

EUROPEAN COMMISSION

Progress in
**Accelerating Clean Energy
Innovation**
2017

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Highlights

The Communication *Accelerating Clean Energy Innovation*¹ was adopted in November 2016, as part of the Clean energy for all Europeans package. It presents the European Union's strategy to boost research and innovation in clean energy solutions and to bring results to the market quickly and successfully. This report informs on progress made in the 20 policy actions defined in this strategy after one year of implementation.

EU funding for energy research and innovation and its market adoption has increased well above the minimum target figures.

The Horizon 2020 Work Programme 2018-2020² includes over EUR 2 billion for programmable actions addressing the four interconnected priorities flagged in the Communication (decarbonising the EU's building stock by 2050, strengthening EU leadership in renewables, developing affordable and integrated energy storage solutions, and electromobility and a more integrated urban transport system). Accounting for bottom-up activities, the total amount may rise to EUR 3 billion, well above the EUR 2 billion minimum target figure. Additional clean-energy inducement prizes and a pioneer mission-driven approach have also been introduced to foster disruptive innovation in clean energy technologies.

Cohesion policy funds for the 2014-2020 period are also supporting energy research and innovation, based on smart specialisation, with at least EUR 2.6 billion of EU funding available to research and innovation in low-carbon technologies. Five interregional smart specialisation partnerships on bioenergy, marine renewable energy, smart grids, solar energy and sustainable buildings have been launched. Currently, the work on them is advancing, with most of them being at the stage of mapping of the regional innovation capacities and challenges to identify common value chains and possible work on common demonstration projects.

The InnovFin Energy Demonstration Projects (EDP) facility, a financial instrument that supports first-of-a-kind projects has been enlarged both in terms of scope and budget in order to better meet the increased demand for financing the market uptake of new innovative low-carbon energy technologies. Its budget has doubled from EUR 150 to EUR 300 million using Horizon 2020 funds and it is now also able to channel a part of undisbursed revenues from the NER³ 300's first call, which will represent around an additional EUR 456 million. Its scope now covers the four above mentioned priorities, and related innovative manufacturing processes.

More projects have taken off. The Cleaner Transport Facility was launched in December 2016 to accelerate the deployment of cleaner transport vehicles and their associated infrastructure needs. Currently four European Fund for Strategic Investments (EFSI)

¹ COM (2016) 763

² European Commission Decision – C (2017) 7124 of 27th of October 2017

³ NER 300 is a funding programme for innovative low-carbon energy demonstration projects. It is funded from the sale of 300 million emission allowances from the New Entrants' Reserve (NER) set up for the third phase of the EU emissions trading system

projects⁴, representing an investment of approximately EUR 552 million, are ongoing within the scope of the facility, tackling urban transport challenges with low-carbon solutions.

Legislative proposals stimulate low-carbon innovation. Legislative proposals of the **Mobility Packages** adopted in 2017 includes incentives for innovation, which will contribute to strengthening EU competitiveness and pave the way for zero and low-emission vehicles. The **Clean Vehicles Directive**⁵, adopted on 8 November 2017, introduces key innovation considerations in public procurement for fleets using innovative low-emission technologies. Furthermore, innovation is now embedded in the regulation for **energy-efficiency labelling**⁶, as it sets out a procedure for rescaling labels every five years, providing incentives for more efficient and innovative products., and pushing those less efficient out of the market.

Dissemination and exploitation of research results towards investors gained effectiveness. A first set of close-to-market innovative clean energy projects have been brought to the attention of investors. Based on this initial experience conceived in function of investor's needs, a more systematic process for dissemination and exploitation of results is being implemented and will be mainstreamed across Horizon 2020 and past EU Framework Programmes for Research and Innovation.

Member States are increasingly mobilised towards low-carbon technology targets. The Strategic Energy Technology Plan (**SET-Plan**) community has made good progress in developing and adopting implementation plans for its ten priority actions to reach the strategic targets agreed with EU Member States, European industry and research organisations to speed up the energy transition. Out of 14 implementation plans being prepared, four have been adopted in 2017, and their implementation is expected to mobilise up to EUR 7.5 billion until 2030 from both public and private sector. A much higher investment contributing to the goals of Accelerating Clean Energy Innovation is expected to be triggered by the additional IPs (14 in total) currently under preparation. The Strategic Transport Research and Innovation Agenda (**STRIA**), adopted in May 2017, proposes an integrated approach addressing the decarbonisation and digitalisation of transport. In addition, the Transport Research and Innovation Monitoring and Information System (**TRIMIS**), launched in September 2017, supports the design and implementation of the transport research agenda, as it monitors the effectiveness of transport research programmes and provides feedback to decision makers.

EU's global leadership in the clean energy arena is being reinforced. The EU's role and co-operation on international clean energy initiatives has seen a boost with its active participation and leadership in Mission Innovation, a major global initiative on clean energy innovation. Calls for proposals addressing Mission Innovation priorities are included in the Horizon 2020 Work Programme 2018-2020 amounting to more than EUR 150 million. The African Union – European Union Research and Innovation Partnership on Climate Change and Sustainable Energy is due to be endorsed during the November 2017 African Union – European Union Summit. The objectives of this partnership complement and reinforce the

⁴ <http://www.eib.org/projects/sectors/transport/cleaner-transport-facility>

⁵ COM(2017) 653

⁶ 2015/0149 (COD)

activities being implemented under Mission Innovation by ensuring that innovative and affordable clean energy technologies are brought to developing countries.

Other actions require more time to achieve concrete results as they are subject to the Commission Work Programme – such as, state aids, subsidies and synergies with the cohesion policy funds – and some others depend on the interinstitutional agenda – like the governance of the Energy Union. Milestones delivered in 2017 on those actions are provided in this report.

Action 1: State Aid

Description of the action: *"The Commission will also examine, when reviewing the guidelines on State aid for environmental protection and energy 2014-2020 how those rules, together with the State aid rules for research & innovation investments, enable Member States to stimulate innovation in renewable energy technologies and solutions"*

Overview

The Commission is collecting evidence and recommendations to prepare the work on the review of State Aid Guidelines for research, development and innovation, including those for environmental protection and energy, which will start in 2018.

Status Update

In preparation for the review of the State Aid Guidelines, reports assessing and outlining recommendations to EU state aid rules for research and innovation have been published. One report recommends increasing the flexibility of research and innovation state aid, and to place EU innovation policy on an equal footing with EU competition policy⁷. Another report states that the current EU State aid rules are perceived as insufficiently innovation-friendly. As a result, it suggests the EU builds converging and open State Aid regimes with its main trading partners to stimulate research and innovation investment without distorting competition⁸.

Action 2: Subsidies

Description of the action: *"In the Communication "Clean Energy for All Europeans", the Commission sets out a range of actions to help redirect financial flows towards the clean energy transition, including measures to reinforce transparency on the issue of subsidies and their effect on innovation."*

Overview

The Commission is reinforcing its monitoring of fossil fuel subsidies in line with the EU's G7 commitment to eliminate inefficient fossil fuel subsidies by 2025. The forthcoming study on energy costs and prices to be carried out in 2018 will directly address the analysis of energy subsidies.

Status Update

To align the Commission's methodology with that of other international reports (i.e. OECD, IMF, IEA) and reinforce transparency, the scope of the analysis on energy costs and prices has been broadened to include oil consuming sectors beyond energy generation, such as transport and agriculture. Furthermore, as part of the proposal for a Regulation on the Energy Union Governance⁹, Member States are expected to plan and report on the phase-out of fossil fuels subsidies through their integrated national energy and climate plans.

⁷ <https://ec.europa.eu/programmes/horizon2020/en/news/state-aid-support-schemes-rdi-eus-international-competitors-fields-science-research-and>

⁸ see pp. 17- 18 at

http://ec.europa.eu/research/evaluations/pdf/archive/other_reports_studies_and_documents/hlg_2017_report.pdf

⁹ COM(2016) 759 final/2

Action 3: In-depth analysis of legislative proposals

Description of the action: *"Upcoming legislative proposals relevant to clean energy and climate action, amongst others the revision of the post-2020 strategies on cars/vans and on lorries, buses and coaches, will be subject to an in-depth analysis of their impact on research and innovation."*

Overview

Strong incentives for innovation were found in the mobility package and energy labelling regulation adopted by the European Commission in 2016 and 2017. The preparation of the respective impact assessments considered the research and innovation toolkit proposed in the Better Regulation guidelines.

Status Update

The May 2017 **mobility package**¹⁰ includes the **monitoring and reporting of CO₂ emissions**¹¹, which is expected to be a strong driver for innovation and efficiency and will contribute to strengthening competitiveness and pave the way for zero and low-emission vehicles. The second part of the Mobility package, adopted on 8 November 2017, includes a proposal on **low carbon mobility - post 2020 strategy on cars and vans**¹². Its impact assessment looks into the development in the market up to 2016. The impact assessments of both packages include considerations, answers, and/or explanations related to the questions raised in the Better Regulation innovation toolkit checklist¹³, which are relevant to the proposals.

Energy labelling and **ecodesign** policies are strong drivers of innovation. However, the current label has a closed scale from A+++ to D, so once the majority of products reach the highest classes, the innovation triggering effect is weakened. Therefore, the Commission proposed, in the recently adopted regulation for **energy efficiency labelling**¹⁴, a procedure for rescaling the labels approximately every ten years or faster, if technology development moved the market faster than expected. As a result, there is a continuous incentive for choosing more efficient and innovative products, and those less efficient are pushed out of the market. The regulation also foresees the creation of a database of products covered by the energy labelling rules, aimed at improving enforcement and transparency. The database takes effect in January 2019.

The revised **Energy Performance Of Buildings Directive (EPBD)**¹⁵, adopted in April 2017, is also an example of legislation stimulating innovation, in particular as it introduces the concept of 'smart readiness indicator'. This indicator assesses the technological readiness of buildings to use ICT and electronic systems to optimise operations and interact with the grid. It is expected to incentivise the integration of cutting edge ICT-based solutions for energy efficiency in buildings, which will contribute to reduce energy use and facilitate the integration of renewable energy systems.

¹⁰ https://ec.europa.eu/transport/modes/road/news/2017-05-31-europe-on-the-move_en

¹¹ COM(2017) 279 final

¹² COM (2017) 676

¹³ https://ec.europa.eu/info/files/better-regulation-toolbox-21_en

¹⁴ (EU)2017/1369

¹⁵ COM(2016) 765 final, 2016/0381(COD)

This initial monitoring of the role on innovation in legislative proposals is being used to develop a more systematic assessment of impacts on innovation of new Commission initiatives.

Action 4: Standardisation

Description of the action: "Future annual Union work programmes for European standardisation will target Energy Union priorities, notably the decarbonisation of the economy and support for green public procurement."

Overview

The European Commission works closely with CEN, CENELEC and ETSI for the development and adoption of standards. A pipeline of standardisation mandates and studies in clean energy technologies are being implemented. The regulations supported in the standards and mandates adopted in 2016 and 2017 are expected to start having an impact from 2020. In the meantime industry is working on innovating processes to develop products that will meet the new standards.

Status Update

Standards allow faster uptake of innovative solutions, boost the economic value of EU research and innovation projects, and contribute to EU competitiveness. Several EN/ISO standards were published in June 2017 supporting the implementation of the **Energy Performance of Buildings Directive** (EPBD). On **eco-design**, a group of mandates on heating and cooling devices, and welding equipment will be adopted by the end of 2017¹⁶. On **renewables**, standards on **photovoltaics** were adopted this year to harmonise design and improve efficiency (see [annex I](#)), six project teams are active finalising requirements, data sets and formats for **concentrated solar power** (see [annex II](#)), and three test methods were developed for **solar heating and cooling** in 2017 (see [annex III](#)). Also, a Standardisation Request Ad Hoc Group (SRAHG) **Hydrogen** was established in 2017 to reduce technical barriers to the contribution of hydrogen technologies and hydrogen containing energy carriers, supporting the implementation of the directive on the promotion of the use of renewable energy sources¹⁷.

On internationalisation of standards, a "Global **Solar** Certification Network"¹⁸ started activities in 2017, allowing a product that has been certified by one of the participating bodies to obtain certification from other schemes without re-testing and re-inspection of production facilities. This is key to strengthening competitiveness and internationalisation of EU solar energy technologies and products.

For **wind generation** a technical committee under CENELEC (CLC/TC 88 – Wind turbines) is developing standards for wind turbines to demonstrate compliance with European Directives. In the 2018 Union work programme for European standardisation there is a specific action point on developing harmonised standards for wind-turbines to ensure safety and market access. For offshore wind, relevant coordination activities have taken place in the

¹⁶ <http://ec.europa.eu/docsroom/documents/24342>

¹⁷ Directive 2009/28/EC

¹⁸ <http://www.gscn.solar/>

North Seas Energy Cooperation¹⁹, and in Support Group 4 - Standards, technical rules and regulations in the offshore wind sector.

In the area of **sustainable fuels**, in response to Commission mandates²⁰, a group of standards were adopted for natural gas and biomethane, replacement of heavy fuel oil, light fuel oil and for use of bio-oils in stationary combustion engines²¹. In the field of algae, in response to a Commission mandate²², a group of standards for algal products was initiated covering all markets of algal products.

To prepare the ground for network codes on demand response, energy-specific cybersecurity and common consumer's data format, in May 2017, the Commission launched three stakeholder working groups, which include CEN/CENELEC experts, under the **Smart Grids** Task Force. The Commission will report on the progress of the groups in December 2017 and final results by the end of 2018.

Actions have been included in the **2018 Annual Union Work Programme for Standardisation**²³ aiming at: reducing the energy consumption of a variety of devices and appliances, improving the energy performance of buildings' heating and cooling systems, providing better understanding of engine performance and emissions when increasing the proportion of ethanol in petrol (from 10 % to 20/25 %), facilitating global action to reduce greenhouse gas emissions and fuel consumption, and increasing the deployment of green infrastructure.

These actions give an initial signal to industry with regards the path developments in the market are expected to take, triggering the deployment of new technologies and innovation as a result.

Action 5: Public Procurement

Description of the action: " *The Commission will examine options to boost market uptake of innovative clean energy solutions through public procurement, including in the context of the revision of the Clean Vehicles Directive (Directive 2009/33/EC), and through the further development of voluntary green public procurement criteria.*"

Overview

A public procurement package²⁴ which seeks a more active role for public procurement in incentivising the use of innovative products in general was adopted. Activities on public procurement for innovation (PPI) and pre-commercial procurement (PCP) in the area of clean energy innovation have been incentivised through thematic legislative proposals, Horizon 2020, and green public procurement (GPP). The voluntary nature of PPIs, PCPs and GPP limits their impact in driving innovation to accelerate the energy transition.

¹⁹ <https://ec.europa.eu/energy/en/topics/infrastructure/north-seas-energy-cooperation>

²⁰ M475-Biomethane (2010) and M/525 (2013)

²¹ EN 16723-1, EN 16723-2, CEN/TR 17103:2017 and EN 16900:2017

²² M547-Algae and their products.

²³ <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=SWD:2017:284:FIN>

²⁴ COM (572) 2017

Status Update

The initiatives taken in the public procurement package adopted on 3 October 2017 are a step towards incentivising the use of innovative products in general. They will thus support the transformation of the energy system.

More concretely, the revised **Clean Vehicles Directive**²⁵, adopted on 8 November 2017, is expected to increase the impact of public procurement on the market uptake of the Directive. The revision should provide for a reliable and long term policy framework for public bodies and manufacturers that will create additional demand-side stimulus for innovative low- and zero-emission technologies, particularly in the heavy-duty transport sector of urban buses.

Preliminary reports evaluating PPIs and PPCs which have been incentivised through topics in the research and innovation framework programmes indicate the realisations and limitations of public procurement projects funded under FP7 (see [annex IV](#) for a list of topics and projects). Final results from those evaluations are expected to be published by the end of 2018.

In 2017 a topic was launched in Horizon 2020 with the aim of using a PPI actions to boost the market uptake of innovative solutions for energy efficient products and services not yet available on a large-scale commercial basis. Unfortunately, no applications were submitted for this call, despite the Commission activities to promote and increase the understanding of the topic's conditions (see [annex V](#) for details).

In the Horizon 2020 Work Programme (2018-2020) of the Societal Challenge "Clean, secure and efficient energy", a topic on pre-commercial procurement (PCP) in the area of wave energy has been included (see [annex VI](#) for a list of public procurement related topics and projects under Horizon 2020). In addition, the brochure "Public procurement for a circular economy"²⁶ published in October 2017, supporting the circular economy action plan,²⁷ provides introductory guidance and good practice on aspects where public procurement can support the transition to a circular economy and a more efficient use of energy and resources.

Action 6: InnovFin Energy Demonstration Projects & synergies between financial instruments

Description of the Action: *"The European Commission is working towards at least doubling the budget of the InnovFin Energy Demonstration Projects scheme, as well as expanding its scope, using funds channelled from different sources including Horizon 2020, the European Fund for Strategic Investment and others. Synergies with other instruments are being developed, aiming for a one-stop advisory facility to orient potential investors and developers among the different instruments available."*

Overview

The budget of the InnovFin Energy Demonstration Projects (EDP) facility has been increased significantly using Horizon 2020 funds and the undisbursed funds from NER300's first call.

²⁵ COM(2017) 653

²⁶ http://ec.europa.eu/environment/gpp/pdf/Public_procurement_circular_economy_brochure.pdf

²⁷ COM(2015) 614

Its scope has also been broadened to cover additional Energy Union research and innovation priorities. In addition, as per a recent amendment to the European Fund for Strategic Investments (EFSI) regulation, the European Investment Bank (EIB) will increase the financing under the EFSI infrastructure and innovation window for projects that contribute to the COP 21 objectives.

Status Update

The InnovFin EDP facility, a financial instrument that supports first-of-a-kind projects has been enlarged both in terms of scope and budget in order to better meet the increased demand for financing to bring new innovative low-carbon energy technologies to the market. Its budget has doubled from EUR 150 to EUR 300 million using Horizon 2020 funds and it is now able to channel at least EUR 436 million of undisbursed funds from the NER 300's first call. Its scope, initially limited to renewables, has also been broadened to cover storage, smart grids, carbon capture storage and utilisation, as well as innovative services and manufacturing processes in relation to these technologies (see [annex VII](#) for details on the first project financed by the facility). InnovFin EDP is expected to provide valuable feedback on the financing of complex projects to optimise the design of the future Innovation Fund

Under the amended EFSI Regulation, the EIB shall target at least 40% of EFSI financing under the infrastructure and innovation window to support projects that contribute to the EU's climate and energy commitments. So far, climate considerations had not been part of EFSI financing decisions. In addition, the same amendment intends to enhance the role of the **European Investment Advisory Hub (EIAH)**, a one-stop advisory service to guide project promoters and investors. The enhancements include better support for projects contributing to the objectives of the COP 21. It also proposes that the EIAH should actively contribute to the establishment of investment platforms and provide advice on combining EFSI financing with support provided by other sources of EU funding, including European structural and investment (ESI) funds.

Action 7: Cleaner Transport Facility

Description of the action: *"The Commission and the European Investment Bank will set up a Cleaner Transport Facility to support the deployment of alternative energy transport solutions. To build a project pipeline, targeted collaboration initiatives, such as the new deployment initiative for clean (alternatively fuelled) buses, will be promoted."*

Overview

The Cleaner Transport Facility (CTF) was launched in December 2016. Currently there are 4 European Fund for Strategic Investments (EFSI)²⁸ projects within the scope of the Cleaner Transport Facility that represent an investment of EUR 552 million.

Status Update

The objective of the CTF is to support the accelerated deployment of cleaner transport vehicles and their associated infrastructure needs. The initiative focuses on life-cycle cost

²⁸ <http://www.eib.org/efsi/>

models involving risk-sharing financial instruments leveraging private sector funds, unlike more traditional models that entail higher capital investment with a debt burden on the public sector. This will be done through the full range of EIB and European Commission financial products, and advisory services available. Financing could be provided by EFSI and the Connecting Europe Facility (CEF)²⁹. The InnovFin EDP programme under Horizon 2020 could also be used to finance first-of-a-kind innovative energy demonstration projects involving electro-mobility, hydrogen and/or fuel cells.

Currently there are 4 EFSI projects within the scope of the Cleaner Transport Facility:

- Riga Transport Company (EUR 175 million) also involving CEF funds;
- SMT Artois Gohelle - Project BHNS Bulles (EUR 197 million);
- Palma de Mallorca urban bus fleet renewal (EUR 60 million) also involving CEF funds;
- Las Palmas bus rapid transit (EUR 120 million).

Action 8: Exploitation of results towards investors

Description of the Action: *"The Commission, through the European Investment Project Portal and other channels, will bring a pipeline of innovative projects to the attention of investors of the relevant Public Private Partnerships supported under Horizon 2020 and the Knowledge and Innovation Communities InnoEnergy and Climate of the European Institute of Innovation & Technology."*

Overview

A first set of 20 close-to-market innovative clean energy projects have been identified to be brought to the attention of investors via different channels. Based on this initial exercise, a more systematic process for dissemination and exploitation of research and innovation results is being developed and mainstreamed across all Commission services responsible for EU funded projects.

Status Update

To identify and support the initial pipeline of projects to disseminate and exploit their results towards investors, two main tools are being used: the *Innovation Radar* – identification of high potential innovations and the key innovators from FP7, Competitiveness and Innovation Programme, as well as Horizon 2020; the *Support Services for Exploitation of Research Results (SSERR)* – raising the awareness about potential exploitation opportunities and supporting the preparation of business plans for research results in the field of energy.

Currently, some 43 completed and ongoing FP7 and Horizon 2020 projects have benefitted from SSERR out of a pool of about 500 FP7 and Horizon 2020 projects in the area of clean energy. With the help of experts, the projects are now being supported to proceed with the exploitation of key results, which includes also the seeking of investors.

The FP7 and Horizon 2020 projects with close to the market results identified and supported by the Innovation Radar and SSERR will be brought to the attention of investors through the

²⁹ <https://ec.europa.eu/inea/en/connecting-europe-facility>

European Investment Project Portal (EIPP), the European Institute of Innovation & Technology (EIT) with its Knowledge and Innovation Communities (KICs) InnoEnergy and Climate, the European Investment Bank EIB (InnovFin Energy Demonstration Projects EDP), the Smart Specialisation Platform on Energy (S3PEnergy), the European enterprise Network (EEN) and the Covenant of Mayors.

In addition, Projects of Common Interest (PCI)³⁰ in trans-European infrastructure have been brought to the attention of investors through the EIPP. It is worth noting that the Connect Europe Facility (CEF)³¹ can support such projects, yet funding has not been confirmed or additional financing is needed. Among these PCIs there are some with a special focus on developing the infrastructure to integrate renewables, and will have a key role increasing the share of renewables in the energy mix and mainstreaming innovative clean energy sources. Increasing the integration of renewable energy between Ireland and Northern Ireland, connecting new renewables generation between Portugal and Spain, increasing the capacity of hydro-pumped storage in Austria, are among the objectives of some of the PCIs.

Concrete initiatives have been taken with EIT InnoEnergy. A pilot “pitching session”, gathering a group of start-ups selected by InnoEnergy as potential candidates to apply for InnovFin EDP financing, took place on 10 October 2017. The start-ups presented their companies as well as concrete investment cases in front of representatives of the EIB. Based on the outcome of this event and similar ones, these pitching sessions will be repeated and the participating projects will be fed into the EIB’s funnel of investment opportunities.

Bridging the gap between project developers and investors is also at the core of the Energy Efficiency Finance Market Place³² and was the topic of a conference organised on 18 January 2017. The event was one of the largest European conferences on the topic, gathered some 350 stakeholders from the project development and investment communities. Closely aligned to the Smart Finance for Smart Buildings Initiative the event presented over 35 projects and initiatives (mainly Horizon 2020 and ELENA) featuring innovative and practical solutions for mainstreaming the financing of energy efficiency measures.

The Intellectual Property Rights (IPR) helpdesk provides support on IP strategies, which are tightly related to dissemination and exploitation. Investors place great importance on the protection of new applications and products, it is very risky to invest in research findings that are not protected. To date the IPR helpdesk has 226 entities registered in the sector of energy, out of a total of 12,801, which leads to the conclusion that this resource is being underutilised for the dissemination and exploitation of results in the field of energy.

It is important to highlight that not every result can be exploited during the life time of a project or shortly after the completion of a research project; more tangible impacts of the research activities are likely to emerge after the end of the project. Therefore, the Commission is fully engaged in researching methods and tools to track research results beyond the lifetime of a project. These tools are expected to be available for the next Framework Programme for Research and Innovation (post-Horizon 2020).

³⁰ <https://ec.europa.eu/energy/en/topics/infrastructure/projects-common-interest>

³¹ <https://ec.europa.eu/inea/en/connecting-europe-facility>

³² <https://ec.europa.eu/energy/en/events/energy-efficient-finance-market-place>

Action 9: European Innovation Council

Description of the Action: *"The Commission will look at ways to strengthen existing bottom-up approaches to innovation under Horizon 2020 and explore other mechanisms, including a potential European Innovation Council. This will help to better support potentially disruptive technologies, innovations, and business models, including breakthrough innovations for the low-carbon economy which are not foreseen in strategic, mission-driven funding."*

Overview

The European Innovation Council (EIC) pilot introduced in the Work Programme 2018-2020 of Horizon 2020 will have a budget of €2.7 billion dedicated to support radically new, breakthrough products, services, processes or business models with high potential for growth in any topic, including low-carbon energy.

Status Update

As described in the Communications "Europe's next leaders: the Start-up and Scale-up Initiative"³³ and "Investing in a smart, innovative and sustainable Industry"³⁴, the Commission is laying the groundwork during the last phase of Horizon 2020 for the European Innovation Council (EIC). The EIC will be piloted in the coming years and it will reach full-scale with the next Framework Programme for Research and Innovation (post-2020). The pilot will provide support with no thematic restrictions to innovative firms and entrepreneurs with potential to scale up rapidly. The objective is to better support potentially disruptive technologies, innovations, and business models, including breakthrough innovations in any area e.g. low-carbon economy.

The European Innovation Council pilot phase will involve a number of existing Horizon 2020 instruments:

- The SME instrument, which supports innovation projects in individual SMEs through a staged approach
- Future and Emerging Technologies (FET-Open), which addresses early-stage technology-based projects through a bottom-up scheme.
- The Fast Track to Innovation, taking into account lessons learned from the pilot addressing industry led consortia seeking quick market uptake of new solutions.
- Inducement (challenge) prizes which will be identified in areas of breakthrough innovation where an ambitious goal can be defined.

Taken together, these actions represent a budget of approximately € 2.7 billion for the period 2018-20.

The Commission has created a fifteen-member High Level Group (HLG) of Innovators that will help shape the design of a EIC. The HLG has been set up to provide a user perspective on potential reforms to Horizon 2020 to help improve Europe's performance in breakthrough, market-creating innovation.

³³ COM(2016) 733 final

³⁴ COM(2017)479

Action 10: Research & Innovation Priorities in Horizon 2020 Work Programme 2018-2020

Description of the Action: *"The Commission intends to deploy more than EUR 2 billion from the Horizon 2020 work programme for 2018-2020 to support research and innovation projects in four priority areas: (1) Decarbonising the EU building stock by 2050: from nearly-zero energy buildings to energy-plus districts; (2) Strengthening EU leadership on renewables (RES); (3) Developing affordable and integrated energy storage solutions; and (4) Electro-mobility and a more integrated urban transport system."*

Overview

The Horizon 2020 Work Programme 2018-2020 includes over €2 billion for programmable actions addressing the four research and innovation priorities flagged in the Communication. Relevant bottom-up activities will add up to programmable actions that may bring the total amount up to €3 billion, hence well above the €2 billion target figure.

Status Update

Over EUR 2 billion will be dedicated through programmable activities across Horizon 2020 to the four R&I priorities of the Communication. The related calls for proposals will be flagged on the Participant Portal.³⁵

The following table summarises the contributions from the different programme parts. Figures are in EUR million, and reflect the budget for 2018-2019 in the Work Programme, plus estimate amounts for 2020 provided by the lead services.

Programme part	Buildings	Renewables	Storage	Transport	TOTAL
LEIT-NMBP	125	55	175		355
LEIT-ICT	30				30
SC2 (Bioeconomy)		11			11
SC3 (Energy)	300	700	120		1120
SC4 (Transport)				285	285
SC5 (Climate)	24,5		24,5		49
FCH-JU			70	70	140
R&I Infrastructures		18			18
TOTAL	479,5	784	389,5	355	2.008

In line with the experience from the 2014-2015 calls, it is expected that relevant projects to be funded under bottom-up parts (European Research Council, Future and Emerging Technologies, Innovation in SME, Marie Skłodowska-Curie actions, Research Infrastructures) over the period 2018-2020 would provide an additional EU contribution of around EUR 200 million.

Possible bottom-up contribution could also be added through the EIT (European Institute of Innovation and Technology) InnoEnergy, co-funded by Horizon 2020, and that estimates its

³⁵ <http://ec.europa.eu/research/participants/portal/desktop/en/home.html>

investment in the 4 priorities of the Communication over the period 2018-2020 of around EUR 100 million.

In addition, the Research Fund for Coal and Steel (RFCS) contributes by about EUR 15 million per year to the priorities ‘Decarbonising the EU building stock’ and ‘Electro-mobility and a more integrated 'urban transport system’.

Therefore, if bottom-up activities are accounted for, the estimate of contributions to the four R&I priorities of the Communication could amount to EUR 3 billion.

Action 11: Cohesion Policy Funds

Description of the Action: *"The Commission will reinforce the support provided from ESIF through the thematic Smart Specialisation Platforms, notably the ones on energy and industrial modernisation, as a springboard for regional innovation and industrial clusters to work on concrete investment projects in areas such as digital and key enabling technologies and energy efficiency. The four priority areas will be further targeted, mobilising public and private stakeholders in synergy with other EU instruments and funding schemes."*

Overview

Currently, the EU dedicates almost EUR 65 billion³⁶ under European Structural and Investment Funds (ESIF), including national co-funding, to support actions related to the low-carbon economy under Thematic Objective 4. A Communication on Smart Specialisation, adopted in July 2017, proposes launching two pilot actions by end of 2017 to test approaches to commercialise and scale up inter-regional innovation projects in all areas, and to support a limited number of regions in their industrial transition. Energy and transition to low-carbon energy system should be among the topics in the pilots.

Status Update

Funding the transition to a low-carbon EU economy is a priority for the cohesion policy funds, which is revealed by the significant amount of funding allocated to it and the high predominance of energy actions across regions. For the first time, the rules on the European Regional Development Fund (ERDF) for 2014-2020 stipulate a mandatory minimum spending for the low-carbon economy (20% of ERDF resources in more developed regions, 15% in transition regions and 12% in less developed regions).

Taking into account the significant funding available and the immensity of the challenge of shifting the energy system to a low carbon one, it is no surprise that energy related actions are among the most predominant in national and regional smart specialisation strategies³⁷. Work on clean energy innovation is carried out under the energy and the industrial modernisation thematic smart specialisation platforms (TSSP). Within the energy TSSP five partnerships (on marine renewables energy, sustainable buildings, bioenergy, smart grids, solar energy) with 40 regions have been launched in 2016-2017. Currently, a mapping process is ongoing for most of these partnerships.

³⁶ <https://cohesiondata.ec.europa.eu/themes/4>

³⁷ <http://s3platform.jrc.ec.europa.eu/eye-ris3>

Under the TSSP for Industrial Modernisation 14 regions came together under the partnership for *Advanced manufacturing for energy applications in harsh environments* (ADMA Energy).³⁸ The Pilot is focused around several market areas: offshore wind and ocean energy (e.g. wave and tidal). The partnership has finalised the mapping process and drafted preliminary project ideas (e.g. Real condition testing of new materials for offshore: composites, steel, ductile iron and light metals; cost-effective power transfer; optimised corrosion management-including modelling, sensing and design). Currently, the partnership has entered the phase of designing the projects.

In July 2017 the Commission adopted a Communication and related Staff Working Document on "Strengthening Innovation in Europe's Regions: Towards resilient, inclusive and sustainable growth at territorial level." In this Communication two pilot actions were announced to be launched by end 2017: one to test approaches to commercialise and scale up inter-regional innovation projects, and one to support a limited number of regions in their industrial transition. In line with the Commission's priorities, energy and the low carbon transition are expected to be considered a priority in both pilots.

In addition to specific actions in support of energy/low carbon economy, a range of horizontal initiatives and activities contribute to creating synergies between Horizon 2020 and ESIF. One of the existing frameworks that facilitates synergies between Horizon 2020 and ESIF at regional level is the Knowledge Exchange Platform (KEP), a cooperation mechanism between the European Committee of the Regions (CoR) and the European Commission. Within the KEP, energy has been one of the knowledge exchange themes for 2017. Participants to the KEP energy events and study visits shared best practices, discussed on ways to combine different supporting instruments and how to connect and cooperate to address common clean energy challenges.

Action 12: Mission Driven Pilot

Description of the Action: *"In the context of the existing Horizon 2020 funding instruments and rules, the Commission will set up a pilot scheme combining a directive, mission-driven approach to identifying and selecting projects with high potential impact; direct involvement in the day-to-day management of the project and various forms of targeted, tailor-made assistance; as well as existing powers to restructure or terminate funding if agreed milestones are not reached. The scheme will emphasize quick impacts and market relevance reached."*

Overview

The topic of the mission driven pilot introduced in the Work Programme 2018-2020 of the Energy Societal Challenge of Horizon 2020 is titled 'disruptive innovation in clean energy technologies' with a budget of EUR 12 million.

Status Update

To further the impact of EU funding, in preparation to the next Framework Programme for Research and Innovation (post-2020), a mission-driven way of identifying and selecting project proposals will be piloted. The projects funded under this call³⁹ should aim to crack specific technological challenges, while emphasising societal impact and market relevance.

³⁸ <http://s3platform.jrc.ec.europa.eu/adma-energy>

³⁹ LC-SC3-RES-2-2018: Disruptive innovation in clean energy technologies

Two specific fields were identified that lend themselves to disruptive innovation: integration of renewable energy into smart buildings, and sustainable fuels. Therefore, proposals are invited for: photovoltaic windows ('transparent' solar cells), and bionic leaf technology.

Proposals are expected to bring the technologies from Technology Readiness Level 3 to at least 5. 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 the KIC (Knowledge and Innovation Communities) InnoEnergy of the EIT (European Institute for Innovation and Technology) on the feasibility and innovation potential of the proposed solution or application. This review will lead to a first go/no go decision.

The call for proposals will be open on 5 December 2017 and will close on 19 April 2018.

Action 13: Flagship Energy Innovation Inducement Prizes

Description of the Action: *"The Commission intends to launch a flagship Energy Innovation inducement Prize for EUR 5 to EUR 10 million to reward a breakthrough innovation, for example in one of the following areas: (1) Artificial photosynthesis; (2) Low cost, nearly-zero energy building (NZEB) design and construction; (3) Community-based energy trading scheme; or (4) Social innovation in energy and/or transport at city level."*

Overview

In a view of piloting the European Innovation Council (EIC), the Horizon 2020 Work Programme 2018-2020 includes a set of Horizon Prizes. Among the six prizes already agreed, two are connected to the priorities of the Accelerating Clean Energy Innovation Communication: innovative batteries for e-vehicles (EUR 10 million) and fuel from the sun: artificial photosynthesis (EUR 5 million).

Status Update

In line with the European Innovation Council (EIC) goal of developing and supporting breakthrough innovations, a set of flagship inducement prizes (EIC Horizon Prizes) have been included in the Horizon Work Programme 2018-2020, among which two address clean energy innovation:

- Innovative Batteries for eVehicles (EUR 10 million): The challenge is to develop a battery for e-vehicles that enables the same or better performance than current gasoline or diesel-powered vehicles with internal combustion engines, based on abundant, sustainable materials available in Europe.
- Fuel from the Sun: Artificial Photosynthesis (EUR 5 million): The challenge is to build a working bench-scale prototype artificial photosynthesis device that is able to produce a synthetic liquid fuel.

The EIC Horizon Prizes were announced as a 'big bang' to garner maximum publicity with a dedicated event at the Web Summit (6-9 November 2017) in Lisbon. The individual prizes will be launched at separate events following the announcement.

Action 14: Mission Innovation

Description of the Action: *"The Commission will work with Member States such that the European Union plays a leading role within the global Mission Innovation initiative. It will lead the Converting Sunlight Innovation Challenge to create storable solar fuels and the Affordable Heating and Cooling of Buildings Innovation Challenge, and take an active part in the remaining innovation challenges. The Commission will focus on realizing synergies with the private sector including the Breakthrough Energy Coalition."*

Overview

The European Commission, on behalf of the EU, reinforces EU's global influence in the transition to a low-carbon energy system through its leadership in Mission Innovation. Calls for proposals designed for Mission Innovation related activities have been introduced in the Work Programme 2018-2020 of Horizon 2020.

Status Update

In February 2017, the Commission took over the chairmanship of the Mission Innovation Steering Committee from the USA and is also strongly involved in its Secretariat which is led by the United Kingdom since 1st October 2017. On the technical side, the Commission is leading on two Innovation Challenges - 'Converting sunlight into storable solar fuels' (IC5) and 'Affordable Heating and Cooling' (IC7) - and is actively engaged in the five remaining challenges (smart grids, off-grid access to electricity, carbon capture, storage and utilization, sustainable biofuels, and clean energy materials). All these seven Innovation Challenges are contributing to the Energy Union research and innovation priorities.

Calls for proposals designed for Mission Innovation-related activities have been introduced in the Work Programme 2018-2020 of Horizon 2020⁴⁰ for a total amount of around EUR 150 million.

The Second Mission Innovation Ministerial (MI-2) meeting took place in Beijing, China, in June 2017, where senior Ministerial delegates from 22 member nations and the European Commission, on behalf of the European Union, representing more than 80% of the world's public investment in clean energy research, came together to take stock of the progress, and explored opportunities for bilateral, regional and multilateral collaborative projects combining public and private efforts to accelerate the pace toward an affordable, low-carbon future. It was also announced then that the European Commission will co-organise the third ministerial meeting with the Nordic countries (Norway, Finland, Denmark, and Sweden) and the Nordic Council of Ministers' Secretariat, in the Öresund region at the end of May 2018.

Mission Innovation is strengthening the Private Sector Engagement through collaborations with the Breakthrough Energy Coalition (BEC) who committed to invest more than USD 1 billion through the Breakthrough Energy Ventures (BEV) and, since MI-2, with the World Economic Forum.

Mission Innovation is also growing in terms of its membership, in particular from the EU Member States. MI-2 in Beijing welcomed Finland and the Netherlands, and Austria's application is in progress.

⁴⁰ Relevant calls are identified on the Horizon 2020 participant portal.

Action 15: Joint deployment programmes in developing countries

Description of the Action: *"The Commission will work with Member States to launch one or two joint deployment programmes in developing countries in the areas of energy efficiency and renewable, with a focus on Africa as a privileged partner in view of the EU-Africa summit in 2017. Such programmes will couple research and innovation with capacity building in the host country as both components are indispensable elements for reaching success on the ground. The EU financial contribution will consist of contributions originating from Horizon 2020 and/or Development cooperation programmes as appropriate. The initiative will be complemented by technical assistance where needed."*

Overview

Activities towards Africa have been focused on setting the ground for launching relevant Research and Innovation (R&I) cooperation. The African Union (AU) – European Union (EU) R&I Partnership on Climate Change and Sustainable Energy has been endorsed and a dedicated topic on Renewable Energy has been introduced in the Horizon Work Programme 2018-2020. Contributions from development cooperation programmes and technical assistance coupling research and innovation with capacity building in the host countries are being considered for 2018.

Status Update

A framework paper on **AU-EU Research and Innovation Partnership on Climate Change and Sustainable Energy**⁴¹ was endorsed at the Senior Officials plenary meeting of the AU-EU High Level Policy Dialogue on Science, Technology and Innovation held on 17-18 October 2017. The framework paper looks to widen the research and innovation partnership to cover renewable energy, energy efficiency and climate services. Technology development and adaptation, cooperation with private sector and integration of social innovation (how new energy technologies can be incorporated into livelihood activities) are among the key actions of the partnership. The partnership will act as a deliverable of the AU-EU summit in November 2017.

Two topics on renewables⁴² in Africa have been introduced as part of Horizon 2020 the work programme 2018-2020. The total budget available for these initiative amounts to more than EUR 30 million (EUR 16 million from the EU, and at least EUR 15 million from Member States and African countries). The framework for an EU Joint Programming initiative on renewables will be developed in 2018 taking stock of the feedback from the AU-EU Summit and other related activities.

In addition to the upcoming R&I partnership, the Commission is also doing work relevant to clean energy innovation with Africa through other mechanisms. Capacity building in developing countries is undertaken thanks to a specific pool of experts in the field of renewable energy policies and regulations. Relevant missions/assignments performed during 2017 include:

⁴¹ Framework to be endorsed at the AU-EU Summit 2017

⁴² LC-SC3-JA-4-2018: Support action in preparation of a Joint Programming activity and LC-SC3-JA-5-2019: Joint Programming with EU and African partners for a R&I actions in the area of renewable energy

- support to the Ethiopian Energy Authority for Capacity building in policy and regulatory framework and developing rules and procedures for competitive power procurement in a single buyer model;
- support to the Ministry of Energy and Mineral Development of Uganda for Capacity Building on data management;
- support to the African Union Commission (AUC) for the implementation and coordination of the Electricity Harmonization Regulatory Strategy and Action Plan and Harmonization of Transmission System Tariffs;
- support to the "ECOWAS Centre on Renewable Energy and Energy efficiency" (ECREEE) on consolidating the Renewable energy and energy efficiency national action plans.

Past and present EU-ACP Cooperation on Research, Science and Technology has also provided continued support to capacity building and research activities to bring about enhanced knowledge and cooperation in the area of R&I including the dissemination of research results and the introduction of innovative practices targeted on poverty reduction. In particular ACP Science and Technology Programme II supported R&I stakeholders in Africa with projects in the area of energy access/efficiency and renewable/sustainable energy. These projects promoted, for instance: (i) innovative approaches for the development of appropriate practices and reliable technology for anaerobic digestion of bio-waste in the Sudan-Sahel zone; (ii) national networks for improving energy access and efficiency in East Africa; and (iii) capacity of African stakeholders to benefit from biochar technology.

The Intra-ACP Global Climate Change Alliance Plus (GCCA+) programme⁴³, due to start late 2017, will include specific funding for Africa to implement capacity building at regional organisation level and projects related to adaptation to climate change.

Action 16: SME Internationalisation

Description of the action: *"The Enterprise Europe Network will be extended to additional third-country markets to facilitate business cooperation, technology transfer, knowledge transfer and research project cooperation for Small and Medium Enterprises, with the environment, renewable energy and sustainable construction as the most important sectors."*

Overview

In addition to the Enterprise Europe Network (EEN), there are numerous initiatives promoting SME internationalisation, such as the European Strategic Cluster Partnerships (ESCP) for internationalisation and the Low Carbon Business Action (LCBA). Each initiative has successfully supported EU SMEs in clean energy break into third country markets. Yet, coordinated efforts across these different initiatives, could strengthen their activities, increase their international reach and optimise their impact.

Status Update

The **Enterprise Europe Network (EEN)** advises SMEs in all sectors. It has three sector groups directly related to clean energy: 'Intelligent Energy', 'Environment' and 'Sustainable

⁴³ <http://www.gcca.eu/about-the-gcca/intra-ACP>

Construction.' Last year around 101 partnerships were signed related to these three sector groups. These partnerships have helped SMEs break into and go beyond the European market. For example: fast charging electric buses from a Dutch SME, Heliox, have been introduced to the US, Singapore, Australia and New Zealand; and a towable power source for electric cars, from a French SME is targeting through the EEN the French, Californian and Chinese markets.

With regards to expansion to third-country markets, the EEN is now present in 10 countries associated to the COSME programme, and an additional 30 countries worldwide through Business Cooperation Centres, Qatar being the last country to join in April 2017. Following this expansion, the main emphasis now is on ensuring that third country centres are well integrated and participate in the activities (matchmaking, technology brokerage events, company missions) of the network.

In addition to the EEN, there are other specific initiatives also focused on the internationalisation of SMEs, such as the European Strategic Cluster Partnerships (ESCP) for internationalisation, the Low Carbon Business Action (LCBA) in Mexico and Brazil, and the Innovation Centres in China and Brazil.

Within the **ESCP** one of the most advanced partnerships is the Renewable Energy Internationalisation ESCP project for European SMEs (REINA). The partnership has signed 5 Memorandums of Understanding with partners in third markets and it has identified and supported business opportunities on sales distribution, solar and biowaste plants, pilot grids and also opening official local branches.

The **LCBA Mexico** project has 93 formal Cooperation Partnership Agreements signed between European and Mexican companies. The **LCBA Brazil** project has 460 cooperation agreements (CPAs) signed. These agreements are under evaluation and those with more potential to bring their business concepts forward will receive technical assistance for the establishment of commercially-viable business cooperation partnerships by the end of 2017.

The Centre for Europe-Brazil Business & Innovation Cooperation (CEBRABIC)⁴⁴, started at the beginning of 2017. In this first year of activity the business model and the marketing plan have been designed, based on a Brazilian STI (Science Technology and Innovation) market study and on the answers to a questionnaire targeting EU entities on their expectation from an EU business and innovation centre in Brazil.

The European Research and Innovation Centre of Excellence in China (ERICENA)⁴⁵, a project supported by Horizon 2020, was launched in early 2017. The project will set up a network of innovation centres in China under the name ENRICH-China (European Network of Research and Innovation Centres and Hubs in China) promoting European Science, Technology and Innovation (STI) interests in China. ENRICH-China is expected to become financially self-sustainable by the end of the 4-year project duration.

⁴⁴ <http://www.cebrabic.eu/>

⁴⁵ <http://web.spi.pt/ericena/>

Action 17: Strategic Energy Technology (SET) Plan

Description of the Action: *The Commission will work with Member States through the Energy Union governance structures, and in particular through the SET Plan, to align Member State investments under the four priority areas mentioned in [Action 10] and to explore possibilities for developing relevant Important Projects of Common European Interest.*

Overview

The SET Plan has made good progress in developing and adopting implementation plans (IPs) addressing the Energy Union research and innovation priorities. The first four approved IPs are on Concentrated Solar Power/Solar Thermal Electricity, Carbon Capture Storage and Use (CCS/U), Energy efficiency in industry, and Photovoltaic (PV) Energy. The implementation of the concrete actions proposed in the Plans, could mobilise up to EUR 7.5 billion until 2030 from both public and private sectors. A much higher investment contributing to the goals of Accelerating Clean Energy Innovation is expected to be triggered by the additional IPs (14 in total) currently under preparation.

Status Update

The SET plan is framed around actions that match all the research and innovation priorities of the Energy Union. In order to focus efforts and set a concrete direction of travel, last year targets were set for each action. At present the SET Plan is focused on delivering the corresponding IPs to reach these targets endorsed by its steering group. This work is structured around 14 temporary working Groups (TWG) led by SET Plan countries and co-led by the European Industry, where other stakeholders, such as research organisations, also participate.

The TWGs will deliver in 2017 and beginning of 2018 concrete IPs that will provide a strong contribution to the respective SET Plan actions and in particular the four Research and Innovation (R&I) priorities of the Communication 'Accelerating Clean Energy Innovation'.

Concentrated Solar Power / Solar Thermal Electricity presents export opportunities for the European industry, which has led the sector until now. Its IP details specific R&I actions to allow for drastic cost reductions as well as delivery of the next generation of these technologies, representing an investment of up to EUR 200 million – both from the public and private sectors. The Plan also intends to support innovative first-of-a-kind demonstration projects by mobilising up to EUR 1 billion, again from private and public sectors in order to boost the early deployment of these new technologies.

The IP on **CCS/U** identifies eight R&I priorities, including the delivery of a whole chain CCS project operating in the power sector, the setup of regional CCS clusters including hydrogen and a cross border CO₂ transport infrastructure. Overall, the implementation of the eight actions is expected to trigger more than EUR 2 billion in investment from the private and public sectors.

The IP on **Energy efficiency in industry** focuses on two cross-sectorial priorities: recovery of industrial surplus heat and system integration; and two priority sectors: Iron and Steel, and Chemical and Pharmaceuticals. These sectors offer the highest potential in terms of energy savings via R&I, added value and employment. In this IP fourteen R&I activities were proposed for a total investment volume of EUR 3 to 4 billion.

The IP on **Photovoltaic (PV) Energy** presents a set of six R&I priorities, including building-integrated PV (BIPV) and similar applications, technologies for silicon solar cells and modules with higher quality, new technologies and materials, and manufacturing technologies. The total investment needed for the implementation of these activities was evaluated at around EUR 500 million.

Action 18: Governance of the Energy Union

Description of the Action: *"The Governance of the Energy Union will ensure that the national objectives and measures regarding research, innovation and competitiveness, are set out in integrated energy and climate plans and that objectives, policies and measures are coherent with the EU's objectives. In addition, biennial integrated progress reports and the State of the Energy Union reports will ensure the necessary follow-up and monitoring."*

Overview

The integrated national energy and climate plans are a key element of the legislative proposal on the Governance of the Energy Union. The plans' integrated approach across all five dimensions of the Energy Union and their solid analytical base will promote the development of credible and coherent policies and measures, including research and innovation ones. They will represent an important driver for investment and innovation in clean energy as they will provide a long-term vision on national policy objectives and measures. The proposal is currently being discussed in the Council and the European Parliament.

Status Update

The Governance of the Energy Union proposal includes integrated national energy and climate plans, in which Member States will set out their national contributions to the 2030 energy targets and present objectives as well as policies for each dimension of the Energy Union, which includes research innovation and competitiveness. These national Plans would lower regulatory risks for investors, which are considered today as the main risks, and would encourage and reward early-moving Member States that create the right conditions for long-term investments in research and innovation in the five dimensions of the Energy Union.

In the European Parliament, the Industry, Research and Energy (ITRE) Committee and the Environment, Public Health and Food Safety (ENVI) Committee have the joint responsibility for the file; more than 1700 amendments were tabled in the Committee. The vote in the joint ITRE - ENVI Committee is scheduled for 7th of December.

In the Council, discussions have progressed with the aim of having a General Approach by the end of 2017.

Action 19: Strategic Transport Research and Innovation Agenda (STRIA)

Description of the Action: *The Commission will set up a specific governance and implementation structure with Member States and stakeholders on the Strategic Transport Research and Innovation Agenda, to align and further develop strategic plans for long-term transport research and innovation actions and to better link them to the energy sector and digital technologies.*

Overview

The Strategic Transport Research and Innovation Agenda (STRIA)⁴⁶ was adopted in May 2017 in the framework of the Mobility Package for clean, competitive and connected mobility. A governance structure will start in November 2017 overseeing the implementation of the key actions, monitor the process and coordinate research activities.

Status Update

The contribution of Transport Research and Innovation to the Mobility package (also known as STRIA) adopted in May 2017, delivers on the European Commission's Strategy for low emission mobility adopted in July 2016 under the Energy Union, thus it complements the Strategic Energy Technology (SET) Plan.

The agenda outlines seven innovation roadmaps reflecting the 'state of the art' of technologies, identifying focus areas for Research and Innovation (R&I) to enable and deliver a systemic transformation of the transport system in the short-term (2018-2020) and in the medium-to-long term (towards 2030 and up to 2050). The roadmaps identify actions to accelerate the development and deployment of innovative low-carbon technologies in transport, and outline a process for the implementation of the actions connecting policy making and the programming of R&I funding.

More coordination of transport R&I efforts at national and European levels is needed to create synergies and steer joint implementation of R&I priorities. Therefore, following the adoption of the agenda, a governance structure with the involvement of Member States and relevant transport stakeholders (transport related European Technology Platforms (ETPs), industry, academia and civil society) will start in November 2017 to ensure progress and steer joint implementation of the innovation road maps.

A new information and monitoring tool - the Transport R&I Monitoring and Information System (TRIMIS) – was launched in September 2017. It tracks transport R&I actions, allowing for mapping and analysis research trends and innovation capacities across Europe, including interfaces with the energy sector's corresponding tool (SETIS). Its features make it a valuable tool to support the design and implementation of STRIA, as it monitors the effectiveness of transport research programmes and provides feedback to policy and decision makers.

Action 20: Smart, sustainable and inclusive urban demonstration projects and best practices in cities

Description of the action: *"The Commission will stimulate sharing and upscaling of best practices and smart, sustainable and inclusive urban demonstration projects, including those supported under the European Innovation Partnership on Smart Cities and Communities and under Urban Innovative Actions. This will also draw on data and products from the European Commission's Copernicus programme for Earth observation."*

Overview

Initiatives supporting research and innovation in cities are many and extend across a variety of funding streams (Horizon 2020, ESIF, LIFE, EFSI and national funds). All these initiatives

⁴⁶ SWD(2017) 223 final

support projects that have had good results, and there is some exchange of best practice across cities. Yet, more coordinated action for cities and urban environment on clean energy could maximise funding and yield even greater results.

Status Update

Innovation supporting the transformation of cities to more sustainable and low carbon entities is strongly supported by multiple EU policies, initiatives, projects and platforms. A first attempt to provide a systemic overview of EU Research and Innovation actions on cities is the RTD publication "*EU Research & Innovation for and with Cities - Yearly Mapping Report September 2017.*"⁴⁷

Sharing best practices and projects - The European Innovation Partnership on Smart Cities and Communities⁴⁸, the Smart Cities Information System⁴⁹, the Joint Programming Initiative Urban Europe⁵⁰, the Urban Development Network⁵¹ the Knowledge Exchange Platforms, the Covenant of Mayors capacity-sharing corner, the Smart Sustainable Districts (SSD) by Climate-KIC⁵², Think Nature⁵³ and Oppla⁵⁴ and the Transport Research and Innovation Monitoring and Information System⁵⁵ are platforms, or encompass platforms, that support the knowledge exchange and dissemination of clean energy solutions developed by city authorities, project developers, research institutions, and universities. These initiatives look to reduce fragmentation in research whilst simultaneously strengthening innovation through capacity building and replication of best practices across European cities. Each of the platforms facilitate knowledge exchange within the cluster of projects and stakeholders related to the funding stream supporting them, yet a wider exchange of best practices could be achieved by sharing information across EU and national funding and financing initiatives for cities.

The Urban Agenda for the EU, Pact of Amsterdam⁵⁶, is an initial step at building bridges and connecting all initiatives and best practice derived from them, through existing European policies, instruments, platforms and programmes. A city portal on the Europa website⁵⁷ was established as a one-stop-shop of EU initiatives for cities. It includes a page on energy transition that maps the tools and initiatives available in the energy domain for cities.

Upscaling best practices and projects - The EU supports multiple initiatives to upscale projects to city-wide or cross-city solutions: Horizon 2020 Large Scale Demonstration

⁴⁷ <https://publications.europa.eu/s/dIqF>

⁴⁸ <http://eu-smartcities.eu>

⁴⁹ <http://www.smartcities-infosystem.eu/>

⁵⁰ <http://jpi-urbaneurope.eu/>

⁵¹ http://ec.europa.eu/regional_policy/en/policy/themes/urban-development/network/

⁵² <http://www.climate-kic.org/flagship-projects/smart-sustainable-districts/>

⁵³ <https://www.think-nature.eu/>

⁵⁴ <http://oppla.eu/nbs/case-studies>

⁵⁵ <https://trimis.ec.europa.eu/>

⁵⁶ http://ec.europa.eu/regional_policy/sources/policy/themes/urban.../pact-of-amsterdam.pdf

⁵⁷ <https://ec.europa.eu/info/eu-regional-and-urban-development/cities>

Projects for smart and sustainable cities⁵⁸, CIVITAS⁵⁹, Public-Private Partnership on Energy-efficient Buildings, the Market Place⁶⁰ of the European Innovation Partnership on Smart Cities and Communities, LIFE Projects, Urban Innovative Actions, and the Belmont Forum Sustainable Urbanisation Global Initiative. The first four support projects with an advanced technology readiness level (TRL) to reach the market. Under Horizon 2020 a dedicated European City facility will be launched as part of the Commission work programme 2018-2020. It will provide financial advice to local and regional authorities to develop well-conceived, comprehensive investment concepts within a limited period of time. The initiative is complementary to ESIF, EFSI, the European Investment Advisory Hub, and the Smart Specialisation Platform on Energy and has the potential to further promote and support absorption rates of both ESIF and EFSI.

Copernicus, the EU Earth observation programme, and the Group on Earth Observations (GEO) could also play a role in the dissemination, upscaling and fine-tuning of clean energy city solutions. Both can be used for the monitoring of resources, access to these and modelling of impacts. GEO has two areas related to cities in its strategic plan: Spatial modelling of impact, exposure and access to resources; and Global Urban observation and information, which will coordinate urban observations, monitoring, forecasting and assessments of initiatives worldwide.

⁵⁸ <https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/calls/h2020-scc-2016-2017.html#c.topics=callIdentifier/t/H2020-SCC-2016-2017/1/1/1/default-group&callStatus/t/Forthcoming/1/1/0/default-group&callStatus/t/Open/1/1/0/default-group&callStatus/t/Closed/1/1/0/default-group&+identifier/desc>

⁵⁹ <http://civitas.eu/>

⁶⁰ <https://eu-smartcities.eu/>

Annex I – Photovoltaic Energy Standards adopted in 2017

- Marking and documentation requirements for Photovoltaic Modules (EN 50380:2017 (pr=25384))
- Photovoltaic devices - Part 1-1: Measurement of current-voltage characteristics of multi-junction photovoltaic (PV) devices (EN 60904-1-1:2017 (pr=61781))
- Photovoltaic devices - Part 8-1: Measurement of spectral responsivity of multi-junction photovoltaic (PV) devices (EN 60904-8-1:2017 (pr=61782))
- Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-4: Special requirements for testing of thin-film Cu(In,Ga)(S,Se)₂ based photovoltaic (PV) modules (EN 61215-1-4:2017 (pr=61204))
- Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures (EN 61215-2:2017/AC:2017-07 (pr=65363))
- Measurement procedures for materials used in photovoltaic modules - Part 1-6: Encapsulants - Test methods for determining the degree of cure in Ethylene-Vinyl Acetate (EN 62788-1-6:2017 (pr=60773))
- Concentrator photovoltaic (CPV) modules - Thermal cycling test to differentiate increased thermal fatigue durability (EN 62925:2017 (pr=60901))

Annex II – Concentrated Solar Power IEC/TC117 Active Project Teams

- Creation of annual solar radiation data set for solar thermal electric plant simulation [close to finalisation]
- Data format for meteorological data sets [close to finalisation]
- Thermal energy storage systems - General characterization
- General requirements and test methods for parabolic-trough collectors
- General requirements and test methods for solar receivers
- General requirements and test methods for linear Fresnel collectors

Annex III - Solar Heating and Cooling – Test Methods developed on 2017

- Test methods for mechanical load on support of close-coupled solar water heating systems
- Test methods for close-coupled solar water heating systems - reliability and safety
- Test methods and requirements for building integrated collectors and systems

Annex IV - Pre-Commercial Procurement (PCP) and Public Procurement of Innovative Solutions (PPI) funded by FP7 and CIP relevant to clean energy

- **SPEA (PPI)** – Smart Procurement European Alliance - energy efficiency's improvement in municipal buildings – 2.1 million Eur
<http://www.speaproject.eu/>
- **Inno booster Light & Furniture** (Inno booster in LIFE – PPI) – supporting public procurers in purchasing new and improved solutions in the field of resource efficient interior and exterior lighting as well as innovative office solutions. – 1.7 million Eur
<http://www.inno booster.eu/about-inno booster/>

- **PRACE 3IP (PCP)** – Consortium of research infrastructure centers that conducts a PCP that focuses on increasing the energy efficiency of high performance computing. <http://www.prace-ri.eu/pcp/> - 26.6 EUR million.
- **ENIGMA (PCP)** – Consortium of cities that planned to implement a joint transnational pre-commercial procurement (PCP) procedure in the field of public lighting. – EUR 5.4 million.
-- *Stopped after the preparation phase of the project. The preparation phase revealed that the solutions proposed already existed, and hence, no need to start a PCP*---
<http://www.enigma-project.eu/en/>
- **CHARM (PCP)** - Consortium of road management authorities that conducts a PCP to improve traffic throughput, road safety, CO2 footprint and reduce the costs of traffic management by moving to an open modular architecture for Traffic Management Centres equipped with advanced traffic management, traffic prediction and cooperative systems.
<https://www.rijkswaterstaat.nl/english/about-us/doing-business-with-rijkswaterstaat/charm-pcp/index.aspx> - 8.6 million eur
<https://www.rijkswaterstaat.nl/english/about-us/doing-business-with-rijkswaterstaat/charm-pcp/index.aspx> - EUR 8.6 million.
- **PAPIRUS (PPI)** - introduced new public procurement process focused on providing materials characterized by nearly zero energy consumption for the repair and construction of buildings in four European locations.
<http://www.papirus-project.com/index.php/project>
- **PROBIS (PPI)** – **promoting bidding through innovative solutions aimed at increasing energy efficiency** and sustainability of European public buildings.
<http://www.probisproject.eu/>

Annex V - Observations on EE-19-2017: Public Procurement of Innovative Solutions for energy efficiency

These observations are based on feedback received from stakeholders, when presenting and promoting EE-19-2017

The 35% co-funding rate for all PPI or PCP activities

- The implementation of the 35% co-funding rate was a major source of concern and requests for information. Many of the questions were on how the so-called 'facilitators,' such as independent consultants and consultancy firms, could cover their costs for participating in the project as a consortium partner at a 35% co-funding rate. Being subcontracted to a (public) procurer was not considered as a valid solution, due to the budgetary constraints most (public) procurers face.
- The existing text allows for a flat rate of 35% co-funding for a PPI Action. A maximum of 50% of the total estimated eligible costs can be allocated to the estimated eligible costs of coordination and networking activities, yet these expenses tend to be substantial.
- Before H2020 (in FP7 and CIP) two different funding rates were used within the PCP/PPI projects:

- A high funding rate for reimbursing all costs for the coordination activities throughout the whole project (was 100% in FP7 and 95% in CIP, but with the indirect costs on top of that it covered actually always 100% of all the coordination costs)
 - A lower funding rate for co-financing the actual procurement cost (which was in the range of 20%-35% for PPIs and 75% for PCPs)
- In FP9, the possibility to have two different funding rates within one project (one for the coordination activities and another for the procurement cost) could be reintroduced.

The high number of requirements to apply

- Compared to other types of actions, the PPI Action call in energy as such is considered quite challenging by some stakeholders as it sets high requirements on potential proposal submitters, compared to the relatively low funding rate of 35%. This was likely to have discouraged those willing to submit a proposal, despite the additional guidance provided by EASME through workshops and webinars.

The risk adverse nature of public procurers

- Public procurers are now getting familiar with the concept of Green Public Procurement, however, its implementation still encounters a lot of difficulties. This rather new instrument (PPI) might have been too demanding for what is basically a risk-averse target audience that deals with budgetary related constraints, and changing political realities at the local and regional level.

The lack of financial capacity at the supply side

- Especially for Small and Medium-sized Enterprises it remains a challenge to respond to the call for tenders as part of a PPI procurement. Without support from national, regional or other budget lines it the companies own budget does not always allow to cover all the costs for the development of the innovative solutions (CEPPI 2 consortium meeting and workshop, 15 and 16 November 2017).

Annex VI - Horizon 2020 public procurement topics and projects relevant to clean energy

EE 8 – 2014: Public procurement of innovative sustainable energy solutions (EUR 1-1.5 million per project)

1. **CEPPI 2** (Network) – building organisational capacity in city authorities (Birmingham, Budapest, Castelló & Valencia, and Wrocław) on how to achieve more sustainable energy solutions through a pro-innovation procurement approach (PPI) and to demonstrate this by selectively intervening in scheduled public tenders.
<http://www.ceppi.eu/home/>
2. **EURECA** (Network) – tackling the lack of knowledge and awareness of how to identify and procure environmentally sound and greener data centres. The work

encompasses solutions for pre-commercial procurement (PCP) and procurement of innovative solutions (PPI).

<https://www.dceureca.eu/>

3. **GreenS** (Network) –establishing support units within participating Energy Agencies to strengthen the capacity of public authorities to successfully apply GPP with priority and enhance their ability and capacity to save energy, reduce CO2 emissions and costs.

<http://greensproject.eu/en/>

4. **SPP Regions** (Network) – promoting strong networking and collaboration among municipalities in seven European regions on sustainable and innovative procurement (SPP/PPI), whilst building capacity and transferring skills and knowledge.

<http://www.sppregions.eu/home/>

SCC 4 – 2014 [2]: Establishing networks of public procurers in local administrations on smart city solutions

This call was cancelled. The proposals received were considered low quality by the evaluators.

MG-4.4-2016: Facilitating Public Procurement of innovative Sustainable transport and Mobility Solutions in urban areas (EUR 2 million)

1. **BuyZET** (Network) - develop innovative procurement plans to help the participating cities achieve their goals of zero emission urban delivery of goods and services.

<http://www.buyzet.eu/>

2. **SPICE** (Network) – Facilitating public procurement of innovative sustainable transport and mobility solutions in urban areas.

<http://spice-project.eu/>

EE-19-2017: Public Procurement of innovative solutions for energy efficiency (EUR 4.2 M)

No proposals received.

LC-SC3-JA-2-2019: PCP for a Wave energy research and development (EUR 15M)

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

Annex VII – Selection of examples of realisations contributing to Accelerating Clean Energy Innovation

Contribution to Action 1 – State Aids

State Aid in Member States incentivising the energy transition

Commission approves €45 million Czech support scheme for refuelling and recharging stations for low emission vehicles. Companies already active in the alternative fuels sector can apply for this support. The Commission considered the public support appropriate as the Czech Republic demonstrated that the aid was necessary to incentivise operators to develop the national network at the required pace and density. The measure will encourage a significant uptake of vehicles running on alternative fuels, and therefore make an important

contribution towards meeting the common interest of reducing emissions and improving air quality. The measure is also in line with the European Strategy for low emission mobility, particularly in terms of speeding up the deployment of low-emission alternative energy for transport and contributing to the decarbonisation agenda. Energy efficiency is key to Europe's clean energy transition and a central policy for achieving the Paris Agreement objectives.

Contributions to Action 5 – Public Procurement

Green Public Procurement (GPP) in the Municipality of Rotterdam – Energy Efficiency in Swimming Pools

The Municipality of Rotterdam identified the need to make cost, resource and energy savings in its €2 billion worth of real estate that could also contribute to the CO₂ reduction targets. Public swimming pools were identified as key facilities for potential improvement, and a call for tenders was launched.

The tender required guaranteed energy savings, quality of the swimming pools and comfort for users in terms of water and air temperature, humidity and chemical concentrations. Contract partners had to be able to guarantee performance and had to have experience delivering the City's requirements.

The award of the contract was based on the energy savings offered by the bidders and the maintenance costs. The winning contractor guaranteed annual energy savings of 34%. The contractor receives a financial bonus for energy savings of over 34% each year or cumulative penalties if they fall short.

Work started within a month of awarding the contract, the first phases of which included maintenance and an improvement in user comfort. In 2011 installations for saving energy were prepared, as energy savings started to be reported from 2012.

Green Public Procurement (GPP) in the City of Bremen

A public tender was published at the EU level by the City of Bremen to cover the electricity requirements for a number of local public entities, including Bremerhaven Municipality, from renewable energy sources.

The additional costs associated with the green requirements included in the tender were calculated at about 0.1 cent/kWh, or approximately 69,000 euro per annum. Bremen's political mandate for green procurement enables it to absorb certain higher costs from switching to green electricity. The CO₂ savings associated with Bremen's purchase are estimated at 75 percent, compared to a supply from non-green sources.

More examples: http://ec.europa.eu/environment/gpp/case_group_en.htm

Contribution to Action 6 – InnovFin Energy Demonstration Projects (EDP)

WaveRoller – a first-of-a-kind unveiling the untapped potential of wave energy

WaveRoller is an innovative device, produced by a Finnish company, converting ocean waves into energy and electricity. In 2012, a grant from the EU Framework Programme for

Research and Innovation supported the development of the first operational prototype, and in 2016, a loan provided by InnovfinEDP is supporting the preparation of a commercial scale demonstration, producing 350 kW of electricity, in Portugal. In 2017, the device was the first one of its kind to receive a design appraisal certificate by the Lloyd's Register (a recognised maritime classification society), guaranteeing its functionality and reliability. This certification is key to exploiting results, and gets WaveRoller a step closer to the market. In addition to InnovFinEDP, a group of investors are also backing this break-through technology, such as: Aura Capital, Fortum, John Nurminen Oy and Sitra. The global market potential for the WaveRoller technology is high – estimated at over 200 GW based on feasible sites.

Contribution to Action 7 – Clean Transport Facility **Las Palmas, MetroGuagua**

During summer 2017 the Las Palmas bus company Guaguas Municipales and the municipality will implement an ambitious project to tackle the challenge of moving people around the city. The project is called MetroGuagua.

The MetroGuagua project will provide a bus rapid transit system, comprising:

- a segregated 11.7 km double lane for buses,
- three bus stations,
- 17 stops, one every 500 metres,
- 17 hybrid-electrical buses carrying 4 500 passengers in a peak hour
- a traffic management and control system at the junctions.

With a EUR 50 million loan, the European Investment Bank backed half the total cost of the loan.

"With the current guaguas (busses), it can take up to 50 minutes to go from Hoya de la Plata to Manuel Becerra," says Augusto Hidalgo Macario, Mayor of Las Palmas, describing a trip through a busy section of the city. "With MetroGuagua, it will take 20 minutes, whether there is traffic or not. It is a mobility revolution, transforming the whole urban setting of the city."

Contribution to Action 8 – Exploitation of results towards investors **Broadbit, winner of the Innovation Radar Prize in 2015:**

Broadbit, a Slovak project, started with a grant from the EU Framework Programme for Research and Innovation to develop a software for estimating remaining battery energy, and is now developing a longer term solution to mobility: a sodium-based battery technology. The project potential was discovered through the Innovation Radar project platform, and it was awarded the Innovation Radar Prize in 2015. Winning this prize gave the project visibility and credibility to advance discussions with investors. Broadbit managed to secure enough venture capital (VC) to continue developing the technology. In 2016 it secured a EUR 450k loan from the Finnish government. It has been awarded numerous recognitions and innovation awards and is now developing with Fraunhofer the manufacturing process for a high power and low cost battery capable of fully recharging in 5 mins. In the short term

Broadbit is looking to have the batteries used in aircrafts and electric bikes. The mid-term goal is to have the batteries used in electric cars, buses and trucks; and in the long term it looks to have applications in grid storage.

- Follow-up Blog post authored by founder of Broa Broadbit rdbit published after they won the prize: <https://ec.europa.eu/digital-single-market/en/blog/path-ahead-broadbit-winner-innovation-radar-prize>
- 4 minute euronews TV programme about Broadbit: <https://www.youtube.com/watch?v=IDVCLfvqxcc>
- Company website: <http://www.broadbit.com/> (in particular look at [the wide range of applications](#) they are aiming at with their tech)

CorPower Ocean

CorPower Ocean's aim is to establish a new generation of highly effective wave power for utility-scale energy generation offering a cost of energy that can compete with established energy resources and also has potential to serve grid balance purposes. It has developed a compact high-efficiency Wave Energy Converter (WEC), inspired by the pumping principles of the human heart, a disruptive innovation.

The company's go-to market is rigidly structured along the methodology for marine energy standards developed by FP7 project EquiMar. Since 2012, the company is supported by InnoEnergy's Highway™ through services along the axis of market, technology, finance, and people as well through an Innovation Project "HIWave" that brings forward the development of the solution. In parallel, the WEC's reliability and performance is improved through the H2020 project "WaveBoost", thereby further reducing the technical risk of the endeavour.

In July 2017, CorPower Ocean has deployed its 1:2 prototype in open sea conditions to demonstrate the system in operational environment. CorPower Ocean has the potential to manifest European leadership in 2nd generation wave power, with value created both in Sweden (35%) and locally (65%)

6 min introduction to the company and its product, May 2017:
<https://www.youtube.com/watch?v=mBOcFIg6zp0>

Introduction to the BoostWave project, on Iberdrola's Youtube-channel, supported by H2020:
<https://www.youtube.com/watch?v=MckUued2PkA>

Introduction to the HiWave project supported by InnoEnergy:
<https://www.youtube.com/watch?v=ffOHZ09Jkos>

Company website: <http://www.corpowerocean.com/>

Skeleton

Skeleton Technologies is the global leader in graphene-based ultracapacitors and energy-storage systems. The company delivers high power, high energy, reliable and long-life storage solutions across industry, with a current customer base in global engineering companies, the European Space Agency and several Tier 1 automotive manufacturers.

Skeleton Technologies received support from EU funds, including the European Regional Development Fund, the European Social Fund and InnoEnergy, giving it access to capital, market entry and market prospection and entry services, as well as technological expertise. In early 2017, the European Investment Bank (EIB) signed a 15mEUR ‘quasi equity’ financing with Skeleton Technologies. This innovative, EFSI-backed financing scheme complements EUR 26,7million private investment for the company to finance the R&D for the further development of its products and systems. Shortly after, Skeleton Technologies opened the largest ultracapacitor factory in Europe, bringing 50 jobs to the area of Saxony in Germany by 2019.

Supercapacitors play a vital role in the energy transition, in particular the change in the transportation sector.

Press release: Skeleton Technologies Chosen as One of Bloomberg New Energy Pioneers for 2017: <https://www.skeletontech.com/news/skeleton-technologies-chosen-as-one-of-bloomberg-new-energy-pioneers-for-2017>

Press release: Skeleton CEO Discusses Ultracapacitors with President of Germany <https://www.skeletontech.com/news/skeleton-ceo-discusses-ultracapacitors-with-president-of-germany>

Video “Every head of ultracapacitors?”, published by EIB: <https://www.youtube.com/watch?v=zWkOFuzkZxo>

Company website: <https://www.skeletontech.com/>

Minesto

Minesto together with its university and RTO partners has applied for InnoEnergy support for testing and demonstration site for the DeepGreen technology. The customized support was offered through innovation projects – where they have had access to a large network of European partners, expertise and funding.

Following the results of the demonstration and tests Minesto was awarded a EUR 13 million grant from the European Regional Development Fund through the Welsh European Funding Office (WEFO), part of the Welsh Government, for the commercial rollout of Deep Green. This is the first commercial-scale project – and also the first low-velocity tidal energy project in the world. Since 2016, Minesto gathers experience in open sea conditions to enhance the structural and power performance of the power take-off (PTO) for the ground-breaking Deep Green tidal energy technology in the H2020 project “PowerKite”

2 min video introducing Minesto’s Deep Green technology: <https://www.youtube.com/watch?v=MbHDrGK7Wus>

Company website: <https://minesto.com/>

Contributions to Action 11- Cohesion Funds

Synergies between Horizon 2020 and ESIF in the area of energy

Combining funding from the Framework Programme/Horizon 2020 and ESIF (and/or from other sources) for **coordinated parallel actions that complement each other:**

Wave & Tidal power generation developments in northern Scotland (Caithness & Orkney)

The regions of Caithness & Orkney are characterised by significant natural resource advantage for the wave and tidal power generation, and therefore, a long-term public-private strategy has been developed for this purpose. Both ERDF and national funds have been invested in upgrading infrastructure, such as harbours, the European Marine Energy Centre campus, and funding support has also been provided to high-tech start-ups and infrastructure for renewables, such as the construction of a marine renewables service base at Copland's Dock in Stromness. All these activities prepared the ground and created the enabling environment for pre-commercial R&D and testing projects on wave energy supported by FP7/Horizon 2020, such as the Scotrenewables-led Floating Tidal Energy Commercialisation (FloTEC) project, and Wello's Clean Energy for Ocean Waves (CEFOW). Furthermore, now the world's first large-scale tidal energy farm has been launched in Pentland Firth (the strait separating the Orkney Islands from Caithness), the Flagship 'MeyGen Tidal Array,', Horizon 2020 funds are contributing its development and second phase, and negotiations for further EU financing are ongoing.

Montieri District (Italy) Heating System

The project developed a highly innovative district heating network in the conurbation of Montieri (province of Grosseto - South Tuscany). It is a significant example of the use of geothermal energy and other renewable resources, while making use of advanced technological systems. The project coordinators integrated two EU funding instruments to support the project: Por CReO FESR 2007-2013 Toscana (ESIF), and GeoCom-Geothermal Communities - programme co-financed by the European Commission under the "CONCERTO" initiative of the 7th Framework Programme for Research 2007-2013.

Fuels Cells and Hydrogen developments in Belgium and the Netherlands

In Flanders and southern Netherlands cohesion funds and research funds have contributed to advances in fuel cell and hydrogen technologies. The Interreg Project 'Hydrogen Region' (cohesion funds), coordinated by WaterstofNet have been an enabler for the two regions to launch demonstrations of fuel cell-powered buses and waste collection trucks, and a 1MW fuel cell plant using hydrogen in a smart grid environment. Through the FCH Joint Undertaking (under FP7) a project in Belgium was funded, and resulted in: (1) the first hydrogen refuelling stations for passenger cars in Zaventem, and (2) Colruyt's hydrogen production facility for its fuel cell forklift fleet in Halle.

The Clean Sky Joint Technology Initiative investing major efforts in stimulating cooperation and synergies with ESIF in aeronautics research across regions in Europe

The 'Clean Sky 2' - the Joint Technology Initiative between the European Commission and the European aeronautics industry - that among its main goals contributes to the transition

towards the low carbon economy by reducing aircraft emissions, including CO₂ - has developed a methodology to concretely implement synergies. The goal is to reinforce the R&I capacity and the European dimension of regions in aeronautics, as well as to identify complementary areas of technical cooperation and to have a leverage effect from the synergies between ESIF and Clean Sky 2 funding, thus ensuring a higher impact of the cumulative innovation investment. This initiative has mapped the smart specialisation priority areas of the regions and has so far signed Memoranda of Understanding with 13 interested regions/Member States aiming at an exchange of knowledge and jointly developing methods to complement and leverage Clean Sky technical content with further or parallel actions co-funded by ESIF. This approach has a high relevance for the 'widening' Member States and could certainly be adapted by other initiatives.

Funding actions that **build research and innovation capacities of actors aimed at participating in the Framework Programme/Horizon 2020** or other internationally competitive research and innovation programmes (sequential – upstream):

Research capacity of Wroclaw Research Centre EIT (Poland) supported by ESIF

The ESI Funds were invested in building up the laboratories of the Wroclaw Research Centre EIT+ (WRC EIT+) which is a company established by the Wroclaw universities, City of Wroclaw and the Lower Silesia Region. WRC EIT+ is a research and development organisation, focused on the development of innovations, new technologies and research for the needs of industry and modern economy. It combines the features of an advanced technology park, thematic cluster, as well as research and development institute. As a result of effective research capacity building with the support of ESIF, WRC EIT+ is today a partner, inter alia, in a successful Horizon 2020 project 'CEPPI - Energy efficiency' through innovation procurement' that aims to build capacity of cities on how to achieve more sustainable energy solutions through a pro-innovation procurement approach and to demonstrate this by selectively intervening in scheduled public procurement tenders. The interventions will involve five cities with different economic and political situations and provide the case-based evidence for replication by others. The project was funded under the Call H2020-EE-2014-3-MarketUptake.

Contribution to Action 16 – SME Internationalisation **Construction of Bio-gas plants in China**

The EEN sector group intelligent energy organized matchmaking sessions at the occasion of the Biogaz Europe event. EEN staff from Lombardy (Italy) facilitated contacts between an Italian company specialised in the design, construction and management of biogas power plants, and a company from North-East China active in the production of cement, metallurgical machinery and equipment manufacturing company. The Chinese company met the Italian company to discuss their potential cooperation. Following the event, both companies started a cooperation aimed at the construction of biogas plants in China.

Greek boiler maker supplies energy efficient boilers and know how to Brazil

An EEN partner in Greece helped a Greek boiler-making and engineering company to obtain financial support towards the costs of travelling to a matchmaking event on Energy

Efficiency in Industry organized by the EEN Business Cooperation Centre in Sao Paolo. Participation in this event, and the additional follow-up services provided by EEN enabled the business to sign 3 MOUs with Brazilian businesses, enabling the Greek company to export its products to Brazil, and also to provide expert technical assistance for improvements in energy efficiency.

Swedish know-how for heating systems

EEN partners in Sweden and Central China organised a matchmaking event in Wuhan and facilitated an collaboration between a Chinese boiler manufacturing company and a Swedish company specialised in heating systems. They will develop a whole new series of products for the Chinese company as well as improve the Chinese company's existing products. The Swedish company will also introduce new fuels for the Chinese heaters, like waste incineration and pellets and help the Chinese company to become more energy efficient.

Platform for clean tech development for EU and Qingdao Region enterprises

EEN partners in Italy and China facilitated contacts at the occasion of the 11th EU-China Business & Technology Cooperation Fair (Qingdao) to create a platform that will jointly promote exchanges and cooperation between EU Countries and Qingdao Region enterprises, universities and science parks in fields of Clean tech development and technology transfer, as an important gateway for environmental technology cooperation between EU and China.

All parties shall be responsible to carry out a specific research to the technology and cooperation demands on the platform, identify the representing companies international cooperation demands, list them, and introduce them to the Platform.

Helping an SME obtain SME-instrument funding and find new international markets for its technology

A Spanish EEN member helped a Spanish SME, which wanted to scale up and expand its market share, improve its business model and apply for EU funding through the SME Instrument. This SME is developing a range of digital platforms to monitor the performance of wind turbines, which helps wind farms avoid failures and improve maintenance. A successful SME Instrument application brought it an €878,000 grant, which allowed the three-staff SME to now employ 14 persons while increasing its annual turnover by €200,000. The SME landed major clients (energy companies) in Spain, and its technology is further used by wind farms in Italy, Bulgaria, Denmark and Uruguay. Its annual turnover is expected to reach €5 million by 2019.

Contributions to Action 20 - Smart, sustainable and inclusive urban demonstration projects and best practices in cities

Urban Innovative Actions and Urban Agenda for the EU

Through the Urban Innovative Actions, the cities of Gothenburg, Paris and Viladecans started testing innovative solutions that could be transferred to other EU cities.⁶¹

Moreover, the Urban Agenda for the EU⁶² offers an innovative governance approach that involves local authorities, Member States, and European Institutions working together. The Partnerships on Energy Transition, Urban Mobility, Air Quality, Sustainable use of Land and Nature-Based solutions, Digital Transition, Circular Economy, Climate Adaptation and Housing will play an important role to deliver an innovative energy transition.

Tampere, Finland

Since 2015, the City of Tampere (FI) focuses on promoting low-carbon solutions in residential housing and urban dwellings through its TARMO+ project. It offers information about renewable energy, ways of monitoring energy consumption and other energy services for housing companies. It runs campaigns and competitions and participates in various events, in order to reach and inspire the relevant stakeholders. One particularly successful element is the Energy Expert, a resident in the building who is trained on energy efficiency and shares it with all other residents. There are now around 200 energy experts in the Tampere area. TARMO+ plays an essential role as a platform where all interested parties can operate, communicate and exchange information transparently, in order to reach the best renovation and complementary building results.

ECODISTRIC- Urban Retrofitting Project⁶³

This FP7 project created a web-based integrated decision support system (IDSS). The IDSS is a software platform that connects all stakeholders involved in district renovation and supports their decision-making process with assessment modules through a purpose-built graphical user interface, addressing also complex, multi-dimensional problems such as energy use and traffic management, and qualitative issues like social inclusiveness, by using a flexible set of key performance indicators (KPIs).

Post-Carbon Cities of Tomorrow

This FP7 project— foresight for sustainable pathways towards liveable, affordable and prospering cities in a world context (**POCACITO**) – **facilitates** the transition of EU cities to a forecasted sustainable or “post-carbon” economic model, leading to an evidence-based EU 2050 post-carbon city roadmap. At the core of the project is a series of participatory stakeholder workshops in case study cities of Barcelona, Copenhagen/Malmö, Istanbul, Lisbon, Litoměřice, Milan/Turin, Rostock and Zagreb. The purpose of these workshops

⁶¹ <http://www.uia-initiative.eu/en/uia-cities>

⁶² <https://ec.europa.eu/futurium/en/urban-agenda>

⁶³ <https://ecodistr-ict.eu/>

is to bring together local stakeholders to construct a common post-carbon vision for 2050 and roadmap, or action plan, to reach the vision. The workshops highlight the current successes and challenges facing the city and support a discussion of city-specific innovative measures based on lessons learned from local experience and best practices.

Other initiatives of the project include the development of a typology of post-carbon cities, the basis of the EU 2050 post-carbon city roadmap. Additionally, the project will establish an online “market place of ideas” that supports an international knowledge exchange of urban best practices between cities in the EU and worldwide. The project also organises two study tours that enable city representatives to visit EU best practices in person as well as to connect and exchange experiences with representatives from other cities.

URBAN LEARNING

The project involves seven capital cities across Europe (Vienna, Berlin, Paris, Stockholm, Amsterdam, Warsaw and Zagreb) and the city of Zaanstad (NL). All these cities have considerable population growth, and are committed to significantly reducing fossil energy consumption and CO₂ emissions. In order to meet these challenges, the project aims at integrating energy and urban development planning processes. The project structure is based on the creation of local working groups composed by relevant representatives from city administration and key external stakeholders, who will bridge the gap between energy planning and urban planning. In the end, the consortium will propose ready-to-use innovative solutions for efficient and effective integrated planning and draft concrete implementation plans to improve governance processes in the partner cities.⁶⁴

⁶⁴ <http://www.urbanlearning.eu/>