

# Finance Schemes Catalogue



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KET4F-Gas project: an international research alliance to fight global warming

Chapter 1:

# **KET4F-Gas project: towards a sustainable F-gas industry and waste management**

KET4F-Gas is a European project that aims at the reduction of the environmental impact of fluorinated gases (F-gases) in the SUDOE area, using Key Enabling Technologies (KETs) to facilitate companies and waste managers to comply with EU F-gas regulations. Thirteen partners and six associated partners from five countries have worked together to help the implementation of the most efficient option for the separation and recovery of F-gases used in refrigeration and air conditioning equipment. The KET4F-Gas solution is based on the most efficient treatment systems and designed according to the principles of green chemistry.





# www.KET4F-Gas.eu

The EU has become in recent years a reference in the fight against climate change and in the mitigation of the HFC impact on the atmosphere. It is a priority for the European Commission the development of technologies and research initiatives, such as KET4F-Gas, that help to efficiently separate and recycle HFCs at the end of the refrigeration and air conditioning equipment life, to reuse and recycle them in the subsequent production of fourth-generation refrigerants following the principles of the circular economy. The release of fluorinated gases into the atmosphere is explicitly prohibited and subjected to penalties. At the end of equipment's lifetime or when retrofitting existing installations, the F-gases must be recovered for re-use or destruction. Since the development of mechanical refrigeration systems in the 19th century, continuous research has been performed aiming to develop more efficient, less dangerous, and more environment-friendly compounds. However, despite the efforts made so far, the emissions of these gases continue to represent a great environmental problem. There are several issues related to F-gases and many challenges to address to reach the EU target of decreasing HFC consumption in 79% by 2030. In turn, if the use of F-gases is correctly controlled, these can also have interesting benefits.

### In a nutshell

### **Issues and challenges**



F-gases represent about 2% of the total GHGs emissions in the EU.



F-gases are powerful GHGs, showing a global warming potential (GWP) up to 23000 times greater than CO2.



The EU28 countries emitted in 2016 the astonishing amount of 110000 million tonnes of CO2-eq of F-gases.



The F-gases emissions have increased a 60% since 1990.



HFCs emissions are projected to grow by nearly 140% between 2005 and 2020.



Even if some compounds have a short-life cycle, some can remain in the atmosphere for thousands of years.



The uncontrolled use of HFCs can lead to these gases to represent a total 12% of the GHGs emissions by 2050, as the global energy demand for cooling equipment is expected to triple by 2050 due to global warming.



### Benefits if controlled correctly



F-gases are not toxic from a chemical point, not very reactive, and non-flammable.



F-gases are valuable materials, especially suitable for recycling and reclamation due to their high stability.



Only 1% of F-gases are collected at the end of their life cycle in Europe thus there is a great window of opportunity of improvement for reclaimed F-gases and their integration into EU circular economy market.



F-gases are man-made compounds which can be improved, recycled safely and re-used, improving the energy efficiency of the systems and their overall cost-effective life cycle.



If done correctly, F-gases environmental impact can be reduced to a minimum under the EU circular economy principles.



Reclaimed F-gases are not subject to additional taxation, while new alternatives, usually protected by industrial patents, represent an additional cost for their use.



F-gases selective recycling is fundamental to reduce the industry's dependence on higher GWP refrigerants, reduce overall prices and alleviate the pressure on the whole market chain.

The actual lack of developed technologies to recycle F-gases dramatically affects the refrigeration sector because most F-gases are incinerated, thereby increasing the atmospheric emissions of these gases. This said, there is a fundamental necessity to not only reduce the release of F-gases into the atmosphere but also to separate and recycle pure HFCs at the end of the refrigeration and air conditioning equipment life, to reuse and recycle in the subsequent production of fourth-generation refrigerants, applying circular economy.

KET4F-Gas proposes a step forward to a real implementation throughout the industrial sector of refrigeration and air conditioning, separation, purification and capture processes of one of the GHG families that most contribute to global warming. Two prototypes have been constructed for the efficient recovery of value-added HFCs (such as R-32) from high-GWP refrigerant blends (R-410A) contained in end-of-life equipment or refrigerant blends, for reutilisation purposes in novel environmentally-friendly refrigerant mixtures with low-GWP. These two prototypes are based on two different advanced separation processes – adsorption on porous materials and membrane technology – that provide high yields and have low energy requirements.

These technologies are easy to apply in a waste management facility due to the small amount of space required, and due to their modularity and scalability. Moreover, these systems require low maintenance and have a long lifetime. Much more about the current situation of F-gas management and impact, as well as about the KET4F-Gas developments can be consulted in two project documents, i.e., *Good practices handbook for industry and waste managers* and *Good practices handbook for industry and waste managers* (see Section D).

The current Catalogue of Financial Schemes was designed to support new synergies and initiatives towards improving environmental performance in the refrigerant industrial sector, as well as to advance the results of KET4F-Gas and its application in real environments. Aimed to all stakeholders in the value chain, it guides through the main international and national financing and investment opportunities and key ideas about the potential of KET4F-Gas results for new project opportunities.

### Main takeaways:

To reach the EU target of reducing HFC consumption in 79% by 2030, several challenges related to fluorinated gases have to be considered. However, we cannot give up on F-gases, nor is it necessary, since their adequate management and control can also have interesting benefits.

KET4F-Gas results and outputs have an excellent utility for stakeholders and the potential to be applied in real settings. From prototypes to the developed guides, these can help waste managers, industrial actors, researchers and public administrations to progress towards the achievement of sustainable goals in the F-gas sector.

This Catalogue of Financial Schemes was designed to support new synergies and initiatives towards improving environmental performance in the refrigerant industrial sector, as well as to advance the results of KET4F-Gas and its application in real environments.



**Opportunities to consolidate and expand the KET4F-Gas results** 

B

Chapter 2:

# Horizon Europe

Horizon Europe is the EU's key research and innovation funding programme until 2027 with a budget of EUR 95.5 billion. It tackles climate change, helps to achieve the UN's Sustainable Development Goals and boosts the EU's competitiveness and growth. The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges. It supports creating and better dispersing of excellent knowledge and technologies. It creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment impact within a strengthened European Research Area.

Through the programme, special attention will be given to ensuring cooperation between universities, scientific communities and industry, including small and medium enterprises, and citizens and their representatives, in order to bridge gaps between territories, generations and regional cultures, especially caring for the needs of the young in shaping Europe's future. Calls could be EU Synergies calls, meaning that projects that have been awarded a grant under the call could have the possibility to also receive funding under other EU programmes, including relevant shared management funds. In this context, project proposers should consider and actively seek synergies with, and where appropriate possibilities for further funding from, other R&I relevant EU, national or regional programmes (e.g. European Regional Development Fund, LIFE, Innovation Fund), where appropriate, as well as private funds or financial instruments.

The Horizon Europe Programme comprises several work programmes answering to different objectives and organized in pillars, besides the specific programme focusing on defense research and development and EURATOM. The objectives and potential of KET4F-Gas' results fit under Pillar II, i.e. Global Challenges and European Industrial Competitiveness, and Pilar III, i. e. Innovative Europe.



General conditions for proposals are described through several annexes (see Section D):

- Admissibility conditions General Annex A.
- Eligibility conditions General Annex B.
- Financial and operational capacity and exclusion General Annex C.
- Award criteria General Annex D.
- Documents General Annex E.
- Procedure General Annex F.
- Legal and financial set-up of the Grant Agreements General Annex G.

### HORIZON EUROPE

### EURATOM



\* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

Horizon Europe: first strategic plan 2021-2024. Source: European Commission

### **Pillar II. Cluster 5. Climate, Energy and Mobility**

The overarching driver for cluster 5 is to accelerate the twin green and digital transitions and associated transformation of our economy, industry and society with a view to achieving climate neutrality in Europe by 2050. This encompasses the transition to greenhouse gas neutrality of the energy and mobility sectors by 2050 at the latest (as well as that of other sectors not covered by this cluster, while boosting their competitiveness, resilience, and utility for citizens and society. Activities of this work programme support the implementation of the Paris Agreement and the United Nations Sustainable Development Goals. The current programme covers the financing years 2021 and 2022. Below, the most relevant destinations, calls and topics are described.

# Destination: Climate sciences and responses for the transformation towards climate neutrality

**Destination** Climate sciences and responses for the transformation towards climate neutrality

Destination's budget	EUR 136 million
Short description	The activities implemented under this destination aim to enable the transition to a climate-neutral and resilient society and economy through improving the knowledge of the Earth system and the ability to predict and project its changes under different natural and socio-economic drivers, including a better understanding of society's response and behavioural changes, and allowing a better estimation of the impacts of climate change and the design and evaluation of solutions and pathways for climate change mitigation and adaptation and related social transformation

Under "Climate sciences and responses for the transformation towards climate neutrality" destination, 17 topics are funded and organized under three (3) calls focused on Climate sciences and responses. The most related topic with KET4F-Gas objectives and results focuses on the need of modelling the role of the circular economy for climate change mitigation. Improve the understanding of greenhouse gas fluxes and radiative forcers also requires actions related with the aim of KET4F-Gas but wider challenges should be addressed.

# HORIZON-CL5-2021-DI-01-01: Improved understanding of greenhouse gas fluxes and radiative forcers, including carbon dioxide removal technologies

Type of action	Research and Innovation Action
Budget	EUR 24 million
Number of projects to fund	3
Deadline	Opening on 24 June 2021. Deadline for proposals: 14 September 2021
Specific conditions	The conditions are described in General Annex B, and one exception applies: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding. If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). Another exception applies regarding procedure (General Annex F), i.e., to ensure a balanced portfolio covering all three areas (see below a., b., and c.), grants will be awarded to applications not only in order of ranking but at least also to one project that is the highest ranked within each area, provided that the applications attain all thresholds

The **scope** of this topic is to fill fundamental gaps in our understanding of Earth system, focusing on greenhouse gas (GHG) fluxes and Earth system feedbacks, the behaviour of radiative forcers (including their pre-cursors), and efforts

to stabilise global temperature through deployment of carbon dioxide (CO<sub>2</sub>) removal approaches. Beneficiaries are encouraged to international cooperation and to take advantage of the relevant national and/or European research infrastructures (e.g. ICOS, ACTRIS etc.)

Actions proposed for this topic should improve scientific understanding in only one of the three following areas:

- a. Greenhouse gas fluxes and Earth system feedbacks, where actions should target a better understanding of key processes related to the life cycles of GHGs, other climate forcers and associated feedbacks affecting the Earth's climate over different time horizons, including the effect of climate variability from inter-annual to multidecadal and longer time scales. Proposal should focus on elements of the climate system with an important influence on climate change and its impact, especially those not sufficiently understood by the latest science, such as terrestrial ecosystems, hydrological cycles, ocean circulation changes, atmosphere-ocean gas exchanges, coastal zones or the biogeochemical cycles.
- **b.** Global warming contribution of different, non-CO2 radiative forcers calls to the improvement of the knowledge concerning the individual and cumulative contribution of short- and long-lived radiative forcers, including GHGs other than CO2 and their precursors, aerosols, refrigerants and other climate forcers, to climate change, including their impact on atmospheric and ocean circulation, as well as other environmental issues. Actions may focus on a subset of forcers, and should concentrate on those where the relationship between emissions, atmospheric lifecycle, climate system feedbacks, and global warming is least well understood. Actions should also assess the climate and non-climate impacts, over multiple time scales, of policies and measures targeting forcers other than CO2. Moreover, the action should examine the application of this knowledge in relevant sectors (such as transport, industry, agriculture and health) with a view to better understand co-benefits and trade-offs of mitigation policies with other societal benefits, including human health.

• c. Climate and Earth system responses to climate neutrality and net negative emissions focuses on the need to improve the understanding of the environmental consequences of reducing net greenhouse gas emissions to levels consistent with the aim of stopping global warming. Actions should focus on the response of global temperatures and other key properties of the Earth system to sustained reductions in GHG emissions to net zero and below. This should include, but not be limited to, pathways consistent with the Paris Agreement goals of limiting warming to well below 2°C and pursuing efforts to limit it to 1.5°C above preindustrial levels, including scenarios with and without temperature overshoot. The actions proposed should pay particular attention to climate-related challenges at different temporal scales, including potential benefits, risks and feedbacks (e.g. effects of surface albedo changes) of using carbon dioxide removal strategies, whether nature-based or technological, to stabilise global temperature.

### The **expected outcomes** under this topic should cover all the following:

- Improved knowledge in the addressed areas, also through increasing the use of high quality data, leading to a better understanding of the processes driving climate change.
- Improved projections of climate change (including in relation to climate change-related extreme events).
- Improve our understanding of how innovative mitigation actions can help stabilise global temperature.
- Improved understanding from these actions should be fed into improvements in Earth system models, climate services and other forms of downstream use.

#### **Relevance for KET4F-Gas results**

Among the three project areas described in the topic, *b. Global warming contribution of different, non-CO2 radiative forcers* is the most related to the KET4F-Gas project objectives and results. The focus on GHGs other than CO2 and their precursors such as refrigerants allow applying the expertise gained throughout the KET4F-Gas project and join forces to understand impacts to a wider level, such as the non-climate ones. To provide new inputs to policies and measures regarding forcers other than CO2 was already an action taken into account in the project which would facilitate keep working in this line and transfer results and knowledge at this level. Furthermore, the experts involved in the KET4F-Gas project and their innovation capacity are interested to work for and with sectors other than the ones addressed by the project and promote new collaboration beyond the SUDOE region.

Areas a. Greenhouse gas fluxes and Earth system feedbacks and c. Climate and Earth system responses to climate neutrality and net negative emissions point more clearly to a system perspective. Therefore, actions and results of the KET4F-Gas project should be framed into a proposal focusing on the Earth system more than specific sectors where refrigerants are used. In any case, taking into account the expected outcomes, area b. Global warming contribution of different, non-CO2 radiative forcers should also propose actions that are addressing the Earth system models.



### HORIZON-CL5-2021-D1-01-02: Modelling the role of the circular economy for climate change mitigation

Type of action	Research and Innovation Action
Budget	EUR 15 million
Number of projects to fund	3
Deadline	Opening on 24 June 2021. Deadline for proposals: 14 September 2021
Specific conditions	The rules applied refers to Legal and financial set- up of the grant agreements (General Annex G), as well as the following exceptions: Beneficiaries will be subject to the following additional obligation regarding open science practices: Open access to any new modules, models or tools developed from scratch or substantially improved with the use of EU funding under the action must be ensured through documentation availability of model code and input data developed under the action

The **scope** of this topic is to advance the understanding and modelling of the current and future potential contribution of the circular economy in Europe to GHG emissions reductions. The scope of the modelling activities has to go beyond the state-of-the-art, in particular in terms of sectors covered and their interrelations, be as comprehensive as possible (e.g. covering also the blue economy), and include citizen's behaviours and engagement. The proposed actions should look beyond the specific measures needed to deliver a circular economy and propose a framework for revealing, demonstrating and quantifying the circular economy's potential contribution to climate goals, as well as

improving the coverage of basic industry value and supply chains in models (or suites of models) used to analyse mitigation pathways. Besides the expected outcome below mentioned, projects can also improve the understanding of the connections between climate action and other environmental areas and issues as well as social and health issues, in line with the systemic approach that the European Green Deal promotes. Collaboration between the scientific community, policy and decision-makers, stakeholders and civil society is also expected.

The **expected outcomes** of the funded project must contribute to all the above:

- Improve existing European and/or global climate mitigation models by better representation of basic industrial value chains (including reliable data) and potential mitigation technologies including the impact of circular economy.
- Improve the quantification of the impacts and potentials of the circular economy for climate change mitigation.
- Support the integration of the circular economy into climate action, policies and their evidence base, including externalities.
- Support the integration of the GHG emission reduction / mitigation in the circular economy criteria.

#### **Relevance for KET4F-Gas results**

KET4F-Gas project technologies aim to mitigate climate change and are potential tools to be included in a circular economy model of GHG emission reduction. The further testing and development of KET4F-Gas technologies could be one of the key steps of a project proposal for this call, where the overall work planning might include other actions required to achieve the expected outcomes, such as the implementation of a circular economy model on pilot sites to be able to quantify impacts and potential of such a model.

### HORIZON-CL5-2021-D1-01-03: Maximising the impact and synergy of European climate change research and innovation

Type of action	Coordination and Support Action
Budget	EUR 9 million
Number of projects to fund	2
Deadline	Opening on 24 June 2021. Deadline for proposals: 14 September 2021
Specific conditions	The procedure is described in General Annex F, and the following exceptions apply: To ensure a balanced portfolio covering both areas, grants will be awarded to applications not only in order of ranking but at least also to one project that is the highest ranked within each area, provided that the applications attain all thresholds

The **scope** of this topic is defined through two work lines. First, to maximise the impact of EU-funded climate change research, and second, to maximise the synergy of climate change research and innovation in Europe. Proposals should focus on one of the two work lines. These two areas address the need of better coordination of climate change research, innovation and technology initiatives, the acceleration of the transfer of knowledge process and raising awareness of citizens, among others.

• a. Maximising the impact of EU-funded climate change research. Actions under this area should deliver effective mechanisms to strengthen the science-policy and science-civil society interface on the state-ofthe-art climate change research in order to increase Europe's capacity to accelerate the response to the climate crisis and, biodiversity and other environmental challenges. It should consider activities such as curating, clustering, co-ordinating and supporting the creation of synergies between EU-funded climate change research and innovation activities, including both international and national initiatives. The actions should identify and systematically update research needs emerging from science and/or policy discussions, and, where possible, match these needs against the themes that are addressed (or could be addressed) by ongoing EU-funded research projects. Communication, dissemination and cross-fertilisation of research results is also an important component of the action.

· b. Maximising the synergy of climate change research and innovation in Europe will help strengthen the European Research Area by ensuring coordination, cooperation and synergies between research, innovation and technology policies and programmes in the area of climate change research, including mitigation and adaptation, at European, national and regional level. Actions are expected to help prioritise investments in climate change R&I and to add value to current and future R&I occurring across the ERA by exploiting potential synergies in R&I planning and activities, and opportunities for partnerships or complementary activities. To achieve this objective, the action should facilitate dialogue and exchange of information among the relevant scientific communities and funding bodies at European, national and regional level. As the first area, it should identify and systematically update research needs emerging from science, policy discussions and the society, but with a focus on enabling the inclusion of these priorities in national and regional research strategies and agendas to finance ongoing and future projects.

Since this topic aims to coordination, cooperation, synergies and clustering activities, the expected outcomes have to cover several issues at a multiple level. Therefore, proposal should include objectives aligned with some of the following:

KET4F-Gas

- Raising awareness of citizens, business, social partners, policy-makers and other relevant audiences towards climate change.
- Better coordination of both on-going and future EU-funded climate change research initiatives and a more efficient use of resources.
- Enhanced impact of research investments and accelerated transfer of knowledge to inform policy and climate actions in Europe.
- Increased robustness, coherence and visibility of the results of EU-funded climate change research and innovation
- Curation of research and innovation project results related to climate change, such that stakeholders can discover and understand what EU-funded research is ongoing in their area of interest.
- Innovative and tailor-made tools and strategies to communicate the results of EU-climate change research leading to improved science civil society interface, while considering drivers for active citizen engagement in climate action and more sustainable behaviours, including social innovations.
- Better coordination of climate change research, innovation and technology initiatives within the European Research Area, facilitating complementarity and coherence between EU-level, national and regional efforts and a more efficient use of resources.
- Identification of complementary research and innovation activities among the past, present and future work supported by national and regional R&I programmes on climate change.
- Showcasing national and regional research and innovation activities and findings that could be of interest for cooperation between countries.
- Improving prioritisation of European climate change research by identifying priority topics (in terms of knowledge gaps and/or societal needs), and taking stock of national and EU-level climate change R&I research activities, in order to enhance the ability of existing and future European R&I to respond to societal needs.
- Accelerating the transfer of knowledge on climate change research to policymakers, practitioners and the society.
- Implementation of collaborative activities to enhance the market, regulatory or societal uptake of R&I solutions related to climate change across Europe, for example by replicating national or local success stories in Europe.
- Identify good practices at European, national and regional level on

communication, dissemination and exploitation of climate change research findings and projects results and facilitate their scaling up.

### **Relevance for KET4F-Gas results**

This topic should be taken into account since KET4F-Gas project could be showcased as a success story, and since it provides good practices to the F-gases management and recovery. Many of the expected outcomes beforementioned are aligned with KET4F-Gas objectives and were reflected in its results. Therefore, the results obtained in the project could be part of the actions of projects funded under this topic (e.g., adding value to proposed strategies). Moreover, the project consortium could participate in new proposals for this topic contributing with their expertise in climate change challenges. Although this topic is not directly focused on fluorinated gases, KET4F-Gas consortium could design new actions that promote collaboration and synergies in the sector and frame it in an impactful climate change action along with other sectors relevant to these challenges.



### Destination: Cross-sectoral solutions for the climate transition

<b>Destination's</b>	EUR 232 million
budget	

**Short description** This Destination covers thematic areas which are cross-cutting by nature and can provide key solutions for climate, energy and mobility applications. Such areas are batteries, hydrogen, communities and cities, early-stage breakthrough technologies as well as citizen engagement. Although these areas are very distinct in terms of challenges, stakeholder communities and expected impacts, they have their cross-cutting nature as a unifying feature and are therefore grouped together under this Destination

Cross-sectoral solutions for the climate transition destination covers three main impact areas: Industrial leadership in key and emerging technologies that work for people, affordable and clean energy, and smart and sustainable transport. Its expected impacts are related to research and innovation ecosystem on batteries, increased efficiency of Europe's cities' and communities' energy, resource use and mobility patterns and cities' and communities' overall sustainability, engagement and empowerment of citizens, as well as nurturing the development of emerging technologies with high potential to enable zero greenhouse gas and negative emissions in energy and transport.

Under "Cross-sectoral solutions for the climate transition" Destination, 27 topics are funded and organized under two (2) calls. General conditions related to the calls of this Destination are described through several annexes (see Section D). The topics most related with KET4F-Gas results potential focuses on the development of emerging technologies to achieve a climate neutral Europe.



### HORIZON-CL5-2021-D2-01-08: Emerging technologies for a climate neutral Europe

Type of action	Research and Innovation Action
Budget	EUR 20 million
Number of projects to fund	8
Deadline	Opening on 19 October 2021; Deadline on 06 September 2022
Specific conditions	Activities are expected to achieve TRL 4 by the end of the project (General Annex B)

The **scope** of proposal under this topic has to address one of several areas: decarbonised, efficient, effective, and safe Transport, fuel cells, efficient energy generators, energy distribution, energy storage or **negative GHG emissions**. Moreover, some areas are explicitly excluded as they fall within either partnerships or other calls: material research, renewable energy technologies and renewable hydrogen production, and batteries.

The **expected outcomes** of the funded project must contribute to all of the following:

- Available high-risk/high return technologies for a transition to a net greenhouse gas neutral EU economy by 2050.
- Knowledge and scientific proofs of the technological feasibility of the concept.
- Environmental, social and economic benefits to contribute to R&I strategy and policy forecast.
- Establishing a solid long term dependable European innovation base.

The proposal should address the validation of its concept to TRL 4, presenting a robust research methodology and activities, establishing the technological feasibility of the proposed concept. The methodology should include proper assessment of the environmental, social and economic benefits, and consider transfers of developments in sectors other than energy whenever relevant. These interdisciplinary aspects may provide ideas, experiences, technology contributions, knowledge, new approaches, innovative materials and skills. The applications of those concepts can also be proposed for various sectors. Economic benefits could be for example technology cost reduction, job creations, new businesses and more efficient motors and generators. Proposals may consider the following areas:

- Technologies providing the possibility of multi-fuel integration and/or the potential for the transversal;
- Intersectorial decarbonization;
- Concepts targeting hard-to-decarbonize sectors and energy-intensive applications, such as road/rail/maritime transport or energy generation through thermal power generators;
- Flexibility in terms of its scalability to different power/energy demands;
- Compatibility with local or distributed energy production layouts;
- Use of already available industrial processes and raw materials for easy TRL upgrading and final transfer to mass production.

In developing its concept the proposal is expected to address lower environmental impact (e.g. on climate change, pollution and biodiversity) quantified based on Life Cycle Assessment (LCA) framework, better resource efficiency (materials, geographical footprints, water, etc...) than current commercial technologies, barriers to the deployment of such technologies, including issues related to social acceptance or resistance to new energy technologies, related socioeconomic and livelihood issues globally, and prospective life cycle approach to be done with the relevant information that can be gathered at such TRL level.

### **Relevance for KET4F-Gas results**

This topic is very wide and actions similar to KET4F-Gas work should be part of a very ambitious proposal. One of the scopes is directly related with this project, i.e. negative GHG emissions. Nonetheless, this call aims especially for transversal technological solutions, looking beyond a specific sector. This should not be a barrier if KET4F-Gas technological solutions are framed in a wider model of GHG emissions reduction.

### HORIZON-CL5-2021-D2-01-10: Technologies for non- CO2 greenhouse gases removal

Type of action	Research and Innovation Action
Budget	EUR 4-6 million
Number of projects to fund	2
Deadline	Opening on 24 June 2021; Deadline on 19 October 2021
Specific conditions	Mentions to specific rules applied refer to the procedure described in General Annex F. A exception also applies, i.e. to ensure a balanced portfolio, grants will be awarded to applications not only in order of ranking but at least also to those that are the highest ranked within set topics, provided that the applications attain all thresholds

As **expected outcomes**, project results are expected to contribute to at least one of the following:

- Increase knowledge on the plausibility of removing non-CO2 greenhouse gases from the atmosphere.
- Raise awareness on the effects of non-CO2 greenhouse gases on earth warming.

- Develop technologies for addressing the effects of non-CO2 greenhouse gas emissions.
- Investigate techno-economic aspects of technologies and physical properties of emissions striving to match both into market-ready solutions.

The **scope** of this topic is to develop technologies for removing non-CO2 greenhouse gases CH4, N2O and **fluorinated gases**. This topic focusses on technological concepts at low TRLs (TRL 3 or lower). Technologies are expected to contribute to the capture, concentration, use and/or disposal of emissions, either from or at natural sources (if more concentrated) or in the atmosphere. Carbon dioxide may be considered, though only if any synergy can be found with processing it in combination with other greenhouse gas(es) which should be the prime focus. The state-of the art of technology development will be clearly presented in the proposal with global potential for emission reductions, cost figures and versatility and economic viability of use where appropriate.

#### **Relevance for KET4F-Gas results**

KET4F-Gas technologies might be a starting point to increase knowledge on the plausibility of removing non-CO2 greenhouse gases from the atmosphere in a wider or real world scenario. Raising awareness on the effects of non-CO2 GHG on global warming was already a key action of KET4F-Gas project, and the lessons learned as well as the created network of stakeholders and target audience for awareness-raising would be an added value to the proposal. Moreover, investigating techno-economic aspects of technologies and physical properties of emissions seeking to match both into market-ready solutions fits with possible further steps to achieve market readiness of KET4F-Gas technology.

### **Pillar II. Cluster 4 Digital, Industry and Space**

The overarching vision behind the proposed investments under Cluster 4 is that of Europe shaping competitive and trusted technologies for a European industry with global leadership in key areas, enabling production and consumption to respect the boundaries of our planet, and maximising the benefits for all parts of society in the variety of social, economic and territorial contexts in Europe. This will build a competitive, digital, low-carbon and circular industry, ensure sustainable supply of raw materials, develop advanced materials and provide the basis for advances and innovation in the global challenges to society. Ten areas of interventions, organized through two Destinations, aim to these objectives.

# Destination 2. Increased autonomy in key strategic value chains for resilient industry

**Destination** Increased autonomy in key strategic value chains for resilient industry

Destination's budget	EUR 136 million
Short description	Proposals for topics under this Destination should set out a credible pathway to contributing to the industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials, achieved through breakthrough technologies in areas of industrial alliances, dynamic industrial innovation ecosystems and advanced solutions for substitution, resource and energy efficiency, effective reuse and recycling and clean primary production of raw materials, including critical raw materials, and leadership in the circular economy

Topics under "Increased autonomy in key strategic value chains for resilient industry" destination, will tackle missing segments in strategic areas and value chains, to strengthen the EU's industrial base and boost its competitiveness and open strategic autonomy. In addition, it will explore how increased circularity has the potential to increase the open strategic autonomy of EU industry through the more efficient use of resources and secondary raw materials. Thus, the R&I activities funded under this Destination focus on four key areas for resilience: raw materials, advanced materials, circular value

chains, and Preparedness of businesses/SMEs/startups. Under this destination 45 topics are funded and organized under four (4) calls. The most related topic

with KET4F-Gas project focuses on Membranes for gas separation, a key process already present in one of the KET4F-Gas prototypes.

### HORIZON-CL4-2022-RESILIENCE-01-14: Membranes for gas separations - membrane distillation (IA)

Type of action	Innovation Actions
Budget	EUR 21 million
Number of projects to fund	6
Deadline	30 March 2022
Specific conditions	Activities are expected to start at TRL 4 and achieve TRL 7 by the end of the project (General Annex B)

The **scope** of this topic focuses on membranes separation, as is one of the key process elements needed for the next level of resource efficiency and for greener industrial plants. Proposals should address the development of the new generation membrane materials from gas separation to membrane contactors in comparison to the current state-of-the-art. Guidance by modelling and simulation techniques should be provided to save on extensive experimentation and support up-scaling. Proposals should address at least two of the following activities:

• Advanced membrane materials for the recovery of valuable components (ammonia, phosphate, alcohols, reactants, products, catalysts) from aqueous, organic and mixed aqueous/organic process and waste streams to enhance the resource efficiency in industrial plants.

- Separating gas streams (e.g. CO2 utilisation processes) in the process emissions by using membrane technologies, where in addition to the produced product, other gases are in the stream (e.g. unreacted CO2 and hydrogen).
- Demonstrate the next generation of porous membranes for membrane contactors (membrane distillation, gas/liquid contactors, liquid/liquid contactors) with use of renewable energy sources (solar energy or waste heat) to achieve significant reduction in CAPEX and process costs of gas separations and distillation.
- Up-scaling the desalination process by solar powered membrane distillation systems by coupling membrane distillation with solar / photovoltaic collectors.
- New membrane materials to reduce the water footprint in industrial plants for the preservation of freshwater resources (e.g solvent tolerant reverse osmosis membranes, forward osmosis).

Proposals submitted under this topic should include a business case and exploitation strategy, and it excludes industrial competitors from countries where the safeguarding of IPRs cannot be guaranteed.

The **expected outcome** focuses on advanced membrane materials as these are essential to achieve the goals of the European Green Deal with significant reductions of industrial emissions in waste streams like wastewater and waste gas like removal of gas / volatile pollutants from liquid emissions or purification of wastewater. Projects are expected to contribute to the following outcomes:

- The next generation membrane materials, delivering smart solutions for greening of industrial plants.
- Advanced membrane materials for recycling of waste streams from industrial plants to support the Zero Pollution strategy.

- Better materials with outstanding separation performance and/or superior properties either in chemical, mechanical or thermal stability compared to commercial materials.
- Reduction of the water footprint of 10% in industrial plants for the preservation of freshwater resources.
- Up-scaling the desalination process by solar powered membrane distillation systems and coupling membrane distillation with solar / photovoltaic collectors.
- Energy saving by 10% through the application of a new generation of membranes.
- End-of-life issues.

#### **Relevance for KET4F-Gas results**

Since one of the KET4F-Gas prototypes uses membrane-based gas separation processes, this can serve as a starting point for other novel membranes or to extend the KET4F-Gas research to other sectors and applications of the membrane technology developed within the project. Moreover, the research and innovation scheme followed in the KET4F-Gas project could be adapted to other needs and challenges, taking advantage of the lessons learned in the project, and the wide collaboration network created and maintained throughout the project.

### HORIZON-CL4-2022-RESILIENCE-01-20: Climate Neutral and Circular Innovative Materials Technologies Open Innovation Test Beds (OITB)

 Budget
 EUR 34 million

 Number of projects to fund
 3

 Deadline
 Opening date 12 October 2021. Deadline 30 March 2022

 Specific conditions
 Activities are expected to start at TRL 5 and achieve TRL 7 by the end of the project (see General Annex B)

Climate Neutral and Circular Innovative Materials Technologies are essential in enabling the transition towards a European decarbonised economy. They can contribute to a stronger circular economy, a cleaner Industry, a more sustainable growth and reduction of greenhouse gas emissions, which is fully in line with the Green Deal Strategy. According to the European Commission, to maintain its competitive advantage in clean Materials technologies the EU needs to increase significantly the large-scale deployment and demonstration of new technologies across sectors and across the single market, building new innovative value chains. This topic supports companies, especially SMEs, to become world leaders in clean products and technologies.

This topic focuses on the creation of Open Innovation Test Beds (OITB) which according to the European Commission definition is a set of entities, established in at least three Member States or Associated Countries, providing common access to physical facilities, capabilities and services required for the development, testing and upscaling of nanotechnology and advanced materials in industrial environments.

As **scope** of this topic, the following specific activities should be considered:

• Establish OITB by upgrading existing or developing new materials facilities and pilot lines, and made available services for the design, development,

Type of action Innovation Actions

testing, regulatory and environmental assessment and upscaling to industry and interested parties, specially SMEs.

- Design new funding instruments that would complement the already existing ones and provide further support for industrial uptake of climate neutral and circular innovative materials technologies in key strategic value chains.
- Proposals should include actions designed to facilitate cooperation with other projects, to enhance user involvement and to reuse other projects results. Open access at fair conditions and cost has to be ensured, as well as outreach and dissemination across Europe, based on a distinct methodology.
- Demonstrate measurable reduction of costs for product design, time-tomarket and regulatory compliance by means of faster and cheaper evaluation of production process deviations. Relevant indicators and metrics, with baseline values, should be clearly stated in the proposal.

### The **expected outcomes** of this topics are:

- Increase significantly the large-scale deployment and demonstration of Climate Neutral and Circular Innovative Materials Technologies across sectors and the single market, as well as to build and maintain new innovative value chains.
- Reduce the technological risk of innovative materials and products, thus attracting more investors, and cut the time to market.
- · Support companies, especially SMEs, to become world leaders in clean

products and technologies by setting up a new generation of Open Innovation test Beds focused on the creation of Business Opportunities and Sustainability. Enhancing ownership and engagement of the society through active collaboration and empowering people and communities as actors of the climate neutral and circular transition.

• Translation of industrial needs into scientific problems and concrete solutions, increased awareness and uptake by industry, and effective access of relevant stakeholders to know-how and advanced tools/infrastructure.

#### **Relevance for KET4F-Gas results**

This topic focuses on technologies with a TRL 5 such as those developed in the KET4F-Gas project. A proposal complying with the expected outcomes where KET4F-Gas developments are being included for upscale would be possible, with project innovations tested in one Open Innovation Test Bed. Nonetheless, this kind of action should be part of a wider strategy, such as European collaboration with several pilot sites testing innovative materials and technologies. Moreover, the previous funding programme Horizon 2020 has supported the creation of OITB for several Key Enabling Technologies (KETs) with the aim to bring nanotechnologies and advanced materials within market reach by providing access to demonstration and upscaling facilities as well as advisory services to advance technologies from laboratory validation to prototypes in industrial environments. This could be an opportunity to find new collaborations for the topic and/or to take advantage of the lesson learned.



### **Pillar III. European Innovation Council**

Under the pillar III of Horizon Europe progamme a key novelty was launched: the European Innovation Council (EIC) built on the experience of the EIC pilot under Horizon 2020 and on the advice from the EIC pilot Advisory Board. EIC has a budget of EUR 10.1 billion to support game changing innovations throughout the lifecycle from early stage research, to proof of concept, technology transfer, and the financing and scale up of start-ups and SMEs. EIC funding opportunities includes several funding schemes as support to research, transition, scale-up, enabling of innovation ecosystems and business acceleration.

The majority of funding will be awarded through open calls with no predefined thematic priorities, called '**Open Funding**', designed to enable support for any technologies and innovations that cut across different scientific, technological, sectoral and application fields or represent novel combinations. This funding has no predefined thematic priorities and is open to proposals in any field of science, technology or application.

The challenge driven approach take form as '**EIC Strategic Challenges**' and provides funding to address specific technological and innovation breakthroughs. These challenges take into account EU priorities for transitioning to a green, digital and healthy society, as well as the overall strategic planning for Horizon Europe, and the inputs of stakeholders, experts and the EIC pilot Advisory Board.

In the context of financing lines to achieve the adoption and effective implementation of the measures proposed by KET4F-GAS, **EIC Transition** comes into play, funding innovation activities that go beyond the experimental proof of principle in laboratory to supports both the maturation and validation of novel technology in the lab and in relevant application environments, and the development of a business case and (business) model towards the innovation's future commercialisation. A key point to take into account in this first years of EIC activity is that as Transition funding is a new scheme, for 2021 it is restricted to applications based on results generated by EIC Pathfinder projects (including projects funded under EIC pilot Pathfinder, Horizon 2020 FET-Open, FET-Proactive) and FET Flagships calls (including ERANET calls under the FET work programme), as well as European Research Council (ERC) Proof of Concept projects. This restriction may change in the upcoming work programmes (2022 and beyond).

**EIC Pathfinder** is another EIC programme supporting the exploration of bold ideas for radically new technologies. It welcomes the high-risk / high gain and interdisciplinary cutting-edge science collaborations that underpin technological breakthroughs. Pathfinder goes beyond what is already known. Visionary thinking can open up promising avenues towards powerful new technologies. Applicants participating in EIC Pathfinder projects are typically visionary scientists,

entrepreneurial researchers and, research organisations, start-ups, high-tech SMEs and industrial stakeholders interested in technological research and innovation. Projects typically involve consortia of researchers and other partners from at least three different countries, but there are also opportunities for individual teams and small consortia (two partners). Even though the Open programme for 2021 has reached its deadline, it is relevant to KET4F-Gas results and objectives. Technologies developed in the project are innovative and interdisciplinary, besides their power to change the usual route of F-gases management if more development is made and more uptake of circular economy models is promoted.

**EIC Accelerator** is another key opportunity for Funding and investments through the EIC Fund for individual startups and small companies to develop and scale up game-changing innovations. Since its relevance as financial support for improving the environmental performance of the industrial sector, the EIC Accelerator is described in section C, of this document.

### **EIC Transition Open**

Budget	EUR 59.60 million (for 2021 call, the EIC considers proposals with a requested EU contribution of up to a EUR 2.5 million as appropriate)
Deadline	22 September 2021

**Who can apply** Single applicants (SMEs, spin-offs, start-ups, research organisations, universities) or small consortia (two to 5 partners). Applications must build on results from eligible Pathfinder, FET or ERC Proof of Concept projects

### **Eligibility and Award Criteria**

The eligible profiles to apply for EIC Transition Open are:

• A single legal entity established in a Member State or an Associated Country ('mono-beneficiary'), being an SME or a research performing organisation

(university, research or technology organisation, including teams, individual Principle Investigators and inventors in such institutions who intend to form a spinout company). Larger companies (i.e. which do not qualify as SMEs) are not eligible to apply as a single legal entity.

• A small consortium of minimum two (2) and maximum five (5) independent legal entities ('multi-beneficiary') that may for example include universities, research organisations, SMEs or larger companies, user/customer organisations or potential end users (e.g. hospitals, utilities, industry, regulatory and standardisation bodies, public authorities).

The Evaluation criteria are: excellence on technological breakthrough, technology feasibility, and objectives; impact in terms of business and market fit, economic and/or societal benefits, entrepreneurship, and partnerships and investment readiness; last but not least, quality and efficiency of the implementation measured by quality of the team, milestones and work plan, and allocation of resources. More information about eligibility and award criteria in the Annexes of the EIC Work Programme document.



# Description and relevance to KET4F-Gas project results

Under Open Funding scheme, EIC Transition ask stakeholders three main questions:

- Have you identified Pathfinder, FET or ERC Proof of Concept project results that could be the basis for ground-breaking innovations and new businesses?
- Is this novel technology ready for the next steps towards its maturation and validation in some specific applications?
- Do you envisage building a motivated and diverse entrepreneur-lead team to develop the idea and increase its market readiness?

Except for the current rule of basing work proposal on Pathfinder, FET or ERC Proof of Concept project results, KET4F-Gas developments have a great potential to apply on EIC Transition Open calls. The proposed activities must

include further technology development on the results achieved in a previous project and follow user-centric methodologies to increase chances of the innovation's future success in the market. EIC Transition projects should address, in a balanced way, both technology and market/business dimensions, possibly including iterative learning processes based on early customer or user feedback. These activities should include, subject to the level of maturity of the technology, a suitable mix of research, technology development and validation activities to increase the maturity of the technology beyond proof of principle to viable demonstrators of the technology in the intended field of application (i.e. up to Technology Readiness Level 5 to 6).

What is expected from projects funded under EIC Transition Open are:

- A technology that is demonstrated to be effective for its intended application.
- A business model and business plan for its development to market. It is also expected that the intellectual property generated by the Transition project is formally protected in an adequate way.

### EIC Transition Challenge

Budget	EUR 40.50 million

Deadline	22 September 2021
Who can apply	Single applicants (SMEs, spin-offs, start-ups, research organisations, universities) or small consortia (two to 5 partners). Applications must build on results from eligible Pathfinder, FET or ERC Proof of Concept projects

EIC Transition Challenges aim to leverage the outstanding results of an ongoing or recently finished project in the specific domain of the Challenge and push forward ground-breaking innovations with a clear perspective towards market uptake for specific applications. Unlike EC Transition Open, EIC Transition Challenges focuses on specific challenges. The same general objectives and requirements as EIC Transition are applied. This means that for the 2021 programme, the same rules are applied in terms of eligible projects, profiles, and expected results. Since in the 2021 work programme there is no specific challenge directly related with KET4F-Gas project results, a follow-up should be done for the upcoming EIC Transition Challenges calls (2022 and beyond).

### **EIC Pathfinder Open**

Budget	EUR 168 million for Open calls
Deadline	19 May 2021
Who can apply	Consortia of at least three different independent legal entities (e.g. research organisations, universities, SMEs, industry) established in at least 3 different eligible countries. Single applicants or small consortia (two partners) may be able to apply for Pathfinder Challenges according to the call specifications

### **Eligibility and Award Criteria**

EIC Pathfinder Open is a great opportunity for funding projects with an ambitious vision for radically new technology, with potential to create new markets and/ or to address global challenges. It supports early stage development of such future technologies (e.g. various activities at low Technology Readiness Levels I-4), based on high-risk/high-gain science-towards-technology breakthrough research (including 'deep-tech'). This research must provide the foundations of the envisioned technology. This funding scheme especially supports highly risky work. For example, you may set out to try things that will not work, you may be faced with questions that nobody knows the answer to yet or you may realise that there are many aspects of the problem that you do not master. On the contrary, if the path to follow is incremental by nature or known, EIC Pathfinder Open will not support it.

Essential characteristics to apply are:

• Convincing long-term vision of a radically new technology that has the potential to have a transformative positive effect to our economy and society.

- Concrete, novel and ambitious science-towards-technology breakthrough, providing advancement towards the envisioned technology.
- High-risk/high-gain research approach and methodology, with concrete and plausible objectives.

This call is open for collaborative research. Any proposal must be submitted by the coordinator, on behalf of a consortium that includes at least three independent legal entities, each one established in a different Member State or Associated Country and with at least one of them established in a Member State. The legal entities may for example be universities, research organisations, SMEs, start-ups, industrial partners or natural persons.

Several evaluation criteria are followed. Excellence comprises long-term vision, science-toward-technology breakthrough, objectives, and interdisciplinarity. The impact evaluation included innovation potential and dissemination and communication strategy. Last but not least, the quality and efficiency of the implementation is also assessed through three indicators: quality of the consortium, work plan, and allocation of resources. More information about eligibility and award criteria in the Annexes of the EIC Work Programme document (see Section D).

# Description and relevance to KET4F-Gas project results

Under Open Funding scheme, EIC Pathfinder asks stakeholders three main questions:

- Do you have a vision for a future technology that could make a real difference to our lives?
- Do you see a plausible way of achieving the scientific breakthrough that will make this technology possible?

• Can you imagine collaborating with an interdisciplinary team of researchers and innovators to realise the proof of principle and validate the scientific basis of the future technology?

These questions could be easily answered by the experts involved in the KET4F-Gas project since their motivation is to design novel technologies that change the F-gas management and their expertise on technological innovation. The EIC Pathfinder Open supports highly risky work but not when the path to follow is incremental by nature or known. Therefore, a new proposal should focus on unknown routes, e.g., another mechanism for F-gas recovery than those used for KET4F-Gas technologies. Moreover, the development of new technologies

would allow further funding through the EIC Transition Open once a TRL of at least 5 is reached.

The expected outcome of projects funded under EIC Pathfinder Open is the proof of principle that the main ideas of the envisioned future technology are feasible, thus validating their scientific and technological basis. The potential for future impact (e.g., create new markets, improve our lives) of the technological innovations is not expected to be addressed or achieved in the course of a Pathfinder Open project. However, it is expected that the proposal will take the necessary measures to allow future uptake, for instance through an adequate formal protection of the generated Intellectual Property (IP).

### **EIC Pathfinder Challenges**

Budget	EUR 132 million
Deadline	27 October 2021
Who can apply	Consortia of at least three different independent legal entities (e.g. research organisations, universities, SMEs, industry) established in at least 3 different eligible countries. Single applicants or small consortia (two partners) may be able to apply for Pathfinder Challenges according to the call specifications

The main difference between EIC Pathfinder Open and Challenges is that the latter focuses on specific challenges to address. In the current work program (2021) five challenges are open to work: awareness applicable to systems other

than humans, tools to measure & stimulate activity in brain tissue, emerging technologies in Cell & Gene Therapy, novel routes to green hydrogen production and engineered living materials. None of these 2021 challenges addresses issues such as those involved in the KET4F-Gas project but future Pathfinder Challenges should be consulted since air pollution will be probably addressed as is one of the key impediments to tackle or mitigate climate change.



Chapter 3:

# LIFE Programme



Programme	LIFE
Financing Years	2021 - 2027
Budget	EUR 5.4 billion
Short description	The LIFE Programme is the EU's funding instrument for the environment and climate action created in 1992. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value



The LIFE Programme'smain goals are to:

- Help make the shift towards a more sustainable, circular, energy-efficient, renewable energy-based, climate-neutral and -resilient economy.
- Protect, restore and enhance our environment.
- Halt and reverse biodiversity loss.
- Stop the degradation of ecosystems by managing and enhancing the Natura 2000 network, thereby boosting sustainable development.
- Encourage and support green ideas from both large and small companies, NGOs, public authorities, citizen groups and academia, amongst others.

The LIFE Programme will help the EU to reach its European Green Deal ambitions by transforming the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are zero net emissions in 2050 and where economic growth is separate from resource use, protecting, conserving and enhancing nature across the continent, and safeguarding the health and well-being of citizens from environment and climate-related impacts.

LIFE will publish two Multi-Annual Work Programmes (MAWP) for the 2021-2024 and 2025-2027 timeframes. It is is structured in two fields: Environment and Climate Action. Each field is divided in two sub-programmes:

### Environment (EUR 3.5 billion)

- Nature and Biodiversity (EUR 2.15 billion)
- Circular Economy and Quality of Life (EUR 1.35 billion)

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### Climate Action (EUR 1.95 billion)

- Climate Change Mitigation and Adaptation (EUR 950 million)
- Clean Energy Transition. (EUR I billion)

### LIFE grants finance the following types of action:

- **Strategic nature projects.** Projects that support the achievement of Union nature and biodiversity objectives by implementing coherent programmes of action in the Member States.
- **Strategic integrated projects.** Projects that implement on a regional, multi-regional, national or transnational scale, environmental or climate strategies or action plans developed by Member States' authorities and required by specific environmental, climate or relevant clean energy Union legislation or policy, while ensuring involvement of stakeholders and promoting the coordination with and mobilisation of at least one other Union, national or private funding source.
- **Technical assistance projects.** Provide action grants and financial support to help applicants prepare integrated projects, standard action projects or accessing other Union financial instruments or other measures necessary for preparing the upscaling or replication of results.
- **Standard action projects.** Projects, other than the above, that pursue the specific objectives of LIFE programme (e.g. pilot and demonstration projects, the implementation and development of EU policy and law, best practices and solutions).

The areas 'Circular economy and quality of life' and 'Clean energy transition' should be particularly relevant for further expansion of the results of KET4F-Gas. Taking into account the average budget of the financed projects, a standard action proposal should be more suitable (integrated projects usually have a total project budget around EUR 17 million). The LIFE programme also finances close-to-market projects which launch innovative, demonstrative solutions that offer clear environmental and/or climate benefits. Examples could be in waste management, the circular economy, resource efficiency, water, air or climate change mitigation.





### **Eligibility and Award Criteria**

The LIFE Programme funding can be reached by applicants with the following profile:

- Be legal entities (public or private bodies) established in one of the eligible countries, i.e. EU Member States (including overseas countries and territories (OCTs)), or non-EU countries, listed EEA countries and countries associated to the LIFE Programme (participating countries) or countries which are in ongoing negotiations for an association agreement and where the agreement enters into force before grant signature;
- Also, the coordinator must be established in an eligible country.

Award criteria are usually set out in the calls for proposals; moreover, the following should be taken into account:

- Projects financed by the Programme shall promote, where possible the use of green public procurement.
- Projects that provide co-benefits and promote synergies between the subprogrammes 4 shall be given priority.
- Projects with the highest potential of being replicated and taken-up by the public or private sector or of mobilising the largest investments or financial resources (catalytic potential) shall be given priority.
- The replicability of standard action project results shall be ensured.
- Projects that build on or upscale the results of other projects funded by the Programme, its predecessor programmes or with other Union funds shall benefit from a bonus in their evaluation.
- Special regard shall be given to projects in geographical areas with specific needs or vulnerabilities.

### **Relevant calls**

### LIFE-2021-SAP-ENV-ENVIRONMENT: Circular Economy, resources from Waste, Air, Water, Soil, Noise, Chemicals, Bauhaus

Type of action	Standard Action Projects (SAPs)
Budget	EUR 95.4 million (Maximum 60% funding rate per SAP project)
Number of projects to fund	50
Deadline	Opening date 13 July 2021; Deadline for proposals 30 November 2021

The aim of this call is to facilitate the transition toward a sustainable, circular, toxic-free, energy efficient/climate-resilient economy and toward a toxic-free environment as well as to protect, restore and improve the quality of the environment. The specific objective is to cover one or more of the following topics: Circular Economy and Waste, Air, Water, Soil, Noise, Chemicals, and a new European Bauhaus.

### a. Circular Economy and Waste

Under this topic, two categories are funded, and both are relevant for F-gases recovery and reuse actions:

- Recovery of Resources from Waste
- Circular Economy and the Environment

**"Recovery of Resources from Waste"** covers the implementation of innovative solutions to support value-added recycled materials, components or products for several areas. Here, F-gases recovery fit under "Recovering critical raw materials from waste" area. Moreover, the need for Implementation of innovative solutions for the identification, tracking, separation, prevention and decontamination of waste containing hazardous substances, to enable value-added recycling of the treated waste and safe disposal of the hazardous substances or reducing the scale of the problem within the framework of the project is specifically mentioned, and Special attention should be given to those substances considered as the most harmful for the environment and human health.

**"Circular Economy and the Environment"** focuses on the implementation of business and consumption models or solutions to support value chains, particularly the key product value chains set out in the new EU Action Plan for the Circular Economy, aiming at reducing or preventing resource use and waste. These are: Packaging, Electronics and ICT, Batteries and Vehicles, Plastics, Textiles, Construction and building, Food, Water and nutrients. Even though F-gases are not specifically mentioned in the EU Action Plan for the Circular Economy, this topic is not restricted to these key products. Under this category, several type of specific actions are funded (one or more):

- Implementation of design for the environment solutions, including circular design, to improve durability, reparability, reusability, upgradability, recycling and use of recycled content in new products
- Solutions (post-design) to support the implementation, transfer and/or uptake of product durability, reuse and repair, including upgrading and

remanufacturing;

- Support to the implementation, transfer and/or uptake of one or more of the following:
  - » Product-as-a-service solutions and other business models or technologies to optimise asset use.
  - » Industrial symbiosis and creation of circular value chains, better tracking resources and matching surplus or by-product materials or recyclable waste across industrial sectors.
  - » Digital product passports.

### b. Air

In this specific call, "Air" priorities focus on the implementation of air quality legislation and a comprehensive approach to related urban, industrial and rural environmental problems. Nonetheless, mobility and construction are the main approach. Further calls might include "Air" priorities closer to F-gas challenges and solutions.

### c. Chemicals

This topic focuses on several actions to prevent and reduce the impact on the environment or human health, of hazardous substances. The highlighted actions for this case aim for:

• Prevention and Reduction of the impact on the environment or human health, of hazardous substances, in particular at least one of the following:

- » Substances identified as being of concern (including endocrine disruptors and persistent substances);
- » combination effects of substances;
- » nanomaterials;
- » biocidal products and/or pesticides;
- » PFAS (Per- and polyfluoroalkyl substances).

This shall be reached through innovation for safe and sustainable by design approaches for chemicals, materials and products and promotion of the phasing out of substances of concern.

- Prevention and Reduction of the impact on the environment or human health of chemical production and use across the value chain to promote:
  - » The development of green and digital/smart technologies;
  - » advanced materials;
  - » low-carbon and low environmental impact industrial production and use of chemicals.
- Implementation of safe and sustainable-by-design solutions, including through the development, commercialisation, deployment and uptake of safe and sustainable-by-design substances, material and product. The overall sustainability should be ensured by minimising the whole environmental footprint in particular on climate change, resource use, ecosystems and biodiversity from a life cycle perspective.
### LIFE-2021-SAP-CLIMA-CCM - Climate Change Mitigation

Type of action	Standard Action Projects (SAPs).	
Budget	EUR 30.5 million (Maximum 60% funding rate per SAP project)	
Number of projects to fund	15	
Deadline	Opening date 13 July 2021; Deadline for proposals 30 November 2021	

Projects under the Climate Change Mitigation Priority Area should contribute to the socially just and sustainable transition towards a climate neutral economy by 2050 and to reaching the EU emission reduction target for 2030 of at least 55% compared with 1990 levels. Under this call four (4) areas of intervention are addressed, and one is directly related with KET4F-Gas actions: Actions to reduce greenhouse gas emissions in the sectors not covered by the EU Emissions Trading System, including the reduction of use of fluorinated greenhouse gases and ozone-depleting substances.

The LIFE call 2021 encourages in particular projects which address:

- Availability of suitable alternatives to fluorinated gases.
- Removal of barriers posed by standards.
- Reclamation and recycling of fluorinated greenhouse gases.

Thus, LIFE programme encourages project proposals focusing on the reclamation and recycling of fluorinated greenhouse gases. More specifically, demonstration or best practice projects supporting and ensuring an efficient recovery and reclamation/recycling of fluorinated greenhouse gases, in particular for HFC blends (mixtures), are sought. In this line, project proposal as the continuation of KET4F-Gas project as highly valued under this call.

# Similar funded project

LIFE C4R(Carbon 4 Retail Refrigeration) started in 2018, and aimed to completely replace HCFCs and HFCs in commercial refrigerators with CO2. LIFE C4R is testing two EPTA technologies: Full Transcritical Efficiency System (FTE2.0) and ETE (Extreme Temperature Efficiency). Both innovations make CO2 usable at higher temperatures, meaning the system can work efficiently in warm climates. They also use 10% less energy than traditional solutions, while installation and maintenance costs are down by 20%.

LIFE-2-ACID (LIFE16ENV / ES / 000242) runed between 2017 and 2020. Several KET4F-Gas partners participated in this project where processes for the recovery and reuse of metals from pickling acids were applied. Its relationship with KET4F-Gas is the demonstration and dissemination of technologies membrane to obtain raw materials from secondary sources, resource efficiency and circular economy.

Chapter 4:

# **Urban Innovative Actions**



ProgrammeUrban Innovative Actions (UIA) - European Urban Initiative (EUI)Financing YearsUnknownBudgetUnknownBudsetUnknownUrban Innovative Actions is an Initiative of the European Union<br/>to test innovative ideas and support urban authorities in their<br/>efforts to ensure sustainable urban development. It takes its roots<br/>in a strong commitment at European level to strengthen the urban<br/>dimension of EU policies.



# **Elegibility and Award Criteria**

The beneficiaries of the UIA Initiative are urban authorities (single or in association comprising at least 50 000 inhabitants) located in a EU Member State. However, given the complexity of the urban challenges, they can't act alone. In order to design and implement effective and innovative solutions, urban authorities need to involve all the key stakeholders that can bring expertise and knowledge on the specific policy issue to be addressed. These include agencies, organisations, private sector, research institutions, NGOs...

As award criteria, the projects need to address the topics identified within the frame of the Urban Agenda for the EU and the selection process includes two different evaluations. First, a Panel of External Experts with in-depth knowledge of the topics of the Call is in charge of a Strategic Assessment. The Panel evaluates the proposals according to 4 weighted criteria:

- Innovativeness (40%)
- Partnership (15%)

- Measurability of results (15%)
- Transferability (10%)

Applications successfully scoring above a certain threshold are considered for the last step of the selection process, the Operational Assessment, during which the quality of the proposal will be checked. This assessment accounts for the last 20% of the overall assessment score. Building on the results of the Operational Assessment, a Selection Committee meets to make the final selection.

The UIA Initiative co-finances 80% of the eligible costs providing up to EUR 5 million ERDF per project. The beneficiary needs to secure 20% at least of public or private contribution to complete its budget either from its own resources or from other sources (but not from another EU funding source). The partners' contribution can be in the form of cash and/or in-kind.



# **Relevance for KET4F-Gas**

There are 14 topics funded under the UIA programme:







Air quality

Circular economy Climate adaptation



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Demographic change

Inclusion of migrants

and refugees

Urban poverty

Digital transition (data collection, data management and digital services)

Jobs and skills in the

local economy

Urban security



**Energy transition** (energy efficiency and local renewable energy systems)

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Sustainable use of

land and nature

based solutions



Culture and

cultural heritage

Housing





Sustainable urban mobility





The topics that better fit the objectives of KET4F-Gas are 'Circular economy', addressed in the second call 2016-2017, and 'Climate adaptation' addressed in the last call in 2020. KET4F-Gas could take advantage of the partnership created within the project to test and implement its technology in urban areas in France, Spain and/or Portugal, involving municipalities, universities and public and private waste management companies.

# **Relevant calls**

No future calls are envisaged under the UIA. The European Commission's proposal for the post-2020 ERDF/CF Regulation provides for a new instrument – the **European Urban Initiative (EUI)**. This new framework will pay much more attention to transfer, replication and scaling-up, all of which are also important steps for KET4F-Gas project. The targeted innovations under EUI will cover 5 main categories:

- Urban innovations for/led by cities.
- Good urban governance in action.
- Urban innovations relevant to the ERDF.
- Innovation capabilities linked to urban « megatrends » (green and digital transitions).
- Innovations in view of specific local contexts.

These changes strongly indicate a need for monitoring the development of EUI programme throughout 2021.

# Similar funded project

There are no similar funded projects in the previous calls.

Chapter 5:

**M-ERA.NET** 



**Programme** M-ERA.NET

Financing Years 2021-2026

**Budget** EUR 60 million

**Short** M-ERA.NET is a strong European network of public funding organisations supporting and increasing coordination and convergence of national and regional funding programmes on research and innovation related to materials and battery technologies to support the European Green Deal. M-ERA.NET started in 2012 under FP7 with 37 partners from 25 European countries. It continued as M-ERA.NET 2 from 2016 to 2022 with 43 partners from 29 countries and is now running in its third phase as M-ERA.NET 3 until 2026 under the Horizon 2020 ERA-NET COFUND scheme with currently 50 public funding organisations from 36 countries



## **Eligibility and Award Criteria**

M-ERA.NET enables collaboration between leading academic and industrial research partners from European and non-European countries and regions and facilitates access to previously inaccessible new markets. The joint calls mobilises a critical mass of public funding to support key players in materials research to intensify pan-European partnerships and to encourage newcomers to realise innovative research and technological development (RDT) projects.

Each project partner has to apply individually for regional/national funding. Before submitting a proposal, all project partners must contact their respective

national/regional programme funding organisations in order to discuss the project line-up and the funding conditions.

The aim of M-ERA.NET is to fund ambitious transnational RTD projects addressing materials research and innovation including materials for low carbon energy technologies, future batteries technology and related production technologies. M-ERA.NET aims to strengthen the contribution of materials R&D to energy-related applications where applicable.

## **Relevance for KET4F-Gas**

The 2021 calls have focused on the following thematic areas:

- Modelling for materials engineering, processing, properties and durability.
- Innovative surfaces, coatings and interfaces.
- High performance composites.
- Functional materials.
- New strategies for advanced material-based technologies for health applications.
- Materials for additive manufacturing.

In Topic 4 - Functional materials - the development of advanced functional materials or material systems in the Membranes for energy-efficient separation and process intensification area was one of the main pursued objectives. As in many other funding programmes, yearly monitoring of new calls is recommended since emissions reduction is one of the main climate emergencies, and the development and scaling-up of innovative green technologies are prioritized, such as those developed in the KETF4-Gas.



# **Relevant calls**

Type of action	RTD projects
Budget 2021	EUR 60 million
Number of agencies in 2021	45
Deadline	Opening date mandatory pre-proposal 15 March 2021. Deadline for pre-proposals 15 June 2021. Invitations to the full proposal phase will be announced in late September 2021

Several national agencies from Spain, Portugal and France have participated in the 2021 call. An example of funding schemes per Sudoe-region country is detailed below as an example for future calls.

### Portugal

Funding agency	FCT - Fundação para a Ciência e a Tecnologia	
Programme/initiative	Project Grants in all Scientific Domains	
Beneficiaries and TRL range	TRL range: 1 – 8. Proposals with a start or end TRL equal or higher than five must include one Portuguese Technological Centre and/or one Portuguese cluster and/or one Portuguese company/SME in the consortium application	
Topics	1-6	
Funding commitment	EUR 700.000	

### France

Funding agency	Region Nouvelle-Aquitaine (RNA)	Agence Nationale de la Recherche (ANR)
Programme/initiative	Regulation for the support to cies	
Beneficiaries and TRL range	Companies of all sizes / research and knowledge transfer organisms. The consortium must include a company	Projects must be positioned at "basic research" segment TRL(I-3) or at the first segment of "applied research" TRL(4-5)
Торіся	1-6	I, 2, 3, 4, 6
Funding commitment	EUR 500 000	EUR 2 million

### Spain

Funding agency	Agencia Estatal de Investigación (AEI)	Centro para el Desarrollo Tecnológico Industrial (CDTI)
<b>Programme/initiative</b> Proyectos de I+D+I « Programación Conjunta Internacional » (PCI)		Convocatorias nacionales de Subvenciones (SERA)
<b>Beneficiaries and TRL range</b> Non-profit research organizations (such as universities, public research institutions, technological centres and other private non-profit institutions performing RDI activities in Spain), as per PCI call (or equivalent). All TRLs.		For-profit enterprises (being Large companies or SME), established and carrying out RTDI activities in Spain. TRL range: 4-7
Торіся	All	All
Funding commitment	EUR 1.7 million	EUR 800.000

Chapter 6:

# Interreg Sudoe Programme

**Programme** Interreg Sudoe

Financing Years 2021-2027

Budget Unknown; EUR 16 million on 2020 calls

Short description

The Interreg Sudoe Programme is part of the European territorial cooperation objective known as Interreg, which is financed by one of the European structural funds: the European Regional Development Fund (ERDF).The Interreg Sudoe Programme supports regional development in Southwestern Europe, financing transnational projects through the ERDF. The Programme promotes transnational cooperation to solve common problems in the covered territory, such as low investment in research and development, weak competitiveness of the small and medium-sized enterprises and exposure to climate change and environmental risks



The 2014-2020 Programme's five priority axis, identified as the areas on which transnational cooperation has strongest impact in the context of Southwester Europe, are:

- Research and innovation.
- Competitiveness of SMEs.
- Low-carbon economy.
- Combating climate change.
- Environment and resource efficiency.



# **Eligibility and Award Criteria**

The projects approved are based on partnerships of public and/or private partners from the regions covered by the Programme. The eligible regions are all the Spanish Autonomous Communities (except Canary Islands), the Southwestern regions of France (Auvergne, Nouvelle Aquitaine, Occitanie), all continental regions of Portugal, United Kingdom (Gibraltar) and the Principality of Andorra.

The projects have to deal with one among the before mentioned priorities. Each of the five priorities has specific objectives. For example, KET4F-Gas project was funded under "Research and innovation" axis, with the specific objective of developing dissemination of applied research related to Key Enabling Technologies (KETs). Moreover, each of the priority axis focuses on different groups of beneficiaries.



#### Keep an eye on...

<u>Interreg website</u>, with an engaging interactive map of all Interreg programmes and an excellent search tool for project calls across the globe.





# **Relevant calls**

Since the 2014-2020 framework ended, there is no open call. Moreover, Interreg Sudoe Programme is preparing for a new programming period. The European Commission confirmed in September 2020 the continuation of the Interreg Sudoe programme for the 2021-2027 programming period, and activities for the preparation of the future programme are under way. The same regions will keep as eligible, and the first call for projects is planned for the first half of 2022, once the programme has been approved by the European Commission.

For the 2021-2027 programming period, the European Union will focus its policies on five investment priorities:









A smarter Europe A greener, A more zero-carbon connected Europe Europe



At first glance, this gives us one main idea aligned with all European Research and Innovation funding schemes: greener technologies, emissions reduction, resiliency and circular economy, among others, will be part of the key objectives to achieve, and continuity of KET4F-Gas results is a realistic possibility.

Interreg is one of the crucial instruments of the European Union (EU) supporting cooperation across borders through project funding. Therefore, besides Interreg Sudoe, which allowed us to construct innovative solutions for the F-Gas management, there are many other Interreg programmes to take into account.

For example, **Interreg Europe** helps regional and local governments across Europe to develop and deliver better policies. Thus, public authorities can lead projects to support and innovate F-gas-related policies and answer to challenges such as the illegal market (which is also a very reported worry by our stakeholders). Other Interreg programmes, such as **POCTEP** or **Atlantic Area**, focus on areas other than Sudoe; thus, priorities are similar, and stakeholders can find many research and innovation opportunities.

# Similar funded project

HYLANTIC (Interreg Atlantic Area, 2017-2020), was coordinated by KET4F-Gas project partner University of Cantabria and aimed to the generation of hydrogen from renewable energies and local waste streams. Its link with the KET4F-Gas project is the development of new membrane materials for application in fuel cells.

Several projects related to waste management and recovery, as well as aligned with circular economy principles, were funded under Interreg Sudoe programme, such as Wetwine, iCirBus-4Industries, CEMOWAS2, or Ecoval.

Chapter 7:

# National funding for R&I initiatives

Research, innovation and development (R&D&I) play an essential role in triggering smart and sustainable growth and job creation. By producing new knowledge, research is central to developing new and innovative products, processes and services, which enable higher productivity, industrial competitiveness, and ultimately prosperity. Although European support for R&D has a crucial impact on sustainable global development, national strategies and support for R&D&I initiatives are a great lever for change toward a better society. In this line, Spain, France and Portugal are actively working towards this end through various strategies to support research and development at both national and regional level. A table with the most relevant R&D&I financing programs in each country is detailed to guide the searching process for the appropriate support. Note that relevant funding lines are mentioned in the 'Name/topic' section as examples related to KET4F-Gas objectives and results, but monitoring of new calls is needed. Links to the mentioned funding programmes are provided in Section D.





# Portugal

### Portugal Government (Governo de Portugal)

Area	National (NUTS II)	National
Name/topic	Incentive System for R&D projects framed under Portugal 2030 strategy - Contractual Investment Regime	Incentive System for RTD projects in Co-Promotion
Description	Based on the Incentive System framed under Portugal 2020 strategy, projects focused on products and services enhancing the value chain are prioritized	Research and Technological Development, no specific area
Туре	Individual/ Consortium	Consortium

### FCT (Fundação para a Ciência e a Tecnologia)

Area	National	National
Name/topic	R&D-Technological project Contest	RTD project Contest: exploratory research projects
Description	Scientific original or relevant topics, based on international standards, that contribute significantly to the advancement of knowledge	Scientific or technological research aimed at exploring ideas or concepts that are considered original and/or potential for innovation
Туре	Individual/ Consortium	Individual



### SPGM (Sociedade de Garantia Mútua)

**Area** National

Name/topic	Credit Line for Decarbonization and Circular Economy
Description	Credit line to replace equipment by modern, innovative and efficient one, as well as to contribute to circular strategies circular strategies for any phase of the product/service life cycle
Туре	Individual



# Spain

### CDTI (Centro para el Desarrollo Tecnológico Industrial, Ministerio de Ciencia e Innovación)

Area	National	National	National	National	National
Name/topic	NEOTEC-2021- CDTI programme, technology development	INNVIERTE programme, technology transfer and investment for technological companies	CDTI R&D projects developed by enterprises to create and significantly improve production processes, products or services	Missions of CDTI, no 2021 relevant topics.	Cervera Transfer Projects, applied research and business development to create or significantly improve production process, product or service
Description	Creation and consolidation of technology- based companies and technology development	Promote business innovation by supporting venture capital investment in technology-based or innovative companies	Industrial research and / or experimental development without restrictions regarding the sector or technology to be developed	Although current calls are not related to F-gases, technological development, circular economy, and industrial advances are addressed	Applied R&D in the circular economy, where reduction of raw materials, as well as recycling and valorization of waste are highlighted
Туре	Individual	Individual/ consortium	Individual	Consortium	Individual, with mandatory collaboration of Spanish Technological Centre



#### AEI (Agencia Estatal de Investigación, Ministerio de Ciencia e Innovación)

Area National

 Name/topic
 No 2021 relevant topics

 Description
 Although current calls are not related to F-gases, nanomaterials, nanotechnology, as well as recycling are addressed

Type Consortium

#### Regional Government of Extremadura (Junta de Extremadura. Consejería de Economía, Ciencia y Agenda Digital. Dirección General de Empresa)

Area Regional (Extremadura)

 Name/topic
 Industrial R&D projects

 Description
 Industrial research and development, no specific area

 Type
 Individual

#### SODERCAN (Sociedad para el Desarrollo Regional de Cantabria)

Area	Regional (Cantabria)	Regional (Cantabria)	Regional (Cantabria)
Name/topic	Promotion of Circular Economy	Promotion of technology transfer (INVESNOVA)	Large R&I projects
Description	Circular economy initiatives to reduce waste generation and improve efficiency in the use of material resources in the region	Cooperation between Research Organizations (Cantabria) and the private business sector for technology transfer, bringing supply and demand closer together and channelling the needs of companies in the field of technology	Promote the creation of innovative companies or orient the activity of existing companies towards innovative activity
Туре	Individual	Consortium	Consortium

# France

#### **Bpifrance-creatión**

### ADEME & The Ministry of the Economy, Finance and Recovery (Le Ministère de l'Économie, des Finances et de la Relance)

Area	National	Area	National
Name/topic	Aid for the development of innovation	Name/topic	Innovative solutions for recycling, recycling and reincorporation of materials, framed under PIA4
Description	Develop innovative products, processes or services (for industrialization and commercialization), or finance the participation in national/ international R&D&I projects	Description	The current funding programme focuses on circular economy of plastics but more innovation thematic areas will be available throughout the following years
Туре	Individual	Туре	Individual / consortium

#### ADEME (Agence de la transition écologique)

Area	National	National
Name/topic	R&D&I projects, especially for the topics not available on current funding programmes	R&D projects for air quality
Description	R&D projects, including emerging research projects or feasibility studies, to promote the development and/or deployment of new energy, environmental and climate change solutions/services and technologies	R&D projects focused on air quality, depending on the specific topics for each call (available every two years). Projects related to topics considered as "closed/finalised" by public policy are prioritized
Туре	Individual	Consortium

# Main takeaways:

At the European level, five main programmes were identified as excellent opportunities to consolidate and expand the KET4F-Gas results.

National financial support is crucial to innovate, research and develop for any sector to boost competitiveness and the value of the national workforce and achieve prosperity. In this line, several funding actions were identified both at the national and regional level, with special focus on the SUDOE areas of Portugal, Spain and France.

Some of the national funding lines focus on covering the gaps between national and international priorities, and others function as additional opportunities to respond to the high innovation capacity of each of the countries.



Financial support for improving the environmental performance of the industrial sector

C



In addition to the fundamental objective of KET4F-Gas bringing science to companies and making it applicable to their progress, achieving a climate-neutral, resource-efficient, and agile digital economy requires the full mobilisation of both SMEs and large enterprises. Industry must be part of a larger model, such as the circular economy, and work hand in hand with the entities that manage the waste generated. In any case, some of the main difficulties for companies to adopt new practices and participate in the ecological transition, and especially SMEs, are closely related to the financing instruments available for this purpose. Sometimes it can range from the simplest, such as reducing the taxes to be paid for a particular activity, to the most complex, such as active collaboration with other actors in the value chain in the framework of a circular economy model.

It should be noted that the results of KET4F-Gas should not always be treated in isolation, since one of its significant contributions is the promotion of a circular economy model in which it perfectly fits. However, with further development (i.e., reaching higher TRL), KET4F-Gas technologies could also be implemented at the "individual" level, e.g. by a specific waste manager with the support of national funding/investment to apply cleaner management practices. Moreover, this waste manager, with the support of funding/investments for the creation of agendas or partnerships (such as those promoted through Portugal in its Recovery and Resilience Plan) could boost a circular economy model by agreements with other waste managers, F-gas producers, local public administrations, and any other actor in the value chain.

Therefore, the objective of Section C is to provide an overview of the current and future project funding to achieve the adoption and effective implementation of the KET4F-Gas results and improve the environmental performance of the industrial sector as well as to promote greater protection of the natural heritage of the Sudoe region. The main focus is on national funding and investment programmes, but one of the most relevant European funding line is also described.

# European financing lines

## **EIC Accelerator**

Among the funding opportunities offered by the European Innovation Council (EIC) and already described in Section B, **EIC Accelerator** is a key opportunity for funding and investments through the EIC Fund for **individual start-ups and small companies** to develop and scale up high impact innovations with the potential to create new markets or disrupt existing ones. The EIC Accelerator provides substantial financial support with:

- Grant funding (non-dilutive) of up to EUR 2.5 million for innovation development costs.
- Investments (direct equity investments) of up to EUR 15 million managed by the EIC Fund for scale up and other relevant costs.

In addition, EIC selected companies receive coaching, mentoring, access to investors and corporates, and many other opportunities as part of the EIC community. The EIC welcomes applications from innovators in all EU Member States and countries associated to the Horizon Europe programme, and it particularly welcomes applications from startups and SMEs with female CEOs.

As happens with the EIC Pathfinder and Transition, the EIC Accelerator also provides funding through two work lines. First, **EIC Accelerator Open** funding is for breakthrough innovations in any field of technology and application. Second, **EIC Accelerator Challenge** funding targets breakthrough innovations with major impacts on Strategic Digital and Health technologies, as well as Green Deal innovations for the economic recovery. The EIC Accelerator provides blended finance to support development (TRL 5/6 to 8), deployment and scale-up (TRL 9). The blended finance is composed of an investment and grant component:

**Investment** can be requested if the applicant is looking to fill the gap for rapid scale-up of high risk innovation and there is no need for a grant. Note that "small-mid caps" (up to 500 employees, such as a regular EU SME) can apply for the investment component only. The investment can range between EUR 0.5 million and EUR 15 million.

2 The **Grant** component (grant only or grant first) can be requested if applicant have not previously received EIC Accelerator grantonly support. For "Grant-only" the applicant has to be prove having sufficient own financial means for deployment and scale-up (TRL9). In turn, "Grant-first" is adequate for innovations that still require significant work to validate and demonstrate in relevant environments to assess its commercial potential.

Stakeholder can apply for EIC Accelerator funding at any time through the EIC platform. The complete process to request funding is as it follows:



Although the relevance of the EIC Accelerator to the results of KET4F-Gas applies mainly to the developers, it is important to know its existence and how it works, as it can also provide great opportunities for other similar technologies developed in the future. Moreover, the grant funding component (described below) is a financial instrument that could allow the test and validation of the KET4F-Gas results in real settings.



Chapter 9:

# National financing lines

Currently, we are at a time of notable change at the European level: a new European Multiannual Financial Framework and the consequent restructuring of the management and financing figures of the different axes that must be addressed in order to achieve sustainable development goals. Furthermore, the Covid-19 pandemic has modified many of our plans, both individually and collectively, which also affects political and financial decisions across Europe.

Therefore, while many of the new European financial instruments are already launched, at the national level is a little bit different. Along with many other factors, the still ongoing process for a final definition and implementation of many of the national plans makes it difficult to clearly address the national financing and investment lines in this document. However, these new plans deserve our attention and follow-up since they are not only an opportunity but also a responsibility to achieve a more sustainable Europe.





# Portugal

### **Recovery and Resilience Plan (PRR)**

The Recovery and Resilience Plan (PRR) started with the preparation of the "Strategic Vision for Portugal's 2020-2030 economic recovery plan", which was the object of a broad consultation process of Portuguese society. In early 2021, the Government approved the Portugal 2030 Strategy which, having benefited from the contributions collected, is the benchmark for the application of the various policy instruments to be adopted in the near future, including the Multiannual Financial Framework (Portugal 2030) and the Next Generation EU. The latter is a temporary European instrument - which includes the national Recovery and Resilience Plans (Plano de Recuperação e Resiliência, PRR) - designed to boost economic and social recovery, bearing in mind the damage caused by the COVID-19 pandemic.

The Portuguese Recovery and Resilience Plan (PRR) has national application, with an execution period until 2026, and will implement, with resources amounting to around EUR 14 billion in grants, a set of reforms and investments that will allow for the country to resume sustained economic growth, thus reinforcing the goal of convergence with Europe over the next decade. Complementarily, the next cycle of structural funds 2021-2027, through Portugal 2030 will contribute to the reform effort and structural change, intervening in relevant areas in the fields of innovation and digital transition, demography, qualifications and inclusion, climate transition and sustainability and territorial cohesion.

Although the PRR is organized into three structural dimensions -Resilience, Climate Transition and Digital Transition-, only the first two include components and areas focused on actions related to KET4F-Gas results.

#### **Resilience dimension**

Under the Resilience dimension, a robust set of 9 components are prioritized, namely health, housing, social responses, culture, capitalization and business innovation, qualifications and skills, infrastructure, forest and water management. Overall, 49 investments are planned to be implemented. The relevant component for KET4F-Gas related actions is the fifth one, focused on capitalization and business innovation (EUR 1.364 M).

The objective of "Capitalization and business innovation" intervention is to increase the competitiveness and resilience of the economy based on R&D, innovation, diversification and specialization of the productive structure. Capitalize economically viable companies before the outbreak of economic

recession, caused by the pandemic, and encourage productive investment in areas of national and European strategic interest. Among its seven investment lines, "Green Agendas/Alliances for business innovation" is one of the strategic interest to take into account. This line is similar to "Agendas/Mobilization of alliances for business innovation", with differences in the intervention areas where project can apply. Both are based on an open and competitive process of consultation, supported by the active involvement of the various potential actors, in order to identify the real investment opportunities and execution capacities in which all relevant entities of the scientific and technological systems, business and public agencies can participate.

Green Agendas/Alliances for business innovation	Agendas/Mobilization of alliances for business innovation
Budget: EUR 372 million	Budget: EUR 558 million
Focus on business innovation, with an emphasis on reindustrialization, reinforcing the importance of green growth and innovation in areas relevant to accelerating the <b>green transition</b> .	Emphasis on reindustrialization, through the definition, support and promotion of a restricted set of Agendas in innovative strategic areas to accelerate the structural transformation of the Portuguese economy, pursuing objective goals in terms of <b>exports, skilled employment, investment in R&amp;D.</b>
The collaborative projects should allow leveraging the development of new products, services and solutions, with high added value and incorporation of knowledge and technology, which allow to respond to the challenge of the green transition towards environmental sustainability.	<ul> <li>The collaborative projects should allow the advancement or development of new products and services with greater added value, with a view to: <ul> <li>increasing or exporting potential;</li> <li>hiring of qualified Human Resources, associated with increased investment by companies in R&amp;D activities;</li> <li>attracting Foreign Direct Investment with transforming potential in the Portuguese productive network;</li> <li>an effective green transition towards environmental sustainability.</li> </ul> </li> </ul>

Areas: cross-cutting technologies and their applications; mobility, space and logistics; production industries and technologies; natural resources and environment; health, wellbeing and territory.

Participants: companies, R&D institutions and non-business entities of the research and innovation system, municipal entities and higher education institutions with a legally constituted establishment in any of the NUT II regions.

Therefore, the funding is available not for individual institutions but for alliances. In the future, proposal could include solutions such as those developed by KET4F-Gas in collaboration with other solutions to create new agendas for business innovation or alliances for transition toward a better management of gas waste. As an example, the open call for application in September 2021 under this category funds project aiming at increasing energy efficiency, capturing exhaust gases for storage or use, or recovering materials from incineration ashes. Although this is not referring to F-gases, a follow-up of new calls should be carried out.

#### **Climate transition dimension**

Under the Climate transition dimension, there are 6 components answering to the urgent need of accelerating the transition to a carbon neutral economy, and among these, "Industry decarbonisation" is the most aligned with KET4F-gas objectives. With the objective of decarbonise the industrial and business sector and promote a paradigm shift in the use of resources, one investment line is offered and led by the Portuguese Agency for Competitiveness and Innovation (IAPMEI, I.P.). It aims to accelerate the transition to a carbon neutral economy and, at the same time, to promote the competitiveness of industry and companies, through its decarbonisation, reduction of energy consumption and the promotion of indigenous energy sources.

#### In a nutshell:

- The available budget is EUR 715 M.
- Industry decarbonisation is intended to promote and financially support the initiative of the national industry for a multidimensional performance in the environmental field, with projects in four areas: low carbon processes and technologies in the industry, adoption of energy efficiency measures in industry, incorporation of energy from renewable sources and energy storage, and business training and the development of information tools.
- Low carbon processes and technologies in the industry covers 4 slopes, such as new production processes and business models, replacement and/or adaptation of equipment and processes for new sustainable technologies, or innovative economy models, and **measures aimed at the adoption of fluorinated gases with reduced GWP** are highlighted.
- At least 300 projects are expected to be funded by 2025.



### PORTUGAL 2030

The Portugal 2030 Strategy is the guideline for public policies for the 2030 horizon. Between 2021 and 2027, it will contribute a total amount of more than EUR 33,000 M of aid to the investments made until the end of the decade. This strategy will frame the investments to be supported by European funds and also establish the operational structure of the Cohesion Policy funds for the same period. It is expected that the entire legal framework allowing the operation of its various operational programs will conclude in the second semester of 2021, followed by the approval of the European Commission in the first semester of 2022. Thus, information about specific calls and fundings is not available yet, but keeping in mind the strategy main objectives and structure might facilitate its following-up.

The Portugal 2030 Strategy comprises four thematic agendas:

- Agenda I People first: better demographic balance, greater inclusion, less inequality;
- Agenda 2 Digitalization, innovation and qualification as development motor;
- Agenda 3 Climate transition and resources sustainability;
- Agenda 4 An externally competitive and internally cohesive country.

Agenda 2 and 3 are highlighted as both are important for improving the environmental performance of the industrial sector. More specifically, **Agenda** 2 faces the barriers of qualifications and competitiveness and structural transformation of the productive network, also responding the new technological and societal challenges associated with the digital transition and industry 4.0. In turn, **Agenda 3** is focused on the climate transition, sustainability and efficient use of resources, promoting the circular economy and responding to the challenge of energy transition and the resilience of the territory.

However, Agenda 3 is the one that may rise financing lines applicable to the results of the KET4F-Gas projec and their future implementation in real settings, as well as the necessary boost for enterprises to reduce their emissions and environmental impact. Therefore, Climate Transition and Resource Sustainability thematic agenda aims to promote efficient use of resources and

sustainability, enhancing all the opportunities associated with them to generate economic value and improve environmental performance, particularly in terms of climate transition. The third thematic agenda is structured in 5 strategic domains:

- Decarbonization of society and promotion of energetic transition
- Promotion of circular economy.
- · Reduction of risks and valorization of the environment.
- Sustainable agriculture and forests.
- Sustainable ocean economy.

The definition of domain the first strategic domain, "Decarbonization of society and promotion of energetic transition" gives us a clear idea about its importance and alignment with the 3 years of work of the KET4F-Gas project. Its objective is to promote a significant reduction in emissions to meet Portugal's commitment to achieve carbon neutrality by 2050, as a contribution to the Paris Agreement. More specifically, besides the promotion of sustainable mobility and energy efficiency, this work agenda pursues the decarbonization of the industry and aims at 10% reduction of the GHG emission by 2030. In the context of the Circular Economy, the need to promote systematic approaches such as the circularity of technical materials (associated with the processing of raw materials and nonrenewable products) is highlighted as one of the work aspects to achieve the transformation of the current linear economy in more circular models.

Concluding, the Portugal 2030 agendas should remain in the sights of waste managers and industry actors as a great window of opportunity to participate in the ecological transition and adapt to the new legal frameworks that may emerge due to this transition.

2030 PORTUGAL

### **Incentive System**

There are currently three main Incentive Systems, corresponding to three domains of business development:

- Business Innovation and Entrepreneurship;
- Qualification and Internationalization of SMEs;
- Research and Technological Development.

These three domains encompass several sub-systems, aimed at enhancing the development of national companies during the various stages of its life cycle and in its areas of competitiveness considered essential to operate in global markets. This type of incentives should be take into account, since they facilitate actions such as the implementation of new technologies or innovative production processes. For example, under "Business Innovation and Entrepreneurship", the "Innovative production" incentive system focuses on the production of new goods and services or significant improvement of current production through the transfer and application of knowledge is incentivized. Under one of the open calls (i.e., AAC 12/SI/2021, Productive Innovation Incentive System; Individual Projects) EUR 145 million will be invested into individual projects proposing an initial investment for actions related to one of the following: the creation of a new establishment, the increase of the capacity of an existing establishment, diversification of the production of an establishment into products not previously produced in the establishment, or fundamental change in the overall production process of an existing establishment. The financing rate varies between 40% and 75%, depending on the region.

The current calls for incentives are framed under the Portugal 2020 strategy thus the following Portugal 2030 programme could lead to new incentives that allow the integration of innovations both in industry and in waste management.



#### Keep an eye on...

**IAPMEI, I.P.** funding search tool, an useful option to detect funding instruments in Portugal for both projects and enterprises.





# Spain

### Recovery, Transformation and Resilience Plan

As is the case of Portugal, the new Next Generation EU financing instruments provide an extraordinary opportunity to roll out the Spanish Recovery, Transformation and Resilience Plan by offering new investment mechanisms of up to EUR 140 billion in transfers and credits in the period 2021-2026, in addition to the rest of the instruments foreseen in the Multiannual Financial Framework to promote investments and reforms in priority areas at the European level.

In this case, 30 components are grouped under "IO levers" and supported by more than IOO investments lines aligned with several planned reforms. For the specific case of enterprise financial support for ecological transition, "Modernization and digitization of the industrial and SME network, recovery of tourism and promotion of an entrepreneurial Spanish nation" is one of the levers to keep track of. Under this dimension, the I2th component described below has the potential to promote the implementation of the KET4F-Gas results.



Plan de Recuperación, Transformación y Resiliencia



#### **Industrial Policy Spain 2030**

#### Support plan for the implementation of waste regulations and the promotion of the circular economy

Among the three investment lines of the Industrial Policy, one focuses on supporting the **implementation of waste regulations and the promotion of the circular economy** (C12.I3). The objective of this investment is to facilitate the deployment of the circular economy in Spain. The actions contemplated are very diverse and range from the implementation of new separate waste collections and the improvement of existing ones to the construction of specific facilities to treat these collections. Actions are also foreseen for recycling other waste streams collected separately and investments related to collection facilities (such as clean points), classification or improvement of existing mechanical-biological treatment plants. The financing line will also pay special attention to the development of digitization instruments for environmental management and the promotion of the circular economy at the company level.

Therefore, according to C12.I3, public financial support and investments will be made to enhance the waste management processes and facilities and companies' digitization when the circular economy model is promoted. These statements give us a bright idea about the possible support of public administrations to implement new technologies such as those developed in the KET4F-Gas project and incentivise waste managers to implement changes in their F-gas management practices. More specifically, the measures underlined under C12. I3 to highlight here are:

- Construction of new facilities prepared for the reuse and recycling of separately collected waste streams other than bio-waste;
- Investments related to collection facilities (such as clean points), sorting

and classification, and improvement of existing mechanical-biological treatment plants;

- Development of digitization instruments for environmental management;
- Promotion of the circular economy in the field of the company;
- The development of these measures is planned for the 2021-2023 period. These will be the object of tenders, commissions by own means, agreements or subsidies to Autonomous Communities or Town Councils. The promotion of the circular economy in the field of the company also contemplates state aids.

#### In a nutshell:

- Overall, Industrial Policy Spain 2030 operates with a budget of EUR 3782 million, and EUR 850 million is set aside for waste regulation and circular economy component.
- Among its two reforms and three investment domains, one is undoubtedly focused on waste regulations and promotion of circular economy actions.
- Given that the improvement of waste management processes and facilities and the digitization of companies are promoted, a more inclusive financial support is expected to approach a circular model for the management of fluorinated gases and other types of waste.
- Besides tenders, commissions by own means, agreements or subsidies to Autonomous Communities or Town Councils, promoting the circular economy in companies also contemplates state aids.



#### Promotion of the industrial competitiveness and sustainability programme

Five investment lines are envisaged within the **Industrial Competitiveness and Sustainability Promotion programme** (C12.I2). Of these, it is worth highlighting the line of "Support for innovation and sustainability plans" (EUR 118.00 M), which finances the expenses associated with the implementation of individual innovation and sustainability projects in critical areas in the industrial transition, such as:

- energy efficiency, decarbonization, and new sources of sustainable energy;
- circular economy and eco-innovation, improvement of value chains;
- advanced materials and products;
- improvement of quality and industrial safety processes.

With a greater scope and complexity, the financing line dedicated to "Strategic projects for the industrial transition" (PERTE) promotes public-private collaboration to enhance a competitive, sustainable and innovative industrial sector. With a budget of EUR 2,289.06 M, the PERTE programme requires collaboration between administrations, companies and research centres and, for this, different financing instruments are available, including the possibility of direct investments from public administrations.

This financing line follows the logic of Large Projects of Common European Interest (IPCEI). In addition to seeking to promote the transformation of strategic value chains in industrial sectors with a great revitalizing effect on the economy, it also aims to promote strategic projects at the national level that can contribute to the IPCEI. Among the different thematic options, we highlight **"the promotion of a large industrial subsector based on the circular economy"**, where actions related to the second life of electric batteries, the recovery of materials for their reincorporation into the production cycle, and the packaging value chain are addressed. In addition, expansion to other areas is allowed to the extent that a real transformation of the industry is pursued in terms of energy efficiency, sustainability and digital transformation.

Ultimately, the "Promotion of a large industrial subsector based on the circular economy" could focus on refrigerants. This strategic line fits with the actions of the KET4F-Gas project; thus its objectives and results can be framed in a strategic project collaborating with the different actors involved in the Spanish value chain.

Both lines will be supported by mixed forms of loans and grants and different instruments for public-private collaboration. In addition, strategic projects can also receive financial support to meet specific objectives through guarantees and endorsements, creation of funds or other investment instruments, such as direct participation in the capital of companies or Temporary Unions of Companies. The Spanish Ministry of Industry, Trade and Tourism supports SMEs and large enterprises in this process through its General Secretariat for Industry and SMEs (SGIPYME).

#### Keep an eye on...

MINCOTUR Public funding search tool provided by the Spanish Ministry of Industry, Trade and Tourism, is the key portal to find out about the latest public funding calls and the related legislation for industrial SMEs.



#### **Funding alternatives**

In Spain, there are multiple opportunities for all companies to advance in the ecological transition. Among them, we find everything from loans from financial institutions and business angels to support from centres accredited by the Spanish government. Given this wide variety, below are some examples described to keep track of and guide for a deeper analysis.

#### **Center for Industrial Technological Development (CDTI)**

Some of the opportunities and financing programmes provided by CDTI are described in Section B. Here we focus especially on the support needed by SMEs. Therefore, CDTI offers support for applied projects, very close to the market, with medium/low technological risk and short investment recovery periods, which are able to improve the competitiveness of the company through the incorporation of emerging technologies in the sector. It is a partially reimbursable aid, compatible with financing through ERDF funds. It can be requested throughout the year and is suitable for projects with a duration of 6 to 18 months.

#### **Official Credit Institute (ICO)**

The 2021 ICO lines are an example of financial institution support. These are designed to meet the needs of all types of companies, of any size and activity sector. They finance from small investment projects to the international expansion of a company, with long amortization and grace periods.

They are managed through different modalities (loan, leasing, renting, line of credit) and finance up to EUR 12.5 million. For the present case, it is worth highlighting the line "Companies and Entrepreneurs 2021" that responds to technological needs, acquisition of new or second-hand fixed assets, adaptation and reform of facilities, among others.

#### **Regional incentives for business investment**

As a great regional example, the Regional Incentives for Business Investment is an initiative of the Regional Government of Extremadura which provides this aid line, in the form of a direct non-refundable subsidy for companies that make investments in Extremadura, to support the creation of new companies and the consolidation of existing ones, favouring expansion, modernization and relocation projects. Its relevance comes because of its availability for existing production centres for industrial waste recycling and extractive/processing industries.

In the same line, the Galician Innovation Agency (GAIN) provides nonrefundable grants to Galician SMEs through its "InnovaPeme" programme for both innovation activities (e.g., research on innovative products) and innovation of production and management processes (e.g., novel solutions to improve production). For this specific programme, the funding per company ranges from EUR 40,000 to 100,000 but more SMEs support programme are available.





# **France**

### **France Relance**

As Spain and Portugal, France has launched a recovery plan to support the country's economic, industrial, ecological, and social development. The recovery of France through its recovery plan aims to be green, social and territorial, strengthening its economic sovereignty and technological independence. As a roadmap for the country's economic, social and ecological rebuilding, this plan proposes concrete measures to apply at multiple levels -individuals, companies, communities and administration-and around three main pillars: ecology and energy transition, the competitiveness of companies and cohesion.

Moreover, the French Government chooses to conduct exceptional investments in sectors or technologies of the future, during and after the recovery; they take the form of unified and global national strategies, activating several levers and responding to priority innovation needs or market failures. This is the case of the "Recovery Plan for the Industry", with the aim of supporting the investment and the modernisation of the industry. It is focused on eight strategic sectors. The relevant here is the one related to essential industry inputs (chemicals, materials, metals). These resources extend in the form of project calls until 2022.

Overall, several measures act as funding opportunities for companies to contribute to the ecological transition and industry decarbonisation. Also, it is worth mentioning that most of the funding and investment opportunities related to waste management, F-gases and the involved facilities are centralised and managed by ADEME, the French Agency for the Ecological Transition.

Some of the most interesting opportunities related to waste management are mainly focused on bio-waste, plastics, and energy efficiency. For example, **"Modernization of waste sorting, recycling and recovery centres"** has the objective to develop the sorting and recovery of recyclable waste and bio-waste 71

as well as the production of energy from solid recovered fuels. **"Investment in reuse and recycling"** is another measure aiming to reduce waste, currently focusing on plastics recycle and reuse. In line with the anti-waste law for a circular economy, the action seeks to accelerate the development of a circular production and consumption model to limit waste production and preserve natural resources, biodiversity and the climate. Both calls are examples of investment lines that should receive another glance in 2022.

#### **Regional support**

The French Recovery Plan includes economic support at the regional level, allowing regions to request it depending on its specific priorities. Thus, for example, the Regional Council of Auvergne-Rhône-Alpes has EUR 6 million available to help public companies test and invest in the circular economy

### **Bpifrance Climate Plan**

Bpifrance is mobilizing nearly EUR 2.5 billion in direct financing throughout the recovery plan to finance the reduction of companies' environmental footprint and support the development of promising companies that promote ecological and energy transition. SMEs companies (>3 years) that contribute through their activity to the ecological transition can benefit from "green" loans (EUR 50.000

model applied to waste. This type of regional action can be found all over the country. This ambitious and co-constructed approach between the State and the Regions is animated through the Territories of Industry programme. As before mentioned, based on the issues and needs expressed at the local level, each industrial territory, under the impetus of its inter-municipal authorities and its industrialists, builds an action plan. Relevant interventions to keep in mind fall under the development of renewable energies, energy efficiency projects at industrial sites and the recovery of waste in the regions.

- 5 million) to optimize processes or improve performance (energy, water, materials, etc.) to control better or reduce environmental impacts. Innovations to market products or services in environmental protection, circular economy or allowing a reduction in the consumption of resources is also eligible.




## Agency for Ecological Transition

The French Agency for Ecological Transition (ADEME) is one of the main actors to think on when it is about ecological transition, contributing to broad but essential topics such as energy, circular economy, mobility, air quality, adaptation to climate change, etc. Currently, ADEME is also working alongside the government to implement the *France Relance* plan, aiming to promote a new growth model based on the decarbonisation of the economy, energy sobriety and green innovations.

Within the framework of the **Industry Decarbonisation Fund**, ADEME calls to projects (DECARB IND) that propose actions related to investments in:

- the decarbonisation of production tools,
- the reduction of greenhouse gas emissions from an industrial site,
- and the implementation of mature technologies for processes and/or utilities related to energy efficiency, electrification and alternative material inputs.

Within the framework of **"Springboard for the ecological transition of SMEs"**, ADEME have funded several actions related to greenhouse gases. More specifically, the assessment of greenhouse gas emissions and the design of an action plan are funded when carried out in companies with more than 100 individuals. The development of a strategy to reduce greenhouse gas emissions and its evaluation within the company is funded when a specific methodology is followed (ACT Pas à Pas). Moreover, a circular economy sizing study is also eligible when companies have selected significant investments (> EUR 25,000) in the circular economy. The objective is to carry out and internal or external sizing study before implementing the planned investments. In the last call, two thousand applications were received for the entire program.

Other outstanding action is that, since 2009, the support of ADEME to the **national waste policy and the circular economy** comes in the forms of aids for different priorities. More specifically, ADEME funds investments by local authorities and companies to prevent waste production, collect it separately, sort it, recycle or recover energy. However, the aid base is generally limited to the additional equipment cost compared to a conventional alternative solution.

#### In a nutshell:

- Maximum funding rate of 55% for waste production prevention equipment from communities and companies
- Maximum funding rate of 50% for equipment of separated collection of biowaste
- Maximum funding rate of 30% for the renovation of recycling and sorting centres for household waste, waste from companies or construction waste, the preparation and treatment of bio-waste by composting or anaerobic digestion, material recycling units (including construction materials), preparation and recovery of solid recovered fuel.

There is a broader desire to develop the circular economy and preserve resources, and a Waste Fund support certain operations. For example, the use of raw materials from recycling in substitution of non-renewable virgin materials (as made possible by the KET4F-Gas project) is being tested. Beyond the Waste Fund, and over the next five years, a Circular Economy Fund (EUR 160 M) will answer the implementation of guidelines based on the energy transition for green growth law to prevent and increase waste recovery and adopt the circular economy by companies.



## **HFC tax incentives**

Since 2019, all companies subject to income tax or corporation tax can benefit from an excessive dampening effect -40% tax deduction, on purchasing new equipment using "clean" gas. This measure encourages the acquisition of professional refrigerators using refrigerants with low GWP. In addition, the renewal of equipment can be part of a more global energy management project and allow companies to benefit from additional subsidies. For example, a manufacturer who replaces his HFC refrigeration units can obtain other financial aid depending on the options chosen. This measure encourages the purchase of professional refrigeration equipment using low GWP fluids (CO2, hydrocarbons, ammonia) or clean gases such as R-290, R-290a or R-600a. R-32, the F-gas recovered in the KET4F-Gas project, is excluded from this measure. However, with simple adjustments, KET4F-Gas technologies can be applied for the recovery of other F-gases.





## Main takeaways:

In addition to the fundamental objective of KET4F-Gas of getting science to companies and making it applicable for their progress, achieving a climate-neutral, resource-efficient, and agile digital economy requires the full mobilisation of both SMEs and large enterprises.

The real value of science is especially appreciated when powerful results and developments can be applied in real settings. This is also the case of the results of KET4F-Gas, and in order to achieve their adoption and effective implementation and to improve the environmental performance of the industrial sector, several investment programmes and financial support are available at both European and national level.

The current change in the European multiannual financial framework also has an impact on national funding, leading to new national action plans. Since most of the measures are not yet implemented, it is worth actively monitoring the next calls.





## **Opportunities to consolidate and expand the KET4F-Gas results**

## **HORIZON EUROPE**

**General Annexes Horizon Europe 2021-2022 Work Programme** https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-13-general-annexes\_horizon-2021-2022\_en.pdf

## Horizon Europe Cluster 5 Climate Energy and Mobillity

https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-8-climate-energy-and-mobility\_horizon-2021-2022\_en.pdf

## Horizon Europe Cluster 4 Digital, Industry and Space

 $\frac{https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-7-digital-industry-and-space\_horizon-2021-2022\_en.pdf$ 

## **EIC Work Programme**

https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021/wp\_horizon-eic-2021\_en.pdf

#### **Pathfinder Challenge calls**

 $https://eismea.ec.europa.eu/funding-opportunities/calls-proposals/pathfinder-challenge-calls\_en$ 

#### **EIC Accelerator guidelines**

https://eic.ec.europa.eu/guide-applicants\_en

#### **Open Innovation Test Beds in Horizon 2020**

https://ec.europa.eu/research/participants/data/ref/h2020/other/guides\_for\_applicants/h2020-im-ac-inno-testbeds-18-20\_en.pdf

## **LIFE PROGRAMME**

#### LIFE programme website

https://ec.europa.eu/easme/en/life

**Calls for proposals. Climate action sub-programe 2014-2020** https://ec.europa.eu/easme/en/section/life/calls-proposals#inline-nav-4

**European Parliament and Council Regulation on establishing the LIFE programme 2021-2027** https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A385%3AFIN

## **URBAN INNOVATIVE ACTIONS**

**Explanatory memo: European Urban Initiative- post 2020** https://ec.europa.eu/regional\_policy/sources/docgener/brochure/explanatory\_memo\_eui\_post\_2020\_en.pdf

## **M-ERA NET**

M-ERA.NET website https://www.m-era.net

 

 CDTI – Acciones ERA-NET

 http://www.cdti.es/index.asp?MP=I0I&MS=83I&MN=2

 Convocatorias - Ministerio de Ciencia e Innovación (es)

 http://www.aei.gob.es/portal/site/MICINN/menuitem.d2ocaeda35aoc5dc7c68b11001432ea0/?vgnextoid=b24e-067c468a4610VgnVCM1000001d04140aRCRD

## FCT - Transnational Cooperation. M-era.Net

https://www.fct.pt/apoios/cooptrans/eranets/meranet/

## Le Guide des Aides de la Région Nouvelle-Aquitaine

https://les-aides.nouvelle-aquitaine.fr/economie-et-emploi/projets-de-recherche-collaboratifs-public prive the second s

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Agence Nationale de la Recherche (ANR) https://anr.fr/

## **INTERREG SUDOE PROGRAMME**

Interreg SUDOE website https://interreg-sudoe.eu/gbr/home

**Preparation of the Sudoe Programme 2021-2027** https://interreg-sudoe.eu/gbr/sudoe-2021-2027/preparation-of-the-sudoe-programme-2021-2027

## **SPAIN - NATIONAL FUNDING FOR R&I INITIATIVES**

#### AEI 2021 topics

http://www.aei.gob.es/stfls/MICINN/AEI/ficheros/Topics\_convocatoria\_lineas\_estrategicas.pdf

## CDTI R&I support

http://www.cdti.es/index.asp?MP=100&MS=898&MN=1&r=1536\*864

## **Cantabria - SORDECAN** https://www.sodercan.es/

**Extremadura – Industrial R&D projects** https://extremaduraempresarial.juntaex.es/subvenciones?idContenido=9711201

## **PORTUGAL - NATIONAL FUNDING FOR R&I INITIATIVES**

## **PORTUGAL 2020 – R&D projects** https://invest2030.pt/candidaturas/c/Incentivos-a-Investigacao-e-Desenvolvimento-Tecnologico-IDT-7

National Innovation Agency (Agência Nacional de Inovação)

https://www.ani.pt/pt/financiamento/

## SPGM (Sociedade de Garantia Mútua)

https://www.spgm.pt/pt/catalogo/linha-de-credito-para-a-descarbonizacao-e-economia-circular/

## FCT (Fundação para a Ciência e a Tecnologia)

https://www.fct.pt/apoios/projectos/concursos/ICDT/index.phtml.pt

## **FRANCE - NATIONAL FUNDING FOR R&I INITIATIVES**

## **Bpifrance-creatión**

https://bpifrance-creation.fr/

## Bpifrance-creatión - Aid for the development of innovation call

https://www.bpifrance.fr/catalogue-offres/soutien-linnovation/aide-pour-le-developpement-developpement-developpement-developpement-developpement-developpement-developpement-developpement-developpe

## ADEME - Innovative solutions for recycling, recycling and reincorporation of materials

https://agirpourlatransition.ademe.fr/entreprises/dispositif-aide/20210728/pia4-rrr2021-153

## **ADEME - R&D projects conditions**

https://agirpourlatransition.ademe.fr/entreprises/sites/default/files/2021-02/conditions-eligibilite-financement-projets-recherche-developpement-innovation-2021.pdf

## ADEME - AQACIA - 2020 funded projects

https://www.ademe.fr/sites/default/files/assets/documents/laureats-apr-aqacia-edition-2020.pdf

# Financial support for improving the environmental performance of the industrial sector

## **PORTUGAL - PLANO DE RECUPERAÇÃO E RESILIÊNCIA**

## Plano de Recuperação e Resiliência

## Capitalization and business innovation requirements

 $\frac{https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Incentivos-Financiamento/Sistemas-de-Incentivos/Plano-de-Recuperacao-e-Resiliencia/Agendas-para-a-Inovacao-Empresarial.aspx}{\label{eq:second}$ 

## Open call Green Agendas/Alliances for business innovation

https://recuperarportugal.gov.pt/wp-content/uploads/2021/07/Concurso-Ideias-C5-i01.pdf

## **Open calls search platform** https://recuperarportugal.gov.pt/candidaturas-prr/

## PORTUGAL 2030

## Portugal 2030 strategy

https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3d%3dBQAAAB%2bLCAAAAAAABAAzNDC-3NAEAkBRcpAUAAAA%3d

## Portugal 2030 strategy summary

https://www.portugal.gov.pt/download-ficheiros/ficheiro.aspx?v=%3d%3dBQAAAB%2bLCAAAAAAABAAzNDC-3NAUABiRbowUAAAA%3d

#### Portugal 2030 official website

http://www.portugal2030.pt/

#### Portugal 2020 Incentive System

https://www.iapmei.pt/PRODUTOS-E-SERVICOS/Incentivos-Financiamento/Sistemas-de-Incentivos/Incentivos-Portugal-2020.aspx

## **SPAIN – RECOVERY, TRANSFORMATION AND RESILIENCE PLAN**

## **Recovery, Transformation and Resilience Plan document**

https://www.lamoncloa.gob.es/temas/fondos-recuperacion/Documents/30042021-Plan\_Recuperacion\_%20 Transformacion\_%20Resiliencia.pdf

## **Industrial Policy Spain 2030**

https://www.lamoncloa.gob.es/temas/fondos-recuperacion/Documents/05052021-Componente12.pdf

## **General Secretariat for Industry and SMEs (SGIPYME)**

https://plataformapyme.es/es-es/Financiacion/Paginas/ApoyoFinanInd.aspx

## CDTI innovation applied projects

http://www.cdti.es/index.asp?MP=100&MS=812&MN=2&r=1536\*864

## ICO companies and entrepreneurs

https://www.ico.es/web/guest/ico-empresas-y-emprendedores

## **Extremadura - Regional Incentives For Business Investment**

https://extrema dura empresarial.junta ex.es/subvenciones?idContenido=57058

#### Galicia - Galician Innovation Agency (GAIN)

http://gain.xunta.gal/artigos/442/axudas+2021

## FRANCE

## **France Relance**

https://www.economie.gouv.fr/plan-de-relance

## France Relance - Call for modernization of waste sorting, recycling and recovery centers

 $\frac{https://www.economie.gouv.fr/plan-de-relance/profils/entreprises/modernisation-des-centres-de-tri-recyclage-et-valorisation-des}{valorisation-des}$ 

## Auvergne-Rhône-Alpes region website

https://www.auvergnerhonealpes.fr/

## **Bpifrance Climate Plan – Green loans**

https://www.bpifrance.fr/catalogue-offres/transition-ecologique-et-energetique/pret-vert

## **ADEME - Industry Decarbonisation Fund**

https://agirpourlatransition.ademe.fr/entreprises/dispositif-aide/20210628/decarb-22021-98

## **ADEME – The Circular Economy Fund**

https://www.ademe.fr/expertises/dechets/passer-a-laction/fonds-economie-circulaire

## ADEME - Springboard for the ecological transition of SMEs

https://agirpourlatransition.ademe.fr/entreprises/dispositif-aide/tremplin-transition-ecologique-pme

# Do you have any questions? Contact us!

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