

# OPORTUNIDADES PARA LA I+D+i EN EL SECTOR DE LA CONSTRUCCIÓN

Programas de trabajo 2018-2020  
(PROGRAMA HORIZONTE 2020)



Elaborado por



Cofinanciado por



*Este documento tiene carácter orientativo.  
La PTEC recomienda que una vez  
identificada la línea de interés para la  
entidad, se trabaje en la preparación de la  
propuesta con los documentos oficiales  
publicados por la Comisión Europea*

**Febrero 2018**

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## 1. ALCANCE DEL DOCUMENTO

PTEC trabaja activamente en el desarrollo de actividades orientadas a la promoción de la internacionalización de la I+D de sus miembros.

Desde el inicio del actual Programa Marco, la Plataforma, ha organizado distintos eventos relacionados con el Programa y ha trabajado internamente en la difusión de oportunidades para los socios de la Plataforma.

Los eventos relacionados con la promoción del Programa Marco son

- Foro de Debate organizado en colaboración con CDTI en diciembre de 2013 en el que, coincidiendo con el lanzamiento del nuevo programa, se presentaron las novedades en H2020 y se revisaron las principales oportunidades para el sector tanto en el entonces recién publicado Programa Marco como en otras iniciativas con países no integrados en la Unión Europea. Toda la información relativa a este Foro está disponible en <http://www.plataformaptec.com/gestor/index.php?c=1386672010984>

- En diciembre de 2014 el Grupo de Trabajo organizó un taller también enfocado a Horizonte2020 en el evaluadores de proyectos y NCPs explicaron los puntos críticos sobre los que trabajar para preparar propuestas de éxito en la Comisión y distintos miembros de la Plataforma con probada experiencia en el Programa Marco presentaron ejemplos de actuación. La información de este taller se puede descargar en <http://www.plataformaptec.com/gestor/index.php?c=1418229092636>

- En Julio de 2016 se organizó un taller específico sobre las oportunidades en el WP Smart, green and integrated transport. La información está disponible en [www.plataformaptec.com/gestor/index.php?c=1467619850159](http://www.plataformaptec.com/gestor/index.php?c=1467619850159)

Adicionalmente, se han elaborado los Documentos de Oportunidades en H2020 en los que se recogen las convocatorias de interés en los distintos Programas de Trabajo, siendo éste en último de la serie que corresponde a los WP 2018-2020

Igual que en los documentos anteriores, se han incluido enlaces a guías genéricas del Programa Marco, recogiendo, en este documento exclusivamente, información específica de interés para el sector.

Para cada uno de los Programas de Trabajo se han incluido los datos de contacto de los NCPs del Programa y enlaces a documentos y webs de interés para el mismo.

Finalmente, se incluyen las convocatorias de interés para el sector indicando, el instrumento que financia, la fecha de cierre de la convocatoria y el TRL cuando procede. El título de la convocatoria está enlazado a la página web de la Comisión en la que está disponible toda la información de la misma.

Adicionalmente, en el Anexo II el documento se ha incluido el texto completo de todas las convocatorias. En la tabla se incluye la página del anexo en la que está disponible el texto

Finalmente, en el Anexo I, se han incluido los contactos de todos los NCPs españoles.

## 2. GUÍAS PARA LA PARTICIPACIÓN EN HORIZONTE 2020

En este capítulo se resumen distintas guías de trabajo sobre HORIZONTE2020 que pueden ser de interés para conocer las características generales del Programa Marco así como el proceso para participar en el mismo.

La Guía Básica HORIZON2020 elaborada por la Universidad Politécnica de Madrid (UPM) presenta las principales características del Programa Europeo de financiación de la I+D+i. Informa a los investigadores de la UPM de la estructura, instrumentos de financiación y reglas de participación en el Programa.

Para descargar la Guía sobre HORIZONTE2020 de la UPM debe acceder al sitio web:

<http://www.upm.es/observatorio/vi/gestionArchivos/gestionArchivos.jsp>

CDTI ha elaborado una Guía del Participante que tiene como objetivo proporcionar información general de H2020, así como sobre el proceso de participación en el programa, desde la detección de la oportunidad de participación y la elaboración y presentación de una propuesta, hasta la puesta en marcha, el desarrollo, seguimiento y finalización de los proyectos, pasando por el proceso de evaluación de propuestas y la preparación y firma del contrato del proyecto con la Comisión Europea. La Guía está disponible en: <http://eshorizonte2020.cdti.es/index.asp?TR=A&IDR=1&iddocumento=4555>

Además, la Guía Rápida HORIZONTE2020 elaborada también por CDTI pretende proporcionar al potencial participante una apreciación inicial general, rápida y directa sobre el programa, dando respuesta a las preguntas básicas más frecuentes que podría plantearse al valorar su participación en el mismo.

La Guía Rápida HORIZONTE2020 está disponible para todos los miembros de la PTEC en el Gestor Documental. También se puede descargar en el enlace:

<http://eshorizonte2020.es/como-participar/guia-del-participante>

### 3. DOCUMENTOS GENERALES DE INTERÉS EN HORIZONTE 2020

A continuación, se incluyen los enlaces a los principales documentos relativos a HORIZONTE 2020. En este capítulo se han incluido exclusivamente los documentos de carácter general. Los documentos específicos de cada programa están disponibles también en los capítulos correspondientes a cada Programa de Trabajo (Capítulo 2 del presente documento)

[Reference Documents de H2020](#)

#### **DOCUMENTOS GENERALES HORIZONTE 2020**

[Legal basis: Horizon 2020 Regulation of Establishment](#)

[Legal basis: Horizon 2020 Rules for Participation](#)

[Legal basis: Horizon 2020 Specific Programme](#)

[Dissemination, Exploitation and Evaluation WP 2018-20](#)

[General annexes to the Work Programme 2018-2020](#)

[Technology readiness levels \(TRL\)](#)

[H2020 online manual](#)

[Fact sheet: Gender Equality in Horizon 2020](#)

[Standard eligibility criteria](#)

[Standard Evaluation Criteria](#)

[Guide for proposal submission and evaluation](#)

[Glosario HORIZONTE 2020](#) (Documento de CDTI)

[Guide to participation by non-EU countries](#)

[List of H2020 Associated Countries](#)

[Guide for Grant Agreement Preparation](#)

#### **MODELOS H2020**

##### **GRANT AGREEMENT**

*Se incluyen los modelos de contrato con la CE para los distintos tipos de proyectos.*

*H2020 Annotated Grant Agreement es una **guía de usuario** del modelo general de Grant Agreement*

[H2020 Annotated Model Grant Agreement](#)

[Grant Agreement for ERANET COFUND](#)

[Multi-beneficiary model grant agreement for precommercial Procurement \(PCP\) AND Public Procurement of Innovative Solutions \(PPI\) COFUND](#)

[Multi partner framework partnership agreement](#)

## DISSEMINATION OF RESULTS

[Guidelines on Open Access to Scientific Publications and Research Data Data Management Plan \(DMP\)](#)

## PROPOSAL TEMPLATES

*Plantillas de presentación de propuestas según el tipo instrumento que se solicite.*

Son **documentos informativos** que recogen todos los campos a cumplimentar en la herramienta disponible en el Portal del Participante

[Research and Innovation Actions \(RIA\) and Innovation Actions \(IA\)](#)

[Coordination and Support Actions \(CSA\)](#)

[Eranet cofund actions](#)

[SME Phase 1](#)

[SME Phase 2](#)

[MCSA Innovative training networks](#)

## IPR

*Hojas informativas sobre gestión de la propiedad industrial e intelectual elaboradas por el IPR Helpdesk*

[IP Management in Horizon 2020: at the proposal stage](#)

[IP management in Horizon 2020: at the grant preparation stage](#)

## OTROS

[Modelos de acuerdo de consorcio](#) (No son modelos de la CE)

[Buscador de proyectos europeos](#)

[Buscador de patentes](#)

## 4. COOPERACIÓN CON TERCEROS PAÍSES

La Comisión Europea define como terceros Países aquellos que no son países miembros o territorios asociados a países miembros. Como regla general la Comisión Europea permite la participación de cualquier país en HORIZONTE2020, pero las condiciones de financiación serán distintas en cada caso.

En este capítulo se resumen las condiciones de cooperación con terceros países. La información general está disponible en los siguientes documentos:

[Dissemination, Exploitation and Evaluation WP 2018-20](#)

[Guide to participation by non-EU countries](#)

[List of H2020 Associated Countries](#)

Países terceros que son elegibles automáticamente en HORIZONTE 2020 son:

### 1.- Países asociados en HORIZONTE 2020

Albania, Bosnia Herzegovina, Islas Feroe, Rep. de Macedonia, Islandia, Israel, Moldavia, Montenegro, Noruega, Serbia, Turquía

### 2.- Otros países

ASIA	Bangladesh, Birmania Camboya Indonesia, Irán, Iraq Jordania Kazakstán, Kirguistán Laos Mongolia	Nepal Pakistán Rep. Democrática de Corea Sri Lanka Tajikistan, Tailandia Vietnam, Yemen
AFRICA	Afganistán, Argelia Angola Benín, Bután, Botsuana, Burkina Faso, Burundi Camerún, Cabo Verde, Chad, Comoras, Costa de Marfil Egipto, Eritrea, Etiopía Filipinas Gabón, Gambia, Ghana, Guinea, Guinea- Bissau Kenia Liberia, Libia,	Madagascar, Malauí, Malasia, Mali, Mauritania, Marruecos, Mozambique Namibia, Níger, Nigeria Rep. Árabe, Rep. Centroafricana, Rep. Democrática del Congo, Rep. del Congo, Ruanda Sudáfrica, Senegal, Sierra Leona, Somalia, Sudán del Sur, Sudan, Somalia, Siria Tanzania, Togo, Túnez Uganda Zambia, Zimbabue

OCEANIA	Fiji Micronesia	Papua Nueva Guinea
AMERICA	Argentina Belice, Bolivia Chile, Colombia Costa Rica, Cuba Dominica Ecuador, El Salvador Granada, Guatemala, Guyana, Haití, Honduras	Jamaica, Nicaragua Panamá, Paraguay, Perú Rep. Dominicana Uruguay Venezuela
EUROPA	Armenia, Azerbaijan Belorussia Georgia	Kosovo Liechtenstein Ucrania

El resto de países podrán recibir financiación de H2020 si se cumple uno de los siguientes casos:

- Si los fondos provienen de acuerdos bilaterales entre la CE y el país
- Si la convocatoria lo indica específicamente
- Si la Comisión considera esencial su participación para desarrollar el proyecto

**Se recomienda que se consulte a los representantes de CDTI el caso concreto según la convocatoria a la que se presenta.**



## 5. OPORTUNIDADES PARA LA I+D+I EN CONSTRUCCIÓN

A continuación, se recogen las convocatorias de interés para el sector en cada programa.

Se ha incluido una tabla en cada programa que recoge el título de la convocatoria con un hipervínculo al texto en el Portal del Participante, el tipo de instrumento que se financia, la fecha de cierre de la convocatoria y la página del anexo II a este documento donde se ha incluido el texto completo.

Si desea trabajar con el documento electrónico, puede acceder al documento de la Comisión pinchando en el nombre de la convocatoria; si desea trabajar con el documento impreso, debe imprimir también el anexo. Se recuerda que este documento es orientativo y se debe trabajar con el documento original para la preparación de la propuesta.

Adicionalmente, [sección de noticias de la web](#) se mantiene una sección sobre convocatorias de proyectos que recoge todas convocatorias abiertas ordenadas por fecha de cierre. Esta sección se actualiza semanalmente.

Finalmente, en el Anexo I del documento se han incluido los contactos de los NCPs españoles

### Marie Skłodowska-Curie Actions

#### Contactos en España

Cristina Gómez  
+34 91 425 09 09  
[cristina.gomez@fecyt.es](mailto:cristina.gomez@fecyt.es)

Jesus Rojo  
91 781 65 72  
[jesus.rojo@madrimasd.org](mailto:jesus.rojo@madrimasd.org)

#### Documentos y webs de interés

[Work Program MCSA 2018-2020](#)  
[Guide to the submission and evaluation process](#)  
[MSCA standard proposal template](#)  
[MSCA standard evaluation form](#)  
[Marie Skłodowska Curie Actions](#)

### Prioridades de interés para el sector de construcción

#### Convocatoria

[MSCA-RISE-2018 Research and Innovation Staff Exchange](#)  
[MSCA-IF-2018 Marie Skłodowska-Curie individual fellowships](#)  
[MSCA-COFUND-2018 Marie Skłodowska-Curie co-funding of regional, national and international programmes](#)  
[MSCA-ITN-2019 Marie Skłodowska-Curie innovative training networks](#)

#### Deadline

21 marzo 2018  
12 septiembre 2018  
27-septiembre 2018  
26-septiembre-2019  
15- enero 2019

## Leadership in enabling and industrial technologies : Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing

### Contactos en España

Lucía Iñigo  
Telf.: 915 81 55 66  
[lucia.inigo@cdti.es](mailto:lucia.inigo@cdti.es)

Carlos León  
Telf.: 913945212  
[carlos.leon@fis.ucm.es](mailto:carlos.leon@fis.ucm.es)

M<sup>a</sup> Nieves González  
Telf.: 915 81 55 66  
[nieves.gonzalez@cdti.es](mailto:nieves.gonzalez@cdti.es)

### Webs y documentos de interés

[Work Programme NMBP 2018-2020](#)

[Industrial Technologies](#)

[NMP partnership](#)

[CEN CENELEC](#)

[CEN \(buscador\)](#)

### Prioridades de interés para el sector de construcción

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">LC-EEB-02-2018 Building information modelling adapted to efficient renovation</a>	RIA	22-feb-18	Activities should start at TRL 4 and achieve TRL 6 at the end of the project	1	Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.
<a href="#">LC-EEB-06-2018-20 ICT enabled, sustainable and affordable residential building, construction, design to end of life (IA 50%)</a>	IA (50%)	22-feb-18	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	2	
<a href="#">LC-EEB-01-2019 Integration of energy smart materials in non-residential buildings</a>	IA	21-feb-19	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	3	
<a href="#">LC-EEB-03-2019 New developments in plus energy houses</a>	IA	21-feb-19	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	4	
<a href="#">LC-EEB-05-2019-20 Integrated storage systems for residential buildings</a>	IA	21-feb-19	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	6	
LC-EEB-04-2020 Industrialisation of building envelope for the renovation market	IA	Información aún no disponible			

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">DT-NMBP-01-2018 Open Innovation Test Beds for Lightweight, nano-enabled multi-functional composite materials and components</a>	IA (2 fases)	23-enero-18 28-junio-18	Activities should start at TRL 4 and achieve TRL 7 at the end of the project.	7	Proposals submitted should include actions designed to facilitate cooperation, across Europe, with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project
<a href="#">NMBP-33-2018 Innovative and affordable solutions for the preventive conservation of cultural heritage</a>	IA (2 fases)	23-enero-18 28-junio-18	Activities are expected to start at TRL 5 and achieve TRL 7 at the end of the project	8	
<a href="#">LC-EEB-02-2018 Building information modelling adapted to efficient renovation</a>	RIA	22-feb-2018	Activities should start at TRL 4 and achieve TRL 6 at the end of the project.	9	
<a href="#">LC-EEB-06-2018-20 ICT enabled, sustainable and affordable residential building, construction, design to end of life</a>	IA (50%)	22-feb-18	Activities should start at TRL 5 and achieve TRL 7 at the end of the project.	10	
<a href="#">LC-EEB-01-2019 Integration of energy smart materials in non-residential buildings</a>	IA	21-feb-2019	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	12	
<a href="#">LC-EEB-03-2019 New developments in plus energy houses</a>	IA	21-feb-2019	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	13	
<a href="#">LC-EEB-05-2019-20 Integrated storage systems for residential buildings</a>	IA	21-feb-19	Activities should start at TRL 5 and achieve TRL 7 at the end of the project	14	
LC-EEB-04-2020 Industrialisation of building envelope for the renovation market	IA	Información aún no disponible			
DT-NMBP-05-2020 Open Innovation Test Beds for functional materials for building envelopes	IA	Información aún no disponible			

## Leadership in enabling and industrial technologies: Information and Communication Technologies

### Contactos en España

Fernando Martín  
34 91 581 55 66  
[fernando.martin@cdti.es](mailto:fernando.martin@cdti.es)

Enrique Pelayo  
34 91 581 55 66  
[enrique.pelayo@cdti.es](mailto:enrique.pelayo@cdti.es)

### Webs y documentos de interés

[Work Programme 2018-2020](#)

[Digital agenda for Europe](#)

### Prioridades de interés para el sector de construcción

Convocatoria	Tipo de acción	Deadline	Pag. en anexo	Comentarios
<a href="#">ICT-11-2018-2019 HPC and Big Data enabled Large-scale Test-beds and Applications</a>	IA (1 fase)	17-abril-18 14-nov-18	15	<i>Proposals could seek synergies and co-financing from relevant national / regional research and innovation programmes, including European Structural and Investment Funds (ESIF) addressing pre-identified smart specialisation priorities at regional / national level. Proposals combining different sources of financing should include a concrete financial plan detailing the use of these funding sources for the different parts of their activities.</i>
<a href="#">DT-ICT-10-2018-19 Interoperable and smart homes and grids</a>	IA	14-nov-18	17	<i>For this topic, the four activities and impact criteria described in the introductory section 'Platforms and Pilots' have to be applied</i>
<a href="#">DT-ICT-11-2019 Big data solutions for energy</a>	IA	2-abril-19	19	
<a href="#">DT-ICT-13-2019 Digital Platforms/Pilots - Horizontal Activities: Preparation of a digital industrial platform for the construction sector</a>	CSA	14-nov-18	20	

## Secure, Clean and Efficient Energy

### Contactos en España

Virginia Vivanco  
Telf.: 91 121 54 02  
[vvivanco@idae.es](mailto:vvivanco@idae.es)

M<sup>a</sup> Pilar González  
Telf.: 91 581 55 62  
[mpilar.gonzalez@cdti.es](mailto:mpilar.gonzalez@cdti.es)

### Documento y webs de interés

[Work Program 2018-2020](#)

[SET PLAN](#)

[DG Energy](#)

[Digital Agenda for Europe. Smart Cities](#)

[Strategic Energy Technologies Information System. SETIS](#)

## Prioridades de interés para el sector de construcción

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">LC-SC3-EE-1-2018-2019-2020 Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation</a>	IA (1 fase)	4-sept-18 3-sept-19	<i>Projects are expected to bring the technology to TRL level 8-9</i>	22	<i>For topics LC-SC3-EE-1-2018-2019-2020 and LC-SC3-EE-6-2018-2019-2020 the threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12. This will be applicable for the relevant call for proposals in 2018 and 2019 subject to the update of the H2020 Work Programme in summer 2018.</i>
<a href="#">LC-SC3-EE-5-2018-2019-2020 Next-generation of Energy Performance Assessment and Certification</a>	CSA	4-sept-18		25	
<a href="#">LC-SC3-EE-5-2018-2019-2020 Next-generation of Energy Performance Assessment and Certification</a>	IA	3-sept-19		25	<i>. Proposals should involve relevant stakeholders (including national and regional certification bodies).</i>
<a href="#">LC-SC3-EE-4-2019-2020 Upgrading smartness of existing buildings through innovations for legacy equipment</a>	IA	3-sept-19	<i>The activities are expected to be implemented at TRL 6-8</i>	23	<i>Proposals are expected to include clear business model development and a clear path to finance and deployment</i>

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">LC-SC3-RES-5-2018</a> <a href="#">Increased performance of technologies for local heating and cooling solutions</a>	IA	13-feb-18	Proposals are expected to bring the technologies from TRL 5-6 to 6-7	27	
<a href="#">LC-SC3-RES-6-2018</a> <a href="#">Demonstrate significant cost reduction for Building Integrated PV (BIPV) solutions</a>	IA	13-feb-18	Proposals are expected to bring the technology from TRL 5-6 to 6-7	27	
<a href="#">LC-SC3-SCC-12018-2019-2020</a> <a href="#">Smart Cities and Communities</a>	IA (1 fase)	5-abril-18 5-feb-19		28	The FAQs for this call as well as the SEAP and SECAP templates are now available in the 'Additional documents' section of this topic.
<a href="#">LC-SC3-EE-2-2018</a> <a href="#">2019 Integrated home renovation services</a>	CSA (1 fase)	4-sept-18 3-sept-19		30	
<a href="#">LC-SC3-EE-11 2018-2019-2020</a> <a href="#">Aggregation - Project Development Assistance</a>	CSA (1 fase)	4-sept-18 3-sept-19		32	The proposed investments will have to be launched before the end of the action which means that projects should result in signed contracts for sustainable energy investments to that effect, e.g. construction works, energy performance contracts, turnkey contracts.
<a href="#">LC-SC3-EE-13 2018-2019-2020</a> <a href="#">Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource</a>	CSA	4-sept-18		33	Proposals are expected to include clear business model development and a clear path to finance and deployment
<a href="#">LC-SC3-EE-13 2018-2019-2020</a> <a href="#">Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource</a>	IA	3-sept-19		33	
<a href="#">LC-SC3-EE-3-2019</a> <a href="#">2020 Stimulating demand for sustainable energy skills in the construction sector</a>	CSA	3-sept-19		36	

## Smart, green and integrated transport

### Contactos en España

Juan Francisco Reyes  
Telf.: 34 91 581 55 62  
[juanfrancisco.reyes@cdti.es](mailto:juanfrancisco.reyes@cdti.es)

Juan Carlos García  
Telf.: 34 91 581 55 62  
[juancarlos.garcia@cdti.es](mailto:juancarlos.garcia@cdti.es)

### Documentos y webs de Interés

[Work Programme 2018-2020](#)

[European Commission Mobility and Transport](#)

[Strategic Transport Technology Plan \(STTP\)](#)

[Transport White Paper](#)

[Transport Research and Innovation Portal](#)

[Mobility in Digital Agenda for Europe](#)

[Transport R&I on europa.eu](#)

### Convocatorias de interés para el sector

Convocatoria	Tipo de acción	Deadline	Pag. en anexo	Comentarios
<a href="#">LC-MG-1-2-2018: Sustainable multi-modal inter-urban transport, regional mobility and spatial planning.</a>	RIA IA (2 fases)	30 enero-18 (1º fase) 19-sept-18 (2ª fase)	38	<i>International cooperation is encouraged</i>
<a href="#">MG-2-1-2018 Human Factors in Transport Safety</a>	RIA (2 fases)	30 enero-18 (1º fase) 19-sept-18 (2ª fase)	40	<i>International cooperation is encouraged</i>
<a href="#">MG-3-3-2018 "Driver" behaviour and acceptance of connected, cooperative and automated transport</a>	RIA (2 fases)	30 enero-18 (1º fase) 19-sept-18 (2ª fase)	42	<i>Research should be validated in a selected number of use cases</i>
<a href="#">LC-MG-1-3-2018 Harnessing and understanding the impacts of changes in urban mobility on policy making by city-led innovation for sustainable urban mobility</a>	RIA IA 2 fases	30-enero-18 (1º fase) 19-sept-18 (2ª fase)	44	<i>International cooperation is encouraged, especially with the USA, China and India</i>
<a href="#">LC-MG-1-3-2018 Harnessing and understanding the impacts of changes in urban mobility on policy making by city-led innovation for sustainable urban mobility</a>	CSA	4-abril-2018		
<a href="#">MG-2-4-2018 Coordinating national efforts in modernizing transport infrastructure and provide innovative mobility services</a>	CSA	4-abril-2019	46	<i>Proposals must include National Authorities from at least 10 EU Member/Associated Countries</i>

Convocatoria	Tipo de acción	Deadline	Pag. en anexo	Comentarios
<a href="#">MG-4-1-2018 New regulatory frameworks to enable effective deployment of emerging technologies and business/operating models for all transport modes</a>	CSA	4-abril-2018	47	<i>Proposals must include National Authorities from at least 10 EU Member/Associated Countries.</i>
<a href="#">S2R-CFM-IP3-01-2018: Research into optimized and future railway infrastructure</a>	IA Lump-Sum	24-abril 18	48	Convocatoria S2R. No incluida en el WP
<a href="#">LC-MG-1-9-2019 Upgrading transport infrastructure in order to monitor noise and emissions</a>	RIA	16-1-19 (1ª fase) 12-sept-19 (2ª fase)	51	<i>International cooperation is encouraged.</i>
<a href="#">MG-2-6-2019: Moving freight by Water: Sustainable Infrastructure and Innovative Vessels</a>	RIA IA 2 fases	16-1-19 1(º fase) 12-sept-19 (2ª fase)	53	
<a href="#">MG-2-9-2019 Integrated multimodal, low-emission freight transport systems and logistics (Inco Flagship)</a>	RIA IA 2 fases	16-1-19 1(º fase) 12-sept-19 (2ª fase)	54	<i>Should consider cooperation with projects or partners from the US, Japan, Canada, China, Latin America</i>
<a href="#">MG-4-5-2019 An inclusive digitally interconnected transport system meeting citizens' needs</a>	RIA (1 fase)	24-abril-2019	56	<i>Research should be validated in a selected number of case studies</i>
<a href="#">MG-4-6-2019 Supporting Joint Actions on sustainable urban accessibility and connectivity</a>	ERANET	Informacion aún no disponible		



## Climate action, environment, resource efficiency and raw material

### Contactos en España

Juan Carlos García

Tel.: 91 581 55 62

[juancarlos.garcia@cdti.es](mailto:juancarlos.garcia@cdti.es)

Ana Tardón

Tel.: 91 346 08 20

[anamaria.tardon@ciemat.es](mailto:anamaria.tardon@ciemat.es)

### Documentos y webs de interés

[Work Programme 2018-2020](#)

[Digital agenda for Europe](#)

[Raw materials](#)

[EIP raw materials](#)

[Environmental research and innovation](#)

## Convocatorias de interés para el sector

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">LC-CLA-04-2018</a> <a href="#">Resilience and sustainable reconstruction of historic areas to cope with climate change and hazard events</a>	RIA (2 fases)	27-feb-18 4-sept-18		58	<i>The participation of social sciences and humanities disciplines such as gender studies, architecture, archaeology, cultural anthropology, law, economics, governance, planning, cultural and historical studies, is considered essential to properly address the complex challenges of this topic.</i>
<a href="#">CE-SC5-03-2018</a> <a href="#">Demonstrating systemic urban development for circular and regenerative cities</a>	IA (2 fases)	27-feb-18 4-sept-18		59	<i>An interdisciplinary approach, including the participation of applied natural sciences, social sciences and humanities disciplines (such as behavioural economics, gender studies, urban planning and governance) is considered crucial to properly address the complex challenges of this topic.</i>
<a href="#">CE-SC5-06-2018</a> <a href="#">New technologies for the enhanced recovery of by-products</a>	RIA (2 fases)	27-feb-18 4-sept-18	<i>sustainable solutions finishing at TRL 3-5.</i>	61	<i>Actions should include a task to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials</i>
<a href="#">SC5-11-2018</a> <a href="#">Digital solutions for water: linking the physical and digital world for water solutions</a>	IA (2 fases)	27-feb-18 4-sept-18	<i>Activities are expected to focus on Technology Readiness Levels (TRLs) 5-7</i>	62	<i>Actions should seek to bring together research and innovation players from the digital and physical spheres to address jointly challenges and opportunities, including regulatory and legislative barriers, data protection issues and opportunities for investments in different application sectors</i>

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">CE-SC5-07-2018-2019-2020 Raw materials innovation for the circular economy: sustainable processing, reuse, recycling and recovery schemes</a>	IA (2 fases)	27-feb-18 4-sept-18  19-feb-19 4-sept-19	<i>finishing at TRL 6-7.</i>	64	
<a href="#">SC5-13-2018-2019 Strengthening international cooperation on sustainable urbanisation: nature-based solutions for restoration and rehabilitation of urban ecosystems</a>	RIA (2 fases)	27-feb-18 4-sept-18  19-feb-19 4-sept-19		66	The participation of social sciences and humanities disciplines, addressing also the gender dimension, is crucial to properly address this topic  Strengthening EU-China collaboration (2018 <sup>1</sup> )
<a href="#">SC5-14-2019 Visionary and integrated solutions to improve well-being and health in cities</a>	IA (2 fases)	19-feb-19 4-sept-19		68	To ensure coverage of geographic, socio-economic and cultural diversity across the EU, consortia must comprise at least 4 cities from different Member States or Associated Countries that are committed to implement the proposed innovative solutions during the project and to assess their impacts and cost-efficiency in improving health and well-being in the cities

<sup>1</sup> <https://www.mea.gov.in/Portal/ForeignRelation/celac-august-2012.pdf>

## Europe in a changing world – inclusive, innovative and reflective Societies

### Contactos en España

María del Mar Mesas  
Telf.: 916037048  
[sociedades.h2020@fecyt.es](mailto:sociedades.h2020@fecyt.es)

Rocio Castrillo  
Telf.: 916037369  
[sociedades.h2020@fecyt.es](mailto:sociedades.h2020@fecyt.es)

Carolina Rodríguez  
Telf.: 955 00 74 80  
[sociedades.h2020@fecyt.es](mailto:sociedades.h2020@fecyt.es)

### Documentos y webs de interés

[Work Programe 2018-2020](#)

### Convocatorias de interés para el sector

Convocatoria	Tipo de acción	Deadline	TRL	Pag. en anexo	Comentarios
<a href="#">TRANSFORMATIONS-05-2018: Cities as a platform for citizen-driven innovation</a>	CSA	13-marzo-18		70	
<a href="#">TRANSFORMATIONS-03-2018-2019: Innovative solutions for inclusive and sustainable urban environments</a>	CSA	13-marz-18		71	
<a href="#">TRANSFORMATIONS-03-2018-2019: Innovative solutions for inclusive and sustainable urban environments</a>	IA	14-marzo-19		71	

# ANEXO I: CONTACTOS EN CDTI

Actualización: 3 de enero de 2018

NCP Temáticas	NOMBRE	TLF	E-MAIL	ORGANIZACIÓN	DIRECCIÓN
Coordinadores Nacionales de NCPs	Almudena AGÜERO	+34 91 603 79 51	<a href="mailto:agentesh2020@mineco.es">agentesh2020@mineco.es</a>	MINECO	Paseo de la Castellana, 162 - Planta 19 28046 Madrid
	Javier GARCÍA	+34 91 581 55 66	<a href="mailto:javier.garcia@cdti.es">javier.garcia@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
Aspectos Legales y Financieros	Gonzalo AREVALO	+34 91 822 20 69	<a href="mailto:garevalo@eu-isciii.es">garevalo@eu-isciii.es</a>	Instituto de Salud Carlos III	C/ Sinesio Delgado, 6 28029 Madrid
	Andrés MARTÍNEZ	+32 2 289 26 96/95	<a href="mailto:andres.martinez@sost.be">andres.martinez@sost.be</a>	SOST (Oficina Española de Ciencia y Tecnología) - CDTI	Rue du Trône, 62 - 7ª planta 1050 Bruselas (Bélgica)
	Diana CASTRILLON	+34 96 3877000 ext 74091	<a href="mailto:diana.castrillon@sgi.upv.es">diana.castrillon@sgi.upv.es</a>	Universidad Politécnica de Valencia	Camino de Vera s/n 46022 Valencia
	Carmen HORMIGO	+ 34 915 68 18 30	<a href="mailto:C.Hormigo@orgc.csic.es">C.Hormigo@orgc.csic.es</a>	CSIC	C/ Serrano 117 - 28006 Madrid
PYMES	Esther CASADO	+34 91 581 55 66	<a href="mailto:esther.casado@cdti.es">esther.casado@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Luis GUERRA	+34 91 581 55 66	<a href="mailto:luis.guerra@cdti.es">luis.guerra@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
Acceso a la Financiación de riesgo	Luis GUERRA	+34 91 581 55 66	<a href="mailto:luis.guerra@cdti.es">luis.guerra@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
Consejo Europeo de Investigación (ERC)	Esther RODRÍGUEZ	+34 91 603 79 39	<a href="mailto:esther.rodriquez@oficinaeuropea.es">esther.rodriquez@oficinaeuropea.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162 - Planta 16 28046 Madrid
	Lucia DEL RÍO	+34 91 822 23 81	<a href="mailto:lrio@eu-isciii.es">lrio@eu-isciii.es</a>	Instituto de Salud Carlos III	C/ Sinesio Delgado, 6 28029 Madrid
Tecnologías futuras y emergentes (FET)	Nicolás OJEDA	+34 91 603 77 80	<a href="mailto:nicolas.ojeda@oficinaeuropea.es">nicolas.ojeda@oficinaeuropea.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162 - Planta 16 28046 Madrid
	Severino FALCÓN	+34 91 603 79 59	<a href="mailto:fet.h2020@mineco.es">fet.h2020@mineco.es</a>	MINECO	Paseo de la Castellana, 162 - Planta 18 28046 Madrid
	Pablo FERNÁNDEZ	+ 34 934054203	<a href="mailto:pablo.fernandez.gonzalez@upc.edu">pablo.fernandez.gonzalez@upc.edu</a>	UPC	c. Jordi Girona, 1-3 - 08034 Barcelona
Acciones Marie Sklodowska Curie; herramientas, formación y desarrollo de carrera investigadora (MSCA)	Cristina GÓMEZ	+34 91 603 79 56	<a href="mailto:cristina.gomez@fecyt.es">cristina.gomez@fecyt.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162. 28046 Madrid
	Jesús ROJO	+34 91 781 65 72	<a href="mailto:jesus.rojo@madrimasd.org">jesus.rojo@madrimasd.org</a>	Fundación MADRI+D para el Conocimiento	c/ Velázquez, 76. 28001 Madrid
Infraestructuras de Investigación Europeas (RI)	Gloria VILLAR	+34 91 8222227	<a href="mailto:gvillar@eu-isciii.es">gvillar@eu-isciii.es</a>	Instituto de Salud Carlos III	C/ Sinesio Delgado, 6 28029 Madrid
Tecnologías de la Información y las Comunicaciones (ICT)	Fernando MARTÍN	+34 91 581 55 66	<a href="mailto:fernando.martin@cdti.es">fernando.martin@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Enrique A PELAYO	+34 91 581 55 66	<a href="mailto:enrique.pelayo@cdti.es">enrique.pelayo@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
Nanotecnologías, materiales avanzados y procesos y fabricación avanzados (NMBP)	Lucia IÑIGO	+34 91 581 55 66	<a href="mailto:lucia.inigo@cdti.es">lucia.inigo@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	María Nieves GONZALEZ	+34 91 581 55 66	<a href="mailto:nieves.gonzalez@cdti.es">nieves.gonzalez@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Carlos LEÓN	+34 913945212	<a href="mailto:carlos.leon@fis.ucm.es">carlos.leon@fis.ucm.es</a>	UCM	Facultad de Física, Plaza Ciencia s/n 28040 Madrid
Espacio	Paloma DORADO	+34 91 581 55 66	<a href="mailto:paloma.dorado@cdti.es">paloma.dorado@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Ainara RIPA	+34 91 520 2004	<a href="mailto:ripaca@inta.es">ripaca@inta.es</a>	INTA	Ctra. De Ajalvir, 4 - 28850 Torrejón de Ardoz - Madrid

Actualización: 3 de enero de 2018

NCP Temáticas	NOMBRE	TLF	E-MAIL	ORGANIZACIÓN	DIRECCIÓN
Salud, cambio demográfico y bienestar (Reto 1)	Carolina CARRASCO	+34 91 581 55 62	<a href="mailto:carolina.carrasco@cdti.es">carolina.carrasco@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Juan RIESE	+34 91 822 21 81	<a href="mailto:jriese@eu-isciii.es">jriese@eu-isciii.es</a>	Instituto de Salud Carlos III	C/ Sinesio Delgado, 6 28029 Madrid
Seguridad alimentaria, agricultura sostenible, investigación marina y marítima y bio-economía (Reto 2)	Marta CONDE	+34 91 581 55 62	<a href="mailto:marta.conde@cdti.es">marta.conde@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Jesús ESCUDERO	+34 91 347 39 79	<a href="mailto:jesus.escudero@inia.es">jesus.escudero@inia.es</a>	Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)	Carretera de la Coruña km 7,5 28040 Madrid
Energía segura, limpia y eficiente (Reto 3)	Maria del Pilar GONZÁLEZ	+34 91 581 55 62	<a href="mailto:mpilar.gonzalez@cdti.es">mpilar.gonzalez@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Virginia VIVANCO	+34 91 121 54 02	<a href="mailto:vvivanco@idae.es">vvivanco@idae.es</a>	IDAE	C/ Madera 8 - 28004 Madrid
Transporte inteligente, ecologico e integrado (Reto 4)	Juan Francisco REYES	+34 91 581 55 62	<a href="mailto:juanfrancisco.reyes@cdti.es">juanfrancisco.reyes@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
Acción por el clima, eficiencia de recursos y materias primas (Reto 5)	Juan Carlos GARCIA	+34 91 581 55 62	<a href="mailto:juancarlos.garcia@cdti.es">juancarlos.garcia@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Ana TARDÓN	+34 91 346 08 20	<a href="mailto:anamaria.tardon@ciemat.es">anamaria.tardon@ciemat.es</a>	CIEMAT	Avda. Complutense, 40 28040 Madrid
Sociedades inclusivas, innovadoras y reflexivas (Reto 6)	Rocio CASTRILLO	+34 916037369	<a href="mailto:sociedades.h2020@fecyt.es">sociedades.h2020@fecyt.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162. 28046 Madrid
	Carolina RODRÍGUEZ	+34 955 00 74 80	<a href="mailto:sociedades.h2020@fecyt.es">sociedades.h2020@fecyt.es</a>	Agencia Andaluza del Conocimiento	c/ Max Planck 3, Edificio Iris 1 - 41092 Sevilla
	María del Mar Mesas	+34 916037968	<a href="mailto:sociedades.h2020@fecyt.es">sociedades.h2020@fecyt.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162. 28046 Madrid
Sociedades seguras (Reto 7)	Maria Teresa BOYERO	+34 91 581 55 62	<a href="mailto:maite.boyero@cdti.es">maite.boyero@cdti.es</a>	CDTI	C/ Cid, 4 28001 Madrid
	Ainara RIPA	+34 91 520 2004	<a href="mailto:ripaca@inta.es">ripaca@inta.es</a>	INTA	Ctra. De Ajalvir, 4 - 28850 Torrejón de Ardoz - Madrid
Ciencia con y para la Sociedad (Swafs)	Rocio CASTRILLO	+34 916037369	<a href="mailto:swafs.h2020@fecyt.es">swafs.h2020@fecyt.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162. 28046 Madrid
	María del Mar Mesas	+34 916037968	<a href="mailto:swafs.h2020@fecyt.es">swafs.h2020@fecyt.es</a>	Oficina Europea. FECYT, MINECO	Paseo de la Castellana, 162. 28046 Madrid
	Carolina RODRÍGUEZ	+34 955 00 74 80	<a href="mailto:swafs.h2020@fecyt.es">swafs.h2020@fecyt.es</a>	Agencia Andaluza del Conocimiento	c/ Max Planck 3, Edificio Iris 1 - 41092 Sevilla
Difundiendo la excelencia y ampliando la participación (Widening)	Ana HIDALGO	+34 954232349 ext 153	<a href="mailto:ana.hidalgo@csic.es">ana.hidalgo@csic.es</a>	CSIC	Pabellón del Perú. Avda. María Luisa s/n 41013-Sevilla
EURATOM	OPE CIEMAT (Fusión-provisional)	+34 913460820	<a href="mailto:ope@ciemat.es">ope@ciemat.es</a>	CIEMAT	Avda. Complutense, 40 28040 Madrid
	José GUTIERREZ (Fisión)	+34 91 346 6217	<a href="mailto:jose.gutierrez@ciemat.es">jose.gutierrez@ciemat.es</a>	CIEMAT	Avda. Complutense, 40 28040 Madrid
Centro de Investigación Conjunta (JRC)	Almudena AGÜERO	+34 91 603 79 51	<a href="mailto:almudena.aguero@mineco.es">almudena.aguero@mineco.es</a>	MINECO	Paseo de la Castellana, 162 - Planta 19 28046 Madrid

# ANEXO II: TEXTOS DE LAS CALLS

## LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES: NANOTECHNOLOGIES, ADVANCED MATERIALS, BIOTECHNOLOGY AND ADVANCED MANUFACTURING AND PROCESSING

### **LC-EEB-02-2018 Building information modelling adapted to efficient renovation**

**Specific Challenge** *The Building Information Modelling (BIM) tools developed so far are adapted mainly to new buildings (all types). In order to offer easy, practical, operational tools for all stakeholders, including constructing companies, designers, architects and service companies, we need to deploy attractive tool kits also for existing buildings. A particular important challenge will be to produce compatible tools that would allow collecting of data from existing buildings (e.g. geometric data) and exploit data from different sources. This will also contribute to more accurate knowledge of the existing building stock by providing methods and tools to generate data for existing buildings. Such BIM tools will be exploited first and foremost in existing residential buildings.*

**Scope** *Proposals should develop advanced solutions, including all of the following:*

- *To harmonise and provide common data exchange formats regarding the components and equipment of a building (e.g. the type of materials and the Heating, Ventilation and Air Conditioning (HVAC) systems in relation to the most actual standards);*
- *The modelling of the building energy should include existing parameters, as well as the environmental and GIS data;*
- *Be flexible in coupling the overall BIM system with other additional types of models (e.g. buildings acoustics; including calculator for economic evaluation of various renovations scenarios);*
- *Be flexible to adapt to work planning, as-buildings documentation and procedures to process changes;*
- *Allow the development of applications to benefit from inputs of inhabitants;*
- *A close cooperation with standardisation bodies is required in order to validate the new BIM tools.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 4 and achieve TRL 6 at the end of the project.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact** *Proposals should achieve all of the following:*

- *A reduction of the renovation working time of at least 15-20% compared to current practices with the baseline defined in the proposal;*



- *Acceleration of the market uptake across Europe, by speeding-up industrial exploitation, in particular amongst constructing/ renovations companies with a target of 50% of their renovation business based on BIM;*
- *Creation of best practice examples for the construction retrofitting sector with benefits for the operators and associated stakeholders (architects, designers, planners, etc.).*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Research and innovation actions*

**LC-EEB-06-2018-20 ICT enabled, sustainable and affordable residential building, construction, design to end of life (IA 50%)**

**Specific Challenge** *The poor energy performance features that buildings may exhibit can be due not only to the characteristics of the building materials used, but also to the use of traditional or unsuitable construction processes. Therefore, the building process needs to benefit from an increased level of industrialisation, including for instance lean construction and higher degree of prefabrication. This is especially true in the case of building retrofitting where the traditional construction methods are not able to plan in advance all the problems to be solved in the variety of renovation sites. Using ICT as an enabler in the building process and operation is a way to meet the challenges. ICT solutions need to incorporate the design, manufacturing, construction, material choice (including reusability, environmental performance and cost aspects), operation and end of life phases affecting the overall building lifecycle. The closer integration of ICT based-building construction tools into the manufacturing, construction and operation phases has a strong impact on the overall building lifecycle, and it will also help reducing the performance gap.*

**Scope** *Existing generic software tools have limited flexibility and lack interoperability concerning models and design cultures. Vertically integrated life cycle design is still missing, mainly due to a fragmented design culture across the various disciplines. ICT tools should be provided for energy and environmental performance related design, analysis and decision-making in early planning phases for new buildings or renovation of buildings. Clear evidence of technical and economic viability should be provided by validating and demonstrating the proposed ICT-driven construction processes in either new or retrofitting projects. For existing buildings, significant effort will be required to first retrieve all relevant information, and to compile and structure it in a meaningful form to be used by new solutions.*

*Proposals should:*

- *Develop an advanced digitalised and industrialised construction and building process utilising smart combinations of materials/components;*
- *Assess the overall life cycle of construction, in order to deliver more efficient buildings in terms of sustainability and construction, maintenance and operation costs;*
- *Provide for fully integrated systems to be compact, exchangeable, and easy to commission and to operate and demonstrate business solutions for operating such building life-time ICT solutions.*

*Proposals should include Social Sciences and Humanities (SSH) elements regarding public perception and acceptance of advanced building life solutions at the level of the construction sector in Europe.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 5 and achieve TRL 7 at the end of the project.*

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

*As an exception from General Annex D, the funding rate for eligible costs in grants awarded under this topic will be differentiated: 100% of the eligible costs for beneficiaries and linked third parties that are non-profit legal entities; and 50% of the eligible costs for beneficiaries and linked third parties that are for profit legal entities.*

**Expected Impact** *Proposals should achieve all of the following:*

- *Reduction of CO<sub>2</sub> with 15-20% for the total life-cycle compared to current situation shown through Life Cycle Assessment;*
- *Construction cost reductions of at least 15% compared to current situation;*
- *Buildings shortened construction time (reduced by at least 10-15% compared to current State of the art);*
- *Reduction of the gap between predicted and actual energy consumption;*
- *Improved indoor environment;*
- *Significantly improved integration of the value chain (design, procurement, manufacturing, construction, operation and maintenance);*
- *Contribution to new standards and regulations;*
- *Demonstration of large scale replicability potential.*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation actions*

### **LC-EEB-01-2019 Integration of energy smart materials in non-residential buildings**

**Specific Challenge** *Europe is leader in the development of components for buildings retrofitting. Its leadership is based on the use of high-efficient insulation materials including concrete, steel, glass, composites, wood and hybrids, which should lead to achieving recyclable, nearly zero-energy building envelopes (roofs, façades) when applied to new buildings. However, these components do still not allow for the integration of smart energy storage and for an equal performance in existing buildings. This has proved to be very challenging, in terms of complexity, weight control and overall retrofitting costs. Therefore, work is required to advance the technology readiness level. Activities should include the demonstration of new hybrid-enabled prototypes for selected non-residential buildings.*

**Scope** *The development of lightweight components based on high-efficiency insulation materials needs adding active energy management capabilities without increasing weight. Proposals should cover all of the following:*

- *development of lightweight components for the construction of building envelopes with integral means for combined active/passive management of energy transfer, i.e., for active insulation, heat diversion, storage and directional transfer;*
- *solutions capable for use in both new buildings and for retrofitting existing ones;*
- *solutions allowing for installation without modifying the structure of the building (or without overloading existing structures) and demonstrating a high replication and industrial potential;*
- *modelling of the materials and components as well as to the development of novel testing methodologies oriented towards assessing the long-term performance of the elements. This should include the estimation of durability and service life;*
- *reduced maintenance costs, possibility of use in a wide range of environmental conditions, favour renewable resources, respect of sustainability principles (International Reference Life Cycle Data System - ILCD Handbook), and the possibility of reuse at the end of service life.*

*This topic is likely to contribute to standardisation and certification activities.*

*Resources should be envisaged for clustering with other projects funded under the call, in order to facilitate research cohesion and inter-consortia cooperation.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 5 and achieve TRL 7 at the end of the project.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact** *When compared to state of the art, the newly developed solutions should bring:*

- *Improvement by at least 25% of the insulation properties at component level for a given weight, when in isolation (passive) mode;*
- *10% improvement in energy-storage capability when in active mode(s);*
- *Water and air tightness should be at least 10% higher than existing solutions (when it is proposed a controllable solution);*
- *Cost increase of less than 15%, in order to allow market uptake across Europe and contribute to social affordability.*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation actions*

### **LC-EEB-03-2019 New developments in plus energy houses**

**Specific Challenge** Energy Efficiency targets set at EU level by legislation are currently being reviewed. The related SET-Plan rolls out concrete steps how research and innovation could further reach these targets by 2025. However, the current practice to construct nearly zero-energy houses will be insufficient to reach the CO<sub>2</sub> emission reduction targets for 2050. Therefore, it is necessary to develop further the concept of "Plus Energy Houses", producing more energy than they use. Buildings have long life cycles until they are replaced. Therefore, it is essential to speed up the development of the required technologies.

**Scope** New designs, making use of already developed and validated materials and components and smarter control systems ready to treat vast amounts of data are needed. The surplus of energy should come from renewable sources (geothermal heat, photovoltaics, wind, etc.), obviously optimizing the dynamic character of the energy balance all along the year.

Each proposal should be expected to involve pioneer cities (demonstrations in a multi-storey apartment building situated in each of the 4 climatic zones in Europe). Such buildings should be properly managed and connected to the neighbourhood grid. Proposals should take the lead by leveraging funding with other energy efficiency schemes, including the private sector. Erecting buildings at such pioneer cities should not encounter regulatory problems. For this reason, the proposal will identify any bottlenecks in the existing regulations and standards concerned by the locations chosen.

Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.

Activities should start at TRL 5 and achieve TRL 7 at the end of the project.

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

**Expected Impact** Proposals should achieve all of the following:

- Similar costs as compared to the 2020 nearly zero-energy buildings as an incentive to erect energy-plus-houses;
- Increase of the share of plus-energy houses with the view of 10% market uptake by 2030;
- Contribute reducing of CO<sub>2</sub> emissions in the residential sector by 88% in 2050 compared to the 1990 levels;
- Improved indoor environment leading to higher rate of users' satisfaction based on their demand and behaviour.

Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

**Type of Action:** Innovation actions

### **LC-EEB-05-2019-20 Integrated storage systems for residential buildings**

**Specific Challenge** Optimised storage solutions for thermal and electric energy are needed in order to better synchronise the overall supply and demand, at residential, district and urban level. Efficient management of the peak loads would reduce the overall operational costs of the installations.

The main challenge is to demonstrate integrated thermal storage systems. The current mature technologies for thermal storage are mostly based on water. In order to increase the storage density, it is needed to further develop other systems such as the Thermochemical materials. The next wave of developments needs to be tackled in order to propose attractive equipment with a significant increase in storage capacity efficiency. The combination of renewable energy with storage is key to support the next generation of very low or plus energy houses. Such storage equipment will be exploited first and mostly in the residential buildings (existing and new ones).

**Scope** Proposals should develop advanced solutions including all of the following elements:

- Reach improved heat exchange in and between storage material and heat carrier as well as high performing storage reactor over time;
- With respect to the entire storage system, advanced energy management is needed, Not only regarding the building needs but also taking in account external conditions such as grid constraints and price signals;
- The overall system should be easy to maintain with low cost associated to this activity;
- The demonstration should include several prototypes operating in three different climatic conditions (with compactness as a crucial boundary condition).

Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.

Activities should start at TRL 5 and achieve TRL 7 at the end of the project.

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

#### **Expected Impact**

- Demonstrate solutions that have a stable, reliable long term performance in multi-cyclic seasonal and use of at least 20 years;
- Deliver compact systems with the potential to fit in the limited space available in a single building in the existing housing stock or new buildings. The storage material volume per dwelling should not exceed 1 m<sup>3</sup>;
- Solutions should demonstrate a potential to reduce the net energy consumption of a building by at least 25% and a have return-on-investment period below 10 years;
- Use of high energy density storage materials allowing storage densities up to 10 times higher than water (based on overall system efficiency).

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation actions*

***DT-NMBP-01-2018 Open Innovation Test Beds for Lightweight, nano-enabled multi-functional composite materials and components***

**Specific Challenge** *The field of new smart lightweight nano-enabled materials has made remarkable progress in recent years. Many different types of materials, with radically enhanced properties and functionalities, are today available for a wide range of industrial applications; e.g. lightweight solutions for transportation and construction, enhanced properties for packaging materials and processes, incorporating smart interacting sensors or indicators, and materials offering enhanced electrical performance and reliability, high-performance thermal and/or electrical conductivity, and UV shielding. The challenge is to scale up and enable industry and users, in a cost-effective and sustainable way, to develop, test, and adopt new lightweight, high performance, multifunctional, and environmentally friendly materials for high-value composite components and structures.*

**Scope**

- *Open Innovation Test Beds should upgrade or develop materials facilities and make available to industry and interested parties, including SMEs, services for the design, development, testing, safety assessment, and upscaling of specific materials compositions, including nano-particle/objects;*
- *Attention should be given to materials new functions, features, capabilities, and properties (functionalisation), and to processing techniques and optimisation of process parameters, from uniform dispersion and distribution of nano-particles within the materials (or nanoparticle aggregates) to the association of dissimilar materials;*
- *Potential regulatory, economic and technical barriers should be identified and assessed;*
- *A methodology for providing open access at fair conditions and cost as well as outreach and dissemination across Europe;*
- *Quality control processes and tools should be validated to allow on-line quality controls;*
- *Materials should be demonstrated in relevant industrial environments.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation, across Europe, with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 4 and achieve TRL 7 at the end of the project.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 7 and 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*



**Expected Impact:**

- *Open and upgraded facilities at the EU level for the design, development, testing, safety assessment, and upscaling of lightweight, nano-enabled and multifunctional materials and components, easily accessible to users across different regions of Europe;*
- *Attract a significant number of new SME users, with at least a 20% increase for existing test beds;*
- *Increased access to finance (for SMEs in particular) for investing in these materials or in applications using them;*
- *At least 15% improved industrial process parameters and 20% faster verification of materials performance for highly promising applications;*
- *At least 20% improvement in industrial productivity, reliability, environmental performance, durability, and reduction of life-cycle costs of these materials;*
- *At least 15% indirect reduction in energy consumption across sectors using lighter materials in their products and processes.*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation action*

**NMBP-33-2018 Innovative and affordable solutions for the preventive conservation of cultural heritage**

**Specific Challenge** *Preventive conservation (PC) prevents damage or reduces the potential for damage of cultural heritage (CH) artefacts. In the long term, it is more cost efficient than remedial conservation, which can be orders of magnitude more expensive than appropriate PC measures. In particular small and medium sized museums struggle to fulfil international recommendations for PC and to implement necessary technologies, e.g. for environmental control and monitoring, mainly because of lack of budget and/or expertise.*

**Scope** *The proposed solution should include the following three main elements:*

*One or more innovative low-cost tools/solution for PC of movable CH artefacts (in storage and/or on display) should be developed;*

*The solution(s) should include monitoring of individual or groups of similar artefact types to allow continuous remote data acquisition for key-parameters and/or conservation status of artefacts;*

*Multi-scale modelling (i.e. linking different types of models such as electronic, atomistic, etc.) should be an integral part of the activities and should at least allow predictions about the CH degradation based on the monitoring data. Building on on-going efforts is encouraged.*

*The majority of resources should be spent on the development of actual tools/solutions rather than new models. Proposals should present clearly measurable objectives. Convergent contributions from SSH disciplines should be considered at least for the CH targeting criteria. Standardisation and/or the production of (certified) reference tools and/or pre-normative research should be an integral part of the proposal.*

*In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is strongly encouraged, in particular with relevant international organisations (e.g. ICOM).*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities are expected to start at TRL 5 and achieve TRL 7 at the end of the project.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact** *Practical and affordable tools/solutions in terms of cost and/or complexity of operation. A cost reduction of at least 50% is expected as compared to existing solutions;*

- *Improved compliance with PC recommendations, without a negative impact on the budget presently available for PC, in particular for end-users such as small and medium sized museums;*
- *Improved CH degradation predictions and modelling-based decision-making with regard to the choice between preventive and remedial conservation measures;*
- *Clear prospect for quantified socio-economic gains from the proposed solutions (e.g. the creation of new services) also beyond their application for CH;*
- *Effective market uptake across Europe of the proposed solutions within five years after the end of the project;*
- *Contribution to sustainable open repositories of simulation/experimental/measurement data;*
- *Contribution to an increased citizens' awareness of PC of tangible CH.*
- *Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation action*

### **LC-EEB-02-2018 Building information modelling adapted to efficient renovation**

**Specific Challenge** *The Building Information Modelling (BIM) tools developed so far are adapted mainly to new buildings (all types). In order to offer easy, practical, operational tools for all stakeholders, including constructing companies, designers, architects and service companies, we need to deploy attractive tool kits also for existing buildings. A particular important challenge will be to produce compatible tools that would allow collecting of data from existing buildings (e.g. geometric data) and exploit data from different sources. This will also contribute to more accurate knowledge of the existing building stock by providing methods and tools to generate data for existing buildings. Such BIM tools will be exploited first and foremost in existing residential buildings.*

**Scope** *Proposals should develop advanced solutions, including all of the following:*

- *To harmonise and provide common data exchange formats regarding the components and equipment of a building (e.g. the type of materials and the Heating, Ventilation and Air Conditioning (HVAC) systems in relation to the most actual standards);*



- *The modelling of the building energy should include existing parameters, as well as the environmental and GIS data;*
- *Be flexible in coupling the overall BIM system with other additional types of models (e.g. buildings acoustics; including calculator for economic evaluation of various renovations scenarios);*
- *Be flexible to adapt to work planning, as-buildings documentation and procedures to process changes;*
- *Allow the development of applications to benefit from inputs of inhabitants;*

*A close cooperation with standardisation bodies is required in order to validate the new BIM tools.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 4 and achieve TRL 6 at the end of the project.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact** *Proposals should achieve all of the following:*

- *A reduction of the renovation working time of at least 15-20% compared to current practices with the baseline defined in the proposal;*
- *Acceleration of the market uptake across Europe, by speeding-up industrial exploitation, in particular amongst constructing/ renovations companies with a target of 50% of their renovation business based on BIM;*
- *Creation of best practice examples for the construction retrofitting sector with benefits for the operators and associated stakeholders (architects, designers, planners, etc.).*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal*

**Type of Action:** *Research and Innovation action*

### **LC-EEB-06-2018-20 ICT enabled, sustainable and affordable residential building, construction, design to end of life**

**Specific Challenge:** *The poor energy performance features that buildings may exhibit can be due not only to the characteristics of the building materials used, but also to the use of traditional or unsuitable construction processes. Therefore, the building process needs to benefit from an increased level of industrialisation, including for instance lean construction and higher degree of prefabrication. This is especially true in the case of building retrofitting where the traditional construction methods are not able to plan in advance all the problems to be solved in the variety of renovation sites. Using ICT as an enabler in the building process and operation is a way to meet the challenges. ICT solutions need to incorporate the design, manufacturing, construction, material choice (including reusability, environmental performance and cost aspects), operation and end of life phases affecting the overall building lifecycle. The closer integration of ICT based-building construction tools into the*

*manufacturing, construction and operation phases has a strong impact on the overall building lifecycle, and it will also help reducing the performance gap.*

**Scope:** *Existing generic software tools have limited flexibility and lack interoperability concerning models and design cultures. Vertically integrated life cycle design is still missing, mainly due to a fragmented design culture across the various disciplines. ICT tools should be provided for energy and environmental performance related design, analysis and decision-making in early planning phases for new buildings or renovation of buildings. Clear evidence of technical and economic viability should be provided by validating and demonstrating the proposed ICT-driven construction processes in either new or retrofitting projects. For existing buildings, significant effort will be required to first retrieve all relevant information, and to compile and structure it in a meaningful form to be used by new solutions.*

*Proposals should:*

- *Develop an advanced digitalised and industrialised construction and building process utilising smart combinations of materials/components;*
- *Assess the overall life cycle of construction, in order to deliver more efficient buildings in terms of sustainability and construction, maintenance and operation costs;*
- *Provide for fully integrated systems to be compact, exchangeable, and easy to commission and to operate and demonstrate business solutions for operating such building life-time ICT solutions.*

*Proposals should include Social Sciences and Humanities (SSH) elements regarding public perception and acceptance of advanced building life solutions at the level of the construction sector in Europe.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 5 and achieve TRL 7 at the end of the project.*

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

*As an exception from General Annex D, the funding rate for eligible costs in grants awarded under this topic will be differentiated: 100% of the eligible costs for beneficiaries and linked third parties that are non-profit legal entities; and 50% of the eligible costs for beneficiaries and linked third parties that are for profit legal entities.*

**Expected Impact:** *Proposals should achieve all of the following:*

- *Reduction of CO<sub>2</sub> with 15-20% for the total life-cycle compared to current situation shown through Life Cycle Assessment;*
- *Construction cost reductions of at least 15% compared to current situation;*
- *Buildings shortened construction time (reduced by at least 10-15% compared to current State of the art);*
- *Reduction of the gap between predicted and actual energy consumption;*
- *Improved indoor environment;*
- *Significantly improved integration of the value chain (design, procurement, manufacturing, construction, operation and maintenance);*
- *Contribution to new standards and regulations;*
- *Demonstration of large scale replicability potential.*

- *Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** Innovation action (50%)

### **LC-EEB-01-2019 Integration of energy smart materials in non-residential buildings**

**Specific Challenge** Europe is leader in the development of components for buildings retrofitting. Its leadership is based on the use of high-efficient insulation materials including concrete, steel, glass, composites, wood and hybrids, which should lead to achieving recyclable, nearly zero-energy building envelopes (roofs, façades) when applied to new buildings. However, these components do still not allow for the integration of smart energy storage and for an equal performance in existing buildings. This has proved to be very challenging, in terms of complexity, weight control and overall retrofitting costs. Therefore, work is required to advance the technology readiness level. Activities should include the demonstration of new hybrid-enabled prototypes for selected non-residential buildings.

**Scope** The development of lightweight components based on high-efficiency insulation materials needs adding active energy management capabilities without increasing weight. Proposals should cover all of the following:

- *development of lightweight components for the construction of building envelopes with integral means for combined active/passive management of energy transfer, i.e., for active insulation, heat diversion, storage and directional transfer;*
- *solutions capable for use in both new buildings and for retrofitting existing ones;*
- *solutions allowing for installation without modifying the structure of the building (or without overloading existing structures) and demonstrating a high replication and industrial potential;*
- *modelling of the materials and components as well as to the development of novel testing methodologies oriented towards assessing the long-term performance of the elements. This should include the estimation of durability and service life;*
- *reduced maintenance costs, possibility of use in a wide range of environmental conditions, favour renewable resources, respect of sustainability principles (International Reference Life Cycle Data System - ILCD Handbook), and the possibility of reuse at the end of service life.*

*This topic is likely to contribute to standardisation and certification activities.*

*Resources should be envisaged for clustering with other projects funded under the call, in order to facilitate research cohesion and inter-consortia cooperation.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 5 and achieve TRL 7 at the end of the project.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact** *When compared to state of the art, the newly developed solutions should bring:*

- *Improvement by at least 25% of the insulation properties at component level for a given weight, when in isolation (passive) mode;*
- *10% improvement in energy-storage capability when in active mode(s);*
- *Water and air tightness should be at least 10% higher than existing solutions (when it is proposed a controllable solution);*
- *Cost increase of less than 15%, in order to allow market uptake across Europe and contribute to social affordability.*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation action*

### **LC-EEB-03-2019 New developments in plus energy houses**

**Specific Challenge.** *Energy Efficiency targets set at EU level by legislation are currently being reviewed. The related SET-Plan rolls out concrete steps how research and innovation could further reach these targets by 2025. However, the current practice to construct nearly zero-energy houses will be insufficient to reach the CO<sub>2</sub> emission reduction targets for 2050. Therefore, it is necessary to develop further the concept of "Plus Energy Houses", producing more energy than they use. Buildings have long life cycles until they are replaced. Therefore, it is essential to speed up the development of the required technologies.*

**Scope:** *New designs, making use of already developed and validated materials and components and smarter control systems ready to treat vast amounts of data are needed. The surplus of energy should come from renewable sources (geothermal heat, photovoltaics, wind, etc.), obviously optimizing the dynamic character of the energy balance all along the year.*

*Each proposal should be expected to involve pioneer cities (demonstrations in a multi-storey apartment building situated in each of the 4 climatic zones in Europe). Such buildings should be properly managed and connected to the neighbourhood grid. Proposals should take the lead by leveraging funding with other energy efficiency schemes, including the private sector. Erecting buildings at such pioneer cities should not encounter regulatory problems. For this reason, the proposal will identify any bottlenecks in the existing regulations and standards concerned by the locations chosen.*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 5 and achieve TRL 7 at the end of the project.*

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

**Expected Impact:** *Proposals should achieve all of the following:*

- *Similar costs as compared to the 2020 nearly zero-energy buildings as an incentive to erect energy-plus-houses;*
- *Increase of the share of plus-energy houses with the view of 10% market uptake by 2030;*

- *Contribute reducing of CO<sub>2</sub> emissions in the residential sector by 88% in 2050 compared to the 1990 levels;*
- *Improved indoor environment leading to higher rate of users' satisfaction based on their demand and behaviour.*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation action*

### **LC-EEB-05-2019-20 Integrated storage systems for residential buildings**

**Specific Challenge:** *Optimised storage solutions for thermal and electric energy are needed in order to better synchronise the overall supply and demand, at residential, district and urban level. Efficient management of the peak loads would reduce the overall operational costs of the installations.*

*The main challenge is to demonstrate integrated thermal storage systems. The current mature technologies for thermal storage are mostly based on water. In order to increase the storage density, it is needed to further develop other systems such as the Thermochemical materials. The next wave of developments needs to be tackled in order to propose attractive equipment with a significant increase in storage capacity efficiency. The combination of renewable energy with storage is key to support the next generation of very low or plus energy houses. Such storage equipment will be exploited first and mostly in the residential buildings (existing and new ones).*

**Scope:** *Proposals should develop advanced solutions including all of the following elements:*

- *Reach improved heat exchange in and between storage material and heat carrier as well as high performing storage reactor over time;*
- *With respect to the entire storage system, advanced energy management is needed, Not only regarding the building needs but also taking in account external conditions such as grid constraints and price signals;*
- *The overall system should be easy to maintain with low cost associated to this activity;*
- *The demonstration should include several prototypes operating in three different climatic conditions (with compactness as a crucial boundary condition).*

*Proposals submitted under this topic should include actions designed to facilitate cooperation with other projects; to enhance user involvement; and to ensure the accessibility and reusability of data produced in the course of the project.*

*Activities should start at TRL 5 and achieve TRL 7 at the end of the project.*

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

**Expected Impact:** *Demonstrate solutions that have a stable, reliable long term performance in multi-cyclic seasonal and use of at least 20 years;*

*Deliver compact systems with the potential to fit in the limited space available in a single building in the existing housing stock or new buildings. The storage material volume per dwelling should not exceed 1 m<sup>3</sup>;*

*Solutions should demonstrate a potential to reduce the net energy consumption of a building by at least 25% and a have return-on-investment period below 10 years;*

*Use of high energy density storage materials allowing storage densities up to 10 times higher than water (based on overall system efficiency).*

*Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.*

**Type of Action:** *Innovation action*



## LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES: INFORMATION AND COMMUNICATION TECHNOLOGIES

### **ICT-11-2018-2019 HPC and Big Data enabled Large-scale Test-beds and Applications**

**Specific Challenge:** *The Internet of Things and the convergence of HPC, Big Data and Cloud computing technologies are enabling the emergence of a wide range of innovations. Building industrial large-scale application test-beds that integrate such technologies and that make best use of currently available HPC and data infrastructures will accelerate the pace of digitization and the innovation potential in Europe's key industry sectors (for example, healthcare, manufacturing, energy, finance & insurance, agri-food, space and security).*

#### **Scope:**

*a) Innovation Actions (2018 call - deadline in April 2018) targeting the development of large-scale HPC-enabled industrial pilot test-beds supporting big data applications and services by combining and/or adapting existing relevant technologies (HPC / BD / cloud) in order to handle and optimize the specific features of processing very large data sets. The industrial pilot test-beds should handle massive amounts of diverse types of big data coming from a multitude of players and sources and clearly demonstrate how they will generate innovation and large value creation. The proposal shall describe the data assets available to the test-beds and, as appropriate, the standards it intends to use to enable interoperability. Pilot test-beds should also aim to provide, via the cloud, simple secure access and secure service provisioning of highly demanding data use cases for companies and especially SMEs.*

*b) Innovation Actions (2018 call - deadline in November 2018) targeting the development of large-scale IoT/Cloud-enabled industrial pilot test-beds for big data applications by combining and taking advantage of relevant technologies (Big Data, IoT, cloud and edge computing, etc.). The aim is to develop industrial pilot test-beds addressing data flows from a very large number of distributed sources (such as sensors or IoT applications/infrastructures and/or involving remote data storage/processing locations) and clearly demonstrate how they will generate innovation and large value creation from such data assets. The industrial pilot test-beds shall also address the relevant networking connectivity and large-scale data collection, management and interoperability issues. The data assets available to the test-beds should be described in the proposal. Pilot test-beds should also aim to provide, via the cloud, simple secure access and secure service provisioning of highly demanding data use cases for companies and especially SMEs.*

*a) is called in the 2018 call with a deadline in April 2018. b) is called in the 2018 call with a deadline in November 2018.*

*For all subtopics a), b) above:*

*Proposals should be led by and show strong industrial commitment. They should explain how the proposed activities will be industrialized and have impact on the competitiveness and leadership of European industry. They should target a wide participation and/or applicability and use of the targeted industrial pilot test-bed by industrial members/users from different countries and regions. They should also define quantifiable outputs and impact Key Performance Indicators, in particular related to the "Expected Impact" of the topic.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 12 and 13 million for subtopic a), and EUR 15 and 18 million EUR for subtopic b) would*

allow these areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Proposals could seek synergies and co-financing from relevant national / regional research and innovation programmes, including European Structural and Investment Funds (ESIF) addressing pre-identified smart specialisation priorities at regional / national level. Proposals combining different sources of financing should include a concrete financial plan detailing the use of these funding sources for the different parts of their activities.

All grants under both subtopics will be subject to Article 30.3 of the grant agreement (Commission right to object to transfers or licensing).

**Expected Impact:**

Proposals should address the following impact criteria, providing metrics to measure success where appropriate:

- Demonstrated increase of innovation and productivity in the main target sector of the Large Scale Pilot Action;
- Increase of market share of Big Data technology providers if implemented commercially within the main target sector of the Large Scale Pilot Action;
- Effective integration of HPC/BD/Cloud/IoT technologies in the main target sector(s) of the Large Scale Action, resulting into integrated value chains and efficient business processes of the participating organizations;
- Widening the use of and facilitating the access to advanced HPC, big data and cloud infrastructures stimulating the emergence of the data economy in Europe;
- Stimulating additional private and public target investments in HPC and Big Data technologies from industry, Member States and Associated Countries, and other sources, as referred to in the contractual arrangements of the HPC and/or the Big Data Value Public Private Partnerships.

**Type of Action:** Innovation action

**DT-ICT-10-2018-19 Interoperable and smart homes and grids**

**Specific Challenge:** When energy production is becoming decentralised and ICT is increasingly present in homes, the integration of renewable energy sources (RES) and promotion of energy efficiency should benefit from smarter homes, buildings and appliances, as well as (the batteries in) electric vehicles. Smart homes and buildings are one crucial element because system integration and optimisation of distributed generation, storage and flexible consumption will require interoperable smart technologies installed at building level. Internet of Things (IoT) enables a seamless integration of home appliances with related home comfort and building automation services allowing to match user needs with the management of distributed energy across the grid, and to gain access to benefits from Demand Response. Novel services should lead to more comfortable, convenient and healthier living environment at lower energy costs for consumers whilst enabling an active participation of consumers in the energy system and energy markets.

**Scope:** The aim of the pilot is to exploit IoT reference architectures models that allow for combining services for home or building comfort and energy management, based on platforms that enable the integration of relevant digital technologies like IoT, AI, cloud and big data services and where applicable, combined with blockchain technologies. Energy services, where appropriate, can be combined with additional non-energy services and



*foster the take-up of smart energy communities (in particular peer-to-peer energy markets). The aim is also to demonstrate platforms through a large-scale pilot for experimentation and co-creation with users under real-life conditions in interaction with the electricity and wider energy system, and to demonstrate the benefits of energy management through IoT application and services for the users. The envisaged architecture should allow for third party contributions that may lead to new value added services both in energy and the home/building domain.*

*This shall be done by developing interoperability and seamless data sharing, through aligning existing standards from the utility and ICT domains, across the devices and systems to enable innovative building energy management services, with the aim to save costs to consumers, to facilitate the integration of renewable energy from distributed intermittent sources and to support energy efficiency. The pilot needs to demonstrate plug-and-play energy management solutions within the home, by taking into account legacy of existing smart home or building solutions, mapping their approach to common architecture models and implementing relevant standards (such as SAREF). Pilots need to ensure interoperability in the communication interfaces between smart devices and from the smart device to the gateway/energy manager and/or to the cloud, i.e. a service provider that uses the data generated from the device, so that smart home services can also be used for the benefit of the electricity and wider energy system. Selected pilots should promote the use of these interoperable solutions as widely as possible involving many different types of appliances (e.g. including white-goods, heating, cooling and ventilation, home & building automation energy management, metering and control, batteries, photovoltaic panels, charging for electric vehicles), and explore the need for further standardisation and legislation. Pilot work plans should include feedback mechanisms from the users to allow adaptation and optimisation of the technological and business approach to the particular use case.*

*The selected large-scale pilot shall in particular address all of the following issues:*

- demonstrate scalability and stimulate spill-over effects; demonstrate that such platforms lead to a marketplace for new services in EU homes and buildings; identify best-practices, inter alia for consumer involvement, in installation, and in sales packages of devices and services;*
- for large-scale piloting and ecosystem building, proposals shall involve financial support to third parties, in particular SME's and start-ups, to support the incorporation of users of the pilots, developers of additional applications, replication of the pilots through new sites or new connected devices, and complementary assessment of the acceptability of the use case where appropriate;*
- the selected project shall cover the whole value chain for IoT-based services: appliance manufacturers and technology providers, ICT suppliers, energy suppliers, as well as independent aggregators or energy service companies (ESCOs), and one or more grid service operators (transmission system operators (TSOs) and distribution system operators (DSOs));*
- the selected project is expected to contribute to the consolidation and coherence work in cooperation with similar EU-funded projects[1] through the BRIDGE initiative [2] and the CSA supporting the activities defined under "DT-ICT-13-2019: Digital Platforms/Pilots Horizontal Activities a)" below by contributing their results of horizontal nature (interoperability approach, standards, security and privacy approaches, business validation and sustainability, methodologies, metrics, etc.);*
- link with Member States' and Associated Countries' initiatives in this area.*

*For this topic, the four activities and impact criteria described in the introductory section 'Platforms and Pilots' have to be applied. The Commission considers that proposals*

requesting a contribution from the EU up to EUR 30 million for Innovation Actions would allow the areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**Expected Impact:**

- Increasing number of energy apps/services and home devices and appliances that are connected through the Internet allowing to shift consumption according to wholesale market or grid-constraints-related price signals.
- Validation of user acceptance, as well as demonstration of viable concepts that ensure privacy, liability, security and trust in connected data spaces.
- Accelerated wider deployment and adoption of IoT standards and platforms in smart homes and buildings in Europe and development of secure, cost-effective and sustainable European IoT ecosystems and related business models.
- Demonstration that such platforms lead to a marketplace for new services in EU homes and buildings with opportunities also for SMEs and start-ups.
- Contribution to increasing the use of renewable energy and increased energy efficiency, offering access to cheaper and sustainable energy for consumers and maximising social welfare.

**Type of Action:** Innovation action

**DT-ICT-11-2019 Big data solutions for energy**

**Specific Challenge:** Tomorrow's energy grids consist of heterogeneous interconnected systems, of an increasing number of small-scale and of dispersed energy generation and consumption devices, generating huge amounts of data. The electricity sector, in particular, needs big data tools and architectures for optimized energy system management under these demanding conditions.

**Scope:** Innovation Actions targeting large-scale pilot test-beds for big data application in the electricity sector. The aim is to develop/pilot and deploy a reference architecture for large-scale multi-party data exchange, management & governance and real-time processing (including distributed/edge processing) in the electricity sector and to translate this reference architecture into an open, modular data analytics toolbox for the safe and effective operation of grids and provision of innovative energy services. The reference architecture should ensure compatibility with legacy formats, interfaces and operating systems of the energy system, allow replication and scale-up, be compliant with applicable EU standards, and should enable the integration of relevant digital technologies like IoT, AI, cloud and big data services. The analytics toolbox shall be able to handle a wide variety of data and support the development of a wide range of energy services, at least to increase the efficiency and reliability of the operation of the electricity network (e.g. by predictive maintenance), to optimize the management of assets connected to the grid (in particular small-scale/renewable electricity generation and those used for demand response), to increase the efficiency and comfort of buildings, and to de-risk investments in energy efficiency (e.g. by reliably predicting and monitoring energy savings). Proposers should demonstrate that they have access to appropriate large-scale and realistic datasets, and should involve as many as necessary of the following types of participants: network operators, suppliers, independent aggregators, ESCO's, power exchanges, building management and renovation sectors, software integrators/developers. Proposals should

address, as appropriate, analytics, simulation, prediction, cloud computing. Projects shall collaborate with EU-funded projects through the BRIDGE initiative [1].

For this topic, the four activities and impact criteria described in the introductory section 'Platforms and Pilots' have to be applied.

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

All grants under both subtopics will be subject to Article 30.3 of the grant agreement (Commission right to object to transfers or licensing).

**Expected Impact:** Proposals should address the following impact criteria, providing metrics to measure success where appropriate:

- *Effective integration of relevant digital technologies in the energy sector, resulting in integrated value chains and efficient business processes of the participating organizations;*
- *Enhancing energy asset management, increasing consumer participation and innovative network management, creating new data-driven business models and opportunities and innovative energy services;*
- *Contribution to increasing the use of renewable energy and increased energy efficiency based on optimised energy asset management, offering access to cheaper and sustainable energy for energy consumers and maximising social welfare;*
- *New data-driven paradigms for energy management systems able to deal with increased complexity of the energy systems;*
- *Improving availability of big data and big data management & analysis facilities for real-life scale research, simulation and test purposes.*

**Type of Action:** Innovation action

### **DT-ICT-13-2019 Digital Platforms/Pilots - Horizontal Activities: Preparation of a digital industrial platform for the construction sector**

**Specific Challenge:** *Coordination and Support activities are needed to support the operation of the pilot projects under the Platforms and Pilots topics in this Focus Area, and to support exploitation of the outcomes of these projects. These activities are expected to identify synergies among the pilot projects of the Focus Area, to promote cross-fertilisation, and to exchange best-practices and lessons learned. There is a need to increase coverage in technological, application, innovation, and geographic terms of these projects, as well as improve their engagement with relevant external stakeholders, and their links with regional/national and other European initiatives.*

*In addition, coordination and support activities are needed to pave the way for future digital industrial platforms in another promising sector, the construction sector. There is major improvement potential in optimising resource use, environmental performance, health, comfort, and resilience to climate change.*

#### **Scope:**

a) *Support pilot activities and knowledge transfer across different sectors: Coordination of the selected platform and pilot projects under the topics of this Focus Area, and where applicable with similar initiatives in Member States and Associated Countries, and with*

*standardisation initiatives and support in ecosystem building to increase the impact of the overall set of projects. Exploitation of synergies between technology-based platform and pilot activities such as IoT and data value chains and the sector-specific platform and piloting projects of the Focus Area related to issues such as architecture, interoperability and standards approaches. Exchange on requirements for the development of common methodologies for design, testing and validation and for success and impact measurement. Furthermore, proposals need to promote the results obtained, support the enlargement of the ecosystems around the projects, facilitate the access for entrepreneurs/API developers/Makers and SMEs in general, and support the transfer of skills and know-how to industry.*

*b) Legal, regulatory and security support: Further development and exploitation of security and privacy mechanisms towards best practices for digital platforms and pilots including contribution to pre-normative activities and to standardization; regulatory and legal support in relation to data ownership and protection, security, liability, across sector legislations. The corresponding activities will be developed and addressed in the pilots and consolidated at programme level under this horizontal support activity line.*

*c) Preparation of a digital industrial platform for the construction sector: proposals should bring together relevant stakeholders and define a reference architecture for a digital industrial platform for the construction sector that increases productivity and optimises material usage in the construction sector, including for SMEs. It needs to take into account the recently developed framework with core indicators to assess the environmental performance of buildings, including circular economy aspects[1]. Proposals should take stock of other ongoing initiatives, promote mutual learning and coordination, and identify knowledge and intervention gaps. Widespread use of Building Information Modelling and building passports will promote information sharing about different resources and their life cycles, re-use of materials, productive processes, including improved engineering, procurement and supply chain management and are therefore part of the scope.*

*Proposals should address only one of the above-mentioned subtopics a), b), or c). The Commission considers that proposals requesting a contribution from the EU up to EUR 2 million for a) and EUR 1 million for each of b) and c) would allow above areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. At least one coordination and support action is supported for each of the areas above.*

**Expected Impact:**

- *Tangible contributions from European key players to actively engage with the platform building process;*
- *Efficient information sharing across the programme stakeholders for horizontal issues of common interests;*
- *Maintaining and extending an active eco-system of relevant stakeholders, including start-ups and SMEs;*
- *Validation in usage context of usability, risk and security assessment and identification of gaps related to trust, security and privacy, respect for the scarcity and vulnerability of human attention, and liability and sustainability;*
- *Strengthening of the role of EU on the global scale, in particular in terms of standardisation activities and access to foreign markets;*
- *Increased prospects on productivity improvements in the construction sector, and on a contribution to a more sustainable construction sector.*

**Type of Action:** Coordination Support action

## SECURE, CLEAN AND EFFICIENT ENERGY

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

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

**Scope:** *Proposals should demonstrate solutions addressing building fabric and/or technical systems that ensure faster and more cost-effective deep renovations that result in high energy performance. Proposals should include innovations in technology and in design and construction methods with low embodied energy and on-site works organisation, industrialization and lowering cost of energy retrofitting and they should take into account any architectural constraints. They should also include innovations in business models and the holistic integration of disciplines across the value chain. Proposals should also consider energy efficient and low carbon solutions to retrofit building-level heating and cooling systems and the integration of on-site renewable energy generation[1], energy storage systems which allow for optimisation and flexible consumption, and, if relevant, integration with district heating and cooling systems. Proposals could address drivers of building renovation that go beyond a desire to reduce energy consumption and related energy costs. For example, decisions to renovate may sometimes coincide with structural repairs. They could also consider further development and improvement of hybrid energy systems using fossil fuel based heating systems coupled with RES based heating systems as well as the integration of highly-efficient buildings and local energy system solutions such as District Heating and Cooling, including hybrid solutions.*

*Solutions should include quick and simple installation of components and systems, minimizing disruption for building occupants and the time spent on site. Proposals should include monitoring and displaying of real time energy performance and other relevant data and consider the ways in which consumers and others could access and make use of such information. Solutions should ensure high levels of occupant comfort (thermal, visual and acoustic) and indoor environmental quality (e.g. air quality, humidity) if possible based on bio-based materials, as well as low risk of moisture-related problems, summer overheating and other harmful unintended consequences, and should address the multiple benefits of energy efficiency. Proposals should demonstrate solutions that aim for large scale roll-out according to defined business models and financial schemes for owners.*

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

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

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



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

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- High energy performance in the renovated buildings;
- Measurable cost reduction compared with a typical renovation (i.e. a renovation that meets current minimum requirements of existing building regulations) or major energy performance improvement at comparable cost;
- Reduction of time needed on site for renovation works by 20% compared to current national standard practice;
- Demonstration of the effectiveness and replicability of the proposed solutions to lead to an increased rate of renovation for defined building typologies in several districts/cities/regions.
- Additional positive effects can be quantified and reported when relevant and wherever possible:
  - Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project.

**Type of Action:** Coordination and Support Actions

#### **LC-SC3-EE-4-2019-2020 Upgrading smartness of existing buildings through innovations for legacy equipment**

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

Today in the EU, the existing building stock represents the main challenge for a more efficient energy use, in buildings as well as across the whole energy system. The smart readiness of buildings may evolve faster for devices and systems easily replaced and installed, than for other parts of the building's equipment such as HVAC and DHW systems etc. due to higher costs of replacement, longer lifecycles and difficulties related to the integration in buildings. This installed equipment remains highly relevant for buildings interactions with the energy system, making its upgrade to higher levels of smartness an essential step.

**Scope:** Proposals should develop and demonstrate cost-effective technological solutions to manage energy within existing buildings and interact with the grid providing energy efficiency, flexibility, generation and storage, based on user preferences and requests. These solutions should be aimed to upgrade existing buildings, either residential or tertiary, using automation and IT to offer new services and control to the building users, thereby improving their comfort and increasing their satisfaction.

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

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

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

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

*A realistic estimate should be provided on the total energy savings/year and on the impact of the innovations demonstrated in the project on the total power available for cost effective demand response actions. The projects should involve technology providers (e.g. manufacturers of appliances, movable envelope components, smart control/home systems providers), energy services providers (aggregators and/or suppliers and/or ESCO's), user representatives, electricity system operators and other actors as relevant.*

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

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

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

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

- *Primary Energy savings triggered by the project (in GWh/year);*
- *Investments in sustainable energy triggered by the project (in million Euro);*
- *Upgrade of existing buildings to higher smartness levels, including a significantly enlarged base of existing building equipment and appliances monitored by energy management systems and activated through demand response actions;*
- *Reduction in energy consumption and costs, exceeding the additional consumption from IT and its cost.*
- *Additional positive effects can be quantified and reported when relevant and wherever possible:*
- *Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project.*



**Type of Action:** Innovation Actions

### **LC-SC3-EE-5-2018-2019-2020 Next-generation of Energy Performance Assessment and Certification**

**Specific Challenge:** Under the Energy Performance of Buildings Directive, all EU countries have established independent energy performance certification systems supported by independent mechanisms of control and verification. However, current practices and tools of energy performance assessment and certification applied across Europe face a number of challenges.

Assessment processes and certificates have to become more reliable, user-friendly, cost-effective, have comparable good quality and be compliant with EU legislation in order to instil trust in the market and incite investments in energy efficient buildings. They have to increasingly reflect the smart dimension of buildings and at the same time, facilitate convergence of quality and reliability of Energy Performance Certificates (EPCs) across the EU. The building energy performance methodologies should also ensure a technology neutral approach, be transparently presented making use of International and European standards, in particular the ISO/CEN standards developed under Commission mandate M/480[2] aimed at enabling the presentation of national and regional choices on a comparable basis.

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

**Scope:**

#### **2018 (Coordination and support action):**

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

housing surveys, EU Building Stock Observatory) and one-stop-shops including administrative, financial and supply side information and linking EPCs to related concepts such as buildings renovation passports, individual buildings renovation roadmaps or building logbooks should also be considered.

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

**2019 (Innovation action):**

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

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

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

**Expected Impact:**

**2018 (Coordination and support action):**

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

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Increased convergence of good quality and reliable energy performance assessment and certification and uptake and compliance with EU Directives and related standards;
- Increased rate of application and compliance of EPCs and independent control systems with the provisions of EU and national legislation, in a defined region;
- Increase of EPCs databases for compliance checking and verification, linking with financing schemes and building stock characteristics research etc.

**2019 (Innovation action):**

- Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible;
- Improved user-friendliness of EPCs in terms clarity and accuracy of the information provided;
- Enhanced user awareness of building energy efficiency;
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro).

- *Additional positive effects can be quantified and reported when relevant and wherever possible:*
- *Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project.*

**Type of Action:** *Coordination Support Actions and Innovation Actions*

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

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

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

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

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

*Attention should be paid to reducing emissions of air pollutants.*

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

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

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

**Type of Action:** *Innovation Actions*

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

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

**Scope:** Support will be given to solutions that address: a) new BIPV product concepts to meet these requirements and cost-efficient production techniques reducing their additional cost by 75% by 2030 compared to 2015 levels ([1]Annex I. BIPV detailed targets) and; b) demonstration of these concepts into a BIPV energy system that guarantees the building functionalities and energy needs on a life-cycle basis. Proposals will involve multidisciplinary consortia including the PV manufacturing industry. The building materials industry, certification bodies and market actors who are committed to adopting/implementing the results will also be included where relevant.

Proposals will also address standardization issues.

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

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

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

**Type of Action:** Innovation Actions

### **LC-SC3-SCC-12018-2019-2020 Smart Cities and Communities**

**Specific Challenge:** The COP21 Paris Agreement recognises the role of cities and calls on them to rapidly reduce greenhouse gas emissions and adapting to climate change. The EU is committed to implementing the 2030 Agenda for Sustainable Development, including Sustainable Development Goal 11 ("Make cities inclusive, safe, resilient and sustainable"). Many forward-looking cities have set themselves climate goals whose achievement rests on wide scale roll out of highly integrated and highly efficient energy systems.

To achieve the necessary energy transition in cities, it is essential to increase energy systems integration and to push energy performance levels significantly beyond the levels of current EU building codes and to realize Europe wide deployment of Positive Energy Districts by 2050[1].

This call will also contribute to the specific objectives of the SET Plan action 3.2 - Smart cities and communities - focussing on positive-energy blocks/districts[2].

**Scope:** Integrated innovative solutions for Positive Energy Blocks/Districts will be developed and tested and performance-monitored in the Lighthouse Cities. Projects will consider the

*interaction and integration between the buildings, the users and the larger energy system as well as implications of increased electro-mobility, its impact on the energy system and its integration in planning.*

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

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

*Definition: Positive Energy Blocks/Districts consist of several buildings (new, retro-fitted or a combination of both) that actively manage their energy consumption and the energy flow between them and the wider energy system. Positive Energy Blocks/Districts have an annual positive energy balance[3]. They make optimal use of elements such as advanced materials, local RES, local storage, smart energy grids, demand-response, cutting edge energy management (electricity, heating and cooling), user interaction/involvement and ICT.*

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

*To increase impact beyond the demonstration part of the project, each Lighthouse City and Follower City will develop, together with industry, its own bold city-vision for 2050[4]. The vision should cover urban, technical, financial and social aspects. Each vision should come with its guide for the city on how to move from planning, to implementation, to replication and scaling up of successful solutions.*

*Proposals should also:*

- *Focus on mixed use urban districts and positively contribute to the overall city goals;*
- *Develop solutions that can be replicated/gradually scaled up to city level. The technical, financial, social, and legal feasibility of the proposed solutions should be demonstrated in the actual proposal.*
- *Make local communities and local governments (particularly city planning departments) an active and integral part of the solution, increase their energy awareness and ensure their sense of ownership of the smart solutions. This should ensure sustainability of Positive Energy Blocks/Districts;*
- *Promote decarbonisation, while improving air quality.*
- *Incorporate performance monitoring (ideally for more than 2 years) of deployed solutions from the earliest feasible moment. All relevant performance data must be incorporated into the Smart Cities Information System database (SCIS)[5].*

*Projects should also deliver:*

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



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

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

Costs of commercial technologies are not eligible, for example:

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

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

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

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 20 million] would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

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

**Expected Impact:** Projects should contribute to:

- Meeting EU climate mitigation and adaptation goals and national and/or local energy, air quality and climate targets, as relevant;
- Significantly increased share of i) renewable energies, ii) waste heat recovery and iii) appropriate storage solutions (including batteries) and their integration into the energy system and iv) reduce greenhouse gas emissions;
- Lead the way towards wide scale roll out of Positive Energy Districts;
- Significantly improved energy efficiency, district level optimized self-consumption, reduced curtailment;
- Increased uptake of e-mobility solutions;
- Improved air quality.

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

**Type of Action:** Innovation Actions

### **LC-SC3-EE-2-2018 2019 Integrated home renovation services**

**Specific Challenge:** Many project promoters – public authorities, individuals or businesses – lack the skills and capacity to set up, implement and finance ambitious low-energy and clean energy building projects. In addition, many project developers still face obstacles in raising the necessary up-front costs for their projects – particularly as the small-size of

investments and the lack of turnkey solutions increase implementation cost – and lack access to attractive and adequate financing products from the market.

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

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

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

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

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

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

- Implementation and upscale of economically viable business models, ultimately running without the need for public subsidies. Data evidence made available to market actors. Proof of the replication of these initiatives by other market actors;
- Availability of adequate financing offer for integrated renovation services;
- Strong and trustworthy partnerships with local actors (e.g. SMEs, ESCOs, financial institutions, energy agencies, NGOs) and quality of the proposed services recognized by market actors;
- Development of large, locally-developed investment pipelines for home renovation, connecting the supply of finance with demand for it (in million Euro of investments within the first 5 years);
- Uptake of home energy renovation at local level and corresponding primary energy savings triggered (in GWh/year).

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

- Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project

**Type of Action:** Coordination Support Actions



### **LC-SC3-EE-11 2018-2019-2020 Aggregation - Project Development Assistance**

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

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

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

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

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

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

*Proposals should include the following features:*

- *an exemplary/showcase dimension in their ambition to reduce energy consumption and/or in the size of the expected investments;*
- *deliver organisational innovation in the financial engineering (e.g. on-bill financing schemes, guarantee funds, or factoring funds) and/or in the mobilisation of the investment programme (e.g. bundling, pooling or stakeholder engagement);*
- *demonstrate a high degree of replicability and include a clear action plan to communicate experiences and results towards potential replicators across the EU;*
- *build on the experiences from previous PDA projects.*

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

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

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

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

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

- Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project.

**Type of Action:** Coordination Support Actions

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

**Specific Challenge:** Energy Efficiency services (e.g. Energy Performance Contracting (EPC)) are available on the market already for quite some time. However, there is a big untapped potential in sectors and with actors not yet engaged in services triggering energy, CO<sub>2</sub> and cost savings. At the same time, new technologies have emerged opening the door for new types of services which use ICT to better control and steer energy consumption according to market and system needs and to the availability of renewable energy; others are able to integrate energy services with non-energy benefits such as comfort. By bundling various services and benefits, additional target groups, sectors and financial resources can be accessed. Actions are also needed to structure and label the quality of demand side service providers (like ESCOs aggregators and energy cooperatives) and improve their accessibility for end energy users.

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

#### **Scope:**

##### 2018 (Coordination and support action):

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

- enhance and refine successful energy performance contracting models and/or;
- include pay-for-performance schemes and/or;
- include customer individualized energy services as a result of better understanding of customer behaviour and needs derived of new data analytics tools;

- *engage new sectors and actors and/or;*
- *integrate energy efficiency services with other energy services like distributed generation and demand response and including storage/hybrid energy systems and/or non-energy related services; these should be endorsed by relevant stakeholders and validated (for example tested around existing projects or projects under development);*
- *factor in potential legal and contractual aspects (e.g. in relation to existing contracts or warranty, safety and data security issues linked to existing and newly deployed equipment).*

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

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

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

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

#### **2019 (Innovation action):**

*Projects should focus on demonstrating and testing innovative energy services in a real environment, across several market segments and across different actors in the value chain. To be economically viable, these services need to be able to rely on sound measurement and verification methodologies. They should cover several but not necessarily all of the relevant areas and aspects identified above, blending in innovative manner different revenue streams coming from different market segments and they should in all cases include innovative verification and monitoring measures. Moreover, they should demonstrate how potential legal and contractual aspects (e.g. in relation to existing contracts or linked to the use of equipment) have been accounted for.*

*Proposals should demonstrate that the tested business models and services are self-sustainable after the end of the project. The upfront investments in energy efficiency*

measures (e.g. upgrading of building energy performance) and in smart building systems should be paid back at least in part by revenues coming from energy savings and remunerated flexibility.

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

Where available and appropriate, the actions should build on the results of the DT-ICT-10-2018: Interoperable and smart homes and grids, DT-ICT-11-2019: Big data solutions for energy and LC-SC3-ES-6-2018-2020: TSO-DSO-consumers: Large-scale demonstrations of cross-border markets for innovative grid services. All innovative energy service concepts and in particular IoT based energy service concepts developed in the frame of the pilot DT-10-2018 should be tested under real market conditions, gathering relevant market actors and exploring user acceptance.

#### **Expected Impact:**

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

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Improved viability of innovative energy services.
- In addition, proposals are expected to demonstrate, the impacts listed below, using quantified indicators and targets wherever possible:
- A growing offer and up-take of services that combine energy efficiency with other energy services, technologies and non-energy benefits;
- A growing up-take of innovative data gathering and processing methods in the monitoring and verification of energy savings and flexibility;
- The application of methods and concepts to ensure that: (i) innovative energy services are reliable and verifiable, (ii) service providers are trustworthy and accessible.

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

- Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project.

**Type of Action:** Coordination Support Actions and Innovation Actions

#### **LC-SC3-EE-3-2019 2020 Stimulating demand for sustainable energy skills in the construction sector**

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

The objective is to increase the number of skilled building professionals and/or blue collar workers across the building design, operation and maintenance value chain (designers, architects, engineers, building managers, technicians, installers, blue collar workers

including apprentices, and other building professionals), with a specific focus on the engagement of SMEs. Recourse to skilled professionals/workers both for renovations and new constructions of buildings and district scale solutions should be made more attractive and easier for companies and home owners alike.

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

- Tools facilitating the mutual recognition of energy skills and qualifications in the construction sector: development of sustainable energy skills passports/registers for workers at regional/national level and support for their take up at EU level, mobile applications facilitating the comparison of workers' skills and qualifications between countries (e.g. by enabling the direct comparison of learning outcomes);
- National, regional or local initiatives raising awareness of home and building owners and tenants about the benefits of sustainable energy skills and providing financial incentives for renovations done using skilled workers/professionals;
- Support to public authorities for the development of new legislative frameworks, e.g. requirements for skilled workers in public procurement;
- Partnerships with producers and retailers of construction products (e.g. DIY stores) to raise awareness of the salesforce and of consumers about energy efficient products, skilled workers and good practice in construction/renovation;
- Initiatives reinforcing the link between skills/education and energy performance/quality of construction e.g. tools showing the reduction of the performance gap as result of an increase quality of the works.

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

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

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

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

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

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

- *Reduction of the greenhouse gases emissions (in tCO<sub>2</sub>-eq/year) and/or air pollutants (in kg/year) triggered by the project.*

**Type of Action:** *Coordination Support Actions*



## SMART, GREEN AND INTEGRATED TRANSPORT

### **LC-MG-1-2-2018: Sustainable multi-modal inter-urban transport, regional mobility and spatial planning.**

**Specific Challenge:** A metropolitan area, "agglomeration" or "commuter belt" (with important cross-docking activities), is a region consisting of a densely populated urban core and its lesspopulated surrounding territories, that is sharing industry, infrastructure and housing. An efficient multimodal transport network at different spatial levels is fundamental to allow a smooth functioning both in such areas and with their connected surrounding regions thus encouraging mobility and enhancing/preserving social inclusion. However, the transport infrastructure needed could cause important negative externalities and even induce unbridled suburbanization.

The introduction of new forms of people mobility and freight distribution, such as innovative soft mobility schemes, drive-sharing, ride-sharing, crowd shipping, crowd delivery, connected and automated vehicles, innovative flying vehicles, Mobility as a Service, could revolutionise transport demand with major consequences for the spatial organisation of cities and their local neighbourhoods. Mitigating the negative impacts of transport and substantially contribute to the achievement of the COP 22 goals must be pursued.

To address these challenges and in line with the guidelines to implement SUMP, a multidimensional approach is needed assessing new forms of mobility in all transport modes, their infrastructures, travel flux evolution, spatial-economic development, environmental and quality-of-life issues, governance issues across spatial and institutional levels and user behavioural aspects. Development of vertical spatial planning can be included. Models should be proposed to support decision-makers in assessing evolution and potential rebound effects of their plans.

GNSS can contribute to boosting new forms of mobility and allow for a more efficient use of transport infrastructure. A large potential stemming from the combination and integration of GNSS with communication technology and telematics platforms remains so far untapped.

**Scope:** Proposals should address one or several of the following:

- Address environmental, socio-cultural and spatial impacts of planning in large metropolitan regions, whilst also enhancing connectivity; governance and institutional issues should be included.
- Identification of new forms of mobility (including trips not covered by metropolitan radial transport infrastructure) with the potential to have the greatest impact on spatial redesign of urban and low-density areas - improving the balance between city and rural development -, on urban space sharing (including pedestrians), on new public and private service allocation patterns, on investments in infrastructure, and new solutions Horizon 2020 for collective transport and transport planning. Identify ways to promote their implementation of the new forms of mobility both in passenger and freight transport.
- Use of geolocalization data, including Galileo and EGNOS for cooperative mobility in combination with other communication and telematic data to foster a more efficient use of infrastructure and reduction of air pollution.
- Suggest appropriate measures to ensure the lowest carbon and air pollutant level of transport with particular consideration for the interdependencies between different spatial patterns of production/consumption (i.e. localization of production sites and relevant schemes of distribution to final consumers) and the energy and carbon intensity of the



related transport systems. Collection and analysis of comprehensive data to provide a sound basis for future planning.

- *Comprehensive planning for the entire functional area (defined as an area of intensive commuter movements and/or freight distribution), adapting, further developing and extending the Sustainable Urban Mobility Plan (SUMP) concept, considering specific needs of metropolitan regions, new operating models in collective public and private transport, overcoming social segregation and inequalities, including gender inequalities, in access to education, jobs, health and leisure. Innovative planning concepts (e.g. multistate planning, performance-based planning, scenario techniques and community planning) should also be considered with the aim to ensuring accessibility, social justice and equity in the mobility of all citizens groups. Coordinated infrastructure development: balancing long-term environmental goals with other development aims (e.g. effective land use and preservation of natural zones), developing environmental high-performance infrastructure (e.g. light rail), upgrading/ repurposing existing infrastructure, improving connectivity to the TEN-T and overall resilience of the region.*

- *Coordinated development of sustainable policies with proven environmental impact, e.g. air-quality and noise-sensitive traffic management, including "nowcasting" as well as long-term strategy, region-wide freight and logistics concepts, shared mobility and innovative collective mobility promotion and incentives/disincentives for access to urban centres. Involvement of local authorities, transport operators in research is essential to ensure the appropriate implementation, in line with SUMP guidelines, as well as modelling and recording reactions of users to changes in infrastructure and mobility options (rebound effects) to support future decision-making and ensuring citizens' engagement. Users' involvement is encouraged, as it is important to reach effective changes in behaviour.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

*In line with the Union's strategy for international cooperation in research and innovation, international cooperation is encouraged. In particular, proposals should foresee twinning with entities participating in projects funded by US DOT to exchange knowledge and experience and exploit synergies.*

**Expected Impact:** *Research will provide cities, regional and national authorities and spatial planners with evidence of long term impacts of innovative transport technologies and business models. It will aid decision makers to better anticipate and plan necessary investments, adaptation and spatial re-design strategies in view of taking full advantage of the new forms of mobility for improving competitiveness, sustainability, social cohesion, equity, and citizen well-being. Research will also contribute to devising transport planning strategies that contribute to a balanced development between urban and rural areas. The innovation processes and final impacts should be systematically evaluated in terms of their contribution to environmental health, to enhanced accessibility to the centre of the metropolitan region as well as to the TEN-T corridors, to regional economic performance, social cohesion and overall regional development potential. To meet the challenge of reducing the environmental impact of commuting and inter-urban transport proposals must demonstrate their contribution towards the following objectives:*

- *Reduced congestion, energy, emissions of air pollutants, carbon footprint, noise and landuse within the identified metropolitan regions.*
- *Increased coordination between multimodal infrastructure mobility and spatial-economic development, including reduction of inequalities.*

- *Increased inter-modality and higher resilience of the transport system between the metropolitan region and the neighbouring cities and rural areas.*

**Type of Action:** *Research and Innovation action*

### **MG-2-1-2018 Human Factors in Transport Safety**

**Specific Challenge** *Human factors are the largest cause of accidents across all transport modes. Increased technical development and automation fundamentally change the way in which humans interact with the road or rail vehicles, vessels or aircraft and can improve safety by decreasing the human element. Evolving systems, operations and technology change how humans perceive their immediate environment and traffic as well as how they interact with the machine. However, machines are inherently less flexible than humans, who are, by their nature, variable in terms of behaviour, experience, cultural demographic, distraction, fatigue etc. Availability of sufficient relevant data on human factors needs to be secured. There is also a need for better methodologies to assess human factors which should be incorporated within risk based approaches to design and operation. In particular, human behaviour in "normal situations", in addition to accidents and incidents, should be assessed using real world data when available. Consideration also needs to be taken of demographic factors, including dynamics such as variations in safety perception and behaviour resulting from greater cultural and ethnic diversity in the EU.*

*The challenge is to improve transport safety through a more timely, focussed and integrated adoption of human factors in the design of road or rail vehicles, vessels or aircraft, infrastructure and the mobility system - taking advantage of automation - as well as increasing knowledge of enhanced human machine interactions to further advance the use of automation without introducing new, previously unknown, safety risks. More knowledge is needed on how automation changes human behaviour and the capability to react appropriately to fast emerging situations in a complex environment.*

*It is also necessary to understand and address bottlenecks in organisational acceptance of technological and social change. This includes emerging legal and regulatory issues associated with shifts in responsibility of the operator (driver, pilot, captain etc) as well as governance of complex integrated systems.*

*Cross-fertilisation of concepts and technologies across transport modes is encouraged.*

**Scope** *In order to meet this challenge, proposals should address one of the following sub-topics, and clearly indicate which subtopic is addressed:*

- *Subtopic A): Understand the limitations, interaction and range of factors that influence and degrade human performance when controlling a vehicle/aircraft/vessel and apply solutions that overcome these limitations. Establish the conditions for a "tolerance zone" of acceptable operator performance and corresponding appropriate actions when the limits of safe behaviour are approached. The range of factors to be taken into account includes – but is not limited to - physical profile and ability, age, gender, linguistic and IT abilities, level of technical and non-technical skills, culture, and limitations faced by persons of reduced mobility ("PRM"). Carry out comparative behavioural and perceptive studies in different EU regions, and – within them – between different cultural and ethnic groups amongst transport users and operators, in order to understand diversity in perception of danger, comprehension of rules, mobility behaviour. Apply the knowledge in concepts and solutions. Methods and measures*

*that support better adaptation skills in human behaviour, or provide intelligent support, may be considered. Define behavioural markers, including indicators of successful and degraded human performance. Develop recovery measures and mitigation solutions together with methods and techniques for measurement of changes in performance. Virtual concepts should be considered. Verify models and methods experimentally in relevant use cases. Activities should be aimed at identifying measures to increase understanding, respect and acceptance of transport safety rules. Furthermore the actions proposed should support the transfer of best practice within the EU and in neighbouring countries and ensure a better transport culture. Collaboration with neighbouring countries is recommended.*

- *Subtopic B): Improve the assessment of human risk factors in risk based design and operation within waterborne / air transport, including crew resource management, crew awareness and response in extreme cases (e.g collision, evacuation, aircrafts upset recovery, runway excursions, etc). Identify new (and presently unknown) risk factors which might arise in the transformation towards increasing automation. Compile and analyse a large quantity of global real world accident, incident, near miss and other safety event data. Use this data to develop improved methodologies to address human factors within risk based comprehensive design models and operational safety assessment for waterborne and air transport. The data (if necessary anonymised) should be retained as an open source beyond the project, and be maintained and updated. Standardised guidelines should be developed for assessing and categorising human factors within investigations of accidents, incidents and near misses and other safety events. The resulting data should be easily incorporated into open data bases which can be a continued resource for risk based design and operations. Guidelines should be developed and, if necessary, recommendations to amend existing rules and regulation should be made.*

*Proposals should include methodologies or tools to demonstrate that they contribute significantly to safe transport systems through the knowledge created and also show how the measures identified adapt best practices to local conditions. Work should draw upon knowledge from other sectors-when addressing risk and interaction with complex systems. Development of enhanced Human Machine Interface solutions and simulators should take into account the advantages of automation. The cross-modal transfer of human factors issues within various levels of automation should also be considered. Proposals addressing air transport may include the commitment from the European Aviation Safety Agency to assist or to participate in the action.*

*In line with the strategy for EU international cooperation in research and innovation[COM(2012)497, international cooperation is encouraged.*

*The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 8 million each would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact** *A significant step towards a safe transport system considering all transport modes, enabled by a decrease in collisions and incidents attributable to human factors by taking advantage of increasing automation in transport operation and control.*

*Enhanced transport safety for a diverse demographic by increasing consideration of human factors within designs and transport operation means. Improved selection and training of operators. Enhanced international cooperation concerning human factors. Improved international rules and regulations. Facilitation of learning and safety improvement from assessment of human factors within accidents, incidents, near misses and other safety events, enabled through the provision of a long term human factors data resource. For road transport, actions will contribute to UN's Sustainable Development Goals 11 (Make cities and human settlements inclusive, safe, resilient and sustainable) and 3.6 (By 2020, halve the number of global deaths and injuries from road traffic accidents). For aviation, actions will contribute to United Nations' International Civil Aviation Organisation (ICAO), EASA and FlightPath2050 goals to decrease fatality rates. For waterborne actions will contribute to IMO, EMSA, European maritime transport policy and UN Sustainable Development Goals 14 concerning the sustainable use of the seas and oceans.*

**Type of Action:** *Research and Innovation action*

### **MG-3-3-2018 "Driver" behaviour and acceptance of connected, cooperative and automated transport**

**Specific Challenge** *Today's vehicles - in all modes of transport - are becoming increasingly connected and cooperative, as well as automated. This raises a number of issues about the role of the "driver" (or operator, rider, pilot, captain) in such vehicles (cars, trucks, powered-two-wheelers, trains, ships, planes, etc.). In particular, human-machine interaction is becoming increasingly complex in an environment with higher levels of both qualitative and quantitative information, automated data exchange (into and out of the vehicle) and increasing levels of automation (systems, operations, etc.).*

*However, developments in recent years have primarily focused on "hard" technological advances and the maturity of technology-driven transport/mobility concepts, outpacing and insufficiently addressing the "soft" human component in this evolution. Therefore the challenge relates to a number of inter-related themes, ranging from public acceptance of connectivity and automation (e.g. data privacy, role of the human), to the development of user-friendly and appropriate Human-Machine Interfaces (HMI), "driver"/vehicle interaction and ethical decision making, to "driver" training and certification for new technologies/levels of automation.*

*A clear challenge for the roll-out of connectivity and automation in transport remains the lack of a detailed, evidence-based assessment of real "driver" behaviour in connected and highly automated or autonomous vehicles (and possible mitigation solutions), accounting also for gender, age and ability, with and without the assistance of cross-modal Cooperative Intelligent Transport Systems (C-ITS), under various use cases (incl. technical failure) and in a range of operating environments (e.g. urban, rural, etc).*

**Scope** *In order to meet this challenge, proposals should address at least 5 of the following aspects:*

- *Assess public acceptance across Europe for higher levels of connectivity and automation, relating to a number of public concerns, including data privacy, safety and security, consequences of the availability of 24/7 mobility, vehicle*

*control, liability, ethics, new features such as driver alerts (various types of alarm), as well as the proliferation of new technology and related behaviours, particularly in view of different types of users ("drivers" / passengers, etc) – all elements enabling sensible use of connectivity and automation.*

- *Public acceptance of different user groups, including current non-drivers (i.e. the elderly, people with disabilities, children, etc.), which in higher levels of automation could travel alone in an automated vehicle.*
- *Perform simulations, correlate and analyse driver behaviour/reaction under different scenarios/use cases, including driver distraction/assistance, driver-vehicle interaction technology failures and/or conditions instigating accidents (either by the vehicle itself or by other/external factors), as well as in different operating environments (e.g. urban, rural, multimodal hub) with other users, utilising big data analytics, assessing impacts of traffic flows, schedule reliability and congestions and also developing appropriate mitigation solutions to enhance "driver" behaviour under such scenarios (including using visual and acoustic information).*
- *Demonstrate the relevance, differentiation and the required evolution/adaptation of "driver" behaviour in connected and automated vehicles for passenger and/or freight transport (considering in particular the value of life vs. the value of cargo and also time and comfort).*
- *Estimate the effects of "driver"-vehicle interaction on transport safety and whether these would be marginal compared to full automation (with no "driver" interaction), hence implying a need to accelerate efforts towards fully connected automation. The necessary timing and issues on the transition from conventional to automated vehicles should be examined (e.g. interaction between "drivers" of conventional and automated vehicles).*
- *Analyse the levels of Human-Machine Interfaces (HMI) across different types of vehicles, as well as the margins for further optimisation in order to enable information generation and dynamic processing in multiple real-time or changing conditions.*
- *Assess and elaborate common issues, approaches and lessons learned across all transport modes (e.g. HMI, "driver" behaviour, ethical decision making, etc.).*
- *Address explicitly the ethical and legal issues associated with "driver" and/or vehicle decision making processes under different circumstances, as well as explore solutions to overcome the ethical and legal challenges relating to connectivity and automation.*
- *Investigate new "driver" training needs and certification requirements for new technologies/levels of automation, including effects on employment and skills.*
- *Assess the regulatory state of art, with particular reference to any regulatory gap hindering the adoption of automated vehicles (cars, trains, ships, planes).*
- *Assess attitudes towards shared modes of transport and the inclusion of connected, cooperative and automated vehicles as part of fleets.*

*Research should be validated in a selected number of use cases through testing/trials/demonstrations, involving service providers and end users.*



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

**Expected Impact** Actions are expected to:

- *Support the integration of higher levels of connectivity and automation in transport;*
- *Contribute to improved levels of safety and security in all modes of transport, in line with the Transport White Paper 2011 (e.g. Vision Zero);*
- *Contribute to the possible reduction of cost for industry and public authorities through an improved understanding of requirements and needs of different types of "drivers"/users in the context of connectivity and automation in all modes of transport;*
- *Contribute to a better user acceptance of innovative, cooperative, connected and highly automated transport systems;*
- *Enhance driver awareness and behaviour in a range of complex / urban operating environments.*

**Type of Action:** *Research and Innovation action*

### ***LC-MG-1-3-2018 Harnessing and understanding the impacts of changes in urban mobility on policy making by city-led innovation for sustainable urban mobility***

**Specific Challenge** *Urban mobility is in transition. This is a result of, for example, changing user needs; emerging transport technologies; new transport services using new business models; and new institutional and financing structures. Greater data availability provides new opportunities for evidence-based policy and policymakers aim at an ever-increasing integration of urban mobility policy with other sectorial policies. The impacts of this change will go far beyond the transport sector and influence other sectors that are transport-reliant.*

*The policy impacts, individually and in combination, of new solutions, which are at different levels of maturity, are not clear yet. There are many open questions about how policymakers should react and how Sustainable Urban Mobility Plans (SUMPs), and other sectorial policies that affect urban mobility, should respond and adapt to these potential disruptive changes. Therefore, research is necessary to improve the understanding of the impacts of new urban mobility solutions on policy making.*

*This topic covers passenger transport and freight transport. It covers urban and peri-urban areas. Special attention should be paid to the needs of vulnerable groups and users with different cultural backgrounds taking into account gender issues; and to the specific context of areas that are undergoing rapid economic change.*

**Scope** *This topic will be implemented through two sub-topics with different types of actions: Proposals should address one of the two.*

*A) Research and innovation actions: This sub-topic asks to examine the impacts of new mobility solutions, addressing the changing mobility patterns and set up of mobility services, including possible negative effects, and covers all relevant transport modes*

*(including active modes) and vehicle types. City-led proposals should address one or more of the following aspects:*

- *investments in and management of the transport network, with attention for facilities for recharging; transport system resilience; and transport demand management tools (such as pricing; low emission zones; parking management; one way traffic);*
- *the specific challenges in areas undergoing rapid economic change, for example in institutional setup; policy coherence; policymakers mind-set; outdated or incomplete legislation/methodologies; and data/statistics;*
- *new operating and business models in collective public and private transport;*
- *pathways to tackling congestion and reducing levels of car use through decoupling economic growth and high mobility from traffic growth;*
- *implications for and interaction with urban planning and design including inputs for developing SUMP.*

*Proposals should incorporate new data-driven planning approaches.*

*The actions will also deliver at least three validated test cases (small pilot projects with quantified objectives in which public stakeholders and economic actors participate) that take into account different political and socio-economic contexts. The active participation of a small number of representatives from authorities of small and medium-sized cities in proposals should be ensured.*

*B) Coordination and support actions: This sub-topic addresses the facilitation of knowledge exploitation and support to the cooperation between projects and stakeholders involved in the projects under the first sub-topic, and from across CIVITAS 2020. This Coordination and Support Action should also consolidate the common 'CIVITAS Process and Impact Evaluation Framework' and ensure the continuity of a 'CIVITAS Secretariat' as well as financing of CIVINets.*

*Proposals should present innovative approaches for all of the following needs:*

- *local capacity building and training in deploying innovative mobility solutions;*
- *networking cities and engaging with stakeholders working at the local level, overcoming language and contextual barriers;*
- *reinforcing the involvement of the CIVITAS cities from different CIVITAS-Phases in the CIVITAS network;*
- *partnering with industry and civil society in navigating through transition and change;*
- *implementing a communication and dissemination strategy with high impact actions.*

*In order to maximise impacts, and in the context of CIVITAS 2020, all projects funded under this topic and other relevant topics (for example dealing with SUMP) shall work together and exchange information and practical experiences*

*In line with the Union's strategy for international cooperation in research and innovation international cooperation is encouraged, especially with the USA, China and India*

*The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million each for Research and Innovation actions, and of up to EUR 3*



million for the Coordination and Support Action, could address this specific challenge appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**Expected Impact:** Proposals addressing sub-topic A) above, will produce new, practice-based knowledge on how to navigate urban mobility policy through transition taking into account legacy systems and the need to integrate new solutions that are at different levels of maturity. They will provide added-value inputs and contribute to evidence-based policy making at local, regional, national and EU levels. Proposals should demonstrate how their work will support effectively mobility policies in the cities' efforts to follow a viable transformation path towards sustainable mobility.

The results of the actions will feed into future EU initiatives, for example on Sustainable Urban Mobility Planning (SUMPs); cooperative-ITS; travel and traffic information; low-emission logistics; and future infrastructure networks, including links to the TEN-T and can help improve Air Quality Plans.

Proposals addressing sub-topic B) will help to promote the take up of innovation that leads to more effective and efficient transition of urban mobility systems by strengthening the mechanisms for urban mobility policy making and planning. A 'CIVITAS Secretariat' will be continued. Capacity building; engaging; partnering; and communication and dissemination actions will aim at a maximum impacts and reach of target audiences.

This results in a developing knowledge-base, technical capacity, harmonised evaluation activities, and support for up-scaling and knowledge transfer which is available to cities and other interested parties. Clear commitments and contribution from the action's participants to Europe-wide take up are expected. The Coordination and Support Action must ensure both continuation of CIVITAS support activities and also support for future CIVITAS-type actions.

**Type of Action:** Coordination and support action, Research and Innovation action

#### **MG-2-4-2018 Coordinating national efforts in modernizing transport infrastructure and provide innovative mobility services**

**Specific Challenge** Europe is faced with a growing need to make transport infrastructure more resilient, and to keep pace with the changing mobility needs and aspirations of people and businesses and to reduce the impact of infrastructure on the environment. It is urgent to find innovative solutions to upgrade transport infrastructure ensuring an adequate performance level that reflects also vehicle and ICT developments. National Transport Authorities are facing a change in their role from infrastructure managers to service providers and a number of relevant activities are being carried out at national and international level. A close collaboration between these activities is necessary to ensure coherence at European level, and avoid duplication of efforts and resources.

**Scope** Proposals should address all of the following, including National Authorities from at least 10 EU Member/Associated Countries:

- Develop a coordination mechanism that will allow National Transport Authorities to align their efforts in modernizing the transport infrastructure network;

- *Identify new roles and competences for the infrastructure managers/operators to respond to the new and future functionalities of the transport infrastructure;*
- *Consolidate partnerships and alliances between the transport infrastructure stakeholders and the research community;*
- *Continue the coordination activities for information exchange and cross-cutting fertilization between projects funded under Horizon 2020, CEF and national schemes for the optimal exploitation of the results.*

*Proposals should consider the advancements already achieved with other initiatives (e.g. Infravation EraNet+, C-Road, RIS, PRIME.....).*

*The Commission considers that proposals requesting a contribution from the EU of between EUR 0.8 to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

*A multimodal approach as well as an international dimension are encouraged.*

*Applicants are invited to read the eligibility and admissibility conditions for this topic.*

***Expected Impact:*** *Align Transport Authorities' activities and decision-making options on the development of the core and comprehensive TEN-T, ensuring compatibility and interoperability of the system, and support joint cross-border actions fostering closer collaboration between national authorities. Enable infrastructure managers to provide higher quality and innovative services to users and customers of the transport network; ensure the appropriate flow from research to innovation to implementation; enhance the appropriate communication flow and cross-fertilization between actions.*

***Type of Action:*** *Coordination and support action*

#### ***MG-4-1-2018 New regulatory frameworks to enable effective deployment of emerging technologies and business/operating models for all transport modes***

*Specific Challenge: Europe is faced with a growing need to make transport infrastructure more resilient, and to keep pace with the changing mobility needs and aspirations of people and businesses and to reduce the impact of infrastructure on the environment. It is urgent to find innovative solutions to upgrade transport infrastructure ensuring an adequate performance level that reflects also vehicle and ICT developments. National Transport Authorities are facing a change in their role from infrastructure managers to service providers and a number of relevant activities are being carried out at national and international level. A close collaboration between these activities is necessary to ensure coherence at European level, and avoid duplication of efforts and resources.*

*Scope Proposals should address all of the following, including National Authorities from at least 10 EU Member/Associated Countries:*

- *Develop a coordination mechanism that will allow National Transport Authorities to align their efforts in modernizing the transport infrastructure network;*
- *Identify new roles and competences for the infrastructure managers/operators to respond to the new and future functionalities of the transport infrastructure;*

- Consolidate partnerships and alliances between the transport infrastructure stakeholders and the research community;
- Continue the coordination activities for information exchange and cross-cutting fertilization between projects funded under Horizon 2020, CEF and national schemes for the optimal exploitation of the results.

Proposals should consider the advancements already achieved with other initiatives (e.g. Infravation EraNet <http://www.infravation.net/>, C-Road <https://www.c-roads.eu/platform.html>, RIS <http://www.ris.eu/>, PRIME [https://ec.europa.eu/transport/modes/rail/market/infrastructure-managers-prime\\_en](https://ec.europa.eu/transport/modes/rail/market/infrastructure-managers-prime_en)).

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.8 to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

A multimodal approach as well as an international dimension are encouraged.

Applicants are invited to read the eligibility and admissibility conditions for this topic.

Expected Impact Align Transport Authorities' activities and decision-making options on the development of the core and comprehensive TEN-T, ensuring compatibility and interoperability of the system, and support joint cross-border actions fostering closer collaboration between national authorities. Enable infrastructure managers to provide higher quality and innovative services to users and customers of the transport network; ensure the appropriate flow from research to innovation to implementation; enhance the appropriate communication flow and cross-fertilization between actions.

**Type of Action:** Coordination and support action

### **S2R-CFM-IP3-01-2018 - Research into optimised and future railway infrastructure**

**Specific Challenge:** In the coming years, we can expect a strong growth in rail transport demand, accompanied by aging infrastructure and growing effects of climate change.

With respect to the rail infrastructure, in order to face these demands, this call consists of research work aiming at enhancing, optimising and developing switches & crossings (linked to TD 3.1 Enhanced switch & crossing system demonstrator and to TD3.2 Next generation switch & crossing system of the S2R MAAP) as well as track systems (linked to TD 3.3 Optimised track system and TD3.4 Next generation track system of the S2R MAAP) including drainage management, in order to ensure optimal line usage and capacity.

The call also includes research on extending the life of bridges and tunnel assets (directly linked to TD 3.5 Proactive bridge and tunnel assessment, repair and upgrade demonstrator of the S2R MAAP) through better approaches for assessing, maintaining, repairing and upgrading these structures. The focus should be on proactive maintenance and operation of all these assets, considering the needs and costs across their whole life including disruption of service.

**Scope:** In order to address the challenges described above, the proposals should address all the following work streams, in line with the S2R MAAP:

- Further improve, develop and implement the whole system modelling approaches for track & S&C, to gain an understanding of how alternative asset designs, materials, etc. affect the overall performance of the railway system. The whole system modelling approach will be validated by simulations, which will enable faster implementation of new technologies by reducing timely and expensive physical testing. A hybrid testing approach will be taken, meaning that state-of-the-art simulation tools, laboratory and field tests will work collectively to provide a whole system assessment (up to TRL 6). In this context the action will make use of developments from earlier S2R IP3 complimentary projects in order to deliver the required tools for the track and S&C demonstrator implementation based on the design for reliability concept. These will use the following principles: Performance, Reliability, Availability and Maintainability and change managed through the Common Safety Method approach.
  - Continue development of Track and S&C Technology Demonstrators (up to TRL 6) to meet functional requirements and establish efficient maintenance procedures. This includes modular track and S&C systems, non-ballasted Track Support solutions (i.e. slab and Asphalt Track), control of track stiffness variations in transition zones, advanced welding and repair technologies (e.g. induction welding) and the innovative use of materials and advanced manufacturing techniques (e.g. new rail material, additive manufacturing of crossings and other S&C components.) New rail concepts will also be considered, in addition to improving the performance of the current design. These concepts should reduce the environmental footprint such as noise and vibration from traffic as well as other pollution from the life cycle of the railway system.
  - Develop proof of concept (TRL3) for a bespoke, localised automatic tamping operation (roadrail type vehicle) to enable localised repair of track geometry deterioration, going beyond the current state-of-the-art techniques, which include the use of large tamping machines that result in the disturbance of 'good' ballast during the treatment of localised track faults.
  - Develop proof of concept for ability to monitor European-wide track stiffness in a more efficient way & establish thresholds for maintenance alerts & interventions. This will then be considered alongside the measuring and monitoring techniques developed in the wider S2R IP3 programme (TRL 3). Current state-of-the-art monitoring techniques can only be deployed on a site by site basis therefore a means of monitoring infrastructure is required to enable predictive and preventative maintenance in Europe, taking into account the relative outcome of the project SMARTE (GA H2020-777627). This will also enable track renewals to be optimised through site prioritisation based upon degradation rates and associated risk.
- 60
- Service life extension of bridges and tunnels by a combination of deterioration monitoring, proactive maintenance and upgrading technologies for enhanced performance (up to TRL 6). This includes technology for assessing fatigue consumption, methods to increase bearing and fatigue capacity, ways of mitigation of clogged tunnel drainage pipes, technologies for enhanced optical methods for tunnel inspection, and development of partly autonomous monitoring networks with on-site processing capabilities;
  - Continue developing requirements for railway bridges for high speed lines. This includes enhanced understanding of dynamic effects based on tests or simulations in a relevant environment, for example, on a bridge not intentionally built for high speed traffic (up to TRL 5). This will include development of proposals for a modernised design approach

including design limits for bridges and the interface with rolling stock, and enhanced knowledge to improve the potential of virtual testing and the tools for compatibility checks between the existing infrastructure and the rolling stock. It is expected that the results will pave the way for the closure of the related open points in the INF TSI. This particular workstream entails collaboration with the European Union Agency for Railways.

- Develop detailed specification including cost benefit and root cause analysis of the importance of effective drainage management within the track system; the impact on track geometry; and methodologies to identify drainage assets across the infrastructure (up to TRL 2). This will assess the true cost of ineffective water management across the industry.
- Develop process for identifying all drainage assets (buried assets); carry out horizon scanning for inspection techniques deployed in other industries for buried assets, to support development of a specification for pro-active inspection of the drainage system. This will involve data gathering, data analysis; and a specification for identification of drainage assets and pro-active inspection techniques for the rail industry to support effective water management (up TRL 3).

This action will build upon the successes and available results of existing and finalised projects, such as In2Track (GA H2020-730841) and S-Code (GA H2020-730849.) This action will take validated and available past projects outputs through to an early system prototype stage. This will run in parallel to incorporating further innovations and technology developments i.e. drainage management. A physical prototype of an enhanced S&C solution will be evaluated and installed for preparation of the final Technology Demonstrator. As part of the installation preparations, safety validation of the final system will be undertaken using the Common Safety Method – Risk Assessment (CSM-RA) process. European railway sites and test facilities will be assessed for hosting the final Integrated Technology Demonstrators (ITD) within future S2R activities.

The action expected to be funded from this topic will be complementary to actions carried out within the following topic:

- S2R-CFM-IP3-01-2016: Research into enhanced track and switch and crossing system (In2Track)
- S2R-CFM-CCA-01-2017 “Improving Railway Services for Users and Operators” (Impact-2)

As specified in section 2.3.1 of S2R AWP for 2018, in order to facilitate the contribution to the achievement of S2R objectives, the options regarding 'complementary grants' of the S2R Model Grant Agreement and the provisions therein, including with regard to additional access rights to background and results for the purposes of the complementary grant(s), will be enabled in the corresponding S2R Grant Agreements.

The action shall actively contribute to the S2R KPIs development. This shall lead to publicly available deliverable, quantified indicatively on a semi-annual basis.

The planned activities of the action should take into account the revised MAAP part A.

The S2R JU will only fund one proposal under this topic.

**Expected Impact:** The action will result in specifications, the start of Common Safety Method Risk Assessment activities to support deployment of the demonstrators, and production of performance indicators to assess demonstrator performance.



*The innovative technology developed will enable a change in building and operating railway infrastructure compared to present practised methods. With successful prototypes, capacity and reliability should increase together with reduction of costs for railway transports. Substantial contribution is expected in the following areas:*

- *Development of a framework for virtual assessment and approval with enhanced prediction capabilities;*
- *Improved LCC, RAMS and environmental aspects through enhanced design of track and S&C components;*
- *Design of next generation track and S&C components in order to enhance LCC, RAMS and environmental aspects;*
- *LCC and RAMS improvements through assessment and management of track and S&C status focusing on key parameters and relevant limits on operational conditions;*
- *Improved RAMS through monitoring solutions to obtain reliable and objective measures of the asset status;*
- *Improved RAMS and LCC through advanced maintenance and repair technologies;*
- *Reduced LCC through service life extension technologies including upgrading solutions for bridges and tunnels;*
- *Reduced delay costs from ineffective water management (flooding); reduced costs associated with track geometry faults; improved resilience to climate change; improved attractiveness of railway;*
- *Reduced costs for railway bridges on high speed lines.*

*Specific metrics and methods to measure and achieve impacts should be included in the proposals, with the objective to achieve by the end of the S2R Programme the quantitative and qualitative targets defined in the S2R MAAP related to TD3.1 to TD3.5 in line with the relative Planning and Budget.*

*The research and innovation activities results shall be brought in the form of a demonstrator and prototype(s) as mentioned here above in the context of InnoTrans 2020, including on the S2R JU stand, to show the impacts intended to be achieved.*

**Type of Action:** Innovation Action

### **LC-MG-1-9-2019 Upgrading transport infrastructure in order to monitor noise and emissions**

*Specific Challenge Noise and emissions from transport affect seriously people's health and environmental ecosystems requiring the implementation of mitigation measures to achieve a higher reduction in all transport modes. The fast development of technologies that facilitate connectivity of innovative sensors, -both on-board and on the side of the infrastructure- could allow real-time monitoring and control of transport noise and emissions. Current applications of different mobile systems and measurement methodologies make comparison of data rather difficult. The development of harmonized measurement methodologies will increase the reliability of collected data and the credibility*



*of the consequent awareness/mitigation procedures. Systems embedded in the transport infrastructure can help in identifying vehicles not respecting prescribed limits and would either allow the operator to be informed swiftly of the environmental deficiencies of the vehicle, or would enable authorities to identify and prevent polluting vehicles from entering, hindering their access to specified low-emission zones, thus mitigating the effects of the non-respect of tolerance limits.*

*The integration in the infrastructure of absorbing materials and the utilization of negative-emissions solutions can also contribute to the reduction of the negative effects of emissions and noise.*

*Scope Proposals should address all the following aspects:*

- *Development of equipment for integration into infrastructure that would be able to detect and identify (plate recognition) in real-time vehicles exceeding the limits of noise (Db(A)) and emissions (CO<sub>2</sub>, NO<sub>x</sub>, PM);*
- *Development of related I2V systems aimed at informing the transgressor of the emissions/noise limits being exceeded and preventing access to delimited low-emission zones;*
- *Development of automated tolling systems that take into account the level of emissions from individual vehicles;*
- *Development of new materials and negative-emissions solutions for infrastructure application, apt to mitigate noise and emissions.*

*Road and rail networks are primarily addressed, but research should not exclude solutions to reduce nuisance coming also from air and water transport.*

*Potential negative effects from fixed sensors on human health should be carefully considered and avoided.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

*In line with the Union's strategy for international cooperation in research and innovation, international cooperation is encouraged. In particular, proposals should foresee twinning with entities participating in projects funded by US DOT to exchange knowledge and experience and exploit synergies.*

*Expected Impact Development of measures aimed at reducing the negative effects of noise and emissions. Increased monitoring and detection of transport unacceptable levels of noise and emissions; identification of transgressing vehicles and possible invitation to appropriate revision; limiting access to sensitive zones (e.g. urban centres). Development of technologies to be applied for better calculation of externalities and consequent charging methods. The application of solutions should bring to a reduction of at least 30% in emissions and 20% in noise in targeted zones based on the measured level at the beginning of the project.*

**Type of Action:** *Research and Innovation Action*

## **MG-2-6-2019: Moving freight by Water: Sustainable Infrastructure and Innovative Vessels**

**Specific Challenge:** *Although it is a means of transport that can reduce transport CO<sub>2</sub> and air polluting emissions and significantly contribute to reducing congestion on European roads waterborne transport around European coasts and on its inland waterways remains under-utilised and is not fully integrated in the multimodal European Transport system. Both technical and administrative requirements hinder the take up of Intra-European waterborne transport. Improvements are needed concerning: efficient and seamless integration between transport modes and last mile connection, inland waterway bottlenecks, capacity of small ports, loading times, efficiency of transferring cargo between modes, cost effectiveness of partial cargo loads, environmental impacts and the feasibility of mixed passenger/freight services. There is a need to stimulate the modernization of intra-European waterborne transport as well as waterborne transport with neighbouring countries, particularly in the case of the outermost regions by fostering automation and digitisation so as to enable their more efficient and reliable participation in the whole supply chain, to reduce environmental impacts such as noise and to respond to changing freight flows and supporting full implementation of synchromodality within inland waterways.*

**Scope:** *Proposals should focus on either area a) inland waterways or area b) maritime transport. To address this challenge, proposals should address the first bullet (for Maritime transport), or the fourth bullet (for Inland Waterway Transport), and at least four others of the following aspects. Proposals should clearly indicate which area they are addressing:*

- *With a focus on the TEN-T network, develop to at least TRL5 one or more innovative inland waterway or short sea transport solutions incorporating innovative vessels which can operate more effectively within intermodal logistic chains with limited and affordable improvements to existing infrastructure. For example, solutions may combine freight with passenger services or ship to ship transfers so as to improve the cost effective feeding of freight from large to small inland ports. The role of smaller coastal ports, inland waterways and their urban waterfront, including those located in the outermost regions, should not be neglected as a means to exploit their high potential to contribute to innovative mobility solutions and last mile freight delivery.*
- *Solutions should address the entire business model including connectivity IT infrastructure and integration with other transport modes.*
- *Automated and connected inland waterway and/or port infrastructure should be addressed to enable more efficient operations. As appropriate, smart systems and automation should consider the automation of bridges, locks and dams, cargo handling and units, docking systems and shore side power. Digitisation, for example, EGNOS/Galileo services should facilitate efficient cross-border traffic and cargo information and ensure multi-modal interconnectivity and integration. The High Precision and Authenticated Positioning services of Galileo should be taken into account in optimizing the port operations.*
- *Proposals addressing inland waterways, should address solutions for infrastructure maintenance and operation that increase the network resilience as well as long-term reliable navigability forecast, and should ensure compatibility with existing and emerging harmonised cross border and intermodal traffic management systems.*
- *Environmental performance must be significantly improved compared to the current state of the art with regard to local air quality, noise, energy efficiency and risk of*

*pollution. An environmental impact assessment and safety assessment of the developed solution in comparison to alternative forms of transport should be undertaken.*

- Concepts should be proven, a cost-benefit analysis undertaken and experimental validation and demonstration should be undertaken where feasible.*
- Dissemination, engagement and cooperation with logistics, shippers and intermodal transport operators are encouraged.*
- Business cases should be developed for key routes including comparison with existing transport solutions.*
- Recommendations should be made for optimising the conditions for intermodal solutions incorporating waterborne freight transport, including over shorter distances.*
- Outcomes should be developed to a level which would be potentially suitable for deployment possibly with the support of CEF TEN-T, EIB loan, ESIF or other programme.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

***Expected Impact:*** *Decongest road and/or city infrastructure. Reduce the CO<sub>2</sub> and air pollutant emissions of intra-European freight transport. Enhance the performance of the CEF TEN-T network. Substantially increase the amount of freight fed from intercontinental European ports using waterborne transport. Modernise, increase the reliability and competitiveness of Intra European Waterborne transport. Proposal should demonstrate that the deployment of solutions can increase the quantity of freight moved by Inland Waterways or Short Sea Shipping by at least 10% by 2030 compared to 2010 baseline data.*

***Type of Action:*** *Research and Innovation action*

### ***MG-2-9-2019 Integrated multimodal, low-emission freight transport systems and logistics (Inco Flagship)***

*Specific Challenge\_Global as well as regional and local freight transport is massively changing due to accelerating technological changes, the establishment of new players in global trade, the rise of protectionism, and the slowing down of economic growth of important partners such as China. New logistics concepts (such as the Physical Internet) and new disruptive technologies, such as Blockchain, Industry 4.0, vehicle automation and truck platooning or new business models, like 'crowdshipping' and the circular economy models will have an impact on global freight transport, its optimisation and its environmental footprint that needs to be better understood and assessed. Furthermore, new trade routes from and to Europe will probably change the traditional pattern of freight movement and will need new connections with European corridors and hubs at a time of budget limitation on investment for transport infrastructure.*

*Sustainable integrated multimodal freight transport is particularly important for the development of countries in special situations – least developed countries, landlocked developing countries, and small island states and outermost regions - which face common problems resulting from the under-resourcing of transport infrastructure and services,*

*traffic-related air pollution and high accident levels, but also diverse geopolitical and trade situations. These countries/regions also have an enormous potential for sustainable development. International cooperation can support their economies both domestically and globally for a global benefit and ensuring better integration of these regions into the world economic landscape.*

*Scope Proposals should address one or more of the following aspects:*

- Understanding how new concepts in logistics, in combination with new national strategies to organize freight flows in ports and airports have an impact on global freight transport, and on related greenhouse gas emissions. Multimodal transfer zones from ports and airports from long-haul to last mile logistics need to be better analysed in order to find appropriate measures and for ensuring seamless door-to-door transport, exploiting the full potential of modularization and other innovative logistics concepts. International cooperation with major trade partner countries is essential to ensure the smooth transfer at all levels of the transport chain. Proposals should also address solutions that enable peripheral regions and landlocked developing countries to have proper accessibility to international trade.*
- Speed up the process and transition towards the Physical Internet paradigm, demonstrating how different technologies, business cases and standards come together in real-world applications, and are able to deliver added value to the users and have positive impacts in terms of emissions and energy consumption. Priority partners should be USA, Canada, China, Japan. Demonstrations of satellite-based applications using EGNOS and Galileo are also suggested.*
- Research the range of new issues and questions emerging with the new trade routes to and from Europe, such as the Northern Sea Route (across an ice-free Arctic in summer months) or the new Silk Road routes and the Chinese One Belt One Road strategy; the effect of the development of these new routes on trans-continental freight modal split; the additional interfaces needed between the new overland routes and the EU internal transport networks / corridors. Priority partners are those along the routes. The geopolitical and trade aspects of these developments, in particular on countries affected by these developments, should be considered.*
- Understand new disruptive trends emerging as on-demand logistics solutions such as crowd-sourcing of deliveries (or 'crowdshipping') which have the potential to be a logistics 'game-changer', evidencing different impacts in both emerging and industrialized countries, including the possible integration of passengers and freight flows. Research on the crowd-sourcing of logistics would benefit from international collaboration, partly to compare the development of the phenomenon in different markets, but also to explore whether it can be extended to long-haul / cross border freight delivery, taking in consideration economic, regulatory and security constraints.*
- Assess the impact of emerging technologies in other sectors than freight transport (e.g. Blockchain, Industry 4.0, 5G, 3D printing, unmanned aerial vehicles (UAV's)) on the logistics operational system, and identify the potential development paths that lead to the optimal exploitation of their positive effect.*
- Collect best case models and develop decision support systems aimed at helping public authorities and private companies to determine the most likely scenarios and to promote a higher level of collaboration between the different stakeholders, including new emerging ones.*

- *Consideration of aspects of governance, privacy and cybersecurity of and with regard to cargo.*

*The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

*In line with the Union's strategy for international cooperation in research and innovation, international cooperation is encouraged. In particular proposals should consider cooperation with projects or partners from the US, Japan, Canada, China, Latin America.*

*In particular, proposals should foresee twinning with entities participating in projects funded by US DOT to exchange knowledge and experience and exploit synergies.*

*Expected Impact Main impact from the R&I activities should be the improved integration of the European transport network (both hard – TEN-T – and soft – logistics and IT) with the global network, through the sustainable development of the transport nodes likely to benefit from the emergence of new trade routes and harmonised platforms and new and revised 'nodes', also in support of the sustainable development of new logistics routes and their link with national/regional markets. Better understanding of the impact of emerging technologies on freight flow and subsequent guidelines to optimize vehicle, infrastructure and operation accordingly. Facilitate the development of disadvantaged regions and their inclusion into the international trading system. Better understanding of links between technological development, trade and geopolitics. Research should be validated in a selected number of case studies through pilot demonstration, trials and testing involving service providers and end-users.*

**Type of Action:** *Research and Innovation action*

#### **MG-4-5-2019 An inclusive digitally interconnected transport system meeting citizens' needs**

**Specific Challenge** *Merging physical transport assets like infrastructure or vehicles with the digital layer, through the Internet of Things (IoT) and big data applications opens vast possibilities in terms of the development of new transport services, business/operating models and social innovations. This has been exemplified in the rapid development of services such as multimodal travel planners, transportation network companies, Mobility as a Service, public transport on demand, new airline ancillary products, various forms of tracking and tracing and many others.*

*Digitally based services and applications provide citizens with an increasing level of tailored real-time information and greater choice thus allowing for a travel process that is faster, more comfortable and which gives travellers greater control. These services and applications can also serve as basis for social innovations in mobility. In the longer time frame, digitisation of transport promises to lead towards fully personalised services and commercial offers. Despite this, important and often overlooked aspects are user impact and user's ability and readiness to take advantage of the new opportunities. Benefiting from digital technology requires specific skills, willingness and ability to assume a new role as an active participant of the digital travel ecosystem. The main challenge is therefore to*



*ensure that all members of society can benefit from digitisation. In order to achieve this, it is necessary to better understand the needs and attitudes of various users, in particular vulnerable-to-exclusion citizens such as, for example, elderly, low-income, disabled or migrants, in relation to the requirements brought about by the digitised transport system as well as the skills and strategies necessary for all citizens in order to fully benefit from it.*

**Scope** *Proposals should address several or all of the following:*

- *Identify the main characteristics of demands that digitally based mobility solutions place on the users;*
- *Identify the needs and attitudes of all societal strata of transport users - in particular vulnerable to exclusion citizens - in the digitised travel ecosystem, taking into account interpersonal and intrapersonal (over time for the same person) variations (age, culture, etc);*
- *Identify the obstacles to the appropriation of digital mobility by different user groups and possible nudges to facilitate it, including the potential for social innovations;*
- *Investigate user requirements when transport is interrupted, e.g.: due to extreme weather, man-made or technical hazards.*
- *Investigate gender related differences in the adoption of digitally based transportation products and services;*
- *Identify skills and strategies needed in order to fully benefit from digitalisation in transport and thus to avoid digital exclusion or digital divide in terms of social and spatial aspects;*
- *Analyse differences and particularities in relation to the adoption of new mobility solutions and social innovations across a representative sample of member states, both in terms of user uptake and service provision;*
- *Provide recommendations for policy making and practical applications for designing an inclusive digital transport system and its related products and services with due regard to data protection and cybersecurity issues;*

*Research should be validated in a selected number of case studies through pilot demonstration, trials and testing involving service providers and end-users. Furthermore, actions should be undertaken in view of ensuring take up of research results by key stakeholders.*

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

**Expected Impact** *Research will help policy-makers design appropriate regulatory frameworks and social and educational strategies in order to create the best possible conditions for an inclusive, user friendly digital transport system, taking into account the needs and characteristics of all parts of society, with particular attention to vulnerable to exclusion citizens. Moreover, research will also help regional authorities and businesses in designing digital transport solutions that are better tailored to citizens' individual needs.*

**Type of Action:** *Research and Innovation action*



## CLIMATE ACTION, ENVIRONMENT, RESOURCE EFFICIENCY AND RAW MATERIAL

### **LC-CLA-04-2018 Resilience and sustainable reconstruction of historic areas to cope with climate change and hazard events**

**Specific Challenge:** *European historic areas and their surroundings, both in urban and rural environments, are increasingly affected by climate-change and various natural hazard events. Increasing their resilience through ‘preparedness’ interventions and securing their sustainable reconstruction in case of damage or destruction is essential to preserve their identity and economic, social and environmental functionality and to seamlessly transmit their historic value to new generations. However, interventions in historic areas are quite difficult and hence costly due to specific characteristics associated with heritage sites (such as artistic values, denser urban fabric, material compatibility requirements, higher vulnerability of materials and structures, difficulty in accessing the damaged areas, high symbolic values for communities involved, traditional lifestyles, etc.). Knowledge- and evidence-based approaches to resilience enhancement and reconstruction approaches are needed to increase the cost-effectiveness of these activities from the whole life cycle perspective.*

**Scope:** *Actions should establish how to implement the principle of building back better and safer in carrying out sustainable reconstruction and recovery interventions of historic areas where damage has occurred, thus rendering them more socially, economically and environmentally resilient, and/or should establish how to proactively enhance the resilience of these areas so that they will better cope with future disasters. Furthermore, actions should:*

- *develop, deploy and validate tools, information models, strategies and plans for enhancing the resilience of historic areas to cope with disaster events, vulnerability assessment and integrated reconstruction;*
- *test and pilot novel cost-effective solutions to enhance the resilience of buildings and whole historic areas to natural hazards, including climate change related events, while at the same time fully respecting the historic value of the places;*
- *provide science- and evidence-based guidelines and models to local authorities for carrying out sustainable reconstruction within a participatory and community-based context, while adopting new governance and finance models;*
- *improve and further develop models to predict direct and indirect impacts of climate, global and environmental change and related risks on historic areas;*
- *review, map and systematically characterize existing experiences and good practices in Europe and globally, through evidence and common metrics to evaluate and establish their replicability conditions and recommend how historic areas can be rendered more resilient and better prepared to face future disaster events.*

*The participation of social sciences and humanities disciplines such as gender studies, architecture, archaeology, cultural anthropology, law, economics, governance, planning, cultural and historical studies, is considered essential to properly address the complex challenges of this topic. Consortia should also include societal stakeholders and community-based partners to find practical and durable solutions.*

*Actions should take into account activities addressed by other initiatives such as the EU Copernicus Climate Change Service and Copernicus Emergency Management Service and provide added value.*

*Actions should envisage resources for clustering with other projects relevant to cultural heritage funded under previous, current and future Horizon 2020 calls within Societal Challenge 5. Proposals should also pay attention to the special call conditions for this topic.*

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

**Expected Impact:** *The project results are expected to contribute to:*

- *enhanced resilience and reduced vulnerability of historic areas to climate change and other natural hazards, also accounting for their synergistic impact;*
- *improved reconstruction and economic and social recovery of historic areas by local authorities and communities through the use of new knowledge and tools.*

**Type of Action:** *Research and Innovation action*

### **CE-SC5-03-2018 Demonstrating systemic urban development for circular and regenerative cities**

**Specific Challenge:** *Cities struggle in their transition to implement a full circular economy model incorporating regenerative practices. There is a clear need for cities to become circular in order to alter urban consumption patterns and value chains, and to stimulate innovation, business opportunities, and job creation in both established and newly created sectors. New, more flexible systemic urban planning instruments enabling the design and implementation of circular urban processes would make urban and peri-urban areas regenerative and facilitate their adaptation to emerging economic, social and environmental challenges.*

**Scope:** *Actions should demonstrate how cities can be transformed into centres of circular innovation and stimulate regenerative practices in both urban and peri-urban areas (including the surrounding industrial areas and commercial ports).*

*Actions should develop and implement innovative urban planning approaches and instruments (e.g. dynamic and semantic 3D real time flexible geospatial data and planning tools, innovative governance and legislation enabling new practices, design approaches, business models, etc.) to support and guide the transition towards circular and regenerative cities in terms of their built environment, public space, urban spatial use and programming. They should demonstrate innovative solutions for closing the loop of urban material and resource flows within the nexus of water, energy, food, air, ecosystem services, soil, biomass, waste/wastewater, recyclables and materials and for supporting an increase in the regenerative capacity of the city while limiting pollution of the environment, for example by reducing the emissions of air pollutants. At the same time, these solutions should ensure sound management of trade-offs and synergies among and across sectors. They should include ways of sustainably reusing and (mixed-use) reprogramming of existing buildings, open spaces and (infra)structures. The action should*

*actively involve public authorities, societal stakeholders and community-based partners such as city-makers, urban (fab-) labs, urban planners, (urban) designers, cultural & creative organisations, and start-ups in close collaboration with the cities to find practical and durable solutions.*

*In addition actions should develop and implement innovative local governance structures and networks to enhance circular economy innovation in the urban fabric and help prioritise flexible implementation of urban space programming for circular initiatives. Actions should enable the continuous monitoring and optimisation of “urban metabolic” processes and rapid management interventions, where needed, deploying new indicators enabling easy assessment, comparison and sharing of best practice on the ground as well as digital solutions comprising networks of sensors, big data, geo-localisation, observational programmes such as Copernicus and GEOSS, satellite navigation and positioning services offered by EGNOS/Galileo, and citizens’ observatories.*

*Actions are expected to establish long-term sustainable data platforms securing open, consistent data on the impacts of the deployed approaches, and to ensure interoperability of relevant data infrastructures for effective communication, public consultation, and exchange of experiences.*

*An interdisciplinary approach, including the participation of applied natural sciences, social sciences and humanities disciplines (such as behavioural economics, gender studies, urban planning and governance) is considered crucial to properly address the complex challenges of this topic.*

*Proposals should pay attention to the special call conditions for this topic.*

*To enhance the impact and promote upscaling and replication of these solutions, actions should engage in substantial networking and training activities to disseminate their experience, knowledge and deployment practices to cities that are planning to design and implement similar solutions in a successive phase beyond the duration of the project. To enhance impact, cooperation and synergies with the activities undertaken within the Global Covenant of Mayors for Climate and Energy initiative, and in particular the regional component for Europe[2](supported by the EC) should be sought where appropriate.*

*Furthermore, actions should envisage resources for clustering with other ongoing and future projects on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of the 2016-2017 Work Programme as well as under the topics SC5-20-2019 and SC5-14-2019 of this Work Programme. They should also ensure that there will be no duplication with work undertaken by relevant projects funded under the topic 'CO-CREATION-02-2016 - User-driven innovation: value creation through design-enabled innovation'.*

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

**Expected Impact:** *The project results are expected to contribute to:*

- *measurable reduction of materials, natural resource consumption and environmental footprint in urban and peri-urban areas;*

- *measurable increase of the regenerative capacity of urban and peri-urban areas due to a measurable increase in material and natural resource creation in cities, as well as increased productivity through maximisation of (multi)-functional use and programming of urban spaces;*
- *set of social behavioural, economic, environmental performance and geospatial indicators to monitor and assess the urban and peri-urban circularity and regenerative capacity;*
- *local governance innovation in response to the needs and concerns of stakeholders and the affected public as well as boosted creativity and entrepreneurship related to circularity and regenerative processes;*

*the implementation of the EU Circular Economy Action Plan with a direct link to the urban fabric (built and public space), and the Habitat III New Urban Agenda's commitment to transition to a circular economy.*

**Type of Action:** *Research and Innovation action*

#### **CE-SC5-06-2018 New technologies for the enhanced recovery of by-products**

**Specific Challenge:** *Securing the sustainable access to raw materials, including metals, industrial minerals and construction raw materials, and particularly Critical Raw Materials (CRM), is of high importance for the EU economy. There is a need for innovative and sustainable raw materials production solutions at lower TRLs to increase the range and quality of raw materials recovered from primary and secondary resources.*

*This specific challenge is identified in the Priority Area 'Technologies for primary and secondary raw materials production' of the European Innovation Partnership (EIP) on Raw Materials.*

**Scope:** *Actions should develop sustainable systemic solutions through industrially- and user-driven multidisciplinary consortia covering the relevant value chain of non-energy, non-agricultural raw materials.*

*Actions should develop sustainable solutions finishing at the level of Technology Readiness Levels (TRL) 3-5.*

*Actions should evaluate the potential by-products existing in primary or secondary raw materials and should develop energy-, material- and cost-efficient new sustainable mineral processing and/or metallurgical technologies and processes to increase the selectivity and the recovery rates of valuable by-products, particularly critical raw materials. The importance of the targeted sources of by-products for the EU economy should be duly demonstrated in the proposal. Recycling of end-of-life products is excluded from this topic.*

*All actions should contribute to achieving the objectives of the EIP on Raw Materials and to building the EU knowledge base of primary and secondary raw materials by feeding into the EC Raw Materials Information System – RMIS[2]. Actions should also contribute to improving the awareness of relevant external stakeholders and the general public across the EU about the importance of raw materials for society, the challenges related to their supply within the EU and about proposed solutions which could help to improve society's acceptance of and trust in sustainable raw materials production in the EU.*

*Actions should include a task to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials.*

*In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged.*

*The Commission considers that proposals requesting a contribution from the EU of between EUR 3 million and EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact:** *The project results are expected to contribute to:*

- *pushing the EU to the forefront in the area of raw materials processing technologies and solutions through generated know-how (planned patents, publications in high impact journals and joint public-private publications etc.);*
- *significantly increased process selectivity, broader range and higher recovery rates of valuable raw materials, particularly critical raw materials, thereby unlocking substantial reserves of new or currently unexploited/underexploited resources within the EU;*
- *significantly increased economic performance in terms of higher material-, water-, energy- and cost-efficiency and flexibility in minerals processing, metallurgical or recycling processes;*
- *in the longer term, improving the competitiveness of and creating added value and new jobs in raw materials processing, refining, equipment manufacturing and downstream industries;*
- *improving significantly the health, safety and environmental performance of the operations throughout the whole life cycle which is considered, including a reduction in waste, wastewater and emissions generation and a better recovery of resources from generated waste.*

**Type of Action:** *Research and Innovation action*

### **SC5-11-2018 Digital solutions for water: linking the physical and digital world for water solutions**

**Specific Challenge:** *Modern information and communication technologies (ICT) have provided today's society with a vast array of innovative capabilities to solve several challenges related to resource efficiency, climate change and sustainable development. Harnessing this technology within the water sector creates a more intelligent means of managing and protecting the planet's water resources and lays the foundation of a water-smart society. However, several challenges related to interoperability and standardisation, collection, protection and sharing of data between users, services and infrastructures, intelligent smart metering, integration with other systems, ICT governance and public awareness and acceptance, are hampering the potential of those technologies.*

**Scope:** *Actions should develop and test new, robust and cybersecure systems, linking the physical and digital world to ensure tailored, water-smart solutions, to exploit the value of data for the water sector and to foster higher information transparency and*



accountability. They should cover various water management areas, cycles and value chains, based on an integrated approach of all water resources and water bodies. Actions should combine different types of advanced data and digital technologies in a multidisciplinary environment, including mobile technology, clouds, artificial intelligence, sensors, open source software and analytics. Aspects such as optimisation, prediction, diagnosis, microsystems, micro-/nano-sensors, modelling and visualisation tools, data management plans, assessment and real time monitoring for water quality and quantity, integrated water management, open data policies, enabling institutional frameworks, health issues, vulnerability to changing water conditions and disaster warnings and risk management should also be considered. Actions should capitalise on knowledge acquired through previous FP7/Horizon 2020 projects.

Actions should seek to bring together research and innovation players from the digital and physical spheres to address jointly challenges and opportunities, including regulatory and legislative barriers, data protection issues and opportunities for investments in different application sectors. Activities are expected to focus on Technology Readiness Levels (TRLs) 5-7. The participation of social sciences and humanities disciplines is crucial to properly address the complex challenges of this topic. To assure applicability and wide deployment of the innovative water technologies in different conditions (including different water resources, economic, social and regulatory settings) involvement of market take-up partners and/or end users from a wide range of different European regions is strongly encouraged.

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

**Expected Impact:** The project results are expected to contribute to:

- the interoperability of decision support systems through the identification and use of ICT/water vocabularies and ontologies in view of developing or improving ICT/water standards;
- improved decision making on water management, related risks and resource efficiency through increased real-time accuracy of knowledge;
- maximising return on investments through reduced operational costs for water utilities, including reduced costs for water monitoring, improved performance of water infrastructures, and enhanced access to and interoperability of data;
- enhanced public awareness on water consumption and usage savings;
- market development of integrated and cyber-resilient ICT solutions and systems for smart water management, and opening up of a digital single market for water services.
- the implementation of the objectives of the EIP Water, especially, reducing the environmental footprint of the main water-dependant activities and improve their resilience to climate changes and other environmental changes.

**Type of Action:** Innovation action



**CE-SC5-07-2018- 2019-2020 Raw materials innovation for the circular economy: sustainable processing, reuse, recycling and recovery schemes**

**Specific Challenge:** *Securing the sustainable access to raw materials, including metals, industrial minerals, wood- and rubber-based, construction and forest-based raw materials, and particularly Critical Raw Materials (CRM), is of high importance for the EU economy. Complex primary and secondary resources contain many different raw materials. Their processing, reuse, recycling and recovery schemes are complex and imply different steps, ranging from collection, logistics, sorting and separation to cleaning, refining and purification of materials.*

*The challenge for industry is to scale up promising raw materials production technologies and to demonstrate that raw materials can be produced in an innovative and sustainable way in order to make sure that research and innovation end up on the market, to strengthen the competitiveness of the European raw materials industries, meet ambitious energy and climate targets for 2030, minimise environmental impacts and risks, and gain the trust of EU citizens in the raw materials sector.*

*This specific challenge addresses the development of "innovative pilot actions", which is one of the major targets of the European Innovation Partnership (EIP) on Raw Materials.*

**Scope:** *Actions should develop and demonstrate innovative pilots for the clean and sustainable production of non-energy, non-agricultural raw materials in the EU from primary and/or secondary sources finishing at Technology Readiness Levels (TRL) 6-7.*

*All actions should contribute to achieving the targets of the EIP on Raw Materials, particularly in terms of innovative pilot actions on processing and/or recycling for the innovative production of raw materials, and to building the EU knowledge base of primary and secondary raw materials by feeding into the EC Raw Materials Information System – RMIS[2]. Actions should also contribute to improving the awareness of relevant external stakeholders and the general public across the EU about the importance of raw materials for society, the challenges related to their supply within the EU and about proposed solutions which could help to improve society's acceptance of and trust in sustainable raw materials production in the EU.*

*All actions should facilitate the market uptake of solutions developed through industrially- and user-driven multidisciplinary consortia covering the relevant value chain and should consider standardisation aspects when relevant.*

*All actions should justify the relevance of selected pilot demonstrations in different locations within the EU (and also outside if there is a clear added value for the EU economy, industry and society).*

*All actions should include an outline of the initial exploitation and business plans (with indicated CAPEX, OPEX, IRR and NPV[3]) with clarified management of intellectual property rights, and commitment to the first exploitation.*

*Actions should also include a task to cluster with other projects financed under this topic and – where possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials.*

*In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged.*

*The Commission considers that proposals requesting a contribution from the EU of between EUR 8 million and EUR 13 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

*Applying a circular economy approach throughout the entire value chain, actions for this multi-annual topic should address only one of the following sub-topics:*

*a) Sustainable processing and refining of primary and/or secondary raw materials (2018, 2019): Actions should demonstrate new or improved systems integrating relevant processing and refining technologies for better recovery of minerals and metals at increased efficiency in terms of better yield and process selectivity as well as better utilisation of resources (hence reducing wastes). This would include processing of and recovery from low grade and/or complex ores and/or from industrial or mining wastes, and/or the reduction of the content of toxic elements or compounds in the resulting materials. The importance of the targeted raw materials and their sources for the EU should be demonstrated in the proposal. The solution proposed should be flexible enough to adapt to different or variable ore/secondary raw material grades and should be supported by efficient and robust process control. Where relevant, any solution proposed for the reduction of the content of toxic elements or compounds in the resulting materials should also include the appropriate management of the hazardous substances removed. Recycling of end-of-life products is excluded from this option.*

*b) Recycling of raw materials from end-of-life products (2018, 2019): Actions should develop and demonstrate novel and environmentally sound solutions for a higher recycling and recovery of secondary raw materials from end-of-life products such as waste electrical and electronic equipment (WEEE), batteries, wood-based panels, multi-material paper packaging, end-of-life tyres, etc. These products can contain a multitude of minerals, metals, wood and wood-fibre, rubber, etc. (including critical raw materials and other technology metals).*

*c) Recycling of raw materials from buildings (2018, 2019): Actions should develop and demonstrate novel solutions for a high-value recovery of raw materials from buildings. Actions should also benchmark against a series of comparative case studies of construction and demolition waste (C&DW) management in deconstruction of buildings of representative size categories in countries with different types of end-of-life building stocks, showcasing the appropriate use of the following: the EU C&DW Management Protocol, pre-demolition audit, smart demolition practices, using appropriate technical equipment, and sorting/processing and quality management of waste fractions such as metals, aggregates, concrete, bricks, plasterboard, glass, polymers and plastics and wood.*

*d) Advanced sorting systems for high-performance recycling of complex end-of-life products (2018, 2019): Actions should develop and demonstrate innovative dismantling and sorting systems enabling functional recycling of critical raw materials, or other types of highly efficient recovery of metals, minerals or construction materials, from complex end-of-life products and scrap thereof. The advanced sorting systems should achieve very high throughput rates in order to allow their economically viable operation on the European market.*

**Expected Impact:** *The project results are expected to contribute to:*

- *pushing the EU to the forefront in the area of raw materials processing and/or recycling technologies and solutions through generated know-how (planned patents, publications in high impact journals and joint public-private publications etc.);*
- *improving significantly the economic viability and market potential that will be gained through the pilot, leading to expanding the business across the EU after the project is finished, as well as creating added value and new jobs in raw materials producing, equipment manufacturing and/or downstream industries;*
- *unlocking a significant volume of various primary/secondary raw materials currently unexploited/underexploited within the EU, hence improving their 'circularity' in the economy;*
- *improving significantly the health, safety and environmental performance throughout the whole life cycle considered, including better energy and water efficiency, a reduction in waste generation and wastewater and a better recovery of resources from generated waste or a better recovery and recycling of resources from complex end-of-life products;*

*additionally, only for sub-topic b) 'Recycling of raw materials from end-of-life products', in the shorter term, increasing measurably the efficiency and effectiveness (range, yield, quality and selectivity of recovered materials) of the exploitation of complex and heterogeneous secondary raw materials deposits ('urban mines') when compared to the state of the art;*

*additionally, only for sub-topic c) 'Recycling of raw materials from buildings', lead to wider application of smart demolition techniques, C&DW processing, quality assurance practices, traceability and standardization for secondary raw materials in the construction sector, thus improving the material and value recovery rate.*

**Type of Action:** *Innovation action*

**SC5-13-2018-2019 Strengthening international cooperation on sustainable urbanisation: nature-based solutions for restoration and rehabilitation of urban ecosystems**

**Specific Challenge:** *Unsustainable, non-resilient urbanisation patterns, the expansion or neglect of urban areas have caused the fragmentation, depletion and destruction of habitats, biodiversity loss and the degradation of ecosystems and their services. Increasing connectivity between existing, modified and new ecosystems and restoring and rehabilitating them within cities and at the urban-rural interface through nature-based solutions, is necessary to enhance ecosystem resilience and adaptive capacity to cope with the effects of climate and global changes and to enable ecosystems to deliver their services for more liveable, healthier and resilient cities.*

**Scope:** *Actions should develop models, tools, decision support systems, methodologies, strategies, guidelines, standards and approaches for the design, construction, deployment and monitoring of nature-based solutions and restoration, prevention of further degradation, rehabilitation and maintenance measures for urban and peri-urban ecosystems and the ecological coherence and integrity of cities. Actions should review and capitalise upon existing experiences and good practices in Europe and (for option a) China or (for option b) CELAC. The strategies and tools should be part of an integrated and*

*ecologically coherent urban planning and city-making process that would secure a fair and equitable distribution of benefits from the restored urban ecology and limit its exposure to environmental stresses. Methodologies, schemes and indicators should be developed to allow for the assessment of the cost-effectiveness of the restoration measures, also accounting for their possible negative effects. They should account for the totality of the benefits delivered by the restored ecosystems in terms of, for example, enhancing cities' climate-proofing and resilience, enhancing mitigation options, improving human health and well-being, reducing inequalities and reducing cities' environmental footprint. Actions should also dedicate efforts to awareness raising, outreach activities and education of citizens, including school children about the benefits of nature for their social, economic and cultural well-being.*

*Actions should bring together European and – depending on the option chosen – Chinese or CELAC research partners, government agencies and urban authorities, private sector and civil society with relevant expertise and competence and foster participatory engagement in urban ecological restoration actions. Further to the eligibility and admissibility conditions applicable to this topic, proposals are encouraged to ensure, to the extent possible, an appropriate balance in terms of effort and/or number of partners between the EU and the international partners, which would correspond to their respective ambition, objectives and envisaged work. This would enhance the impact of the actions and the mutual benefits for both the EU and the international partners.*

*In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged. Proposals should pay attention to the special call conditions for this topic.*

*The participation of social sciences and humanities disciplines, addressing also the gender dimension, is crucial to properly address this topic. Cooperation and synergies with the activities undertaken within the Covenant of Mayors initiative for Climate and Energy[2] initiative (supported by the EC) should be sought where appropriate.*

*Actions should address only one of the following sub-topics:*

**a) Strengthening EU-China collaboration (2018)**

*This topic is part of the EU-China flagship initiative on Environment and Sustainable Urbanisation which aims at promoting substantial coordinated and balanced research and innovation cooperation between the EU and China.*

*China-based participants have the possibility to apply for funding under the Chinese co-funding mechanism and other Chinese sources[3].*

**b) Strengthening EU-CELAC collaboration (2019)**

*The possibility for participants from some CELAC countries to apply for funding under national co-funding mechanism should be explored*

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

**Expected Impact:** *The project results are expected to contribute to:*

- *restored and functioning urban ecosystems with an enhanced capacity to deliver their services;*
- *making a business and investment case for nature-based solutions on the basis of increased evidence about the benefits from restored urban ecosystems with regards to urban liveability, climate change resilience, social inclusion, urban regeneration, public health and well-being;*
- *guidelines for cost effective urban ecosystem restoration and ecological rehabilitation measures and new planning approaches and methods.*

**Type of Action:** *Research and Innovation action*

### **SC5-14-2019 Visionary and integrated solutions to improve well-being and health in cities**

**Specific Challenge:** *It is estimated that by 2050 up to 70% of the world's population will be living in urban areas. Urbanisation affects human health and well-being through factors such as exposure to pollutants, including noise, disasters, stressors and diseases, urban density, lack of physical activity, degraded ecosystems and erosion of natural capital, which can be exacerbated by climate change. As acknowledge by the Habitat III New Urban Agenda, public spaces play a crucial role in urban interaction and systemic urban innovation and they need to be designed and managed sustainably and equitably to ensure that the way citizens produce, consume, commute and interact within the urban fabric has a positive impact on their health and quality of life, enhances resilience to disasters and climate change and reduces the environmental footprint of the cities. The systemic integration of social, cultural, digital and nature-based innovation in the design, development and governance of public space has a tremendous potential to transform these spaces into diverse, accessible, safe, inclusive and high quality green areas that increase well-being and health and deliver a fair and equitable distribution of the associated benefits.*

**Scope:** *Actions should deliver visionary and integrated solutions (e.g. therapy gardens, urban living rooms, creative streets, city farms) at the intersection of social, cultural, digital and nature-based innovation to increase citizens' health and well-being in cities. These solutions should address social, cultural, economic and environmental determinants of health and well-being and support urban communities in reducing their exposure to climate-related risks, pollution (including noise), environmental stress and social tensions, including the negative effects of gentrification.*

*Actions should also demonstrate how the integration of these solutions into innovative land-use management, urban design and planning could reduce health-related environmental burdens in socially deprived neighbourhoods, foster equitable access for all to public spaces, enhance their quality and use and promote sustainable urban mobility patterns.*

*Actions should test new transition management approaches, governance models, legal frameworks and financing mechanisms to re-design public spaces and urban commons and assess their contribution to improving health and well-being. They should promote multi-stakeholder initiatives, citizens' engagement, co-creation and co-ownership of public spaces. Optimal and cost-effective use of behavioural games, networks of sensors, GIS-mapping, big data, observational programmes such as Copernicus and GEOSS, and citizens'*



*observatories should be made as appropriate to enable the integration and visualisation of data for more effective monitoring of the transition towards healthier and happier cities.*

*The involvement of social sciences and humanities disciplines such as psychology, behavioural science, economics, law, anthropology, sociology, architecture, or design studies, is considered essential to enhance social learning and promote the role of social and cultural innovation in transforming public spaces, with particular attention devoted to gender dynamics and diversity.*

*To enhance the impact and promote upscaling and replication of these solutions, projects should engage in substantial networking and training actions to disseminate their experience, knowledge and deployment practices to other cities beyond the consortium. To enhance impact cooperation and synergies with the activities undertaken within the Global Covenant of Mayors for Climate and Energy initiative and its regional components (supported by the EC) should be sought where appropriate.*

*Furthermore, actions should envisage resources for clustering with other ongoing and future projects on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of the 2016-2017 Work Programme as well as relevant projects to be funded under topics SC5-20-2019 and CE-SC5-03-2018 of this Work Programme. Cooperation with relevant actions funded under the Horizon 2020 Societal challenge 6 topic 'TRANSFORMATIONS-03-2018-2019: Innovative solutions for inclusive and sustainable urban environments' should also be sought as appropriate.*

*Funded projects are expected to establish long-term sustainable data platforms securing open, consistent data about the impacts of the deployed approaches and ensure interoperability with other relevant data infrastructures for effective communication, public consultation, exchange of practices, and sharing of experiences.*

*Proposals should pay attention to the special call conditions for this topic.*

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

**Expected Impact:** *The project results are expected to contribute to:*

- high quality, multifunctional, public spaces able to integrate digital, social, cultural and nature-based innovation to enhance health and well-being, while ensuring 'the right to the city' as specified in the Habitat III New Urban Agenda;*
- European cities being world ambassadors of sustainable lifestyles, providing universal access to greener, safe, inclusive and accessible public spaces, also accounting for the gender dimension;*
- participatory approaches in re-designing and transforming public spaces to increase health and well-being in cities through innovative public-private-people partnerships (PPPPs);*
- more comprehensive assessment of the sustainability and resilience of cities through the development of health and well-being indicators;*
- establishing innovative monitoring systems to measure benefits and capture the multiple co-benefits created by nature-based solutions in terms of health and well-being*

**Type of Action:** *Innovation action*



## EUROPE IN A CHANGING WORLD – INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES

### **TRANSFORMATIONS-05-2018: Cities as a platform for citizen-driven innovation**

**Specific Challenge:** *Public institutions in Europe are increasingly challenged to find new ways to provide public value in an open, transparent way. In a growing number of small and large cities across Europe, citizens are engaged and mobilised to demonstrate their ability in creating innovative solutions for important social issues. The challenge is to capture the creativity of these local solutions and their potential opportunities, both from a social and a market perspective, including the potential for sustaining diverse and alternative economies, slow economies among them.*

**Scope:** *Proposals should capture successful innovative practices that are emerging in Europe particularly from those urban areas that effectively absorb, develop and create new knowledge and ideas, and turn this knowledge into social and economic development. In particular, they should take stock of how citizens are increasingly engaging in the experimentation and the development of new solutions blending technological, non-tech, cultural and social practices, e.g., frugal technologies. The issue is how to scale up these community-driven approaches without compromising their participatory character. Citizen-driven innovation also increases the possibilities for a broader range of people to become directly involved in all stages of social action and innovation, thus enhancing co-creation while boosting equal opportunities and promoting social integration. Proposals should also assess how citizen-driven collaborative innovation can help overcome the lack of equity as regards both the access to ICT solutions and the concrete involvement in the innovation process of traditionally underrepresented social groups, particularly in those contexts affected by socio-economic and ethnic differences and by gender disparities. Proposals should also deal with approaches able to attract different types of stakeholders involved in the innovation value chain, starting from schools and universities, public administrations, and private organizations as well.*

*The Commission considers that a platform bringing together hubs, incubators, co-creation spaces etc. and requesting a contribution of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

**Expected Impact:** *The action will enhance scaling-up and expand opportunities for innovations created by citizens across Europe. It will provide a wider European scale to innovative practices based on experimentation, particularly testing and engaging in local co-creation, in living labs, in designing city experimental areas bringing new opportunities to light. It will provide policy-relevant solutions to local governments on how to enable citizen-driven innovation to develop and strengthen common welfare. It will allow for a smoother sharing of best practices between European urban areas, thus also enhancing community building, and move beyond traditional innovation processes that often exclude the end-user perspective, and thereby contribute to sustainable growth and employment.*

**Type of Action:** *Coordination Support Action*

## **TRANSFORMATIONS-03-2018-2019: Innovative solutions for inclusive and sustainable urban environments**

**Specific Challenge:** *The increasing percentage of people living in urban areas and the impact of digital technologies on public services make good governance, inclusive policies, smart planning and social and environmental sustainability ever more important for ensuring the quality of human life. Urban environments and agglomeration effects provide an ecosystem for economic growth and innovation. While the impact of the recent financial crisis on European urban areas is by no means uniform, it has led in many instances to rising socio-economic inequalities that are affecting social cohesion and resilience. The challenge is to identify the main drivers of inequalities in different urban and peri-urban contexts and to identify best practices and initiatives, including digital solutions and alternative participatory growth models, with potential for upscaling that can promote upward social mobility, social inclusion and cohesion, resilience and sustainable development.*

### **Scope:**

#### **a) Coordination and Support Action (2018)**

*The Urban Research Platform should bring together researchers, policy-makers and other experts on equitable, inclusive and sustainable urban development. It should map, assess, distil and communicate findings and recommendations from the many relevant projects on these issues funded under FP7 and H2020 and translate these into clear and applicable policy recommendations. It should facilitate knowledge sharing and connectivity between researchers, policy makers and practitioners.*

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

#### **b) Research and Innovation action (2019)**

*Proposals should assess the scale, dimensions and drivers of socio-economic inequalities in urban and peri-urban settings across different city typologies, across Europe and across demographic diversities, paying particular attention to gender differences. They should assess the effectiveness at local level of relevant policies, strategies, planning practices and other interventions aimed at promoting social inclusion, cohesion and resilience in urban environments, including new and participatory models of growth that foster sustainable and equitable prosperity. Findings should be communicated also in the form of clearly formulated policy recommendations.*

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

**Expected Impact:** *By linking research, innovation and policy, the action will support urban strategies, policies and planning practices to promote equitable, inclusive and sustainable growth, including the uptake of new, participatory and alternative growth models. It will contribute to the advancement of the EU Urban Agenda and the Sustainable Development Goal dedicated to making cities inclusive, safe, resilient and sustainable. It will also inform*

*the continuous development and implementation of Smart Specialisations as well as the urban dimension of cohesion policy.*

***Type of Action:*** Innovation action and Coordination Support Action