

**Disclaimer:** This document does not present a draft of the Green Deal call to be part of the Horizon 2020 work programme update, nor any future position of the European Commission. It aims to support the development of the call and its content is subject to change.

## Title: European Research Infrastructures capacities and services to address European Green Deal challenges

Specific Challenge: The urgency and the scale of Green Deal challenges require the mobilisation and advancement of world-class scientific capacities and resources such as those offered by European Research Infrastructures. They will contribute to the transition towards a climate neutral Europe, targeting 50% emissions reduction by 2030. As a pilot under Horizon 2020, activities will focus on the provision of research and innovation services for breakthrough research in two priority areas: energy storage and advanced climate/environment observation and monitoring. Expected impacts range from answering short-term needs of thematic European Green Deal objectives to longer-term perspective including Horizon Europe.

### Energy storage:

In order to boost the advancement of knowledge and technology in the field of energy storage, European researchers need effective and customised access to the best research infrastructures. The aim of this action is to bring together, integrate on European scale, and open up key national and regional research infrastructures to European researchers from both academia and industry, as well as to develop any missing services, which better fit specific needs for research and technological developments.

### Advanced climate/environment observation:

European research infrastructures such as ICOS, ACTRIS and IAGOS<sup>1</sup> are key enablers of the knowledge necessary to conceive, develop and assess European policies to address climate change and air pollution. They are essential to observe, understand and predict complex processes of the atmosphere, the concentration and flux of (long-lived) greenhouse gases, the interaction of short-lived atmospheric constituents and air pollutants. They provide sustained

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<sup>1</sup> [ICOS](#) Integrated Carbon Observation System; [ACTRIS](#) Aerosols, Clouds and Trace gases Research Infrastructure; [IAGOS](#) In-Service Aircraft for a Global Observing System.

long-term, high quality and interoperable data, also used to calibrate satellites, validate or constraint climate models, weather forecasts, air pollution forecasts etc.

Yet, these research infrastructures do not cover appropriately “hotspots” such as cities and industry intensive sites (frequently not far from cities) despite their major role: cities and their surrounding are strong emitters of greenhouse gases and air pollutants; due to the high density of population, the impact on citizens’ health is very high. In particular, in situ measurements in and around cities to quantify anthropogenic emissions of greenhouse gases<sup>2</sup> and nanoparticles (with still unknown potential health damage) are lacking.

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

***(a) Support EU leadership in clean energy storage technologies***

This sub-topic aims at:

- supporting the development of a world-class European research and industrial ecosystem underpinning energy storage activities and the related value-chain;
- enhancing the competitiveness of current and emerging industries by providing easy and seamless access to the most advanced scientific infrastructure available in Europe and related services;
- enabling breakthrough research and innovation in energy storage systems and related materials across the whole value chain and with a life-cycle approach;
- supporting a fair transition towards climate neutrality through a better understanding of socio-economic issues underpinning a paradigm change.

Activities will cover the coordinated and integrated provision of transnational and virtual access by wide communities of key research infrastructures as well as joint developments of specific services to facilitate and integrate the access procedures, to improve and customise the services the infrastructures provide, and to further develop on-line and testing services. User training may be supported, to maximise the benefits and to ensure the optimal use of the services provided.

This action brings together several complementary and interdisciplinary facilities relevant for energy storage research and innovation, addressing different TRLs and covering the whole value chain in view of possible industrial applications. They will provide transnational and virtual

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<sup>2</sup> [CO2 Green Report 2019](#)

access to technically advanced instrumentation and scientific methods in a coordinated and user-friendly way as well as training for their use and services linked to material modelling, data mining and experiment design.

Activities will also contribute to address the objectives of the European initiatives, such as the Battery Alliance, to tackle critical issues relating to performance, reliability and safety of storage technologies and to support strategies addressing the whole life-cycle.

Proposals should clearly identify potential industrial users and research communities, which can benefit from this pan-European open access to services and advanced instrumentations offered by internationally renowned facilities and strengthen the cooperation among researchers and industrial users.

Proposals are expected to duly take into account all relevant ESFRI and other world-class research infrastructures as well as relevant major European initiatives, such as the Open Innovation Test Beds, to exploit synergies.

Proposals will also have to highlight how they contribute to attract new talents and create expertise support new skills through training addressing researchers and industrial users.

Trans-national and virtual access provision shall follow the rules specified for integrating activities under point (ii) “Trans-national and/or virtual access activities” in part D of the section “Specific features for Research Infrastructures”. Compliance with these provisions will be taken into account during evaluation.

Proposals should adopt the guidelines and principles of the [European Charter for Access to Research Infrastructures](#). They should define a data management plan, even when they opt out of the extended Pilot on Open Research Data. When they address the curation, preservation and provision of access to the data collected or produced under the project, proposals should build upon the state of the art in ICT and e-infrastructures for data, computing and networking, and ensure connection to the European Open Science Cloud.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), proposals should, whenever appropriate, pay due attention to any related international initiative (i.e. outside the EU) and foster the development of global standards.

Proposals should include clear indicators allowing the assessment of the progress towards the general and specific objectives, other than the access provision.

As the scope of this topic is to ensure integration and access to key European infrastructures in this domain and to avoid duplication of effort, at most one proposal is expected to be submitted.

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

**(b) European research infrastructures and monitoring networks for greenhouse gases observing, air quality and citizens' health in cities**

The proposals will address one of the two objectives b1) or b2). All proposals should propose a roadmap for upscaling (section b3).

**(b1) Enhancing European research infrastructures for greenhouse gases observation**

The action should enhance greenhouse gases observation capacity of European research infrastructures, notably anthropogenic CO<sub>2</sub> emissions, in and around cities and other large emissions sites such as industrial sites, transport infrastructures.

The action should include:

- Scientific and technical work, i.e. (1) the drafting of concepts, architecture and engineering plans for extending and upgrading existing European research infrastructures and, when relevant, the creation of instrumentation prototypes; (2) plans for the efficient curation, preservation and provision of access to data in line with FAIR principles.
- Conceptual work i.e. (1) plans to integrate the new capacities into the existing European research infrastructures and related governance; (2) estimated budget for upgrade and operation.
- Pilot implementation in one representative urban site, showing the engagement of national/local authorities and demonstrating the ability to integrate complementary measurements systems and methods as well as data. When applicable, the action should consider solutions relevant to air quality assessment e.g. measurement of co-emitted species from fossil fuel burning. It should address quality control, traceability of measurements and standards. It should include the development of core data services upgrading the current services offered by the European research infrastructures.

The action should propose a flexible design with generic core elements and complementary observations depending on the specific nature of sites.

The action should seek, at all stages, synergies and interoperability among European research infrastructures as well as with air quality monitoring networks as well as coordination with European observational programmes and initiatives, such as Copernicus<sup>3</sup>.

## **(b2)** Enhancing city air quality monitoring networks

The action should enhance urban air quality monitoring networks in measuring air pollutants such as particles (both in mass and particles number concentrations, including specific nanoparticles data at traffic and airport sites). Engagement of the health community is required to address the scarce availability of sub 100nm particles concentration data, which has hampered epidemiological studies on their effects.

The action should include:

- Scientific and technical work to upgrade air quality monitoring networks ensuring measurement of maximum exposure to nanoparticles and efficient curation, preservation and provision of access to data in line with FAIR principles.
- Pilot implementation in one representative site, showing the engagement of national/local authorities and demonstrating the ability to integrate complementary measurements systems and methods as well as data. It should address quality control, traceability of measurements and standards. In particular, it should develop interoperable solutions and ensure measurements between cities are comparable. It should test innovative solutions such as mobile instrumentation, citizens' observatories.

The action should explore, at all stages, synergies and interoperability with European research infrastructures as well as among air quality monitoring networks.

## **(b3)** Roadmap for upscaling

The actions should propose the optimal design of well-coordinated, inter-operable, large city scale networks building on existing European research infrastructures and city air quality monitoring networks and on the relevant work done respectively under b1) and b2).

The actions should propose strategies to engage stakeholders, including citizens, to build commitment at local, national and European level and promote long-term sustainability.

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<sup>3</sup> such as COPERNICUS (including the CO2 monitoring Task Force), GEOSS and IG3IS framework of WMO.

The actions should engage in networking and training and promote interoperability, , dissemination and exchange of experience and practices.

The actions should propose appropriate framework to coordinate with or contribute to key relevant European initiatives such as COPERNICUS, EOSC, and support global initiatives such as COP21 Paris Agreement, 2030 Agenda for Sustainable Development Goals. It should also ensure relevance to the Mission on Climate Neutral Cities by 2030.

The actions should propose possible roadmaps for upscaling and replicating the solutions for enhancing the European research infrastructures and city air quality monitoring networks.

*The Commission considers that proposals requesting a contribution from the EU of up to EUR X million for greenhouse gases observation and up to EUR X million for air quality monitoring would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.*

#### Expected impact:

- The development of synergies among research infrastructures in different disciplinary areas, including social sciences, and improved, optimised and harmonised research services to address Green Deal objectives will foster economies of scale and improved use of scientific resources across Europe and beyond.
- Users, both from the scientific and industrial community, will benefit from integrated and efficient access to the best research infrastructures as well as from advanced research services addressing their specific needs.
- RIs will foster the development of new skills and a new generation of researchers ready to optimally exploit the most advanced and essential instruments and resources for research and innovation addressing Green Deal challenges.

#### **(a) Support EU leadership in clean energy technologies.** This activity will:

- enable breakthrough research and innovation in energy storage across the whole value chain and in line with a life-cycle approach, in view of possible industrial applications, by providing access to their advanced, integrated and interdisciplinary research services;

- support the development of a strong and competitive research and industrial energy storage ecosystem addressing the different steps in the value chain, including advanced materials and modelling, chemistry, systems, advanced manufacturing, reuse and recycling, innovative business models;
- allow users to benefit from integrated and efficient access to the best research infrastructures as well as from advanced services addressing specific needs;
- support, more broadly, the transition towards a climate neutral continent, with a target of 40% emissions reduction by 2030;
- foster a new generation of researchers ready to optimally exploit the most advanced and essential tools for research and innovation in a key field for Europe;
- enhance synergies and complementary capabilities among existing infrastructures, leading to improved and harmonised services as well as foster economies of scale and improved use of resources across Europe thanks to less duplication of services, common development and optimisation of operations.

***(b) European research infrastructures and monitoring networks for greenhouse gases observing, air quality and citizens' health in cities.*** This activity will:

- enable the development of evidence-based sustainability strategies, taking also account of impacts on health, through the provision of interoperable data, tools/equipment and models needed by the scientific community and public authorities/decision makers;-.
- trigger the decision making process leading to the upgrade of existing infrastructure;.
- develop synergies and complementary capabilities between Research infrastructures and monitoring networks, thus promoting economies of scale and improved use of resources across Europe through the common development and optimisation of operations as well as interoperability of data and data streams;
- enhance ability to assess the impact at city scale of policy implementations initiated at city, national and European levels with respect to air quality, citizens' health and progress towards the greenhouse gas reduction-targets of the Paris Agreement as well as the impact of the EU Bioeconomy Strategy;

- boost multidisciplinary research and innovation actions including modelling to address climate change (mitigation, adaptation) and understand the potential health damage of nanoparticles; to facilitate the engagement of citizens;
- strengthen and sustained COPERNICUS in-situ component and improve air quality monitoring;
- strengthen the technological development capacity and effectiveness as well as the scientific performance, efficiency and attractiveness of the European Research Area.

Type of actions: Research and Innovation Action