES-3-2018-2020 (IA)	26.30	05 Apr 2018
LC-SC3-ES-4-2018-2020 (IA)	19.00	
LC-SC3-ES-5-2018-2020 (IA)	30.00	
LC-SC3-ES-7-2018 (CSA)	3.00	
LC-SC3-RES-22-2018 (IA)	20.00	
LC-SC3-SCC-1-2018-2019-2020 (IA)	43.00 ¹³⁴	
LC-SC3-CC-4-2018 (CSA)	8.50	19 Apr 2018
LC-SC3-RES-2-2018 (RIA)	12.00	
Opening: 25 Jan 2018		
LC-SC3-EC-1-2018-2019-2020 (CSA)	5.00	04 Sep 2018
LC-SC3-EC-2-2018-2019-2020 (CSA)	5.00	
LC-SC3-EE-1-2018-2019-2020 (IA)	9.00	
LC-SC3-EE-10-2018-2019-2020 (CSA)	6.00	
LC-SC3-EE-11-2018-2019-2020 (CSA)	7.00	
LC-SC3-EE-13-2018-2019-2020 (CSA)	4.00	
LC-SC3-EE-14-2018-2019-2020 (RIA)	4.00	
LC-SC3-EE-15-2018 (CSA)	5.00	
LC-SC3-EE-16-2018-2019-2020 (CSA)	8.00	

¹³⁴ of which EUR 3.00 million from the 'Smart, green and integrated transport' WP part.

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LC-SC3-EE-2-2018-2019 (CSA) 7.00

LC-SC3-EE-5-2018-2019-2020 (CSA) 5.00

LC-SC3-EE-6-2018-2019-2020 (IA) 9.00

LC-SC3-EE-8-2018-2019 (CSA) 10.00

LC-SC3-EE-9-2018-2019 (CSA) 6.00

Opening: 15 May 2018

CE-SC3-NZE-2-2018 (RIA) 12.00 06 Sep 2018

LC-SC3-CC-1-2018-2019-2020 (RIA) 10.00

LC-SC3-CC-2-2018 (RIA) 5.00

LC-SC3-CC-5-2018 (CSA) 4.00

LC-SC3-CC-6-2018 (CSA) 2.00

LC-SC3-NZE-1-2018 (RIA) 20.00

LC-SC3-NZE-3-2018 (CSA) 3.00

LC-SC3-JA-1-2018 (ERA-NET-Cofund) 10.00 11 Sep 2018

LC-SC3-JA-2-2018-2019 (CSA) 6.00

Opening: 01 Aug 2018

LC-SC3-RES-1-2019-2020 (RIA) 20.00 16 Oct 2018 (First Stage)

LC-SC3-RES-14-2019 (RIA) 20.00 25 Apr 2019 (Second Stage)

LC-SC3-EE-17-2019 (CSA) 16.00 05 Feb 2019

Opening: 05 Sep 2018

LC-SC3-RES-15-2019 (IA) 25.00 11 Dec 2018

LC-SC3-RES-17-2019 (IA) 40.00

LC-SC3-RES-24-2019 (IA) 20.00

LC-SC3-RES-28-2018-2019-2020 (CSA) 15.00

Horizon 2020 - Work Programme 2018-2020
Secure, clean and efficient energy

LC-SC3-RES-30-2019 (IA)	10.00	
LC-SC3-RES-8-2019 (IA)	15.00	
LC-SC3-ES-1-2019 (IA)	37.30	05 Feb 2019
LC-SC3-ES-2-2019 (IA)	25.00	
LC-SC3-ES-6-2019 (RIA)	28.35	
LC-SC3-ES-8-2019 (CSA)	10.00	
LC-SC3-SCC-1-2018-2019-2020 (IA)	83.00 135	

Opening: 14 Nov 2018

LC-SC3-CC-3-2019 (CSA)	2.00	27 Aug 2019
LC-SC3-ES-9-2019 (ERA-NET-Cofund)	10.00	
LC-SC3-JA-2-2018-2019 (CSA)	1.00	
LC-SC3-JA-3-2019 (PCP)	20.00	

Opening: 12 Mar 2019

LC-SC3-EC-1-2018-2019-2020 (CSA)	7.50	03 Sep 2019
LC-SC3-EC-2-2018-2019-2020 (CSA)	7.50	
LC-SC3-EE-1-2018-2019-2020 (IA)	12.00	
LC-SC3-EE-10-2018-2019-2020 (CSA)	6.00	
LC-SC3-EE-11-2018-2019-2020 (CSA)	6.00	
LC-SC3-EE-13-2018-2019-2020 (IA)	8.00	
LC-SC3-EE-14-2018-2019-2020 (RIA)	4.00	
LC-SC3-EE-16-2018-2019-2020	10.00	

¹³⁵ of which EUR 3.00 million from the 'Smart, green and integrated transport' WP part.

Horizon 2020 - Work Programme 2018-2020
Secure, clean and efficient energy

(CSA)

LC-SC3-EE-18-2019 (CSA)	1.00
LC-SC3-EE-2-2018-2019 (CSA)	10.00
LC-SC3-EE-3-2019-2020 (CSA)	6.00
LC-SC3-EE-4-2019-2020 (IA)	10.00
LC-SC3-EE-5-2018-2019-2020 (IA)	10.00
LC-SC3-EE-6-2018-2019-2020 (CSA)	5.00
LC-SC3-EE-8-2018-2019 (CSA)	5.00
LC-SC3-EE-9-2018-2019 (CSA)	4.00

Opening: 07 May 2019

LC-SC3-CC-1-2018-2019-2020 (RIA)	10.00	27 Aug 2019
LC-SC3-NZE-4-2019 (IA)	20.00	
LC-SC3-NZE-5-2019-2020 (IA)	33.00	
LC-SC3-RES-16-2019 (RIA)	15.00	
LC-SC3-RES-23-2019 (RIA)	20.00	
LC-SC3-RES-29-2019 (RIA)	6.00	
LC-SC3-RES-7-2019 (RIA)	10.00	

Opening: To be defined

Focus area topic(s) for 2020	To be defined
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Opening: To be defined

Focus area topic(s) for 2020	321.92	To be defined
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Opening: To be defined

Focus area topic(s) for 2020	320.89	To be defined
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Opening: To be defined

Focus area topic(s) for 2020	To be defined
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Overall indicative budget 537.30 623.65 642.81

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in General Annexes B and C of the work programme. The following exceptions apply:

LC-SC3-EC-1-2018-2019-2020, LC-SC3-EC-2-2018-2019-2020, LC-SC3-EE-10-2018-2019-2020, LC-SC3-EE-13-2018-2019-2020, LC-SC3-EE-15-2018, LC-SC3-EE-16-2018-2019-2020, LC-SC3-EE-3-2019-2020, LC-SC3-EE-5-2018-2019-2020, LC-SC3-EE-6-2018-2019-2020, LC-SC3-EE-8-2018-2019, LC-SC3-EE-9-2018-2019	<p>Taking into account the nature of the activity and with the objective to maximize the European Added Value and European market uptake through transnational collaboration¹³⁶, the following additional eligibility criteria apply for Coordination and Support Actions (CSA):</p> <ol style="list-style-type: none">1. at least three legal entities shall participate in an action;2. each of the three legal entities shall be established in a different Member State or Associated Country <p>all three legal entities shall be independent of each other within the meaning of Article 8 of the Rules for Participation.</p>
LC-SC3-SCC-1-2018-2019-2020	<p>Consortia shall be composed of 2 lighthouse cities and at least 5 follower cities.</p>

¹³⁶ Transition towards Secure, Clean and Efficient Energy and the Energy Union project are cross-national policy initiatives and priorities aiming at trans-national solutions.

By the call deadline, all lighthouse cities must have a validated¹³⁷: i) Sustainable Energy Action Plans (SEAP)¹³⁸ or ii) Sustainable Energy (and Climate) Action Plans (SECAP)¹³⁹ or iii) a similar, at least equally ambitious, plan.

A city can be funded as a lighthouse city only once under Horizon 2020.

LC-SC3-ES-5-2018-2020

Consortia shall involve:

- at least 2 energy suppliers and at least 2 ESCOs or independent aggregators,
- Transmission System Operators (TSO) from at least 3 different Member States (this doesn't exclude participation of additional TSOs from non-Member States),
- 5 Distribution System Operators (DSO) from several Member States, with at least 2 of those DSOs operating in the area covered by the transmission system of any of the participating TSOs.

LC-SC3-ES-4-2018-2020

Proposals must include:

- at least one demonstration on one island;
- at least 2 other follower islands with similar issues; these follower islands will develop plans to adapt similar solutions to their island in a cost-efficient way.

LC-SC3-ES-3-2018-2020

In case of international cooperation with India, participants in the EU actions must explain in their proposal what are the mutual benefits and added value of the cooperation and conclude a Coordination Agreement with the participants from India with sizeable efforts on both parts. A final draft of this agreement has to be provided with the proposal.

LC-SC3-ES-1-2019

In case of sub-topic 2) International cooperation with Canada, participants in the Horizon 2020 proposal will have to conclude, if successful, a Coordination Agreement with the project supported by Canadian funding authorities. A final draft of this agreement must be provided with the proposal. A guidance document on how to draw up such coordination agreement is

¹³⁷ Validated by DG JRC. See also FAQ for more detail.

¹³⁸ http://www.covenantofmayors.eu/actions/sustainable-energy-action-plans_en.html

¹³⁹ <http://www.covenantofmayors.eu/0-4.html>

provided with the topic documentation.

- LC-SC3-ES-6-2019,
LC-SC3-RES-29-2019,
LC-SC3-RES-30-2019
- Due to the specific challenges associated with this topic (in case of topic LC-SC3-ES-6-2019 this refers only to sub-topic 4) and the international focus of the Mission Innovation initiative, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least one participant from a non-EU/Associated country member of Mission Innovation (i.e. Australia, Brazil, Canada, Chile, People's Republic of China, India, Indonesia, Japan, Mexico, Republic of Korea, Saudi Arabia, United Arab Emirates, United States). Standard rules on eligibility for EU funding apply.
- LC-SC3-EE-18-2019
- Due to the specific challenges associated with this topic, proposals must involve at least one legal entity established in a Member State or Associated Country and one legal entity established in one of the following African countries: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic People's Republic), Congo (Republic), Côte d'Ivoire, Djibouti, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Exceptional page limits to proposals/applications:

- LC-SC3-SCC-1-2018-2019-2020
- The page limit for a full proposal is 150 pages

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the work programme. The following exceptions apply:

- LC-SC3-EE-1-2018-2019-2020, LC-SC3-EE-6-2018-2019-2020
- In line with the other topics for Innovation Actions contributing to the PPP on Energy-efficient Buildings and SPIRE, the threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the work programme. The following exceptions apply:

- LC-SC3-RES-12-2018, LC-SC3-RES-13-2018, LC-SC3-RES-16-2019, LC-SC3-RES-17-2019 In order to ensure that a balanced portfolio of activities covering different renewable energy technology areas will be supported, the available budget will be firstly allocated to the proposal with the highest score, passing all thresholds, in each of the sub-topics. In a second round, proposals will be selected for funding regardless of the sub-topic and only according to the single ranking list of this topic.
- LC-SC3-ES-6-2019 In order to ensure the coverage of all sub-topics, proposals above all thresholds will be ranked in each of the 4 areas and the first ranked proposals in each sub-topic will be selected until the available budget is exhausted (first, all proposals ranked nb 1, then nb 2, etc.), with the exception of sub-topic 4 for which only the highest-ranked eligible proposal will be selected; in case of insufficient budget to select all projects of the same rank to cover the 3 sub-topics, the best scores will prevail; in case of equal scores, standard rules do apply.
- LC-SC3-ES-3-2018-2020 The proposal involving International Cooperation with India with the highest score, passing all thresholds, will be selected first. In a second round, proposals will be selected for funding according to the single ranking list, regardless of whether they include partners from India or not.
- LC-SC3-ES-1-2019 At least one proposal per sub-topic will be funded, provided it passed all thresholds.

The full evaluation procedure is described in the relevant [guide](#) published on the Participant Portal.

Grant Conditions:

- LC-SC3-ES-5-2018-2020 For grants awarded under this topic beneficiaries may provide support to third parties as described in [part K of the General Annexes of the Work Programme](#). The support to third parties can only be provided in the form of grants. The respective options of Article 15.1 and Article 15.3 of the [Model Grant Agreement](#) will be applied. Each consortium will define the selection process of the third parties for which financial support will be granted (with a maximum of EUR 60.000 per party¹⁴⁰). Up to 2,5% of the EU funding requested by the proposal may be

¹⁴⁰ In line with Article 23 (7) of the Rules for Participation the amounts referred to in Article 137 of the Financial Regulation may be exceeded, and if this is the case proposals should explain why this is necessary to achieve the objectives of the action.

allocated to the purpose of financial support to third parties.

- LC-SC3-EE-17-2019,
LC-SC3-ES-8-2019
- For grants awarded under this topic beneficiaries should provide support to third parties as described in [part K of the General Annexes of the Work Programme](#). The support to third parties can only be provided in the form of lump sum grants. The respective options of Article 15.1 and Article 15.3 of the [Model Grant Agreement](#) will be applied.
- LC-SC3-JA-3-2019
- In line with the nature of the instrument and the need to leverage national funding, the funding rate for grants awarded under this topic and type of action is 50% of the eligible costs.
- LC-SC3-ES-1-2019
- For sub-topic 2), the respective options of Article 2, Article 41.5 and Article 50.3.1 (i) (j) of the [Model Grant Agreement](#) will be applied.

Consortium agreement:

- CE-SC3-NZE-2-2018,
LC-SC3-CC-1-2018-
2019-2020, LC-SC3-
CC-2-2018, LC-SC3-
CC-3-2019, LC-SC3-
CC-4-2018, LC-SC3-
CC-5-2018, LC-SC3-
CC-6-2018, LC-SC3-
EC-1-2018-2019-2020,
LC-SC3-EC-2-2018-
2019-2020, LC-SC3-
EE-1-2018-2019-2020,
LC-SC3-EE-10-2018-
2019-2020, LC-SC3-
EE-11-2018-2019-
2020, LC-SC3-EE-13-
2018-2019-2020, LC-
SC3-EE-14-2018-
2019-2020, LC-SC3-
EE-15-2018, LC-SC3-
EE-16-2018-2019-
2020, LC-SC3-EE-17-
2019, LC-SC3-EE-18-
2019, LC-SC3-EE-2-
2018-2019, LC-SC3-
- Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

EE-3-2019-2020, LC-
SC3-EE-4-2019-2020,
LC-SC3-EE-5-2018-
2019-2020, LC-SC3-
EE-6-2018-2019-2020,
LC-SC3-EE-8-2018-
2019, LC-SC3-EE-9-
2018-2019, LC-SC3-
ES-1-2019, LC-SC3-
ES-2-2019, LC-SC3-
ES-3-2018-2020, LC-
SC3-ES-4-2018-2020,
LC-SC3-ES-5-2018-
2020, LC-SC3-ES-6-
2019, LC-SC3-ES-7-
2018, LC-SC3-ES-8-
2019, LC-SC3-ES-9-
2019, LC-SC3-JA-1-
2018, LC-SC3-JA-2-
2018-2019, LC-SC3-
JA-3-2019, LC-SC3-
JA-4-2018, LC-SC3-
NZE-1-2018, LC-SC3-
NZE-3-2018, LC-SC3-
NZE-4-2019, LC-SC3-
NZE-5-2019-2020,
LC-SC3-RES-1-2019-
2020, LC-SC3-RES-
11-2018, LC-SC3-
RES-12-2018, LC-
SC3-RES-13-2018,
LC-SC3-RES-14-2019,
LC-SC3-RES-15-2019,
LC-SC3-RES-16-2019,
LC-SC3-RES-17-2019,
LC-SC3-RES-2-2018,
LC-SC3-RES-21-2018,
LC-SC3-RES-22-2018,
LC-SC3-RES-23-2019,
LC-SC3-RES-24-2019,
LC-SC3-RES-28-
2018-2019-2020, LC-
SC3-RES-29-2019,

LC-SC3-RES-30-2019,
LC-SC3-RES-4-2018,
LC-SC3-RES-5-2018,
LC-SC3-RES-6-2018,
LC-SC3-RES-7-2019,
LC-SC3-RES-8-2019,
LC-SC3-SCC-1-2018-
2019-2020

NEXT-GENERATION BATTERIES

The Energy Challenge contributes to the call "Building a low-carbon, climate resilient future: Next-generation Batteries" (call identifier H2020-LC-BAT-2019-2020), in particular as regards the topics:

- LC-BAT-2-2019: Strengthening EU materials technologies for non-automotive battery storage
- LC-BAT-3-2019: Modelling and simulation for Redox Flow Battery development
- LC-BAT-4-2019: Advanced Redox Flow Batteries for stationary energy storage

For 2020, the following topics are indicated:

- LC-BAT-8-2020: Next-generation batteries for stationary energy storage
- LC-BAT-9-2020: Hybridisation of battery systems for stationary energy storage

TRANSFORMING THE ENERGY SECTOR THROUGH DIGITISATION

At a time when the energy landscape is undergoing a fundamental change towards decentralisation and decarbonisation, the introduction of new and smarter technologies will make an important contribution. They will help integrate renewable energies from variable and distributed resources in the energy systems and increase efficiency through better monitoring and optimisation of assets.

These technologies can moreover provide an opportunity for the uptake of new energy services and business models enabling consumers in the active participation in the energy system and energy markets.

The Energy Challenge contributes to the Focus Area "Digitising and transforming European industry and services" with the following specific topic which is implemented under the work programme annex of the Information and Communication Technologies part (the contribution of the Energy Challenge is matched by a contribution from the ICT part of the H2020 programme):

- DT-ICT-10-2018: Interoperable and smart homes and grids;
- DT-ICT-11-2019: Big data solutions for energy.

In addition, the Energy Challenge contributes to the Focus Area "Boosting the effectiveness of the Security Union" by contributing to a topic under the work programme Annex 'Secure societies - Protecting freedom and security of Europe and its citizens':

- SU-DS-04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks.

SME instrument & Fast-Track-to-Innovation

The respective calls for the EIC-SME instrument (H2020-EIC-SMEInst-2018-2020) and EIC-Fast-Track-to-Innovation (H2020-EIC-FTI-2018-2020) are found under the Horizon 2020 Work Programme Part – *Towards the next EU Framework Programme for Research and Innovation: European Innovation Council (EIC) Pilot* (part 17 of this work programme).

Other actions¹⁴¹

Horizon Prizes

1. Horizon prizes launched under the Work Programme 2016-2017 of the Horizon 2020 Societal Challenge "Clean Secure and efficient energy" (SC3)

On 4 July 2016 the following Horizon prizes were launched under the Work Programme 2016-2017 of the Horizon 2020 Societal Challenge "Clean Secure and efficient energy" (SC3)¹⁴².

Prize	Budget Prize amount	–	Timeline of the contest	Expected award ceremony
Horizon prize for CO2 reuse	EUR million	1.5	5 July 2016 - 03 April 2019	Q4 2019
Horizon Prize for a Combined heat and power installation in a hospital using 100% renewable energy sources	EUR million	1	5 July 2016 - 03 April 2019	Q4 2019
Horizon prize for Integrated Photovoltaic System in European Protected Historic Urban districts	EUR Million	0.75	5 July 2016 - 26 September 2018	Q2 2019

The prizes are expected to be awarded in 2019 and provision for the prize amounts must be made accordingly.

Type of Action: Prize

Indicative budget: EUR 3.25 million from the 2019 budget

2. RESponsible Island - Prize for a renewable geographic energy island ¹⁴³

The prize intends to highlight the potential of renewables for decentralized energy grids by addressing energy needs for electricity, heating, cooling and transport. The title is inspired by RES (short for Renewables) and "responsible" to highlight the citizen in the centre of the

¹⁴¹ The budget amounts for the 2019 budget are subject to the availability of the appropriations provided for in the draft budget for 2019 after the adoption of the budget 2019 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2020 budget are indicative and will be subject to separate financing decisions to cover the amounts to be allocated for 2020.

¹⁴² As amended, C(2016)4614, announcing the prizes.

¹⁴³ This activity directly aimed at supporting pilot activities is excluded from the delegation to INEA and will be implemented by the Commission services.

energy system. Within this context, the prize recognizes realised achievements in renewables on geographic energy islands.

Geographic energy islands are ideal test labs for the deployment of innovative energy technologies. The prize will reward integrated local RES production in a decentralized electricity grid and the achievements in decarbonizing heating, cooling and transport. In this context, renewable energy consumed on the island is also linked to the renewable energy produced on the island, supporting its local value chains and self-engaging the local society as a RESponsible prosumer.

The prize is in line with the objectives of the Political Declaration on Clean Energy on EU Islands and the Smart Islands Initiative and will contribute to Mission Innovation Challenge 2 (“Off Grid Access to Electricity Innovation Challenge”)¹⁴⁴.

The specific rules of the contest will be published by the European Commission at the beginning of each yearly competition. The European Commission will directly launch and manage the annual contest and annual award the prize based on the judgement of independent experts¹⁴⁵.

The indicative budget for the prize is EUR 1.7 million from the 2020 budget, intended as award for two yearly competitions: EUR 0.5 million for the 1st place, EUR 0.25 million for the 2nd place, EUR 0.1 million for the 3rd place.

Essential award criteria: After closure of the contest, the prize will be awarded to the three best-ranked contestants, who in the opinion of the jury, best address the following cumulative criteria for the respective whole geographic energy island¹⁴⁶:

- The share of renewable energy produced by innovative energy technologies on the island respective to the energy consumed on the island for electricity, heating and/or cooling and transport;
- Environmental and socioeconomic sustainability and impact of the renewable energy solution;
- Citizen and community involvement;
- Replicability of the solution.

Eligibility criteria: The island shall be located within the territory of an EU Member State (including Overseas Countries and Territories linked to them) or an H2020 associated country and the prize is open to any legal entity or group of legal entities representing the respective island. Representation has to be proven through written representation agreement signed by the respective authorities responsible for the whole island. Participating islands must have

¹⁴⁴ <http://mission-innovation.net/our-work/innovation-challenges/off-grid-access-challenge/>

¹⁴⁵ A pre-selection phase may be done by Commission services in case of numerous applications received.

¹⁴⁶ Further clarification of these criteria might be published in the Rules of Contest

permanent residents and an energy demand in electricity, heating and/or cooling as well as transport of at least 100 MWh/year overall.

Contestants that have already received an EU or Euratom prize cannot receive a second prize for the same activities.

For the common Rules of Contest for Prizes please see General Annex F of the work programme.

Expected results: The prize will highlight realised achievements/best practices in reaching the potential of renewable energy for covering electricity, heating, cooling and transport needs in off-grid societies, and in the introduction of innovative technologies to the market. It will be a recognition of a responsible local society committed to expanding the share of renewables. It will also provide excellent visibility for citizens participating in the promotion of innovative renewable energy technologies.

The recognised solutions are expected to have high replicability also to other isolated energy systems with islands characteristics worldwide in the context of Mission Innovation Challenge 2¹⁴⁷ by show-casing working business models.

Indicative timetable of contest(s):

Stages	Date and time or indicative period
Opening of the contest	1st round: 1st quarter of 2019; 2nd round: 1st quarter of 2020
Deadline for submission of application	first round: 3rd quarter of 2019; 2nd round: 3rd quarter of 2020
Award of the prize	1st round: 1st quarter of 2020; 2nd round: 1st quarter of 2021

Type of Action: Recognition prize

Indicative budget: EUR 1.70 million from the 2020 budget

¹⁴⁷ <http://mission-innovation.net/our-work/innovation-challenges/off-grid-access-challenge/>

Grants to identified beneficiaries

1. Fostering transnational cooperation between National Contact Points (NCP) in the area of Energy: follow-up project¹⁴⁸

The action will facilitate transnational cooperation between Horizon 2020 NCPs in the area of Energy 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 the energy sector. It will involve one consortium of NCPs focussing on transnational cooperation on issues specific to the energy sector, within the context of Horizon 2020 calls for proposals.

All activities must be tailored according to the nature of this sector.

The proposal should show that the activities put forward will deliver tangible benefits to potential applicants. Activities should capitalise on relevant work of the previous NCP network project in this sector (C-ENERGY 2020), and of the 'NCP Academy' (www.ncpacademy.eu). Various mechanisms may be included, such as benchmarking, joint workshops, enhanced cross-border brokerage events, and specific training linked to the energy sector.

Where relevant, activities should make use of commonly available tools (e.g. for brokerage and partner search, benchmarking tools, guidebooks, promotional tools etc).

To help close the innovation divide, a substantial component of the proposed activities must be devoted to activities aimed at helping NCPs in those countries that have been participating at low levels in the programme up to now. These activities should help these NCPs to rapidly acquire the know-how on NCP operations accumulated in other countries including, for example, training, mentoring, and twinning. They may also include awareness raising actions aimed at increasing visibility of well-qualified potential applicant organisations in the above mentioned countries.

The legal entities listed below are the host organisations of NCPs from EU Member States and Associated Countries who have been officially appointed by the relevant national authorities, and who have expressed a willingness to participate in this proposal. NCPs opting not to be a beneficiary are nevertheless invited and encouraged to participate in the project activities (e.g. workshops), and costs for such participation (e.g. travel costs paid by the consortium) may be included in the estimated budget and be eligible for funding by the Commission.

¹⁴⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

In line with Articles 2, 31.6 and 41.4 of the Model Grant agreement, the project arising from this grant will complement other NCP network projects. This means that the beneficiaries and those of the complementary grants must cooperate and provide access to their results. They must conclude a written collaboration agreement regarding the coordination of the complementary grants and the work of the action.

The project must end by August 2020.

Expected impact:

- An improved, more consistent and professionalised NCP service across Europe, thereby helping to simplify access to Horizon 2020 calls, and lowering the entry barriers for newcomers;
- An increase in the quality of proposals submitted, including those from countries where success rates are currently lower than average.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Austrian Research Promotion Agency, Sensengasse 1, A-1090 Vienna, Austria

The Brussels Enterprise Agency - impulse.brussels, Chaussée de Charleroi 110, 1060 Brussels, Belgium

GIS - Transfer Center Foundation; Technology Transfer Center on Renewable Energy Sources and Energy Efficiency, Acad. G. Bonchev Str., block 4, 1113 Sofia, Bulgaria

Agency for Mobility and EU Programmes, Frankopanska 26, 10000 Zagreb, Croatia

Research Promotion Foundation, PO BOX 23422, 1683 Nicosia, Cyprus

Estonian Research Council, Soola 8, 51013 Tartu, Estonia

Project Management Juelich (PtJ), Wilhelm-Johnen-Straße, 52425 Jülich, Germany

National Documentation Centre, 48 Vas. Constantinou Ave, 116 35 Athens, Greece

Icelandic Centre for Research - RANNIS, Borgartun 30, 105 Reykjavik, Iceland

ISERD, 4 Hayarden St., 7019900 Airport City (Lod), Isreal

APRE, Via Cavour 71, 00184 Rome, Italy

State Education Development Agency, Ministry of Education and Science of the Republic of Latvia, Valnu iela 1, LV 1050 Riga, Latvia

IPPT PAN, Pawinskiego 5B, 02-106 Warsaw, Poland

FCT, Av. D Carlos I 126, 1249-074 Lisboa, Portugal

Centro para el Desarrollo Tecnológico Industrial - CDTI, C/ Cid, 4, 28001 Madrid, Spain

TUBITAK, TÜBİTAK Başkanlık Tunus Caddesi No:80 Kavaklıdere, 6100 Ankara, Turkey

Ivano-Frankivsk National Technical University of Oil and Gas, 15 Karpatska St., 76019 Ivano-Frankivsk, Ukraine

EU Energy Focus, c/o Microwire Ltd, 27 Porson Road, Cambridge, CB2 8ET, United Kingdom

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 0.50 million from the 2018 budget

2. 5th Concerted Action on the Energy Performance of Buildings Directive support to Member States and participating countries for the implementation of the EPBD¹⁴⁹

Concerted action with regard to implementation of EU legislation and policy: It covers topics where coordination and/or harmonisation of approaches would be beneficial, but is not required by EU legislation. A concerted action is therefore designed to provide added value compared with measures taken by each MS acting on its own and to achieve an optimum combination of the various instruments at the disposal of both the EU and the MS.

A concerted action meets the conditions laid down in Article 190(1)(f) of the rules implementing the Financial Regulation and the relevant procedures will be applied. Concerted actions will be undertaken by organisations designated by the MS and countries participating in the CA. The Commission Member States (MS) and participating countries (CA) concerns a limited number of specific activities in relation to implementation of EU legislation and policy. It aims at fostering exchanges of information and experience between MS and participating countries with has the role of coordinating this kind of action with the countries concerned.

Each concerted action will be allocated to a consortium of organisations designated and entrusted by the participating countries, under the coordination of one member of the consortium.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

¹⁴⁹ This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

Legal entities:

ENERGISTYRELSEN, Danish Energy Authority (DEA), Amaliegade 44, KOBENHAVN K 1256, Denmark

OSTERREICHISCHES INSTITUT FÜR BAUTECHNIK, Austrian Institute of Construction Engineering (OIB), Schenkenstrasse 4, WIEN 1010, Austria

CENTRE SCIENTIFIQUE ET TECHNIQUE DE LA CONSTRUCTION, The Belgian Building Research Institute (CSTC), Rue du Lombard 42, BRUXELLES 1000, Belgium

SUSTAINABLE ENERGY DEVELOPMENT AGENCY (SEDA), 37 Ekzarh Jossif Str., SOFIA 1000, Bulgaria

MINISTRY OF ENERGY, COMMERCE, INDUSTRY AND TOURISM (MCIT), 6, Andreas Araouzos str., Nicosia 1076, Cyprus

MINISTRY OF INDUSTRY AND TRADE (MPO), Na Frantisku, 32, PRAHA 1, 11015, Czech Republic

BUNDESAMT FÜR WIRTSCHAFT UND AUSFUHRKONTROLLE, Federal Office for Economic Affairs and Export Control (BAFA) Frankfurter Straße 29–35, 65760 Eschborn, Germany

MAJANDUS- JA KOMMUNIKATSIOONIMINISTEERIUM, Ministry of Economic Affairs and communications (MKM), Harju 11, Tallinn, 15072, Estonia

CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING (CRES), Marathonos 19TH KM, PIKERMÍ 19009, Greece

INSTITUTO PARA LA DIVERSIFICACION Y AHORRO DE LA ENERGIA, Institute for Diversification and Energy Saving (IDAE), Calle Madera 8, MADRID 28004, Spain

MOTIVA OY (MOTIVA), Urho Kekkosen katu 4-6 A, Helsinki 00101, Finland

MINISTERE DE L'ENVIRONNEMENT, DE L'ENERGIE ET DE LA MER, French Ministry of the Environment, Energy and the Sea (MEDDE), Grande Arche - Tour Pascal A et B, Paris-La Défense 92055, France

MINISTARSTVO GRADITELJSTVA I PROSTORNOGA UREDENJA, Ministry of construction and physical planning (MGIPU), Republike Austrije 20, ZAGREB 10000, Croatia

EGYETEM TER 1, UNIVERSITY OF DEBRECEN, DEBRECEN 4032, Hungary

THE SUSTAINABLE ENERGY AUTHORITY OF IRELAND (SEAI), Wilton Park House, Wilton Place, Dublin 2, D02T228, Ireland

AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE, Italian national Agency for new technologies, Energy and

Sustainable Economic Development (ENEA), Lungotevere Grande Ammiraglio Thaon di Revel 76, ROMA 00196, Italy

STATYBOS PRODUKCIJOS SERTIFIKAVIMO CENTRAS, Certification Center of Building Products (SPSC), Linkmenu Gatve 28, VILNIUS 08217, Lithuania

MINISTERE DE L'ECONOMIE (MinEco), 19-21 Boulevard Royal, LUXEMBOURG 2914, Luxembourg

EKONOMIKAS MINISTRIJA, Ministry of Economics (ME), Brivibas Iela 55, RIGA LV 1519, Latvia

BUILDING REGULATION OFFICE (BRO), Horn Works Ditch, Emvin Cremona Street, Floriana, FRN1280, Malta

MINISTERIE VAN ECONOMISCHE ZAKEN, Ministry of Economic Affairs (RVO), Bezuidenhoutseweg 73, The Hague 2595 AC, Netherlands

NORGES VASSDRAGS- OG ENERGIDIREKTORAT, The Norwegian Water Resources and Energy Directorate (NVE), Middelthunsgate gate 29, Oslo 0368, Norway

INSTYTUT TECHNIKI BUDOWLANEJ, Building Research Institute (ITB), Ul Filtrowa 1, WARSAW 00 611, Poland

AGENCIA PARA A ENERGIA, Energy Agency (ADENE), Av. 5 de Outubro, n° 208, 2° piso, 1050-065 Lisboa, Portugal

MINISTERUL DEZVOLTARII REGIONALE, ADMINISTRATIEI PUBLICE SI FONDURILOR EUROPENE, Ministry of Regional Development and Public Administration (MDRAPFE), Libertatii 16, Latura Nord, sector 5, BUCHAREST, 050706, Romania

BOVERKET, National Board of Housing, Building and Planning (BOVERKET), Drottninggatan 18, KARLSKRONA 37123, Sweden

TECHNICKY A SKUSOBNY USTAV STAVEBNY N.O., Building Testing and Research Institute (TSUS), Studena 3, BRATISLAVA 821 04, Slovakia

GRADBENI INSTITUT ZRMK DOO, Building and Civil Engineering Institute (GI ZRMK) Dimiceva Ulica 12, LJUBLJANA 1000, Slovenia

BUILDING RESEARCH ESTABLISHMENT LTD (BRE), Bucknalls Lane, WATFORD WD25 9XX, United Kingdom

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 5.00 million from the 2018 budget

3. Support for a Member States' concerted market surveillance action on EU product energy efficiency legislation¹⁵⁰

Compliance by industry and dealers with EU product efficiency legislation is key to ensure that the EU's energy efficiency targets are met. Non-compliance with these rules is estimated to reduce the resulting savings by at least 10%. Enforcement of this legislation is the sole competence of Member States.

This action aims to strengthen the enforcement of the Ecodesign Directive, the Energy Labelling Directive and the Regulation on Labelling of Tyres, by supporting the coordination, monitoring, verification and enforcement activities of national Market Surveillance Authorities, in particular for those products that represent the highest energy saving potential or those that represent new challenges (e.g. newly regulated products), thereby improving compliance and increasing energy savings. The project should not replace activities that are under the responsibility of Member States, but should add European value to them. The project is expected to cover both horizontal activities (i.e. actions that are not product specific) and vertical activities (i.e. actions targeting specific product groups). It may include exchange of information and best practices, development of common methods, protocols, checklists or IT tools (e.g. web crawlers), execution of joint surveillance activities, strengthening the collaboration with customs authorities, communication, establishment of centres of excellence for product testing, support the development of the Energy Labelling products registration database, input into standardisation, addressing challenging issues like defeat devices, software updates, plausibility testing, support for international alignment of standards and requirements, etc.

The project shall have a Management Team consisting of representatives of MSAs, which is responsible for supporting the Coordinator in decisions relating to the technical content of the programme, planning of plenary meetings (including agenda), communication and dissemination and reporting in agreement with nominated representatives from the Commission. Each operational work package shall be led by a MSA representative, or other relevant entity formally appointed by its national MSA to perform market surveillance activities.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Federal Ministry of Science, Research and Economy - Division I/9, Stubenring 1, 1011 Vienna, Austria

¹⁵⁰ This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

Federal Ministry for Europe, Integration and Foreign Affairs, Minoritenplatz 8, 1010 Vienna

Österreichische Energiagentur, Austrian Energy Agency, Mariahilfer Straße 136, 1150 Vienna, Austria

Federal Public Service Economy, S.M.E.s, Self-employed and Energy, Directorate-General Energy - Division Infrastructure et Contrôles (Energy labelling), Boulevard du Roi Albert II 16, 1000 Brussels

Federal Public Service Health, Food Chain Safety and Environment, Directorate-General Environment (Eco design and tyre labelling), Place Victor Horta 40 boîte 10, 1060 Brussels

Commission for Consumer Protection (energy labelling + tyre labelling), 4A, Slaveykov Sq., 1000 Sofia, Bulgaria

Stage Agency for Metrological and Technical Surveillance -Directorate-General Market Surveillance (eco-design), 52A, "G.M.Dimitrov" Boulevard, Sofia 1797, Bulgaria

Ministry of Economy, Entrepreneurship and Crafts - Directorate for Economic Inspection - Sector of Market Inspection, Ulica grada Vukovara 78, 10000 Zagreb, Croatia

Ministry of Energy, Commerce, Industry and Tourism - Energy Service, 6 Andreas Araouzos Street, 1421 Nicosia, Cyprus

State Energy Inspection, Gorazdova 24 120 00 Praha 2

Ministry of Transport, Nábřeží Ludvíka Svobody 12/1222 P.O. Box 9 110 15 Prague 1

Danish Energy Agency, Amaliegade 44, DK-1256 Copenhagen C

Danish Transport Authority, Edvard Thomsens Vej 14, DK-2300 Copenhagen S

Technical Regulatory Authority, Sõle 23 A, Tallinn 10614, Estonia

Environmental Inspectorate, Kopli 76 10416 Tallinn, Estonia

Finnish Safety and Chemicals Agency (Tukes), Kalevantie 2, FI-33100 Tampere, Finland

Finnish Transport Safety Agency (Trafi), P.O. Box 320, FI-00101 Helsinki

Ministère de l'Écologie, du Développement durable et de l'Énergie (MEDDE) - Direction générale de l'énergie et du climat - Bureau des économies d'énergie et de la chaleur renouvelable (ecodesign), Tour Séquoia 92055 Paris La Défense Cédex

Ministry of the Economy, Industry and the Digital Sector - Direction générale de la concurrence, de la consommation et de la répression des fraudes - Unit 5A – Teledoc 241 (energy labelling and tyre labelling), 59 boulevard Vincent Auriol F-75703 Paris Cédex 13

Direction Générale des douanes et droits indirects , 11 rue des deux Communes 93, F-558 Montreuil Cédex, France

Thüringer Ministerium für Umwelt, Energie und Naturschutz, Max-Reger-Str. 4 – 8, 99096 Erfurt

Ministerium für Energie, Infrastruktur und Digitalisierung, Schloßstraße 6-8, 19053 Schwerin

Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung, Kaiser-Friedrich Ring 75, 65185 Wiesbaden

Ministerium für Wirtschaft, Wissenschaft und Digitalisierung des Landes Sachsen-Anhalt, Hasselbachstr. 4, 39104 Magdeburg

Sächsisches Staatsministerium für Wirtschaft, Arbeit und Verkehr, Wilhelm-Buck-Str. 2, 01097 Dresden

Ministerium für Wirtschaft, Arbeit, Energie und Verkehr, Franz-Josef-Röder-Str. 17, 66119 Saarbrücken

Ministerium für Umwelt, Energie, Ernährung und Forsten – Rheinland-Pfalz, Kaiser-Friedrich-Str. 1, 55116 Mainz

Bayerisches Staatsministerium für Umwelt und Verbraucherschutz, Rosenkavalierplatz 2, 81925 München

Senatsverwaltung für Wirtschaft, Technologie und Forschung, Martin-Luther-Straße 105, 10825 Berlin

Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes NRW, Schwannstr. 3, 40476 Düsseldorf

Niedersächsisches Ministerium für Umwelt, Energie und Klimaschutz, Archivstr. 2, 30169 Hannover

Behörde für Umwelt und Energie, Neuenfelder Str. 19, 21109 Hamburg

Der Senator für Umwelt, Bau und Verkehr, Ansgaritorstraße 2, 28195 Bremen

Ministerium für Arbeit, Soziales, Gesundheit, Frauen und Familie, Henning-von-Tresckow-Str. 2-13, Haus S, 14467 Potsdam

Ministerium für Umwelt, Klima und Energiewirtschaft Baden Württemberg, Kernerplatz 9, 70182 Stuttgart

Ministerium für Energiewende, Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein, Mercatorstrasse 3, 24106 Kiel

Federal Ministry for Economic Affairs and Energy, Scharnhorststrasse 34-37 DE-10115 Berlin

BAM - Federal Institute for Materials Research and Testing Division S.4, Ecodesign and Energy Labelling, 12200 Berlin

BAM - Federal Institute for Materials Research and Testing Department S, Working Group Product Requirements, 12200 Berlin

Ministry of Economy, Development and Tourism - General Secretariat of Industry - Directorate of Technical Industrial Legislation, Kaniggos sq. 10181 Athens - Greece

Ministry of Development & competitiveness, General Secretariat of Consumer Affairs, Directorate for technical control , Pl. Kaninggos, 101 81 Athens

Hungarian Trade Licensing Office (MKEH) (Industrial and commercial products), Németvölgyi út 37-39. 1124 Budapest

Hungarian Authority for Consumer Protection (HACP), 1088 Budapest, József krt. 6

Iceland Construction Authority, Skúlagata 21 - 101 Reykjavík

Department of Communications, Energy and Natural Resources, 29 - 31 Adelaide Road, Dublin 2

Sustainable Energy Authority of Ireland, Wilton Park House, Wilton Place, Dublin 2, D02 T228

Ministry of Economic Development - Directorate General for the Market, Competition, Consumers, Surveillance and Technical Standards - Division XIII - Technical Standards and Safety and product conformity, Via Sallustiana, n.53 IT-00187 Roma

Ministry of Infrastructure and Transport -Directorate-General motorization, Via Caraci 36 00157 IT Roma

Ministero delle Infrastrutture e Trasporti - Consiglio Superiore dei Lavori Pubblici – Servizio Tecnico Centrale, Via Nomentana, 2, Roma, Città Metropolitana di Roma, 00161 Lazio, Italy

Agenzia Nazionale Per Le Nuove Tecnologie, L'energia E Lo Sviluppo Economico Sostenibile - Italian national Agency for new technologies, Energy and Sustainable Economic Development (ENEA), Lungotevere Grande Ammiraglio Thaon di Revel 76, 00196 Roma, Italy

Camera Di Commercio Metropolitana Di Milano-Monza-Brianza-Lodi, Metropolitan Chamber of Commerce of Milano-Monza-Brianza-Lodi, Via Meravigli 9/B 000, 20123 Milano, Italy

Consumer Rights Protection Centre, Brivibas street 55, Riga, Latvia, LV-1010

State Non-Food Products Inspectorate, Gedimino Ave. 38 LT-01104 Vilnius

ILNAS – Surveillance du Marché, 1, avenue du Swing L-4367 Belvaux

Malta Competition and Consumer Affairs Authority - Market Surveillance Directorate, Technical Regulations Division, Mizzi House, National Road, Blata l-Bajda, Hamrun, Malta HMR 9010

Netherlands Food and Product Safety Authority (NVWA) (energy labelling), Catharijnesingel 59 3511 GG Utrecht

Human Environment and Transport Inspectorate (eco-design and tyre labelling), Koningskade 4, 2596 AA Den Haag

RDW, Europaweg 205 – NL 2711ER Zoetermeer

The Norwegian Water Resources and Energy Directorate (NVE), PO Box 5091 Majorstua, 0301 Oslo, Norway

Public Roads Administration , PO Box 8142 Dep, NO-0033 Oslo, Norway

Office of Competition and Consumer Protection - Market Surveillance Department, Plac Powstańców Warszawy 1 00-950 Warszawa

Office of Competition and Consumer Protection - Trade Inspection Department , Plac Powstańców Warszawy 1 00-950 Warszawa

Office of Electronic Communications - Department of Monitoring and Enforcement, 18/20 Kasprzaka Street 01-211 Warsaw Poland

Food and Economic Safety Authority (ASAE), Rua Rodrigo da Fonseca, n° 73; 1269-274 Lisboa

Regional Inspectorate for Economic Activities in the Madeira (IRAE Madeira), Rua Direita n° 27, 3° andar; 9050-450 Funchal

Regional Inspection of Economic Activities in the Azores (IRAE Açores), Rua Margarida de Chaves, n.º 103, 9500 – 088 Ponta Delgada, São Miguel Açores

National Authority for Consumers Protection, 72 Aviatorilor blvd, sect. 1 – RO-O1865, Bucharest

Romanian Energy Regulatory Authority (ANRE) - Department for Energy Efficiency, Str. Cotroceni nr. 4, sector 6, 060114, Bucharest

Slovak Trade Inspection, PO Box 29 Prievozská 32 827 99 Bratislava 27 Slovak Republic

Market Inspectorate, Dunajska cesta 160 SI-1000 Ljubljana Slovenia

Inspectorate for Infrastructure , Vožarski pot 12, 1000 Ljubljana

Ministerio de Economía, Industria y Competitividad. Subdirección General de Calidad y Seguridad Industrial (EcoDesign), P. de la Castellana 160. 28071 Madrid

Agencia Española de Consumo, Seguridad Alimentaria y Nutrición - AECOSAN. Consumer Affairs, Food Safety and Nutrition Agency (Energy labelling and Tyre labelling), C/ Príncipe de Vergara, 54. 28071 Madrid.

Dirección General de Industria, Energía y Minas de la Comunidad de Madrid, C/Cardenal Marcelo Spínola, 14 – 28016 Madrid

Fundación para el Fomento de la Innovación Industrial (FFII), C/ José Gutierrez Abascal 2, 28006 Madrid

The Swedish Energy Agency, P.O. Box 310, SE-631 04 Eskilstuna

Ministry of Science, Industry and Technology - Directorate General for Safety and Inspection of Industrial Products, Mustafa Kemal Mahallesi Dumlupınar Bulvarı (Eskişehir Yolu 7.Km) 2151. Cadde No:154 06510 Çankaya, Ankara

National Measurement and Regulation Office, Stanton Avenue Teddington Middlesex TW11 0JZ

International Vehicle Standards - Department for Transport, Great Minister House 33 Horseferry Road London SW1P 4DR

Stichting Prosafe - The Product Safety Enforcement Forum Of Europe (Prosafe), Avenue des Arts, 41, B-1040 Brussels, Belgium

Vores Bureau ApS, Bredbjergvej 44, 5230 Odense M, Denmark

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 6.00 million from the 2018 budget

4. Support to the coordination of national research and innovation programmes in the areas of activities of the European Energy Research Alliance (EERA) ¹⁵¹

The European Energy Research Alliance (EERA) plays a key role in the coordination of European energy research actors along the SET Plan objectives. This includes the participation of the joint programmes of EERA in the definition and accomplishment of the specific sectorial implementation plans with the goal to reach the specific targets previously defined in collaboration with industry and the official representatives of the SET Plan countries.

The action will facilitate the coordination of EERA with the organisations responsible for national research and innovation programmes in the SET Plan Member countries in support of the SET Plan priorities and the execution of the corresponding implementation plans. This

¹⁵¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

will include when appropriate the coordination of the public resources and capabilities of the energy research organisations in the EU member states and associated countries.

Activities will include the organisation of regular meetings and workshops between European energy research organisations, national research and innovation programme owners/ programme managers and other stakeholders to increase coordination between European national research and innovation programmes.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

European Energy Research Alliance (EERA AISBL), Rue de Namur 72, 1000 Brussels, Belgium

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

5. Support to the initiative on sustainable energy in the defence and security sector¹⁵²

A specific consultation mechanism with Member States experts from the defence sector based on the model of the existing Concerted Actions and set up by the Commission Communication COM(2013) 542 final of 24 July 2013¹⁵³ and confirmed in the Commission Report COM(2014) 387 final of 24 June 2014¹⁵⁴. This mechanism focuses on a) energy efficiency, particularly in building sector; b) renewable energy and alternative fuels; c) energy infrastructure, including the use of smart grid technologies and:

- Examine the applicability of the existing EU energy concepts, legislation and support tools to the defence sector.
- Identify possible objectives and focus areas of action at EU level for a comprehensive energy concept for armed forces.

¹⁵² This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

¹⁵³ "Towards a more competitive and efficient defence and security sector" <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0542&from=EN>

¹⁵⁴ "A New Deal for European Defence - Implementation Roadmap for Communication COM (2013) 542; Towards a more competitive and efficient defence and security sector" <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0387&from=EN>

- Develop recommendations for a guidebook on renewable energies and energy efficiency in the defence sector with a focus on the implementation of the existing EU legislation, innovative technologies' deployment and the use of innovative financial instruments.
- Exchange information with the SET-Plan Steering Group on a regularly basis.

Exchanges, analyses and training to Member States on the implementation of EU policies and legislation on energy efficiency, renewable energy and energy infrastructure.

This action aims at facilitating exchanges of good practices with using renewables and promoting energy efficiency in the civilian types of energy use in the defence sector.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

European Defence Agency (EDA), Rue des Drapiers, 17-23, B-1050 Ixelles (Belgium)

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 0.75 million from the 2019 budget

6. Support to the Austrian Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2018¹⁵⁵

Austria will organise the 11th Strategic Energy Technology Plan conference. The conference will take place in Austria during the Austrian Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

AIT Austrian Institute of Technology GmbH, Giefinggasse 2, 1210 Vienna, Austria

Type of Action: Grant to identified beneficiary - Coordination and support actions

¹⁵⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

Indicative timetable: 2nd quarter of 2018

Indicative budget: EUR 0.25 million from the 2018 budget

7. Support to disruptive innovation in clean energy technologies¹⁵⁶

This action shall support the implementation of the pilot on 'disruptive innovation in clean energy technologies'. This pilot aims to crack specific technological challenges, while emphasising societal impact and market relevance. Projects selected under this pilot will follow a stage-gate approach based on milestones and periodic reviews.

This action shall support selected projects under topic LC-SC3-RES-2-2018 during their lifetime with continuous innovation and business development, including completing the market uptake supply chain, with the aim to strengthen the consortium's innovation performance. During the first 6 months of the projects' lifetime, the action shall perform a deep-dive assessment of the feasibility and innovation potential of the proposed solution or application, analysing a.o. the business and innovation strategy, the technology readiness level of the proposed application, the consortium's freedom to operate (e.g. background, foreground, IP), and the market. Since the action is part of a pilot, the assessment of 'lessons learned' will be a key deliverable. The beneficiary shall establish appropriate confidentiality and conflict of interest procedures for carrying out the related activities.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

InnoEnergy SE, Kennispoort, John F. Kennedylaan 2, 5612 AB Eindhoven, The Netherlands

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

¹⁵⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

8. Contribution to the IEA & Energy Transition Support¹⁵⁷

Given the momentum to implement commitments undertaken by the EU and others in the framework of the Paris Agreement, the EU will support and help shape sustainable energy policies in emerging economies. With its specific all-of-energy expertise, the International Energy Agency is well placed to support EU's work in helping guide major emerging economies' (such as China, Indonesia, Brazil, India, South Africa and Mexico) energy transition through policy advice and guidance efforts.

The proposed activities primarily aim to accelerate energy transition efforts in emerging economies by:

- Strengthening training and capacity building, targeting improved ability to develop a sound, analytically rigorous evidence base for policy action (via statistics, indicators, energy modelling, and improved data analysis capabilities);
- Building more effective knowledge and information systems, as well as enabling environments, creating capacity for stronger policy action (via country-specific scenario development, modelling capacity, advice and support on policy development, and facilitating knowledge exchange as relevant to country needs);
- Building a more robust international energy and climate architecture, by complementing and facilitating implementation of other initiatives, supporting multilateral efforts to facilitate and enable NDC implementation, and by strengthening connections and collaboration between experts across countries and relevant global expertise; and
- Encouraging technology RDD&D and innovation, through specific technology policy support activities, which should encourage the promotion of sustainable energy technologies and related investments.

Given the close link between a sustainable energy transition and meeting GHG mitigation objectives, the above outcomes also would bolster these key countries as they develop, implement, and further strengthen their NDCs under the Paris Agreement.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

¹⁵⁷ This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

International Energy Agency (IEA), 31-35 rue de la Fédération, 75739 Paris Cedex 15 France

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: as of 1st quarter 2019 and as of 1st quarter 2020

Indicative budget: EUR 2.00 million from the 2019 budget and EUR 1.50 million from the 2020 budget

9. Support to the Romanian Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2019 with a focus on regional dimension¹⁵⁸

Romania will organise a High-Level Strategic Energy Technology Plan conference with a special emphasis on the European regional dimension. The conference will take place in Romania during the Romanian Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Romanian Municipalities Association, Matei Basarab Street no. 63, District 3, 030672, Romania

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 0.25 million from the 2019 budget

¹⁵⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

10. Support to the Finish Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2019¹⁵⁹

Finland will organise the Annual Strategic Energy Technology Plan conference in 2019. The conference will take place in Finland during the Finish Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Any entity designated by the Presidency under its responsibility

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2019

Indicative budget: EUR 0.25 million from the 2019 budget

11. Technical assistance to assess renewable energy potential in Central and South-Eastern Countries (CESEC region)¹⁶⁰

The objectives of the Renewable Energy Roadmaps (REmap) study for South East Europe are:

- To assess the status of renewable energy deployment in the Base Year (2015) on a country-by-country basis and across the region;
- To assess the expected renewable energy deployment with policies in place until 2030 (Reference Case) for the eleven countries in the region;

¹⁵⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

¹⁶⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

- To identify cost-effective technical options for accelerated renewables deployment in energy supply (power and district heating) as well as end-use sectors (buildings, transport and industry) in terms of potentials and cost competitiveness by 2030;
- To develop REmap scenario for the region with a 2050 timeframe exploring the long-term role of renewables across all sectors;
- To assess the role that renewables can play in the decarbonization of the region;
- To identify opportunities for further energy sector integration (power sector, sector coupling, biomass trade) between countries within the region as well as with the European Union;
- To assess the impact of higher shares of renewables in terms of greenhouse gas emissions, costs and benefits of environmental and health externalities, energy security as well as in terms of investment needs in the energy sector;
- To provide recommendations at regional level to unleash the renewable potential identified.

The scope of the study are the countries that are member High Level Group "Central and South Eastern Europe Gas Connectivity" (CESEC)¹⁶¹. For many of the countries (in particular EU-28 countries), there will be already comprehensive data available that the study can build on and use for aggregation of data.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

IRENA, Masdar City, P.O. Box 236, Abu Dhabi, United Arab Emirates

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 0.35 million from the 2018 budget

¹⁶¹ Austria, Bulgaria, Croatia, Greece, Hungary, Italy, Romania, Slovakia and Slovenia, Ukraine, the Republic of Moldova, Serbia, the Former Yugoslav Republic of Macedonia, Albania, Bosnia and Herzegovina, Kosovo, and Montenegro.

Public procurements

1. Provision of technical assistance, IT tools, modelling and/or studies to collect and analyse relevant data and to properly assess complex technical, environmental, economic, legal and social aspects of energy efficiency¹⁶²

The services contracted under this point will provide the Commission with the expertise needed to inform policymakers with an objective and unbiased judgement of the likely impacts of different policy options and, allow an efficient implementation and monitoring of existing legislation in the area of energy efficiency (EED, EPBD, Ecodesign, Energy Labelling and Labelling of Tyres Directives).

The services will address technical, economical, legal aspects linked to, for example, the analysis of calculation method of Member States, the verification of compliance of national legislative measures implementing the directives, assessments of certain costs and/or benefits of the energy efficiency policies, the support to the standardisation of instruments (calculation methodologies and common certification).

Provision of technical assistance, studies and IT tools to collect and analyse relevant data and to properly assess complex technical, environmental, economic, legal and social aspects of different product groups in order to inform policymakers with an objective and unbiased judgement of the likely impacts of different policy options and allow an efficient monitoring of existing legislation and technical support to the Commission on standardisation work for energy related products.

The services will provide preparatory and review studies, technical assistance (including where appropriate IT tools) and impact assessment studies for identified product groups.

Type of Action: Public Procurement - 1 single framework contract, 28 specific contracts under framework contracts or direct service contracts

Indicative timetable: As from 1st quarter 2018 and as from 1st quarter 2019 and as from 1st quarter 2020

Indicative budget: EUR 4.20 million from the 2018 budget and EUR 3.70 million from the 2019 budget and EUR 3.50 million from the 2020 budget

2. Study on the role of smart technologies in residential buildings¹⁶³

Forward looking study to create a better understanding of the role of smart technologies in achieving higher comfort levels and wellbeing for building occupants; the link between

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buildings quipped for electro-mobility and smart appliances, products and local grid networks; and adaptation of buildings to the needs of an aging population.

Type of Action: Public Procurement - 1 service contract

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 0.10 million from the 2018 budget

3. Multiple Framework contract with reopening of competition for qualified legal, technical and economic expertise in the field of Energy Efficiency to support the Commission in the design, preparation and proper implementation of EU initiatives and legislation in the area of Energy Efficiency ¹⁶⁴

The purpose of the framework contract with reopening of competition is to provide at short notice the contracting authority with highly qualified external expertise to support with objectivity the contracting authority in the design, preparation and proper implementation of EU initiatives and legislation in the area of Energy Efficiency. The maximum amount of the Multiple Framework contract will be EUR 4.000.000 for a period of 4 years.

Type of Action: Public Procurement - 1 multiple Framework service contract with reopening of competition

Indicative timetable: 1st quarter 2018

Indicative budget: EUR million from the 0 budget(Commitments will be made through specific contracts)

4. Technical support for renewable heating and cooling¹⁶⁵

Technical support for policy development and implementation in the field of renewable (RES) heating and cooling addressing the following key areas

- Technical requirements and regulatory options of TPA for RES and waste heat in District heating & cooling;
- Costs and feasibility of deploying renewables in the space heating sector (buildings) in EU and by MS;
- Electrification of heating in the building sector;

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- Heat decarbonisation trajectory scenarios through renewables in the building related heating sector by 2050, including an assessment of the renewable district heating and cooling potentials by 2050;
- Renewable cooling;
- Best practice overview of national strategies and national policies of switching the building sector to renewable heating and cooling and comparison with other non-RES decarbonisation options with identification of commonly applicable tools, policies, regulations and approaches, including financing;
- Industrial and other process heat decarbonisation pathways, the role and share of renewable energy in comparison with other decarbonisation options (energy efficiency, CCS, hydrogen technologies, etc.);
- Support for policy and market issues for decarbonisation of heating initiatives.
- Policy development support for national district heating sectors' transition;
- Support for energy communities, consumer initiatives and micro-district systems in renewable heating and cooling.

Type of Action: Public Procurement - 10 direct service contracts in 2018, 2019 and 2020

Indicative timetable: 4 tenders as from 1st quarter 2018, as 3 tenders from 1st quarter 2019 and 3 tenders as from 1st quarter 2020

Indicative budget: EUR 1.50 million from the 2018 budget and EUR 1.50 million from the 2019 budget and EUR 1.50 million from the 2020 budget

5. Provision of technical assistance and/or studies to support the implementation of the heating and cooling strategy ¹⁶⁶

Provision of technical assistance and/or studies to support the implementation of the heating and cooling strategy, in particular for setting up sectoral round tables with industry and developing guidance/best practices.

Type of Action: Public Procurement - 3 direct service contracts

Indicative timetable: 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 0.90 million from the 2019 budget and EUR 0.50 million from the 2020 budget

¹⁶⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

6. Product registration database at EU level ¹⁶⁷

The study for the review of Directive 2010/30/EU on Energy labelling of energy-related products highlighted non-compliance issues as the main cause of a loss of about 10% of envisaged energy savings from product-specific measures. To correct this policy failure the Commission proposed to establish a product registration database at EU level to support enforcement by Member States. The database is developed under the central management of the Commission and manufacturers will have to register their models before placing them on the market. The database has to be operational (i.e. populated with data and accessible to all users) at the latest by 1/1/2019.

Type of Action: Public Procurement - 4 specific contracts under framework contracts

Indicative timetable: as from 1st quarter 2018, as from 1st quarter 2019 and as from 1st quarter 2020

Indicative budget: EUR 0.70 million from the 2018 budget and EUR 0.50 million from the 2019 budget and EUR 0.50 million from the 2020 budget

7. Support for the development and implementation of the EU Energy Star Programme including maintenance of the website, development of new technical specifications, impact analysis and market penetration survey ¹⁶⁸

Maintenance of the website ensures the registration of industries (def. partners in the programme), product compliance check (on provided declarations, no 3rd party control) and public availability of data. Development of new specifications provides technical support for negotiations with US-EPA on requirements tightening.

Type of Action: Public Procurement - 2 direct service contracts

Indicative timetable: 1st quarter 2019 and 1st quarter 2020

Indicative budget: EUR 0.30 million from the 2019 budget and EUR 0.30 million from the 2020 budget

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8. Technical assistance for communication and evaluation purposes related to energy efficiency¹⁶⁹

Provision of technical assistance to the Commission for collecting and processing information of all kinds needed for the analysis and promotion of Energy Efficiency projects financed under Horizon 2020, such as the evaluation of the 2nd Concerted Action on the Energy Efficiency Directive; the 4th Concerted Action on the Energy Performance of Buildings Directive. Services will also address technical assistance related to information and communication, conferences and events promoting activities on energy efficiency, including electronic and paper publications, audio-visual products as well as the development of different web based and social media activities directly linked to the achievement of the objective of the energy efficiency policy.

Type of Action: Public Procurement - specific contracts under existing framework contract

Indicative timetable: As of 1st quarter 2018 and as of 1st quarter 2019 and as of 1st quarter 2020

Indicative budget: EUR 0.50 million from the 2018 budget and EUR 0.50 million from the 2019 budget and EUR 0.50 million from the 2020 budget

9. Support to Smart finance for smart buildings initiative¹⁷⁰

Provision of technical assistance and high level financial/economic expertise to support the development of an investible market framework for energy efficiency. Specific contracts under one single framework contract to address the following type of activities:

- EEFIG 3.0 activities, studies on the valuation of externalities related to energy efficiency investments;
- Mapping of energy efficiency financing schemes across Europe;
- Mapping of energy efficiency services available and progress in setting up one-stop shops in Europe.

Type of Action: Public Procurement - 1 single framework contract and 3 specific contracts in 2018, 4 specific contracts in 2019 and 3 specific contracts in 2020

Indicative timetable: 2nd quarter 2018, and 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 1.00 million from the 2018 budget and EUR 0.90 million from the 2019 budget and EUR 0.80 million from the 2020 budget

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10. Tender on "Energy Efficiency Finance Market Place"

In complement to the activities carried out at European level to support the implementation of the Smart Finance for Smart Buildings initiative, in co-operation with the EEFIG, there is a need to further engage with stakeholders at national level on the specificities of energy efficiency finance, in order to identify obstacles, facilitate a common understanding and create co-operation between the financial sector, governments, industry and consumers.

This service contract will build on the Sustainable Energy Investment Forums and focus on the national and regional levels, through the organisation of public events and stakeholder dialogue roundtables at national level on energy efficiency finance, as well as targeted EU events disseminating the lessons learned from ongoing initiatives (EU, national and regional levels, in particular from Horizon 2020 projects).

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: As of 1st quarter 2018

Indicative budget: EUR 2.20 million from the 2018 budget

11. Assessment of Finance projects covering PDA, De-risking and Innovative Finance

The aim of the tender is to assess the impacts and the achievements of the energy efficiency financing related projects supported under the Energy Efficiency Calls in Horizon 2020, including call topics on:

- project development assistance, i.e. projects focussed on developing a concrete investment pipeline at local and regional level;
- innovative financing schemes, i.e. projects looking at how to match demand and supply of finance for energy efficiency with a focus on attracting private finance;
- energy performance contracting, in which investments are designed by an Energy Service Company which guarantees the energy savings and usually makes the upfront investments;
- making the energy efficiency market investible, e.g. projects looking at how to reduce the perceived risk of energy efficiency projects, reduce transaction costs and change the financial institutions evaluate and process investments in energy efficiency.

This service contract will analyse the projects and their outcomes, evaluate the impact, collect lessons learned and analyse what market gaps still need to be addressed in order to enhance access to finance for energy efficiency investments.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: As of 1st quarter 2019

Indicative budget: EUR 0.25 million from the 2019 budget

12. Evaluation of projects in Industry area

The aim of the tender is to assess the impacts and the achievements of the industry related projects supported under the programme IEE II (2007-2013) and the Energy Efficiency Calls in Horizon 2020. The results of this assessment are expected to contribute to the definition of industry related actions to be supported in the future under FP9.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: As of 1st quarter 2019

Indicative budget: EUR 0.20 million from the 2019 budget

13. EASME external communication activities (publications, audiovisual, events)

Organisation and logistic support for EU Sustainable Energy Week.

This action will also support the organisation of stakeholders meetings and other communication activities aiming at the exchange and replication of successful practices.

Type of Action: Public Procurement - direct service contracts and specific contracts under existing framework contract

Indicative timetable: As of 1st quarter 2018, as of 1st quarter 2019 and as of 1st quarter 2020

Indicative budget: EUR 1.50 million from the 2018 budget and EUR 1.50 million from the 2019 budget and EUR 0.50 million from the 2020 budget

14. Support to Research and Innovation Policy in the areas of Renewable Energy, Carbon Capture and Storage and More Efficient Coal Combustion¹⁷¹

Specific contracts under the Multiple Service Framework Contract 'Studies in Support to Research and Innovation Policy in the areas of Renewable Energy, Carbon Capture and Storage and Clean Coal' – (PP-02161-2014) addressing technical, economic and policy analysis to support various aspects of the Research and Innovation policy in one or more areas of the energy field.

The areas concerned are i) renewable electricity (e.g. wind power, photovoltaics, concentrated solar power, bioenergy, enhanced geothermal systems, ocean energy, hydro power), ii) heating and cooling through renewable energy and fossil fuels, iii) biofuels, iv) Carbon Capture and Storage, including utilisation of Carbon Dioxide and v) More Efficient Coal Combustion.

These analyses required in the terms of reference of the specific contracts may include:

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- Technology foresight and potential;
- Analysis of the above specified EU energy areas vis-à-vis global competitors as well as vis-à-vis other technologies at the various levels of the supply lines: an overview and analysis of trends in the different renewable energy sectors and possible synergies with Carbon Capture and Storage. Key factors to maintain global technological leadership.
- Research and innovation strategies of major international players, including inventory, impacts and best practices of the support put in place in leading countries;
- Impact of various European and national, regional, local policies (energy, industrial and SME policy, fiscal, environmental, employment, R&D etc.)
- Economic analysis e.g. business cases, supply line economics, value-added analysis;
- Market take-up issues;
- Environmental and health related impacts of projects in the above specified areas and possible areas for risk mitigation to be undertaken by research and innovation;
- Public perception and awareness;
- Analysis of capacities and skills.

Type of Action: Public Procurement - 6 specific contracts in 2018 and 6 specific contracts in 2019

Indicative timetable: as of 1st quarter 2018 and as of 1st quarter 2019

Indicative budget: EUR 3.00 million from the 2018 budget and EUR 2.60 million from the 2019 budget

15. Dissemination and information activities¹⁷²

Communication activities such as meetings, conferences, out-reach communication events/papers/materials and publications should support dissemination of knowledge and information to relevant stakeholders.

Type of Action: Public Procurement - either direct service contract or through existing Framework Contract

Indicative timetable: as of 1 quarter 2018, as of 1 quarter 2019 and as of 1 quarter 2020

Indicative budget: EUR 0.25 million from the 2018 budget and EUR 0.20 million from the 2019 budget and EUR 0.20 million from the 2020 budget

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16. Information services for energy research and innovation policy development¹⁷³

An information platform is planned to be used to gain a better understanding of the energy research sector. Intelligence gained through the platform will help to establish priority areas, base policy decisions on hard evidence, and allocate resources optimally.

Type of Action: Public Procurement - 1 service specific contract in each of 2018, 2019 and 2020 using an existing framework contract

Indicative timetable: as of 2nd quarter 2018, as of 2nd quarter 2019, and as of 2nd quarter 2020

Indicative budget: EUR 0.08 million from the 2018 budget and EUR 0.09 million from the 2019 budget and EUR 0.09 million from the 2020 budget

17. Information, communication and logistic support for EU #1 in RES¹⁷⁴

EU as global leader in renewables is one of the three main goals of the Clean Energy for all Europeans Package. To support the policy dialogue, analysis, communication and logistics assistance will be necessary. This will include, studies on KPIs for EU's global leadership role, EU global positioning, support to political dialogue in international forums, and communication activities in major global capitals based on the concept of the EU energy days.

Type of Action: Public Procurement - 2 direct service contracts in 2018 and 2020

Indicative timetable: 1st quarter in 2018 and 2020

Indicative budget: EUR 1.00 million from the 2018 budget and EUR 0.80 million from the 2020 budget

18. Support services for exploitation of research results (SSERR)¹⁷⁵

A framework contract for Support Services for Exploitation of Research Results SSERR has been concluded in 2015 for four years. This framework contract provides to the Commission external assistance for an on-demand service for the benefit of former and current grant beneficiaries of the Energy Theme of the FP7 Cooperation Specific Programme and of the Energy Challenge of Horizon 2020 in view of supporting them with the exploitation of their EU-funded research results.

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The framework contract consists of four predefined support services and two services to be agreed with the beneficiaries on a case-by-case basis. The services involve, inter alia, identification of market potential and opportunities, evaluation of competing technologies, development of business and action plans, pitching results, assessment of the costs for upscaling, and protection of IPR.

Specific contracts will be concluded in 2018 and in 2019 based on the individual needs of the grants to be assisted.

Type of Action: Public Procurement - up to 40 specific contracts in both 2018 and 2019 using an existing framework contract

Indicative timetable: 1st quarter 2018 until 4rd quarter 2019

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.30 million from the 2019 budget

19. Assessment of the impacts of EU-funded RD&D projects in the area of fuel cells and hydrogen¹⁷⁶

The aim of this action is to qualify and quantify the socio-economic, environmental and other impacts of EU-funded research and demonstration projects in the area of fuel cells and hydrogen.

Type of Action: Public Procurement - 1 service contract under existing framework contract

Indicative timetable: 1st half 2018

Indicative budget: EUR 0.10 million from the 2018 budget

20. Contest implementation, management and communication services related to the second and third Phase of the international Mission Innovation Prize Program¹⁷⁷

The Mission Innovation (MI) Prize Program, called MI Champions Program, is a new recognition program to celebrate and support innovative individuals around the world who are accelerating the clean energy revolution. This program was launched at the MI third ministerial meeting in May 2018 in Malmö, Sweden. The first cohort of MI Champions will be presented at MI fourth ministerial in Vancouver in 2019.

Bolt-on support is required for the further implementation of the second and third Phase of the MI Prize Program. This will allow the second and third cohort of MI Champions to be presented to MI fifth and sixth ministerial meetings taking place in 2020 and 2021

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respectively. The support will entail, in particular, contest launch, implementation and management, communication, marketing and outreach activities. This second and third Phase of the program will have to ensure continuity with the first phase and use the same selection process based on openness, transparency and fairness.

Type of Action: Public Procurement - 1 direct service contract for a duration of 2 years

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.40 million from the 2019 budget

21. Assessment of advanced biofuels, including deployment potential of new/ appearing feedstocks, feedstock availability, resource competition, and sustainability issues in the context of the Renewable Energy Directive Article 3(4)¹⁷⁸

Article 3(4) of the Renewable Energy Directive allows extend the list of feedstock's that are eligible for double counting based on an analysis. A similar provision is included in the proposal for the RED post 2020. Technical support is necessary to assist the Commission's work on fulfilling its obligations.

Type of Action: Public Procurement - 1 specific contract under existing framework contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 1.50 million from the 2019 budget

22. Assessment of carbon fuels produced from fossil waste streams, including deployment potential, resource competition and decarbonisation potential¹⁷⁹

Article 25 of the proposal for the RED post 2020 sets out an incorporation obligation covering in addition to renewable fuels also fuels produced from fossil waste streams. Further, the Commission is empowered to set out a methodology for estimating the GHG emission savings of these fuels. The study is aiming to provide the Commission with useful information for this exercise.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.75 million from the 2019 budget

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23. Technical requirements for track and trace databases¹⁸⁰

Article 25 of the proposal for the RED post 2020 requires Member States to set up data bases that allow tracing of biofuels and other low carbon fuels. The Commission is empowered to set out technical parameters of such data bases enabling among other things the exchange of data between individual national data bases. Technical support is necessary to assist the Commission's work on fulfilling its obligations.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.50 million from the 2019 budget

24. Support for the implementation of the ILUC- Directive¹⁸¹

The support will address the following areas:

- Technical assistance on the implementation of the ILUC- Directive

Directive (EU) 2015/1513 revised the Renewable Energy with the objective to reduce the risk of indirect land use change (ILUC) and to prepare the transition towards advanced biofuels. This directive introduced additional requirements for the Commission (in force as of 5 October 2015) and the Member States (transposition deadline: 10 September 2017) and effectively implemented in view of reaching the mandatory 2020 target of 10% share of renewable energy in transport sector.

Technical and legal support is necessary to assist the Commission's work on fulfilling its obligations under the ILUC – Directive, as well as for assessment of the Member States' progress on transposition and implementation of the ILUC – Directive.

This work should be carried out by taking into account that on 30 November 2016, the Commission adopted a legislative proposal for a recast of the Renewable Energy Directive for the time period 2020–2030, including sustainability criteria, GHG emission requirements, and measures for promotion of renewable energy in transport sector.

- Potential for mitigating ILUC impacts (desk assessment + 3 pilot studies)

Article 2 (w) on the Renewable Energy Directive includes at definition of low indirect land use change biofuels. This includes biofuels produced from crops for which impacts on indirect land use change are mitigated by increasing crop yields and use of abandoned land.

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The tender aims to explore how this approach could be implemented in practise applying a certification approach.

Type of Action: Public Procurement - 3 direct service contracts

Indicative timetable: 1st quarter 2018

Indicative budget: EUR 4.00 million from the 2018 budget

25. Technical assistance for the implementation of the EU bioenergy sustainability criteria¹⁸²

Recast of the RES Directive, article 26 (5) to (8) includes revised EU bioenergy sustainability criteria covering also biomass and biogas for heat and power. The service contracts will provide the technical support that is necessary to assist the Commission's work in fulfilling its obligations.

Type of Action: Public Procurement - 3 direct service contracts in 2018, 2019 and 2020

Indicative timetable: 1 contract in the 1st quarter 2018, 2 contracts in the 1st quarter of 2019, and in 2020

Indicative budget: EUR 0.20 million from the 2018 budget and EUR 0.60 million from the 2019 budget and EUR 0.60 million from the 2020 budget

26. Supply side flexibility of combined renewable energy systems (non-variable and variable). Assessment of development, barriers and regulatory aspects of combined RES supply systems of gaseous renewable fuels and variable RES¹⁸³

Renewable gaseous fuels (biogas, biomethane, renewable hydrogen, power – to gas) can be used as final fuel (to replace natural gas), stored and/ and or transformed in different types of fuels (electricity and heat). However, this potential is insufficiently used so far.

With maturing gaseous RES markets and increasing share of variable RES, interest in combination of on-demand and variable renewables (solar, wind) is growing as it has a potential to increase both the efficiency and flexibility of the whole energy supply system. Interest in application of and support for such solutions in the time period until and after 2020 is growing in the Member States, especially in those with high variable RES shares and high diversification level of RES technologies. However, information on developments in the EU MS and market and regulatory issues to be addressed is limited and dispersed

Type of Action: Public Procurement - 1 direct service contract

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Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.45 million from the 2019 budget

27. Technical support for RES policy development and implementation¹⁸⁴

Provision of technical support for the implementation of the directive based on the proposal COM (2016) 767 (RED recast) and to further develop policy frameworks for renewable technologies and their deployment with a particular focus on electricity generation. This would include studies of industry competitiveness, facilitation of standardisation (e.g. offshore wind), analysis of administrative procedures and permits to support the "one stop shops", and analysis of financial support schemes

Type of Action: Public Procurement - 3 direct service contracts in 2018, 2019 and 2020

Indicative timetable: 1 contract 2nd quarter of 2018, 1 contract 2nd quarter of 2019, and 1 contract 2nd quarter of 2020

Indicative budget: EUR 0.70 million from the 2018 budget and EUR 1.50 million from the 2019 budget and EUR 1.50 million from the 2020 budget

28. Support for policy and market development for alternative and renewable transport fuels and products¹⁸⁵

The aim of this action is to support the European industry, producers and market operators engaging in policy dialogue with the European Institutions and national governments in order to facilitate addressing common issues on markets, policy and regulation that hinder the deployment of alternative and renewable fuels and products.

The action is addressing the following key areas:

- Support for alternative and renewable liquid and gaseous fuels forum

The objective is to facilitate addressing common issues on markets, policy and regulation that hinder the deployment of the alternative and renewable fuels, in particular in relation to the Renewable Energy Directive and the Mobility Package. The activities will be complimentary to those of ETIP Bioenergy.

- Support for market development of algae and their products

The objective is to support the European algae industry on addressing and facilitating the deployment of algal-refineries supplying multiple products (chemicals, feed, cosmetics etc.)

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in addition to biofuels. Coproduction of algal fuels and other products can significantly reduce the costs of algal fuels and improve their overall market attractiveness.

- Support for policy and market analysis for the deployment and valorisation of industrial CO_x utilisation (CCU)

The objective is to support the European CCU industry in creating a forum from all sectors of the industry for the deployment of alternative and renewable fuels, chemicals, and products (e.g. cement) representing both CO_x producers and CCU market operators. The forum will address common issues on markets, policy and regulation that hinder the deployment of the such CCU applications in the market,

Type of Action: Public Procurement - 2 direct service contracts in 2018 and 1 direct service contract in 2019

Indicative timetable: 3rd quarter 2018 and 1st quarter 2019

Indicative budget: EUR 2.75 million from the 2018 budget and EUR 2.00 million from the 2019 budget

29. Analysis of actual land availability in the EU; trends in changes (abandoned land, low fertility land, saline land etc.) and options for energy crop utilisation¹⁸⁶

EUROSTAT and FAO data indicate that there is significant agricultural land that is abandoned continuously in the EU at accelerating rates with adverse effects on the EU farming community and economy. The abandonment is due to several social and economic reasons. The study should analyse the reasons, establish a reliable estimate on the extent of the abandoned land in the EU and then analyse options for using it for energy crop deployment.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2018

Indicative budget: EUR 0.50 million from the 2018 budget

30. Support for the planning and deployment of efficient, low carbon District Heating and Cooling in cities¹⁸⁷

The advanced implementation of the first smart cities projects with a special focus on DHC and the good replication policy created a great interest for the DHC sector in numerous cities.

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The aim of this action is to support our cities in their endeavour to plan and deploy new, efficient DHC systems or extend, refurbish existing ones to higher standards allowing greater uptake of renewables, recovering of excess heat, improving the overall efficiency of the systems.

The objective is to facilitate the deployment of smart DHC with planning tools, trainings, best practices and tailor made technical and financial expertise.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 0.60 million from the 2018 budget

31. Research & Innovation communication activities ¹⁸⁸

The purpose of this action is to support the development and implementation of Communication strategies and activities, boost greater stakeholder engagement and inform an even wider audience in the area of EU Energy Research and Innovation policies in general and SET Plan Strategy in particular. The aim is to carry out an effective information campaign on ongoing initiatives (i.e. for SET-Plan, Mission Innovation, of actions stemming out of the Accelerating Clean Energy Innovation Communication) in this field, in a proactive and informative way.

Tasks involve, inter alia, the conception, definition, planning and contribution to communication campaigns, identification of key messages, tailor-made dissemination and information plans, follow-up on key findings for a more sustained and impactful communication strategy for SET Plan over the medium and long term, advertisement and advice, production of content, etc. Organisation of events such as meetings and conferences, publications, mapping and provision of information to relevant stakeholders etc., are some of the envisaged outcomes.

Type of Action: Public Procurement - 3 specific contracts under existing framework contract and direct service contracts

Indicative timetable: 4th quarter 2018, and as of 1st quarter 2019 and 2020

Indicative budget: EUR 0.20 million from the 2018 budget and EUR 0.20 million from the 2019 budget and EUR 0.20 million from the 2020 budget

¹⁸⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

32. Support Services for the Covenant of Mayors for Climate and Energy¹⁸⁹

The new "*Covenant of Mayors for Climate and Energy*" was endorsed in October 2015, merging the Covenant of Mayors with its sister initiative - Mayors Adapt and extending cities commitments to energy and climate changes actions to 2030.

Following the success of the Covenant of Mayors in Europe and the European neighbourhood (CoM – East) regional Covenants were launched in 2017 by the Commission: in i) North America and Mexico; ii) Latin America and Caribbean; iii) Japan; iv) China; v) India; vi) South-East Asia, as part of the International Urban Cooperation (IUC) Programme, with the exception of sub-Saharan Africa, where Covenant of Mayors is a separate initiative launched in 2016.

Since 2017, the Covenant of Mayors office providing support services to the EU Covenant of Mayors for Climate and Energy acts also as central support unit for the IUC programme.

In parallel, the Covenant of Mayors initiative merged with the Compact of Mayors into a Global Covenant of Mayors (GCoM). This merger creates a single coalition of cities taking action on climate change and brings together the signatories of the EU-funded Covenants (CoM Europe, CoM-East and Regional Covenants) and the Compact of Mayors.

Two actions are envisaged:

1) Support services, in particular for the operations of its Brussels-based office

The services to be covered by a new tender will include amongst others:

- Promotion of the Covenant of Mayors for Climate and Energy to encourage new signatories
- Communication activities, including web-based and in media
- Technical assistance to signatories of the Covenant of Mayors for Climate and Energy,
- Organisation of workshops, seminars and tailor-made training and information events
- Capacity building and networking with relevant stakeholders and supporting structures
- Supporting synergies and interactions with relevant EU urban energy actions and policies and with initiatives covering islands, coastal and remote regions
- Cooperating with the Secretariat of the Global Covenant of Mayors
- Facilitate signatories' access to finance for implementation of actions from their SEAPs/SCEAPs.

¹⁸⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Ensuring of operation of technical and administrative capacity of the Covenant of Mayors Office;
- Providing central support in relation to the IUC programme to Offices on different regions

Given that the scope of activities includes both services that were previously covered by the Mayors Adapt initiative and support to the IUC programme, contributions from corresponding Programmes can be expected to complement the indicated budget.

2) Support for events under the Covenant of Mayors Investment Forum

The Covenant of Mayors Investment Forum consists of a series of events to be organised in different cities across Europe in 2018 and 2019. The Investment Forum aims to bring together mayors and city representatives, Commission, industry and financial institutions. The events will showcase best practices and innovative financing solutions from concrete projects and aim at catalysing major investments in energy efficiency, renewable and smart energy projects in municipalities and regions participating in Covenant of Mayors.

Type of Action: Public Procurement - 1 direct service contract and 3 contracts using framework contract

Indicative timetable: 1st and 3rd quarter 2018, 1st, 3rd and 4th quarter 2019

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 4.30 million from the 2019 budget

33. Innovation, fair transition and sustainable growth in coal and carbon intensive regions in the context of the clean energy transition (technical assistance)¹⁹⁰

EU decarbonisation objectives and international competition result in accelerated structural change in regions which depend on coal mining and carbon intensive industries. The clean energy transition is likely to have profound social and economic impacts on selected regions. As part of the Clean Energy Package, the Commission committed to assist coal and carbon intensive regions in order to ensure that any negative effects from the economic and energy transition on these regions can be mitigated. Such action would allow the EU to reinforce the support for climate policies and the decarbonisation objectives.

The proposed technical assistance will:

- Assist identified coal regions in finalising their strategies and a list of priority projects to drive the process of structural and technological transformation;

¹⁹⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Assist identified coal regions in preparing strategies for the implementation of priority projects including strategies for financing and funding.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 1.00 million from the 2018 budget

34. Support to the European Innovation Partnership on Smart Cities and Communities and its Market Place¹⁹¹

This action shall ensure constant and high quality support to the Market Place of the European Innovation Partnership on Smart Cities and Communities:

- Maintenance and further development of the interactive web site of the above mentioned Market Place;
- Further development and improvement of the match making dimension of the above mentioned Market Place (allowing for project and investment focussed matches between cities, companies and financing entities);
- Providing Programme Management Office services to handle daily logistics, communications, social network contributions, etc.;
- Individual streamlined support to each Action Cluster in terms of content as well as logistics;
- Policy analysis and modelling of the Smart Cities context system to allow for sound decision making with regard to novel solutions, new market designs, business models, players and policy instruments (this shall provide assessments of the costs and other impacts of Smart City related policies, policy instruments, including the social, environmental and economic impacts of policy decisions);
- Regular reports containing meaningful up-to-date figures and information to be used for marketing the European Innovation Partnership on Smart Cities and Communities further.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 4th quarter 2019

Indicative budget: EUR 3.00 million from the 2019 budget

¹⁹¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

35. Innovative assessment of macro-economic impacts of EU energy transition¹⁹²

The purpose of this action is to support the development and implementation of innovative approaches in the assessment of the macroeconomic implications of the EU's clean energy transition. Drawing on most recent improvements in the treatment of finance and innovation in macroeconomic models used to assess the clean energy transition, this action would aim at further improving the modelling tools as well as the interpretation of the results that can be derived from such tools.

Tasks relate, inter alia, to better capture interactions between energy systems, finance, innovation, and macroeconomic trends, including in a global context, or to put more focus on the social drivers and implications of the clean energy transition, including at the sub-national level and in specific sectors of the economy. Attention would notably need to be paid on the drivers or necessary conditions to secure a successful clean energy transition. All model improvements would need to be developed in an open and transparent manner, for them to be replicable in various macroeconomic models or contexts.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: as of 3rd quarter 2018

Indicative budget: EUR 3.00 million from the 2018 budget

36. Removing barriers to Green Growth by assessment scale and impact of subsidies in all energy sectors of the EU¹⁹³

The purpose of this action is to prepare a comprehensive study, looking at both financial and non financial interventions in energy markets and in other sectors, taking into account energy production costs and externalities, and to analyse the impact of current interventions on green investment. Under the State of the Energy Union Report and forthcoming Governance regulation, the Commission and Member States are meant to review progress in achieving energy union objectives including stimulating innovation in the energy sector, the achievement of targets and internal market developments such as the removal of market distorting government interventions, including fossil fuel subsidies in particular.

Tasks involve, inter alia, a multi-annual study to develop and explore the methodological issues associated with assessment of energy production, technology and external costs and all the government interventions, including fossil fuel subsidies that inhibit energy innovation, including technology innovation and deployment, in the energy markets of the EU. Existing data are outdated and do not reflect the significant changes in market conditions of certain

¹⁹² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

¹⁹³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

generation technologies, such as falling wholesale energy prices, ongoing subsidies for low carbon energy and the rise of capacity payments. Thus a new study with a comparable up-to-date database across all EU countries and generation technologies, with an international comparative dimension, is necessary. Furthermore, as the scope of the analysis should be extended to other sectors, such as transport, in order to capture the full impact of fossil fuel subsidies. Environmentally harmful subsidies, being an obstacle to green investments, are in the focus of international discussions over the last few years. Therefore, besides collection data on subsidies, production costs and externalities, we need to analyse the impact of energy subsidies to green investments.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

37. Extension of METIS gas/electricity markets and systems model¹⁹⁴

The purpose of this action is to further support the European Commission's energy policy proposals by enhancing the EU's modelling capacity. To study recent trends in energy markets, the Commission has been developing a new mathematical model, METIS, to perform analyses of the European energy system for electricity, gas and heat. It simulates the operation of energy systems and markets on an hourly basis over a year, while also factoring in uncertainties like weather variations. For example, it can analyse the hour-by-hour impact of using more renewable electricity.

In order to further extend and enhance METIS' capabilities, additional activities in the area of, inter alia, data gathering, modelling of interactions between gas, electricity and heat markets, and considerations on optimal capacity expansion are envisaged. In addition, dissemination activities of METIS model and results towards interested stakeholders should also be envisaged.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: as of 2nd quarter 2019

Indicative budget: EUR 4.00 million from the 2019 budget

¹⁹⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

38. 2020 Renewable energy progress report¹⁹⁵

The Renewable Energy Directive requires the Commission, on biennial basis and drawing on the Member State national renewable energy reports, to present a comprehensive assessment of EU and Member State progress towards 2020 renewable energy targets. These reports shall include analysis of data and description of renewable energy policy measures in Member States, based on national renewable energy reports, and the data and impacts of the EU renewable energy policy and biofuel consumption in the EU and in main third countries of supply.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.80 million from the 2019 budget

39. Support to the realisation of Implementation Plans of the SET Plan¹⁹⁶

The tenders will support the execution/realisation of the Implementation Plans prepared by one of the following three SET Plan Temporary Working Groups (TWGs): energy efficiency solutions for buildings/Renewable heating and cooling; Industry less energy intensive and more competitive, and Batteries for e-mobility and stationary storage, including the monitoring of their progress and the disseminating of results. The scope shall include: supporting further development of the activities identified in the Implementation Plan into projects with defined partnership and funding plan (at private, National and EU levels); monitoring the projects progress, results and contribution to the targets defined in the Declaration of Intent; enhancing the sharing of information on relevant ongoing projects at National and EU levels, as well as the sharing of experiences of bilateral/multilateral cooperation between countries in order to foster more cooperation; dissemination to communicate the achievements of the SET Plan action.

The support for the Implementation Plan on energy efficiency solutions for buildings/Renewable heating and cooling will also expand to the activities carried out within the Innovation Challenge N°7 of Mission Innovation.

The support for the Implementation Plan on Batteries for e-mobility and stationary storage will also:

- Include a link to the Batteries initiatives;

¹⁹⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

¹⁹⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Streamline conclusions from stationary energy storage projects (including battery-based projects), especially as regards system integration, with a view to foster relevant policy action and identify research gaps;
- Help with identification/streamlining of accompanying non-R&D&I actions, necessary for uptake of battery-based storage and relevant R&D&I;
- Organise networking activities to foster knowledge sharing.

The Implementation Plans in the areas of solar thermal energy, offshore wind, photovoltaics, ocean energy, deep geothermal systems, carbon capture and storage, and bioenergy are supported under the topic LC-SC3-JA-2-2018-2019. Support for the Implementation Plan on Smart Cities (Action 3.2) is foreseen through the procurement "Support to the European Innovation Partnership on Smart Cities and Communities and its Market Place" (included in the work programme 2016-2017 of the Horizon 2020 Energy Challenge). Support for the Implementation Plan on Energy Systems (Action 4) will be provided through the ongoing project *Intensys4EU*¹⁹⁷.

Type of Action: Public Procurement - 3 direct service contracts.

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

40. Information, dissemination and logistic support for EU in Mission Innovation¹⁹⁸

The European Commission, on behalf of the European Union, joined the Mission Innovation (MI) in June 2016. MI is a global initiative that aims to reinvigorate and accelerate public and private global clean energy innovation to make clean energy widely affordable and it is one of the key strategic forum for the EU's international cooperation in clean energy RD&D. MI members committed to share information on their clean energy RD&D activities, double their governmental clean energy investments within 5 years, and encourage greater levels of private sector investments.

To guarantee continuation of MI initiative, and maintain the ownership of the activities the EC, on behalf of the EU, is actively engaged in and another set of activities it leads, a series of supporting services need to be covered, mainly the websites, information and dissemination activities and logistic support, etc.

Type of Action: Public Procurement - up to 6 direct service contracts and specific contracts under existing framework contract

Indicative timetable: 1st quarter of 2018, 2019 and 2020

¹⁹⁷ <https://www.etip-snet.eu/intensys4eu/>

¹⁹⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.20 million from the 2019 budget and EUR 0.20 million from the 2020 budget

41. Website for directing potential innovators to the most appropriate public funding instruments available to support clean energy projects¹⁹⁹

This action will provide the European Commission with an internet-based navigator guiding promoters of clean energy innovation projects, in a few steps, to the most relevant EU funding and financing instruments that could support the clean energy technology or service they seek to be assisted financially. The navigator should cover all public and joint public-private funding instruments, including those providing grants, equity, equity-type or loans, provided by the European Union. The tool should be designed with the possibility of covering relevant funding instruments provided at EU Member States level.

Type of Action: Public Procurement - 1 service contract (preferably through an existing Framework Contract)

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 0.50 million from the 2018 budget

42. Provision of technical assistance and study to support the development of a composite indicator to track clean-energy innovation performance of EU members²⁰⁰

Provision of technical assistance and/or studies to develop the methodology for a composite indicator to track clean-energy innovation performance of EU members and related analysis. These activities, aimed at supporting the governance of the 5th pillar of the Energy Union, will build on work carried out on and know how gained by DG RTD with the European Innovation Scoreboard and by JRC with the monitoring of progress in Research and Innovation in the frame of the annual State of the Energy union reports and the Strategic Energy Technology Plan (SET-Plan).

Type of Action: Public Procurement - 1 service contract (preferably through an existing Framework Contract)

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 0.70 million from the 2018 budget

¹⁹⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁰⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

43. Technical and legal assistance to facilitate regional cooperation on deploying renewable energies among EU Member States²⁰¹

Regional cooperation on deploying renewable energy can bring substantial benefits in terms of the cost-effectiveness of RES deployment across Europe and can help to increase market and system integration of renewable energy.

Technical and legal assistance for regional cooperation will be needed to complement and prepare actions based on the Commission's proposal for a recast of the Renewable Energy Directive from 30 November 2016 and the developments within the subsequent co-decision procedure. In particular, Art. 3 (3)²⁰² and Art. 5, 8-12, emphasize the importance to enhance regional cooperation in the field of RES.

The following actions are needed:

- Developing a coordination tool for auctions of renewable energies, including gathering and disseminating data on (planned) auctions;
- Maintenance and development of internet database with renewable energies support schemes and related information;
- Technical assistance for the development of a platform for statistical transfers of renewable energy between Member States under *Art. 8 of the* recast of the Renewable Energy Directive;
- Technical assistance for developing a platform for national plans to support renewable energy (including indicative timing, capacity and budget) under (Art. 15 (3)) of the recast of the Renewable Energy Directive;
- Technical assistance to support regional cooperation on renewable energy High Level Groups (North Seas, BEMIP, CESEC).

Type of Action: Public Procurement - 2 direct service contracts in 2018, 1 direct services contract in 2019, and 1 direct service contract in 2020

Indicative timetable: 3rd quarter 2018, 1st quarter 2019, 1st quarter 2020

Indicative budget: EUR 0.45 million from the 2018 budget and EUR 0.30 million from the 2019 budget and EUR 0.05 million from the 2020 budget

²⁰¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁰² Compare General Approach in the Council (from 18 December 2017) the Report of the European Parliament (voted on 17 January 2018).

44. Support for the creation of a multi-disciplinary innovations analysis for the energy transition²⁰³

The creation of a multi-disciplinary centre of expertise on innovations that are relevant for the energy transition, and that identifies and analyses technology and innovation in the energy sector and in other relevant domains (e.g. digital, mobility, industry, circular economy) to make recommendations to the European Commission on policy responses, in the form of priorities for Research and Innovation, but also in terms of regulatory action as well as engagement with key (existing and new) stakeholders. Work would be organised based on proposals for topics or issues by the contractor, to be agreed to and elaborated in cooperation with the European Commission.

Type of Action: Public Procurement - 1 service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 3.00 million from the 2019 budget

Provision of technical/scientific services by the Joint Research Centre

1. Administrative arrangement with the JRC, to provide Technical assistance on GHG emission saving criteria for biofuels and biomass fuels²⁰⁴

Renewable Energy Directive, Articles 17 – 10 and Annex V, Recast of the RES Directive, Articles 26 - 28, Annexes V and VI

The JRC technical and scientific support is needed for the implementation of EU Renewable energy policy and the tasks allocated to the Commission under the Renewable Energy Directive 2009/28/EU, particularly as regards the requirements regarding the greenhouse gas emissions of biofuels and bioliquids and other related provisions for biofuels and bioliquids. The JRC support is also required for the development of the legislative framework following the adoption of the Commission's legislative proposal for the Recast of the Renewable Energy Directive which contains proposal for greenhouse gas emission criteria and provisions for their implementation for liquid, gaseous and solid fuels from biomass.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: 1st quarter of 2018, 2019, and 2020

Indicative budget: EUR 0.25 million from the 2018 budget and EUR 0.25 million from the 2019 budget and EUR 0.20 million from the 2020 budget

²⁰³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁰⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Delegation Agreements

1. ELENA (European Local Energy Assistance)²⁰⁵

The ELENA (European Local Energy Assistance) facility was established in 2009 under the Intelligent Energy-Europe Programme II and continued under the H2020 Work Programme 2014-2015 and Work Programme 2016-2017.

The ELENA facility aims at supporting public and private project promoters to prepare and develop ambitious and large-scale (normally above EUR 30 million) aggregated investment programmes which will contribute to achieving and going beyond the objectives of the EU energy and climate policy. The ELENA facility aims at mobilising local, regional and national stakeholders towards actions leading to broader utilisation and market uptake of innovative solutions, including technologies, processes, products, policies, organisational models and practices. The objective is also to accelerate investments by increasing experience, facilitating financing, in particular through the aggregation of projects and overcoming existing investment barriers.

In the public sector, the ELENA facility should continue helping cities (such as local authorities) to mobilise investments and implement their sustainable energy action plans, where relevant in synergies with other sustainable development plans (Sustainable Urban Mobility Plans and Air Quality Plans). The ELENA facility can provide, directly or indirectly, assistance to different type of project promoters such as e.g. local, regional or national authorities, social housing operators, public/private infrastructure operators, building owners.

The implementation of the ELENA facility is subject to dedicated delegation agreements between the European Investment Bank (EIB) and the European Commission. The EIB ensures that Project Development Services are being awarded in accordance with the principles of transparency, proportionality, sound financial management, equal treatment and non-discrimination, lack of conflict of interests and compliance with internationally accepted standards. Eligible projects are selected by the EIB and submitted to the European Commission for approval. The selection of projects shall take into consideration:

- the eligibility of the applicant;
- the eligibility and potential bankability of the proposed investment programme;
- the financial and technical capacity of the applicant to implement and complete the Investment Programme;
- the technical need for the project development services;
- the contribution to the broader utilisation and market uptake of innovative solutions including technologies, processes, products, policies, organisational models or practices;

²⁰⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to the Executive Agencies and will be implemented by the Commission services.

- the expected Leverage Factor (the cost of the Investment Programme divided by the amount of the ELENA contribution)
- the contribution to EU policies and the EU added value.

The project development services grants are provided in relation to all the activities necessary to develop and mobilise finance for a clearly identified investment programme, including for instance: feasibility studies, design studies, structuring of programmes, business plans, energy audits, legal/financial advisory, preparation of tendering procedures and contractual arrangements, bundling of smaller projects to form bankable packages, set-up and running of a project implementation unit. However, costs related to the investment programme itself such as hardware costs are not eligible. The Request for Project Development Services shall be addressed to the EIB according to the standard procedure for the submission of projects to the EIB. Applications are open to all participating countries following the CSA eligibility conditions and are not restricted by the availability of local offices of the EIB in a specific country.

In 2018, 2019 and 2020, the ELENA Facility will aim at supporting ambitious and significant investment programmes in one or both of the following two pillars (1) and (2):

(1) energy efficiency and distributed renewable energy. Investment programmes could cover one or more of the following areas:

- investments to significantly increase the energy performance of public or private buildings, including measures to decrease energy consumption in heating/cooling and electricity – e.g. thermal insulation, energy efficient heating, air conditioning and ventilation systems, efficient lighting, and measures for the integration of renewable energy sources into the built environment – e.g. solar photovoltaic (PV), solar thermal collectors and biomass. These investment programmes could correspond to the deployment of dedicated financial instruments and investment platforms aiming at e.g. accelerating energy renovations, as promoted under the "Smart Finance for Smart Building" Initiative²⁰⁶.
- investments into renovating, extending or building new district heating/cooling networks, including networks based on combined heat and power (CHP); decentralised CHP systems (building or neighbourhood level);
- investments in energy efficient local infrastructures, including energy efficient street and traffic lighting, smart grids leading to energy efficiency improvements, measures to improve the energy efficiency of water infrastructures (water pumping, water treatment etc.), information and communication technology infrastructure for energy efficiency, energy-efficient urban equipment and link with transport.

Following areas shall be excluded:

²⁰⁶ https://ec.europa.eu/energy/sites/ener/files/documents/1_en_annexe_autre_acte_part1_v9.pdf

- Stand-alone renewable energy systems, not integrated in buildings or heating/cooling networks, e.g. wind turbines; stand-alone PV, concentrated solar power; hydropower and geothermal electricity production;
- Large industrial facilities (falling under the Emission Trading Scheme Directive), and investments in reducing greenhouse gas emissions due to industry delocalisation.

(2) Urban transport and mobility in urban/suburban agglomerations and other densely populated areas:

A part of the ELENA budget will be ring-fenced for the development of investment programmes (often with public sector involvement) in the field of urban transport that will contribute to the EU urban transport policy goals of halving the use of 'conventionally-fuelled' cars in cities by 2030, achieving essentially CO₂ free logistics in major urban centres by 2030 and attaining the 2020 objectives for urban areas presented in the Directive on the deployment of alternative fuels infrastructure.

Projects could cover one or more of the following areas:

- Investments to support the use and the integration of innovative solutions (beyond the current state of the art) for alternative fuels²⁰⁷ in urban mobility, e.g. in vehicles and in refuelling infrastructure for alternative fuel vehicles and other actions to support the wide-scale use of 'alternative fuels' in urban areas.
- Investments to introduce - at a wide scale, system level - new, more energy-efficient transport and mobility measures in any modes in urban areas., e.g. in shared mobility, urban logistics, intelligent transport systems, planning, urban infrastructure (including investments in 'soft modes').

The preparation of a Sustainable Mobility Plan (SUMP) could be one of deliverables of an ELENA funded project, and/or the ELENA-planned investments could contribute to the implementation of an existing or updated SUMP.

Projects dealing with long-distance transport infrastructure are not eligible for financing by the ELENA Facility.

Type of Action: Delegation Agreement

Indicative timetable: 4th quarter 2018, 4th quarter 2019 and 4th quarter 2020

Indicative budget: EUR 54.80 million from the 2018 budget²⁰⁸ and EUR 35.00 million from the 2019 budget²⁰⁹ and EUR 35.00 million from the 2020 budget²¹⁰

²⁰⁷ See the Communication on 'Clean Power for Transport: A European alternative fuels strategy' (COM/2013/017)
²⁰⁸ of which EUR 5.00 million from the 'Smart, green and integrated transport' WP part.
²⁰⁹ of which EUR 5.00 million from the 'Smart, green and integrated transport' WP part.
²¹⁰ of which EUR 5.00 million from the 'Smart, green and integrated transport' WP part.

Specific Grant Agreements

1. Technical support to stakeholders on standardisation work for energy related products²¹¹

To give support to environmental NGOs for participating in Technical Committees and Working Groups on Standardisation.

Beneficiary: ECOS, rue d'Edimbourg 26, Brussels 1050, Belgium

ToA text: Three Specific Grant Agreements under Framework Partnership Agreement 1338/G/ENV/ENTR/2014 with the identified beneficiary ECOS for Coordination and Support Actions.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in General Annexes D and H or the work programme.

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2018, 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.30 million from the 2019 budget and EUR 0.30 million from the 2020 budget

2. Support to European Standardisation Organisations on standardisation work for energy related products²¹²

Identified beneficiaries:

CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

According to Regulation (EU) No 1025/2012, CEN and CENELEC are the competent European standardisation organisations to carry out this work and are therefore the identified beneficiaries.

ToA text: Three Specific Grant Agreements under the Framework Partnership Agreement FPA/CEN/ with the identified beneficiary for Coordination and Support Actions

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in General Annexes D and H or the work programme.

²¹¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services

²¹² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2018, 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.50 million from the 2019 budget and EUR 0.50 million from the 2020 budget

3. Standardisation request to the CEN for algae and algae-based products in support of the implementation of the RED II Proposal²¹³

CEN/BT/WG 218 worked on the Commission's Standardization Request M/547 for algae and algae-based products or intermediates under contract CEN/2016-04/ENER/C2/498-2016 - SI2.735225 and developed the Work Programme for Mandate M/547. The Work Programme has been approved by CEN/BT and by the Commission. The additional budget request is to cover for additional work not foreseen in the original Standardization Request M/547 but identified by CEN/BT/WG 218. CEN is in the process of establishing a new Technical Committee CEN/TC XX 'Algae' to implement the Work Programme.

Identified beneficiary: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 1.00 million from the 2019 budget

4. Support to European Standardisation Organisations for biomethane injection in the grid in support of the implementation of the RED II Proposal²¹⁴

CEN/TC 408 worked on the Commission's Standardization Request M/475 on standards for biomethane use in transport and injection in natural gas pipelines under contract SA/CEN/ENTR/EFTA/475/2012-15 and the standardisation work has progressed well. However the work identified important topics for which research has to be continued in order to provide certainty for the specification and in particular:

- a. Impact of siloxanes on heavy duty engines
- b. Impact of Sulphur on catalytic converters and performance of engines
- c. Impact of oxygen on underground storages
- d. Impact of components on health

²¹³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²¹⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Identified beneficiaries: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 2.00 million from the 2019 budget and EUR 3.00 million from the 2020 budget

5. Support to European Standardisation Organisations for Ethanol 20/25 blends in petrol in support of the implementation of the RED II ²¹⁵

Under the Framework Partnership Agreement FPA/CEN/ENTR/2014/C(2014)1892, CEN/TC/19 has been carrying out studies for the European Commission on ethanol 20/25 blends with petrol under contracts:

- a. ENER/C2/GA/449-2012/SI2.641582
- b. ENER/C2/GA/449-2012/SI2.674184
- c. SA/CEN/RESEARCH/EFTA/000/2014-13

The results from the first two contracts have been positive while the third one is still ongoing. However, preliminary results are encouraging and it is expected that the Commission, in consultation with CEN and the stakeholders, will consider a standardisation request to CEN on standards for E20/25 ethanol blends in petrol.

Identified beneficiaries: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 1.00 million from the 2019 budget

6. Support to European Standardisation Organisations for petrol/ethanol blends in diesel in support of the implementation of the RED II Proposal²¹⁶

Under contract SA/CEN/RESEARCH/EFTA/000/2014-13 CEN of the Framework Partnership Agreement FPA/CEN/ENTR/2014/C(2014)1892; in close collaboration with ACEA and CONCAWE; CEN is carrying out investigative research work on blends of petrol

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²¹⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

and/or petrol/ethanol in diesel in view of minimising diesel consumption and increased consumption of petrol/ethanol in the EU. It is expected that further research work will be necessary to ascertain the consideration of an eventual standardisation request by the European Commission.

Identified beneficiary: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 3rd quarter 2019

Indicative budget: EUR 1.50 million from the 2019 budget

Financial Instruments

1. Support to first-of-a-kind renewable energy projects²¹⁷

Meeting the EU energy goals for 2030 and beyond will require continuous development and commercialisation of new generations of low-carbon technologies. First-of-a-kind commercial-scale demonstration (FOAK) projects are essential to roll-out new generations of innovative renewable energy technologies to the market.

The InnovFin *Energy Demo Projects*²¹⁸ (EDP) Facility contributes to bridging the gap between technology demonstration and market entry by supporting the demonstration of the technical feasibility and commercial viability of such innovative FOAK projects, thereby reducing perceived investment risks for private investors. Successful first-of-a-kind demonstration and validation at commercial scale of technology performance, installation time, reliability and lifetime of energy technologies, are expected to facilitate their subsequent market roll-out after 2-4 years of operation.

Support is delivered to these high-TRL (please see part G of the General Annexes) projects via European Investment Bank (EIB) loans or via guarantees extended to financial intermediaries making such loans. Demand has proven strong, and the European Commission has decided to double the financial support to this facility from EUR 150 million to EUR 300 million (with EUR 250 million channelled from Horizon 2020 Access to Risk Finance and EUR 50 million from the 2016 budget of this Societal Challenge). In addition, the scope of EDP has been enlarged to cover the whole SET-Plan priorities with the exception of energy and nuclear safety. This includes, but is not limited to renewable energy technologies; Smart energy systems, including smart grids; Energy storage, including batteries for both e-mobility and stationary storage; and Carbon capture and storage and use (CCS/U). Projects or investments enhancing the competitiveness of manufacturing processes for innovative technologies may be considered in the light of the SET Plan strategic targets. Eligible costs

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²¹⁸ <http://www.eib.org/products/blending/innovfin/products/energy-demo-projects.htm>

include all the costs necessary for the successful demonstration of the technology, service, manufacture or business process.

Type of Action: Financial Instrument

Indicative timetable: as of 1 quarter 2019 and 2020

Indicative budget: EUR 50.00 million from the 2019 budget and EUR 50.00 million from the 2020 budget

Subscriptions

1. Annual subscription to the International Partnership for Energy Efficiency Cooperation (IPEEC)²¹⁹

The purpose of the International Partnership for Energy Efficiency Cooperation (IPEEC) is to strengthen international cooperation on energy efficiency. The action carried out under the auspices of the Partnership should result in more effective energy policy and programme output, in best practices being more widely known, disseminated and applied and in economies of scale. The aim of the Partnership is to offer a topic-driven, structured dialogue and an operational network for enhanced cooperation and exchanges on energy efficiency between countries and international organisations by:

- exchanging information and experience on development of regulatory measures, policies and programmes;
- developing benchmarks and sharing information on goods and services, along with measurement methods regarding energy performance and energy savings;
- strengthening information, education and training for energy consumers;
- building stakeholder capacity by improving contacts between national, regional and local authorities and other relevant partners and stakeholders, exchanging views and sharing knowledge and experience.

On 30 November 2009 the Council adopted a Decision on the signing and conclusion of the Terms of Reference for the IPEEC and the Memorandum concerning the hosting by the International Energy Agency of the Secretariat of the International Partnership for Energy Efficiency Cooperation by the European Community. The Council endorsed the Commission proposal that, from the second year of membership (i.e. 2012), the European Union will voluntarily contribute for each subsequent year.

Type of Action: Subscription

Indicative timetable: From 3rd quarter of 2018 onwards

²¹⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Indicative budget: EUR 0.08 million from the 2018 budget and EUR 0.08 million from the 2019 budget and EUR 0.08 million from the 2020 budget

2. Contribution to Technology Collaboration Programmes (TCPs) of the International Energy Agency (IEA)²²⁰

The Commission represents the European Union in the Technology Collaboration Programmes (TCPs) concluded under the framework of the International Energy Agency where it participates in activities in certain areas of energy research. The annual financial contributions will be paid to the entities responsible for managing the following TCPs:

- Geothermal;
- Bioenergy;
- Ocean Energy Systems;
- Smart Grids (ISGAN);
- Greenhouse Gas R&D;
- Concentrated Solar Power;
- Photovoltaic Power Systems;
- Solar Heating and Cooling;
- Clean Coal Centre;
- Wind Energy Systems;
- Renewable Energy Technology Deployment;
- Hydropower;
- Gas and Oil Technologies;
- Energy Efficient End-Use Equipment (4E);
- Clean Energy Education and Empowerment (C3E).

Type of Action: Subscription

Indicative timetable: as of 1st quarter 2018, as of 1st quarter 2019, and as of 1st quarter 2020

Indicative budget: EUR 0.45 million from the 2018 budget and EUR 0.45 million from the 2019 budget and EUR 0.45 million from the 2020 budget

²²⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

3. Contribution to the International Renewable Energy Agency (IRENA)²²¹

The European Union is a member of IRENA. According to the organisation's Statute and Financial Regulation this implies the obligation to pay an annual contribution to its budget covering the participation of the EU in IRENA's activities. IRENA's main objective is to disseminate best practices in the field of renewables as the principal platform for international cooperation in the field, a centre of excellence on renewable energy and a repository of policy, technology, resource and financial knowledge. This includes:

- The promotion of the widespread and increased adoption and the sustainable use of all forms of renewable energy globally, including in the EU, in particular to bring down costs and also to increase market experience, in order to contribute to economic growth and social cohesion as well as access to and security of energy supply
- Support activities for countries in their transition to a renewable energy future
- Reducing of barriers for renewable energy, stimulating best practice and raising awareness.

Type of Action: Subscription

Indicative timetable: as of 1st quarter 2018, as of 1st quarter 2019, and as of 1st quarter 2020

Indicative budget: EUR 0.56 million from the 2018 budget and EUR 0.56 million from the 2019 budget and EUR 0.56 million from the 2020 budget

4. Contribution to the Secretariat of the Clean Energy Ministerial (CEM)²²²

While the Commission has been active in the Clean Energy Ministerial (CEM) since its inception in 2010, the European Union formally became a member on 6 June 2016 when the EU Energy Ministers formally endorsed the CEM Framework Document. This Framework Document is a combination of political commitment and more detailed procedural arrangements of the co-operation, but does not create any legal or financial obligations under domestic or international law.

The CEM Framework Document establishes a multilateral CEM Secretariat to facilitate the long term engagement of all CEM Members in the work of the CEM. This is hosted at the International Energy Agency (IEA) under an "Administrative Arrangement" between the IEA and CEM Members. In order to provide "adequate and predictable financial resources" for the CEM Secretariat, CEM Members are encouraged to provide voluntary contributions on an annual or multi-annual basis.

²²¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²²² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

The CEM consists of a small group of countries²²³ that, together with the European Commission on behalf of the EU, are aiming to accelerate the global clean energy transition. Together they have the potential for making a major impact as they represent about 90% of global clean energy investment and 75% of global greenhouse gas emissions.

The CEM is focused on three global climate and energy policy goals, namely:

- Improve energy efficiency worldwide;
- Enhance clean energy supply;
- Expand clean energy access.

Type of Action: Subscription

Indicative timetable: As of 1st quarter 2018 and as of 1st quarter 2019

Indicative budget: EUR 0.20 million from the 2018 budget and EUR 0.70 million from the 2019 budget

Expert contracts

1. External expertise

This action will support the use of appointed independent experts for the monitoring of actions (grant agreements, grant decisions, procurements, financial instruments).

Type of Action: Expert Contracts

Indicative timetable: As of 1st quarter 2018, 1st quarter 2019 and 1st quarter 2020

Indicative budget: EUR 1.00 million from the 2018 budget and EUR 0.95 million from the 2019 budget and EUR 0.89 million from the 2020 budget

²²³ Australia, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Indonesia, Italy, Japan, Mexico, Norway, Russia, Saudi Arabia, South Africa, South Korea, Spain, Sweden, the United Arab Emirates, the United Kingdom, and the United States) and the European Commiss

CALLS AND OTHER ACTIONS for 2020²²⁴

Indicative topics for 2020

- **Energy efficiency**
 - o Energy efficient industry and services: LC-SC3-EE-7-2020: Increasing energy efficiency of small data centres;
 - o Energy efficiency is an investment: LC-SC3-EE-12-2020: Innovation procurement for energy efficiency;
- **Global leadership in renewables**
 - o Next Renewable energy solutions: LC-SC3-RES-3-2020: International Cooperation with USA on alternative renewable fuels for energy and transport;
 - o Renewable energy solutions for implementation at consumer scale:
 - LC-SC3-RES-9-2020: Next generation of thin-film photovoltaic technologies;
 - LC-SC3-RES-10-2020: Pre-Commercial Procurement for a 100% Renewable Energy Supply;
 - o Renewable energy solutions for energy system level implementation:
 - LC-SC3-RES-18-2020: Demonstration of the solutions based on renewable sources that provide flexibility to the energy system;
 - LC-SC3-RES-19-2020: Demonstration of floating wind farms;
 - LC-SC3-RES-20-2020: Efficient combination of concentrated solar power (CSP) and desalination (with particular focus on the Gulf Cooperation Council (GCC) region);
 - o Renewable Fuels for transport:
 - LC-SC3-RES-25-2020: International cooperation for Research and Innovation on advanced biofuels and alternative renewable fuels;
 - LC-SC3-RES-26-2020: Development of next generation biofuel and alternative renewable fuel technologies from CO₂ and renewable energy (Power and Energy to Fuels);

²²⁴ The budget amounts for the 2020 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2020.

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LC-SC3-RES-27-2020: Demonstration of advanced biofuels production from aquatic biomass;

- Smart and clean energy for consumers: LC-SC3-EC-3-2020: Consumer engagement and demand response;
- Enabling near-zero CO₂ emissions from fossil fuel power plants and carbon intensive industries: LC-SC3-NZE-6-2020: Geological Storage Pilots.

Other Actions for 2020

1. Monitoring and assessment of the performance indicators of renewable energy, investment and RES market trends in Europe

Type of Action: Public Procurement - null

Indicative budget: EUR 2.00 million from the 2020 budget

2. Study on the impact of projects funded under the Horizon 2020 Energy Challenge

Type of Action: Public Procurement - null

Indicative budget: EUR 0.70 million from the 2020 budget

3. Continuation of the Building Stock Observatory and production of relevant bottom-up statistical data on buildings²²⁵

Type of Action: Public Procurement - null

Indicative budget: EUR 1.00 million from the 2020 budget

4. Support facility for public authorities

Type of Action: Public Procurement - null

Indicative budget: EUR 1.80 million from the 2020 budget

²²⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

5. Energy system modelling

Type of Action: Public Procurement - null

Indicative budget: EUR 2.80 million from the 2020 budget

6. Support to R&I Strategy and feedback to policy in the field of electricity networks and local energy systems²²⁶

Type of Action: Public Procurement - null

Indicative budget: EUR 2.95 million from the 2020 budget

7. Smart Cities and Communities information system

Type of Action: Public Procurement - null

Indicative budget: EUR 2.50 million from the 2020 budget

8. Research oriented data sets and open access database²²⁷

Type of Action: Public Procurement - null

Indicative budget: EUR 4.00 million from the 2020 budget

9. Operation, maintenance, improvement and promotion of the BUILD UP interactive web portal

Type of Action: Public Procurement - null

Indicative budget: EUR 2.50 million from the 2020 budget

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²²⁷ These activities directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

10. Studies on the EU energy system in support of policy

Type of Action: Public Procurement - null

11. Concerted Action supporting the transposition and implementation of the recast Renewables Directive

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative budget: EUR 5.00 million from the 2020 budget

12. Concerted Action on the Energy Efficiency Directive support to Member States and participating countries for the implementation of the EED

The action will be implemented by an identified beneficiary(ies) in accordance with Art. 190(1)(e) RAP and Art. 11(2) H2020 Rules for Participation.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative budget: EUR 5.00 million from the 2020 budget

13. Administrative arrangement with the JRC, to implement the relevant provisions of Energy Efficiency related Directives or Regulations, including Directive 2012/27/EU and the EPBD²²⁸

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative budget: EUR 2.50 million from the 2020 budget

14. Technical and scientific assistance to the Covenant of Mayor by JRC

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative budget: EUR 2.00 million from the 2020 budget

²²⁸ These activities directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Budget²²⁹

	Budget line(s)	0 Budget (EU R million)	2018 Budget (EU R million)	2019 Budget (EU R million)	2020 Budget (EU R million)
Calls					
H2020-LC-SC3- 2018-2019-2020			534.30 ²³⁰	620.65 ²³¹	642.81
	<i>from</i>		<i>326.00</i>	<i>302.00</i>	<i>321.92</i>
	<i>08.02030</i>				
	<i>3</i>				
	<i>from</i>		<i>208.30</i>	<i>318.65</i>	<i>320.89</i>
	<i>32.04030</i>				
	<i>1</i>				
Contribution			13.65	13.65	13.65
from this part to					
call H2020-EIC-	<i>from</i>		<i>6.87</i>	<i>6.87</i>	<i>6.87</i>
FTI-2018-2020	<i>08.02030</i>				
under Part 17 of	<i>3</i>				
the work	<i>from</i>		<i>6.78</i>	<i>6.78</i>	<i>6.78</i>
programme	<i>32.04030</i>				
	<i>1</i>				
Contribution				44.00	30.00
from this part to					
call H2020-LC-	<i>from</i>			<i>44.00</i>	<i>30.00</i>
BAT-2019-2020	<i>08.02030</i>				
under Part 20 of	<i>3</i>				
the work					
programme					
Contribution			15.00	15.00	

²²⁹ The budget figures given in this table are rounded to two decimal places.

The budget amounts for the 2019 budget are subject to the availability of the appropriations provided for in the draft budget for 2019 after the adoption of the budget 2019 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2020 budget are indicative and will be subject to separate financing decisions to cover the amounts to be allocated for 2020.

²³⁰ To which EUR 3.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 537.30 million for this call.

²³¹ To which EUR 3.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 623.65 million for this call.

Horizon 2020 - Work Programme 2018-2020
Secure, clean and efficient energy

from this part to call H2020-DT-2018-2020 under Part 5.i of the work programme	<i>from</i> <i>32.04030</i> <i>1</i>	15.00	15.00	
Contribution from this part to call H2020-SU-DS-2018-2019-2020 under Part 14 of the work programme		5.00		15.00
	<i>from</i> <i>32.04030</i> <i>1</i>	5.00		15.00
Other actions				
Prize			3.25	1.70
	<i>from</i> <i>08.02030</i> <i>3</i>		3.25	1.70
Grant to Identified beneficiary		16.10	3.25	11.50
	<i>from</i> <i>08.02030</i> <i>3</i>	4.50	0.25	
	<i>from</i> <i>32.04030</i> <i>1</i>	11.60	3.00	11.50
Public Procurement		35.63	36.94	31.98
	<i>from</i> <i>32.04030</i> <i>1</i>	30.40	33.15	31.15
	<i>from</i> <i>08.02030</i> <i>3</i>	5.23	3.79	0.83
Provision of technical/scientific services by the Joint Research Centre		0.25	0.25	4.70
	<i>from</i> <i>32.04030</i> <i>1</i>	0.25	0.25	4.70

Horizon 2020 - Work Programme 2018-2020
Secure, clean and efficient energy

Delegation Agreement	49.80 ²³²	30.00 ²³³	30.00 ²³⁴
<i>from</i> 32.04030 1	49.80	30.00	30.00
Specific Grant Agreement	0.60	6.30	3.80
<i>from</i> 32.04030 1	0.60	6.30	3.80
Financial Instrument		50.00	50.00
<i>from</i> 08.02030 3		50.00	50.00
Subscription	1.29	1.79	1.09
<i>from</i> 32.04030 1	1.06	1.56	0.86
	<i>from</i> 08.02030 3	0.23	0.23
Expert Contracts	1.00	0.95	0.89
<i>from</i> 08.02030 3	0.25	0.30	0.25
	<i>from</i> 32.04030 1	0.75	0.64
Estimated total budget	672.62	826.03	837.13

²³² To which EUR 5.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 54.80 million for these actions.

²³³ To which EUR 5.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 35.00 million for these actions.

²³⁴ To which EUR 5.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 35.00 million for these actions.