

2024 THOUGHT LEADERSHIP

FROM PROPOSALS TO REALITY: HOW EU FUNDS CAN HELP JUMP-START CCS PROJECTS

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Acronyms

BECCS	Bioenergy with carbon capture and storage	FEED	Front-end engineering design
CAPEX	Capital expenditure	GHG	Greenhouse gas
CCS	Carbon capture and storage	JTF	Just Transition Fund
CCU	Carbon capture and utilisation	NPV	Net present value
CCUS	Carbon capture, utilisation and storage	NZIA	Net-Zero Industry Act
CEF-E	Connecting Europe Facility for Energy	OPEX	Operational expenditure
CO₂	Carbon dioxide	PCI	Project of common interest
DKK	Danish krone	PMI	Project of mutual interest
EEA	European Economic Area	R&D	Research & development
EFTA	European Free Trade Association	RRF	Recovery and Resilience Facility
EIB	European Investment Bank	TEN-E	Trans-European Networks for Energy
ETS	Emissions Trading System	TRL	Technology readiness level
EU	European Union	VAT	Value-added tax

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1.0 INTRODUCTION

In March 2023, the European Commission unveiled its proposal for a Net-Zero Industry Act¹ (NZIA) to scale up the European Union's (EU) manufacturing capacities in technologies that will drive decarbonisation while fostering competitiveness and supply chain resilience. Recognising the imperative for improved coordination and synergies between existing funding sources, the proposal suggests the establishment of the Net-Zero Europe Platform.

This innovative governance tool is envisioned as a coordination hub where the European Commission and EU Member States can discuss advice on project financing, looking at different opportunities such as EU and national funding programmes, resources from international financing institutions and private sector support.

As part of the NZIA, the European Commission included Carbon Capture and Storage (CCS) as one of the eight strategic net-zero technologies to reach the EU's climate goals.² CCS entails a suite of applications that capture carbon dioxide (CO₂), transport it, and store it safely and durably underground so that it does not contribute to climate change. Given insufficient market signals, public support for CCS projects is crucial for establishing a more viable business case for the rollout of a CO₂ value chain at this nascent deployment stage.

In light of the future Net-Zero Europe Platform, this guide aims to serve as an introduction to how to access EU funding for CCS. It presents seven funds in a simple way, each accompanied by a brief description that emphasises their relevance for developing an industrial carbon management value chain.

¹ As of January 2024, the proposal has reached the trilogue stage and is expected to be endorsed in early 2024. Source: Proposal for a Regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act), COM/2023/161 final.

² The list of strategic net-zero technologies is being revised by the European Parliament and the Council of the EU and may be subject to change prior to final approval by the co-legislators.

2.0 MAPPING EU FUNDS THAT CAN SUPPORT CCS PROJECTS

The EU's financial support for CCS is distributed between several funding programmes. This guide presents seven of them: Horizon Europe, Innovation Fund, Connecting Europe Facility – Energy, Recovery and Resilience Facility, Just Transition Fund, InvestEU, and LIFE [Table 1].

It is designed for 'CCS project developers' that can refer to a wide range of entities, both public and private, such as companies, research organisations, and/or public authorities. While it aims to offer a simplified and comprehensive overview of EU CCS funding opportunities, it may not cover every potential funding avenue.

For each fund, the following categories of information are included:

- General information: Its overall objective, structure, budget, operating period and geographical scope.
- Relevance for CCS: The potential of the fund for CCS and the types of projects that can be supported.
- Award criteria: The criteria against which applications are evaluated and scored.
- Funding rate: The costs that can be eligible for support and the maximum contribution.
- Combination with other public support: The feasibility of combining assistance from the mentioned fund with support offered by another EU fund.
- Success story: Illustrates a carbon management project that applied to the mentioned fund and secured support from the EU.
- Expert advice³: The key recommendations by experts from the [Ciaotech-PNO Group](#) for project developers intending to apply to the mentioned fund.

EU FUNDING PROGRAMME	ACTIVITY DOMAIN	LEGAL FRAMEWORK	PROGRAMME WEBSITE
Horizon Europe	Research & innovation	Regulation (EU) 2021/695	Reference
Innovation Fund	Research & innovation	Regulation (EU) 2019/856	Reference
Connecting Europe Facility – Energy	European strategic investments	Regulation (EU) 2021/1153	Reference
Recovery and Resilience Facility	Recovery and resilience	Regulation (EU) 2021/241	Reference
Just Transition Fund	Environment & climate action	Regulation (EU) 2021/1056	Reference
InvestEU	European strategic investments	Regulation (EU) 2021/523	Reference
LIFE	Environment & climate action	Regulation (EU) 2021/783	Reference

Table 1 – Overview of EU funding opportunities for CCS and their legal basis

³ This category of information is only applicable to the Horizon Europe, the Innovation Fund and the Connecting Europe Facility – Energy.

2.1. Horizon Europe

General information

Succeeding Horizon 2020, Horizon Europe⁴ is the EU's key funding programme for research and innovation. It aims to facilitate collaboration and increase the impact of research and innovation in tackling climate change while boosting the EU's competitiveness. From 2021 to 2027, it has a budget of €95.5 billion. Entities from EU Member States, non-EU countries with association agreements,⁵ and third countries can participate in Horizon Europe's calls for proposals.

The structure of Horizon Europe consists of three pillars and one horizontal part [Figure 1] with a specific budget allocated to each of them [Figure 2]:



Figure 1 - Structure of Horizon Europe⁶

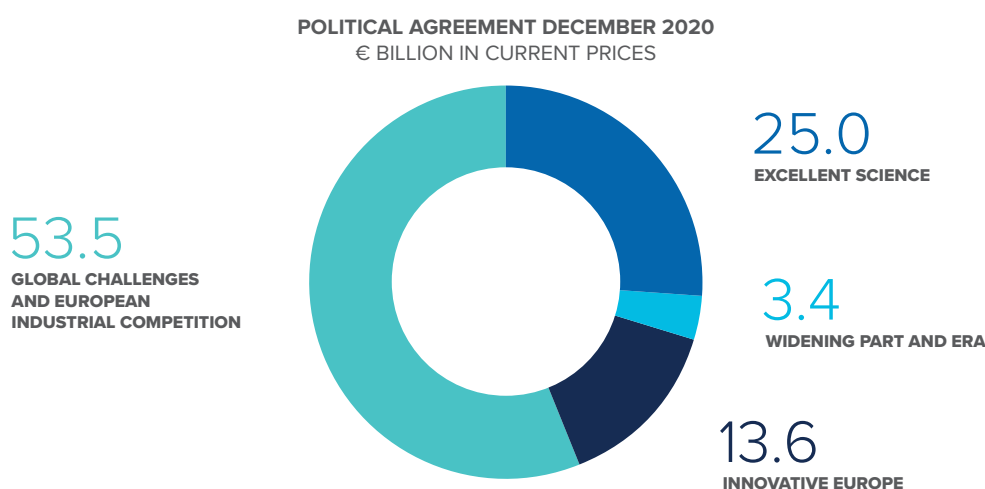


Figure 2 - Budget composition of Horizon Europe⁷

⁴ Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013, OJ L 170

⁵ Associated states include Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Iceland, Israel, Kosovo, Moldova, Montenegro, New Zealand (restricted to Pillar II), North Macedonia, Norway, Serbia, Tunisia, Turkey, Ukraine and United Kingdom (starting from 2024) according to European Commission (2023) List of participating countries in Horizon Europe, version 15 September 2023. Available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratome_en.pdf

⁶ Adapted from European Commission, Directorate-General for Research and Innovation, Horizon Europe, the EU research and innovation programme (2021-27) – For a green, healthy, digital and inclusive Europe, Publications Office of the European Union, 2021. Available at: <https://data.europa.eu/doi/10.2777/052084>

⁷ Adapted from European Commission (2021) 'Horizon Europe: The EU Research & Innovation Programme 2021-27' [PowerPoint Presentation]. Available at: https://research-and-innovation.ec.europa.eu/system/files/2022-06/ec_rtd_he-investing-to-shape-our-future_0.pdf

Relevance for CCS

CCS is explicitly mentioned in two clusters under the second pillar, 'Global challenges and European industrial competitiveness', which was allocated the largest share of the budget at €53.5 billion:

- Cluster 5 on 'Climate, Energy and Mobility': In the Work Programme for 2023-2024, CCS is explicitly mentioned in destination 'Sustainable, secure and competitive energy supply', the objective of which is to accelerate the development of carbon capture, utilisation and storage (CCUS) in electricity generation and industry applications.
- Cluster 4 on 'Digital, Industry and Space': In the Work Programme for 2023-2024, destination 'Climate neutral, circular and digitised production' addresses CCS in the context of industrial symbiosis and hubs for circularity.

Award criteria

Proposals submitted to Horizon Europe are evaluated against three criteria:

- Excellence: The innovativeness of the project and its underlying scientific methodology.
- Impact: What the project's results bring to the markets and EU society, as well as the dissemination, communication, and exploitation plan of the project.
- Quality and efficiency of implementation: The project's work breakdown structure, plan for implementation and the composition of the consortium.

Funding rate

If a project is successful and depending on the type of action, Horizon Europe can contribute between 60% and 100% of the eligible costs [Figure 3].

According to the General Model Grant Agreement⁸, there are five eligible cost categories:

- Personnel costs,
- Subcontracting costs (including related duties, taxes and charges, such as non-deductible or non-refundable value added tax (VAT)),
- Purchase costs:
 - Travel and subsistence,
 - Equipment,
 - Other goods, works and services,
- Other cost categories:
 - Financial support to third parties,
 - Internally invoiced goods and services,
- Indirect costs (reimbursed at the flat rate of 25% of the eligible direct costs).

The European Commission recently introduced a lump sum model with the aim of simplifying the financial management of the funded projects in the Horizon Europe's program⁹. The basic principle the model is based on includes a fixed lump sum for each work package that is paid once the work package is completed. The lump sum model removes all obligations on actual cost reporting and financial ex-post audits, making the administrative process significantly smoother.

⁸ European Commission (2022) General Model Grant Agreement: Contract For The Horizon Europe Programme, 15 April 2022. Available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/agr-contr/general-mga_horizon-euratom_en.pdf

⁹ European Commission (2023) Lump fund funding in Horizon Europe. Available at: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/horizon/lump-sum/guidance>

TYPE OF ACTION	RESEARCH AND INNOVATION	INNOVATION	COORDINATION AND SUPPORT
Objective	Establish new knowledge or explore the feasibility of a new or improved technology, product, process, service, or solution.	Produce plans and arrangements or designs for new, altered, or improved products, processes, or services (prototyping, testing, demonstrating, piloting, large-scale product validation, and market replication).	Promote cooperation and networking actions between legal entities from Member States and Associated Countries.
Funding rate (expressed as a percentage of eligible costs)	100%	60-70% for profit, 100% non-profit	100%
Technology Readiness Level (TRL)	3-5	5-7	N.A.
Typical duration	36-48 months	30-36 months	12-30 months

Figure 3 - Type, objectives, funding rates, TRL and typical duration of actions under Horizon Europe ¹⁰

Combination with other public support

In principle, it is possible to combine support from Horizon Europe and another EU fund, provided that:

- The two financial supports do not cover the same eligible costs (double funding),
- The cumulation of the two financial supports does not exceed the funding rate associated with the type of the project.

SUCCESS STORY: 3D, FRANCE

Launched in 2019, the 3D (DMX Demonstration in Dunkirk) project¹¹ was funded by Horizon 2020. The project aimed to demonstrate an innovative process for capturing CO₂ from industrial activities (DMX™ process), implement an industrial unit at the ArcelorMittal site in Dunkirk, France, operational by 2025, and explore storage solutions for more than 1 Mtpa CO₂ in the North Sea.



¹⁰ Table based on research by PNO.

¹¹ ArcelorMittal (2023) The 3D Project (DMXTM Demonstration in Dunkirk). Available at: <https://corporate.arcelormittal.com/climate-action/decarbonisation-technologies/the-3d-project-dmx-demonstration-in-dunkirk>

Expert advice

- Successful projects have a high focus on innovation (with respect to being state of the art at least at the EU level) and collaborative effort to mature technologies, processes and methodologies and reach impacts with multiple benefits for EU society.
- Successful projects are centered around technologies in their first steps of development, from fundamental research at scientific level (TRL 3) up to first industrial demos and pilots (TRL 7). Mature, close-to-market projects should seek other sources of funding.
- Successful projects are collaborative in nature, bringing together a consortium of at least three partners from three different EU countries, along the CCS value chain (technology developers, end-users, research centers and universities, small- and medium-sized enterprises, large enterprises). The size and composition of the consortium can be tailored to the type of call and project.
- It is necessary to address intellectual property and ownership of results well ahead in the process. The European Commission sets general rules in the grant agreement but leaves parties to regulate this as they best see fit (normally in a consortium agreement).
- Large prefinancing (up to 80% of the grant) allows positive cashflows for research and development (R&D) activities.
- The application package should be up to 80-100 pages, involving mostly the R&D and technical team. It is recommended to start the application writing process 3-4 months before the call deadline.

2.2 Innovation Fund

General information

The Innovation Fund¹² aims to bolster the commercial implementation of innovative decarbonisation technologies, including CO₂ capture and storage [Figure 4]. It is sourced from revenues generated by the EU Emissions Trading System (EU ETS), underscoring the carbon market's pivotal role in advancing the EU's green transition. The Innovation Fund may amount to €40 billion for 2020-2030, depending on the EU ETS prices, awarded to projects in the European Economic Area (EEA) through calls for proposals or competitive tenders.

Based on a record budget of €4 billion, the current 4th Innovation Fund's call for proposals runs from 23 November 2023 to 9 April 2024. For the first time, project developers can apply under five distinct categories encompassing different budget ranges and capital expenditure (CAPEX) requirements:

- General decarbonisation (large scale): €1.7 billion for projects with CAPEX above €100 million,
- General decarbonisation (medium scale): €500 million for projects with CAPEX between €20 million and €100 million,
- General decarbonisation (small scale): €200 million for projects with CAPEX between €2.5 million and €20 million,
- Cleantech manufacturing: €1.4 billion for projects with CAPEX above €2.5 million focusing on the manufacturing of components for renewable energy, energy storage, heat pumps, and hydrogen production,
- Pilot: €200 million for projects with CAPEX above €2.5 million focusing on deep decarbonisation (limited to €40 million per project).

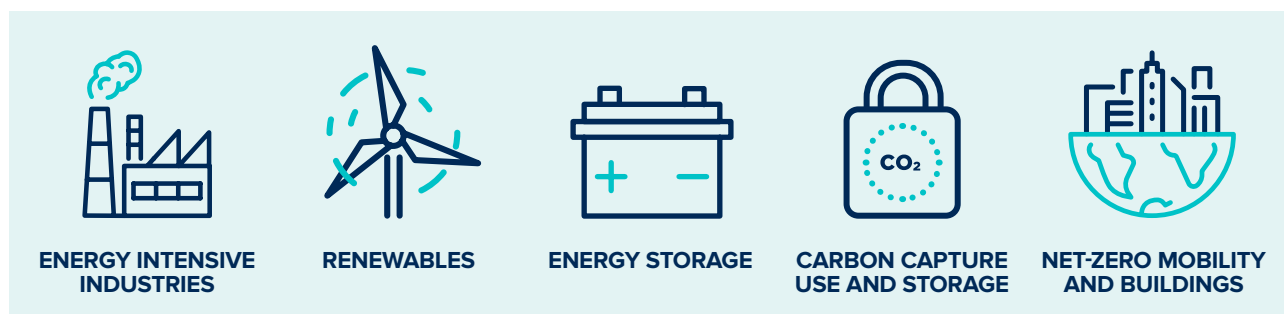


Figure 4 – Innovative technologies eligible under the Innovation Fund¹³

¹² Commission Delegated Regulation (EU) 2019/856 of 26 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council with regard to the operation of the Innovation Fund, OJ L 140

¹³ European Commission (2023) What is the Innovation Fund? Available at: https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/what-innovation-fund_en

Relevance for CCS

From 2020 to 2022, the European Commission launched three calls for proposals for large-scale projects and three others for small-scale projects. More projects with a CCS component applied with each new call. Some 20 CCS-related projects have been funded so far.

Award criteria

The 2023 Innovation Fund call¹⁴ specified the criteria in the following order:

1. Degree of innovation: Compared with state of the art.
2. Greenhouse gas (GHG) emissions avoidance potential: Absolute GHG emission avoidance, relative GHG emission avoidance and quality of the GHG emission avoidance calculation and minimum requirements.
3. Project maturity: In terms of technical, financial and operational maturity.
4. Replicability: Efficiency gains, further development, resilience of EU industrial system, potential in terms of multiple environmental impacts, quality and extent of the knowledge sharing, quality, soundness and reliability of the information.
5. Cost efficiency: The ratio between the requested grant plus any other public support and the absolute GHG emission avoidance, quality of the cost calculation and minimum requirements.
6. Bonus points: Allocated if the project can deliver net carbon removals or other GHG savings, relies on electricity from additional renewable sources or uses renewable fuels of non-biological origin or, for maritime sector projects, it decarbonises the maritime sector.

The evaluation is based on a cascading approach: the evaluator stops the assessment if the proposal does not meet the minimum threshold under each of the first three criteria.

Funding rate

The Innovation Fund can contribute up to 60% of the relevant costs if a project is selected. The revised Innovation Fund Delegated Regulation¹⁵ defines relevant costs as the net extra costs the project proponent bears due to the application of innovative technology related to reducing or avoiding GHG emissions. This, in general, includes the undiscounted CAPEX and the Net Present Value (NPV) of the project revenues, operational benefits, CAPEX maintenance, and operational costs (OPEX), arising over the first 10 years of the project's operation.

Combination with other public support

When the European Commission launches a new call for proposals under the Innovation Fund, it may impose restrictions on the combination with other sources of public support, such as EU funds or state aid (carbon contracts for difference, feed-in tariffs, etc.).

With the ongoing 2023 Innovation Fund call, it explicitly promotes synergies and complementarities between the Innovation Fund and other EU support schemes. However, it is essential to note that any other public support, whether already allocated or planned to be requested, will be considered to evaluate the cost-efficiency criteria.

¹⁴ European Commission (2023) Call for proposals, Innovation Fund call 2023 Net Zero Technologies, 23 November 2023. Available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/innovfund/wp-call/2023/call-fiche_innovfund-2023-nzt_en.pdf

¹⁵ Commission Delegation Regulation (EU) 2023/2537 of 15 September 2023 amending Delegated Regulation (EU) 2019/856 supplementing Directive 2003/87/EC of the European Parliament and of the Council with regard to the operation of the Innovation Fund, OJ L, 2023/2537



SUCCESS STORY: KAIROS@C, BELGIUM

Launched in November 2020, the Kairos@C project¹⁶ was funded by the Innovation Fund in the first call for proposals. The project aims to create the first and largest cross-border CCS value chain in the Port of Antwerp, Belgium, with the potential to avoid the emission of 14 Mt of CO₂ over its first 10 years of operation, starting from Q3 2025. CO₂ will be captured from five production plants on the Antwerp industrial platform and then liquefied via an export terminal located in the Port of Antwerp and transported by ship for permanent storage beneath the North Sea.

Kairos@C will enable the deployment of several pioneering technologies that include a cryogenic CO₂ capture process at an industrial scale, an energy-efficient CO₂ liquefaction plant, and the development of a major functioning cross-border shipping and storage CCS chain.

Kairos@C is a joint initiative of Air Liquide and BASF and aspires to be a kick-starter of the open access CO₂ export infrastructure in the Port of Antwerp, built under the umbrella of the Antwerp@C consortium that received funding for the Antwerp@C CO₂ Export Hub under the CEF-E programme (see next chapter).

Expert advice

- Successful projects are large, full-scale industrial projects for first-of-its-kind plants (or pilots) of innovative technologies/processes, including manufacturing of cleantech components.
- The main CCS projects funded so far under the Innovation Fund are energy-intensive industries with CCS (mostly cement and lime), bioenergy with CCS (BECCS), blue hydrogen with CCS, CO₂ transport and storage (mineralisation).
- Single applicant is possible.
- Successful projects are innovative not only in the technology, but also in the business model, products, value chain, etc.
- Financial maturity, commitment and a financing plan need to be demonstrated.
- The Innovation Fund allows prefinancing (up to 40% of the grant) before construction. The rest of the support is distributed over the years of operation and depends on the yearly GHG emissions reduction monitoring report.
- The application package should be around 250 pages, involving multiple teams (technical, GHG emissions calculation, business and financials, communication, etc.). It is recommended to start the application writing process 6 months before the call deadline.

¹⁶ Kairos@C (2021) A unique momentum for massive decarbonisation through the largest cross-border CCS value chain. Available at: <https://kairosatc.eu/>

2.3 Connecting Europe Facility – Energy

General information

The Connecting Europe Facility¹⁷ is the EU funding programme aiming at accelerating investment in trans-European networks in the field of transport, energy and telecommunications. In relation to energy, it relies on the revised Trans-European Networks for Energy (TEN-E) regulation¹⁸ which outlines the investment priorities needed to meet the EU energy and climate objectives. For 2021-2027, the Connecting Europe Facility for Energy (CEF-E) has a budget of €5.84 billion.

In accordance with the revised TEN-E Regulation, the European Commission must establish every two years two lists: one for Projects of Common Interest (PCIs) and Projects of Mutual Interest (PMIs), and the other for cross-border projects in the field of renewable energy.¹⁹

To qualify as a PCI, a project must satisfy three general criteria:

- Be deemed essential for at least one of the energy infrastructure priority corridors and areas.
- Have potential overall benefits that surpass its cost, including over the longer term.
- Involve at least two Member States, either directly or indirectly via interconnection with a third country, crossing the border of two or more Member States, and must be located in the territory of one Member State.

To qualify as a PMI, a project must satisfy four general criteria:

- Make a significant contribution to the EU's 2030 objectives and those of the third country, and the third country supports the priority status of the project,
- The anticipated overall benefits of the project at the EU level surpass its costs within the EU, including over the longer term,

- Must be located in the territory of at least one Member State and the territory of at least one third country and must showcase a significant cross-border impact,
- For the section located on Member State territory, the project must comply with Directives 2009/73/EC²⁰ and (EU) 2019/944²¹ where it falls within the infrastructure categories set out in the revised TEN-E Regulation.

The CEF-E can allocate two types of grants under dedicated calls for proposals:

- Grants for studies, including activities related to the preparatory, mapping, feasibility, evaluation, testing and validation studies for the implementation of a PCI or a PMI,
- Grants for works, including the purchase, supply and deployment of components, systems and services, the development, construction and installation activities for the implementation of a PCI or a PMI, the acceptance of installations and the project's launch.

Projects can request funds for either studies or works (hybrid projects are not eligible).

To qualify for grants under the CEF-E, project developers must follow a two-stage process:

1. Application to the PCI-PMI list,
2. If the project is selected as a PCI or a PMI, application to the CEF-E's call for proposals for grants for studies or works.

The CEF-E call for proposals is published every year, with a budget of approximately €750-800 million. Overall, the process can take two to three years between applying for the PCI-PMI list and receiving the grant decision under the CEF-E.

¹⁷ Regulation (EU) 2021/1153 of the European Parliament and of the Council of 7 July 2021 establishing the Connecting Europe Facility and repealing Regulations (EU) No 1316/2013 and (EU) No 283/2014, OJ L 249

¹⁸ Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013, OJ L 152/45

¹⁹ As CCS project developers can only apply for the PCI-PMI list, this guide does not cover cross-border renewable energy projects.

²⁰ Directive 2009/73/EC of the European Parliament and of the Council concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC, OJ L 211

²¹ Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast), OJ L 158

Relevance for CCS

Different types of CO₂ infrastructure can be eligible under the PCI-PMI list²² for grants:

- Dedicated pipelines, other than upstream pipes, used to transport CO₂ from more than one source for permanent storage permitted under the CCS Directive,
- Fixed facilities for liquefaction, buffer storage, and converters of CO₂ for further transportation through pipelines, ships, barges, trucks, or trains,
- Surface and injection facilities associated with geological CO₂ storage permitted under the CCS Directive and necessary to allow cross-border CO₂ transport and storage,
- Any equipment or installation essential for the proper, secure and efficient system operations.

The European Commission adopted 14 CO₂ transport and storage projects in the PCI-PMI list published in November 2023²³, the first one since the revision of the TEN-E Regulation.

Award criteria

Applications to the CEF-E's calls for proposals are evaluated against the following criteria:

- Priority and urgency: Coherence with EU policy targets, objectives and priorities,
- Maturity: Readiness/ability of the project to comply with proposed start and end dates, contractual procedures and necessary permits,
- Quality: Soundness of the implementation plan, architecture and design approach, organisational structures, etc.,
- Impact: Externalities such as security of supply, innovation, solidarity, climate and environmental consequences,
- Catalytic effect: Financial gap, capacity to rely on different investment sources, etc.

Co-funding rate

Various co-funding rates, expressed as percentages of eligible costs, can apply to projects selected under the CEF-E:

- Up to 50% for the development of PCIs or PMIs,
- Up to 70% for works undertaken in outermost regions,
- Up to 75% for the development of PCIs or PMIs demonstrating a high level of impact in terms of security of supply at the EU or regional level, solidarity or innovation.

Eligible costs may encompass personnel, subcontracting, purchasing, other categories and indirect costs.

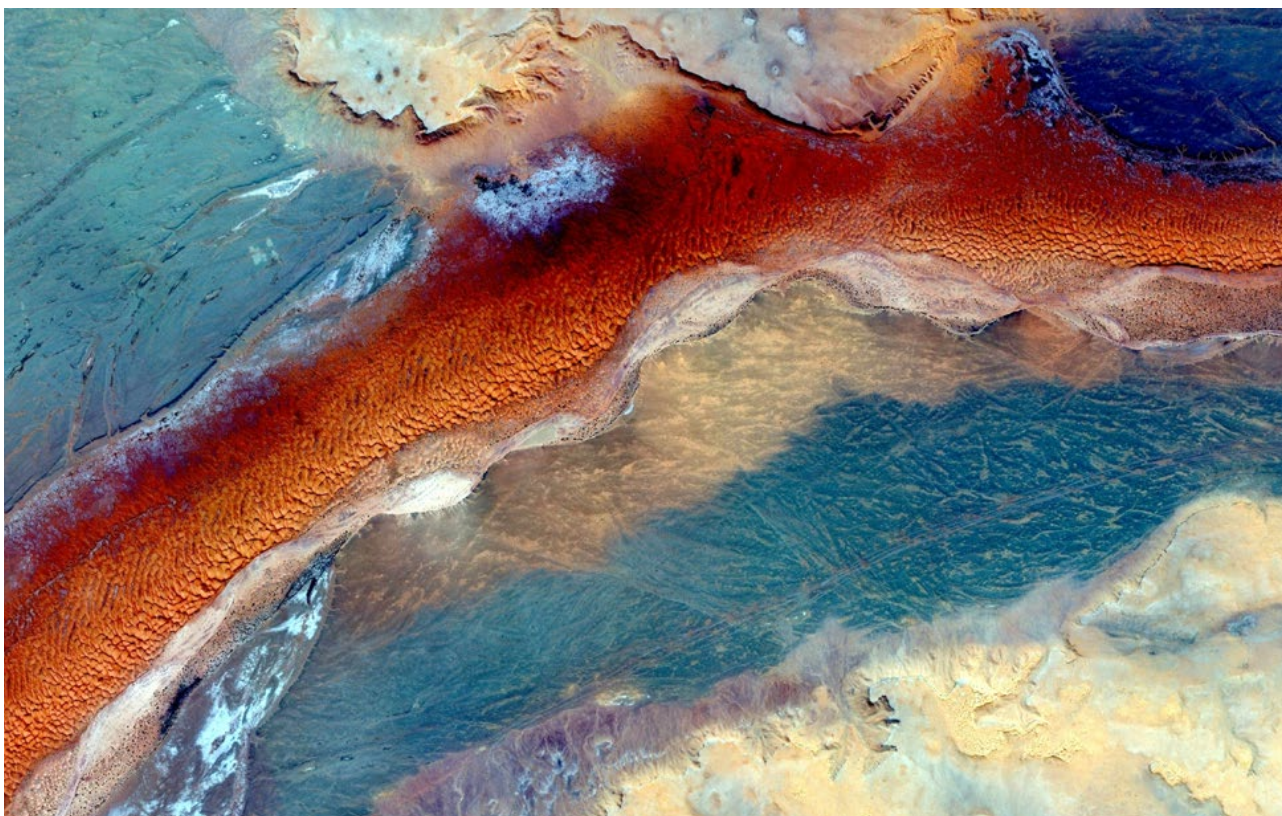
Combination with other public support

It is possible to combine support from the CEF-E and another EU fund, provided that:

- The two financial supports do not cover the same eligible costs (double funding),
- The cumulation of the two financial supports does not exceed the funding rate associated with the type of the project.

²² Please see Annex II of the revised TEN-E Regulation.

²³ Annex to the Commission Delegated Regulation of 28 November 2023 amending Regulation (EU) No 2022/869 of the European Parliament and of the Council as regards the Union lists of projects of common interest and projects of mutual interest, C(2023) 7930 final



SUCCESS STORY: ANTWERP@C CO₂ EXPORT HUB, BELGIUM

Launched in 2020, Antwerp@C CO₂ Export Hub project²⁴ was funded by the Connecting Europe Facility for Energy (CEF-E studies in 2020 and CEF-E works in 2022). The project aims to set up an open-access infrastructure to transport, liquefy and load onto ships CO₂ captured on industrial sites on the Antwerp port platform, for permanent storage offshore beneath the North Sea.

The first phase of the initiative is the Kairos@C project financed through the Innovation Fund programme (see success story of chapter B above). The Antwerp@C CO₂ Export Hub will have an initial export capacity of 2.5 Mtpa, with the ambition to reach up to 10 Mtpa by 2030, being among the world's first and largest multimodal open-access CO₂ export facilities. The project is expected to be completed in June 2027, contributing as one of the capture initiatives under the PCI N-LITES.

Expert advice

- Successful projects focus on infrastructure that is open-access and cross-border with clear benefits for multiple stakeholders across at least two EU Member States.
- CEF-E is very relevant for CO₂ export terminals and hubs.
- Maturity is important: CEF-E studies focus on projects in feasibility/pre-front-end engineering (FEED) stage, while CEF-E works is mainly for projects that are concluding FEED and going into construction.
- The CEF-E includes other categories, such as electricity, gas storage and hydrogen (from 2024). In the coming years, strong competition between projects can be expected for a relatively small budget.
- In the last CEF-E 2023 round²⁵, an unprecedented €480 million (out of a total of around €600 million) was earmarked for five CCS projects (four CEF-E works and one CEF-E study), proving the increased commitment by the European Commission to support the deployment of a pan-European CCS infrastructure.

²⁴ Fluxys (2023) Antwerp Export Hub. Available at: <https://www.fluxys.com/en/projects/antwerp-export-hub>

²⁵ European Commission (2023) Connecting Europe Facility: Nearly €600 million for energy infrastructure contributing to decarbonisation and security of supply, 8 December 2023. Available at: https://energy.ec.europa.eu/news/connecting-europe-facility-nearly-eu600-million-energy-infrastructure-contributing-decarbonisation-2023-12-08_en

2.4 Recovery and Resilience Facility

General information

The EU's Recovery and Resilience Facility²⁶ (RRF) is a critical element of the Next Generation EU initiative. Established in February 2021 and effective until the end of 2026, it is a temporary instrument designed to help EU Member States tackle the economic and social impacts of the COVID-19 crisis while strengthening the green transition and digital transformation. With a total budget of €723 billion over 2021-2026, financial support is provided through grants (€338 billion) or loans (€385 billion).²⁷

To qualify for RRF support, governments had to submit a comprehensive national recovery and resilience plan detailing the reforms and public investments they planned to implement by 31 December 2026. The RRF

funding disbursement is conditional to the successful implementation of these reforms and investments, and each plan must allocate at least 37% of its budget to energy transition measures [Figure 5].

Relevance for CCS

The European Commission published two staff working documents to guide Member States in developing recovery and resilience plans. Even though projects related to the decarbonisation of industry are mentioned as typical investments linked to the green transition, there is no explicit reference to CCS. However, when analysing the different Member States' recovery and resilience plans, several relevant funding opportunities related to CCS can be identified, including:

- Belgium²⁹: One of the six investments planned under Component 1.2. 'Innovative energy technologies' is a CO₂ and hydrogen backbone. The total budget for this initiative is estimated at €95 million, with project completion expected in August 2026.

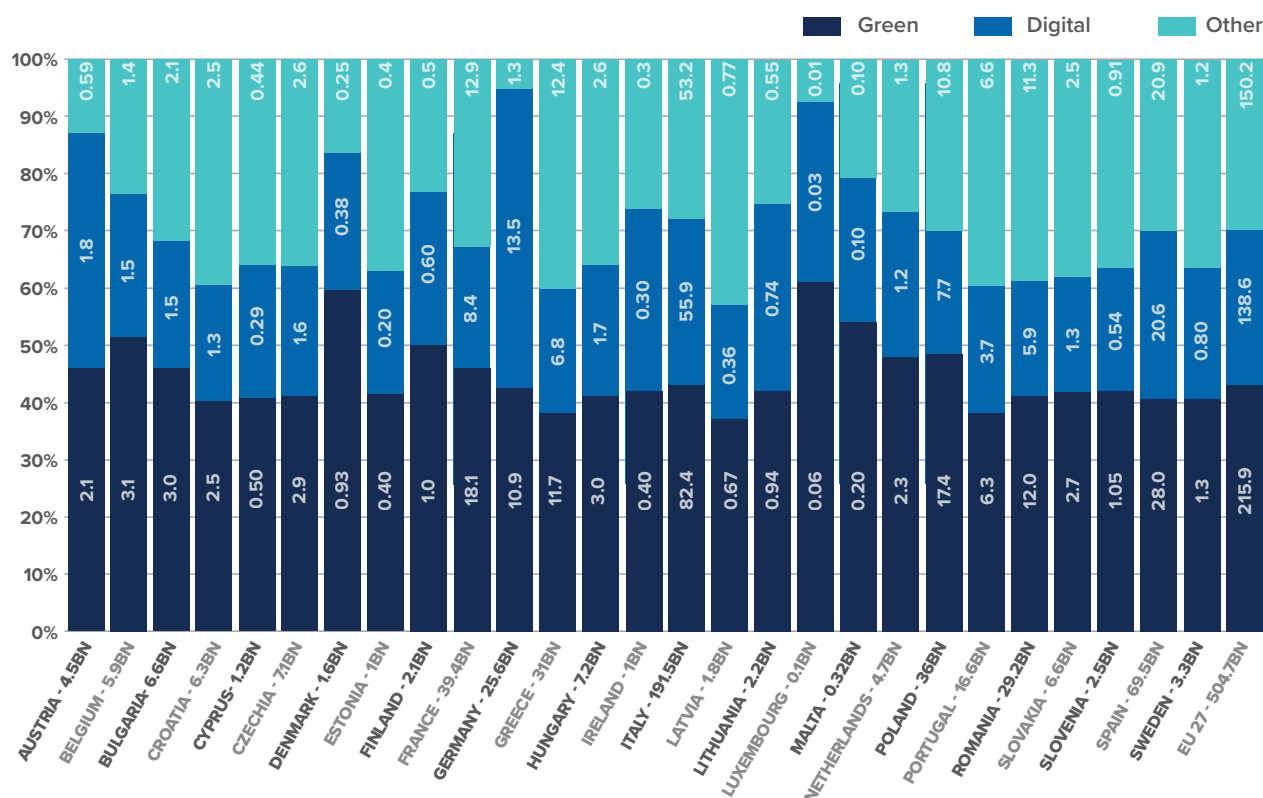


Figure 5 - Overall resource allocation in national recovery and resilience plans (% of total and € billions)²⁸

²⁶ Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility, OJ L 57

²⁷ This represents the maximum amount foreseen by the RRF Regulation, at 2022 prices. According to European Commission (2023) The Recovery and Resilience Facility. Available at: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en

²⁸ Adapted from Darvas, Z., M. Domínguez-Jiménez, A. Devins, M. Grzegorzczak, L. Guetta-Jeanrenaud, S. Hendry, M. Hoffmann, K. Lenaerts, T. Schraepen, A. Tzaras, V. Vorsatz, P. Weil, L. Welslau, 'European Union Countries' recovery and resilience plans', Bruegel Datasets. Available at: <https://www.bruegel.org/dataset/european-union-countries-recovery-and-resilience-plans>

²⁹ Cabinet du Secrétaire d'Etat à la Relance et aux Investissements Stratégiques, en charge de la Politique Scientifique (2021) Plan national pour la reprise et la résilience – Belgique. Available at: <https://dermine.belgium.be/sites/default/files/articles/FR%20-%20Plan%20national%20pour%20la%20reprise%20et%20la%20re%CC%81silience.pdf>

- Croatia³⁰: Under the first pillar dedicated to green transition, the country's plan allocates €658 million to modernise the energy infrastructure, invest in advanced biofuel and renewable hydrogen production, and implement innovative CCS projects.
- Denmark³¹: One of the seven components of the country's recovery and resilience plan relates to 'Energy efficiency, green heating and carbon capture and storage.' Under this component, DKK 200 million has been allocated for a subsidy scheme to support developing and demonstrating CO₂ storage sites in depleted fields in the North Sea.
- Finland³²: Under the first pillar dedicated to the green transition, the plan announces that €136 million will be invested in low-carbon hydrogen and carbon capture, storage, and recovery.

Award criteria

Each EU Member State defines the criteria under which grants are awarded in their national recovery and resilience plan.

Funding rate

Each EU Member State defines the maximum funding rate for the reforms and investments identified in their national recovery and resilience plan. It must, however, be aligned with the revised guidelines on state aid for climate, environmental protection, and energy.³³

Combination with other public support

Other EU funds can complement reforms and investments supported by the RRF, provided they do not cover the same costs. Thus, when determining the funding requirements of the different actions outlined in their national recovery and resilience plans, Member States should specify the money they anticipate from alternative funding sources.

In this regard, the European Commission published a note explaining how to prevent, identify, and address double funding between RRF and other EU funds, including some concrete examples.³⁴

SUCCESS STORY: PRINOS, GREECE

In Greece, Prinos³⁵, a CO₂ storage project, will receive €150 million in grants from the Greek Recovery and Resiliency Facility. Prinos consists of a former depleted oil field that will be repurposed for CO₂ storage. Operational from Q4 2025, it will initially have a capacity of up to 1 Mtpa, possibly scaling it up to 3 Mtpa by the end of 2027.

Prinos has also been listed in the recently published PCI-PMI list, and if confirmed, it could apply for CEF-E funding in the coming years.

³⁰ European Commission (2023) Croatia's recovery and resilience plan. Available at: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/croatias-recovery-and-resilience-plan_en

³¹ Danish Ministry of Finance (2021) Denmark's Recovery and Resilience Plan – accelerating the green transition, April 2021. Available at: https://fm.dk/media/18771/denmarks-recovery-and-resilience-plan-accelerating-the-green-transition_web.pdf

³² Finnish State Council (2021) Finland's sustainable growth programme: Recovery and recovery plan, May 2021. Available at: <https://julkaisut.valtioneuvosto.fi/handle/10024/163176>

³³ Communication from the Commission – Guidelines on State aid for climate, environmental protection and energy 2022, OJ C 80

³⁴ European Commission (2023) Double funding under the Recovery and Resilience Facility. Available at: <https://www.gov.si/assets/organi-v-sestavi/URSOO/Pojasnilo-in-interpretacija-sluzb-Evropske-komisije-glede-dvojnega-financiranja-pri-Mehanizmu-za-okrevanje-in-odpornost.pdf>

³⁵ Sardi, K. (2023) Prinos, a CO₂ storage option for SE. Europe. Available at: <https://www.iene.eu/articlefiles/inline/sardi%20-%2014th%20seed.pdf>

2.5 Just Transition Fund

General information

The Just Transition Fund³⁶ (JTF) is one of the three pillars of the Just Transition Mechanism. It aims to ensure no one is left behind by providing grants to regions and industries facing severe socio-economic challenges associated with the move to net zero. Over 2021-2027, it has a budget of €19.32 billion.³⁷

To qualify for JTF support, EU Member States must establish Territorial Just Transition Plans in dialogue with the European Commission. Figure 6 illustrates the geographical scope of the approved plans. The Just Transition Fund can support a wide range of investments, from creating new firms, supporting research and innovation activities to developing affordable clean energy technologies and facilitating digitalisation, on the condition they are located in one of these JTF territories. Investments related to the production, processing, transport, distribution, storage or combustion of fossil fuels, even if they take place in one of these areas, is clearly excluded from the scope of support.

Relevance for CCS

Investments that allow the reduction of GHG emissions from industrial activities covered by the EU ETS, such as CCS, can be supported on the following conditions:

- The investments contribute to the just transition in one of the approved Just Transition Fund territories,
- They significantly reduce GHG emissions below the EU ETS benchmark,
- They are needed to protect a significant number of jobs.

Award criteria

National authorities are responsible for publishing the calls for proposals under the Just Transition Fund, defining the award criteria and evaluating the projects. The requirements under which projects are considered eligible and selected for receiving grants can thus vary from one country to another.

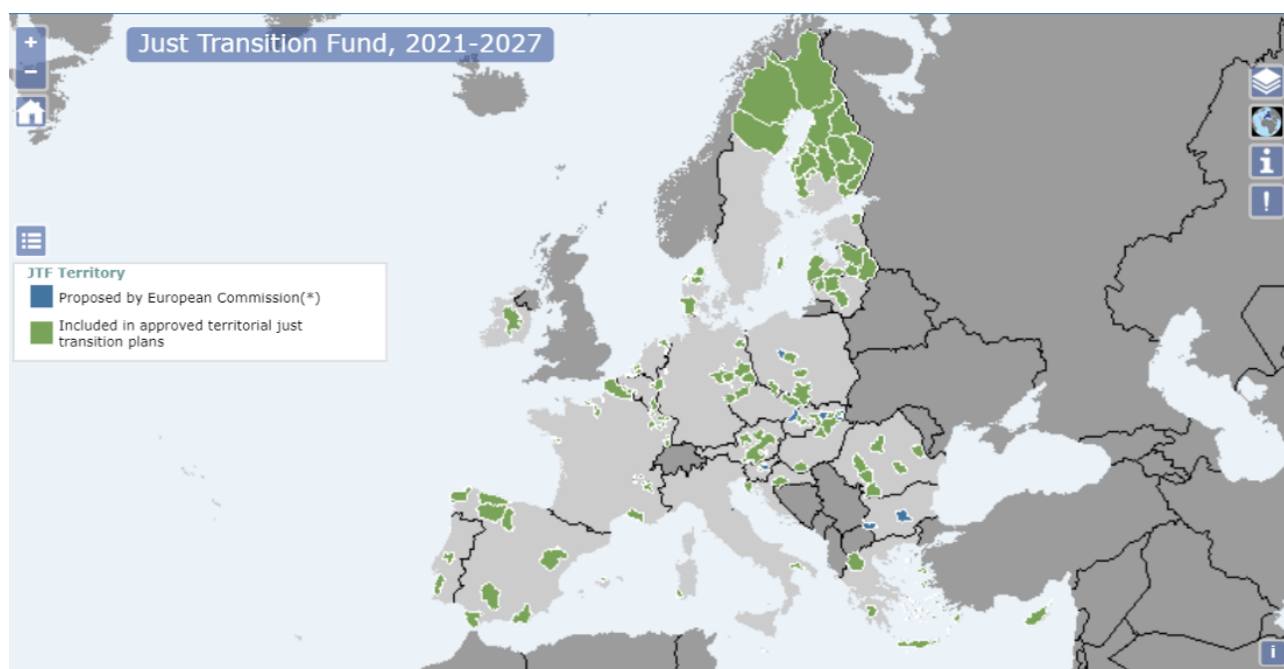


Figure 6 - Just Transition Fund territories ³⁸

³⁶ Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021 establishing the Just Transition Fund, OJ L 231

³⁷ In current prices.

³⁸ The map is updated on a regular basis. According to European Commission (2023) Just Transition Platform. Available at: https://ec.europa.eu/regional_policy/funding/just-transition-fund/just-transition-platform_en



Funding rates

Various co-financing rates can apply to projects selected under the Just Transition Fund:

- 85% for less developed regions,
- 70% for transition regions,
- 50% for more developed regions.

Combination with other public support

Funding from the Just Transition Fund can be combined with grants and loans provided by other pillars of the Just Transition Mechanism, such as the InvestEU's instrument (Pillar II) or the Public Sector Loan Facility (Pillar III).

SUCCESS STORY: GREENPORT SCANDINAVIA, DENMARK

At the Port of Hirtshals in Denmark, the Greenport Scandinavia project³⁹ was granted €14.6 million (DKK 109 million) funding from the European Commission's Just Transition Fund. The only Danish project proposed for EU funding under the fund's 2023 call, it aims to establish a hub to collect CO₂ from Denmark and other European countries and ship it to permanent storage reservoirs in the North Sea.

³⁹ Greenport Scandinavia (2024) Gateway to the Danish CCUS infrastructure. Available at: <https://greenportscandinavia.com/>

2.6 InvestEU

General information

Strengthened to support a sustainable recovery after the recent crises, the InvestEU⁴⁰ programme comprises the InvestEU Fund, InvestEU Advisory Hub, and InvestEU portal [Figure 7]. Through a budget guarantee of €26.2 billion for 2021-2027, it aims to back the investment of financial partners such as the European Investment Bank (EIB) in four policy areas:

- Sustainable infrastructure (€9.9 billion),
- Research, innovation and digitisation (€6.6 billion),
- Small and medium-sized businesses (€6.9 billion),
- Social investment and skills (€2.8 billion).

The InvestEU Fund is set to benefit all EU Member States, irrespective of the size or financial market development. It is also open to third countries that are already part of an existing comprehensive agreement with the EU such

as members of the European Free Trade Association (EFTA) or candidate countries, or those that are engaged in a specific agreement determining their participation in an EU funding programme.

Relevance for CCS

CCS projects can be eligible for InvestEU's funding under several intervention fields of different policy windows⁴², such as:

- For direct operations:
 - Other renewable energy (including geothermal energy) and low-carbon technologies,
 - Green energy infrastructure.
- For intermediate financing:
 - Manufacturing and investment in other low-carbon technologies not included elsewhere,
 - Research, development and innovation aimed at climate mitigation.

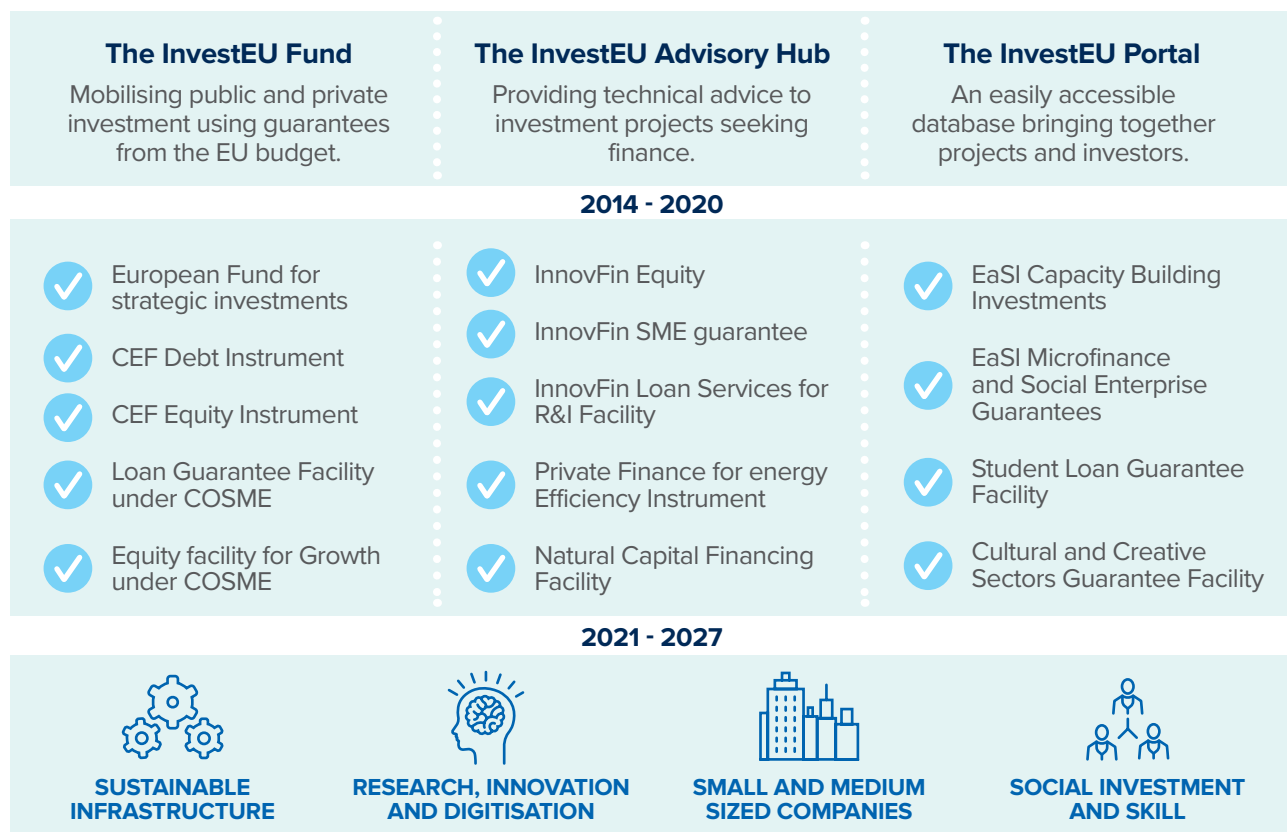


Figure 7 - Structure of the InvestEU programme ⁴¹

⁴⁰ Regulation (EU) 2021/523 of the European Parliament and of the Council of 24 March 2021 establishing the InvestEU Programme and amending Regulation (EU) 2015/1017, OJ L 107

⁴¹ Adapted from European Commission (2019) InvestEU Programme. Available at: https://www.fi-compass.eu/sites/default/files/2019-12/Invest%20EU%20programme_0.pdf

⁴² European Commission (2021) Commission notice on the InvestEU Programme climate and environmental tracking guidance. Available at: https://investeu.europa.eu/system/files/2022-06/InvestEU%20C%26E%20T%20C_2021_3316_Main%20%26%20Annexes_EN.pdf



Eligible criteria

The InvestEU Regulation sets out several eligibility criteria that a potential project must meet:

- Address market failures or investment gaps and be economically viable,
- Need EU funds to come into reality,
- Achieve a multiplier effect,
- Help meet EU climate and energy policy objectives.

Funding rate

The fund is implemented in partnership with financial partners, or 'implementing partners' (e.g. EIB, Nordic Investment Bank, Caisse des Dépôts, etc.) that invest in projects using the EU guarantee. Project promoters apply directly to the implementing partners for suitable financing solutions based on the financial products supported by the EU guarantee.

Combination with other public support

It is possible to couple the InvestEU Fund with grants and/or other financial instruments, supported either by the EU budget or the EU ETS Innovation Fund.⁴³ In cases where a project relies on both EU grants and the InvestEU Fund, it will comply with the InvestEU rules.

SUCCESS STORY: STEELANOL, BELGIUM

With the support of the European Commission, the EIB has granted a loan of €75 million to ArcelorMittal to facilitate the construction of two ground-breaking initiatives at its installation in Ghent, Belgium. One of them is Steelanol⁴⁴, a €165 million industrial-scale demonstration plant, that will capture waste gases (carbon and hydrogen) from the blast furnace for biological conversion. The result will be recycled-carbon ethanol that can be used as liquid fuel.

⁴³ European Commission (2023) Frequently asked questions about the InvestEU Fund. Available at: https://investeu.europa.eu/investeu-programme/investeu-fund/frequently-asked-questions-about-investeu-fund_en

⁴⁴ European Commission (2023) InvestEU, Example(s) of selected projects. Available at: https://single-market-economy.ec.europa.eu/industry/strategy/hydrogen/funding-guide/eu-programmes-funds/investeu_en

2.7 LIFE

General information

Building on its predecessor, the LIFE⁴⁵ programme is the EU's flagship initiative dedicated to environment and climate action, thus playing a pivotal role in advancing the objectives of the European Green Deal. The financial envelope of €5.4 billion earmarked for the 2021-2027 period is split into two fields and four sub-programmes, each with specific objectives [Figure 8]:

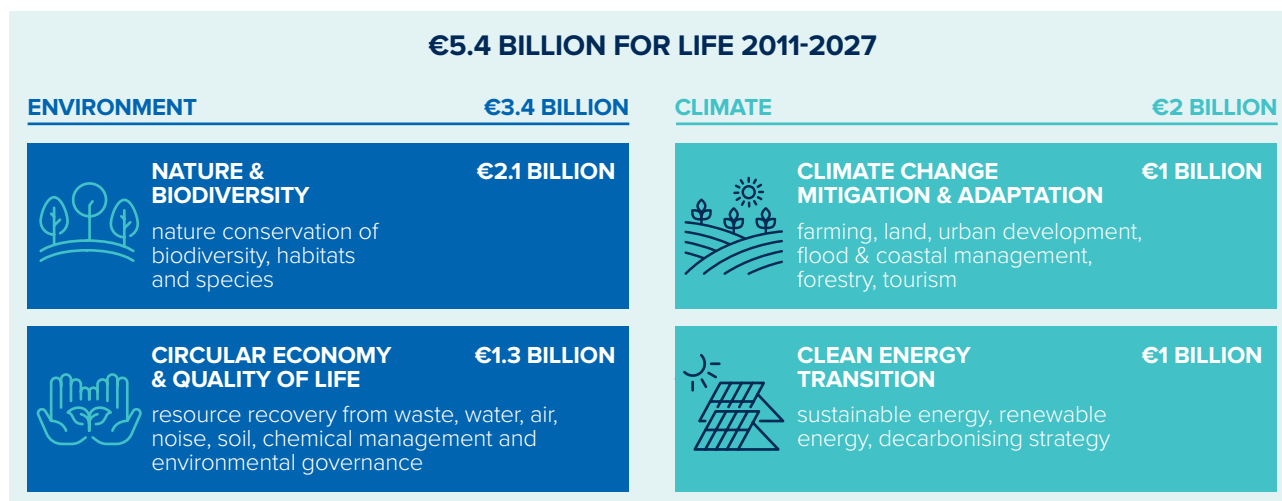


Figure 8 - Structure of the LIFE Programme ⁴⁶

The calls for proposals under the LIFE Programme occur on a yearly basis. They are open to EU Member States and third countries with agreements, i.e. Iceland, Moldova, North Macedonia, and Ukraine.⁴⁷

Relevance for CCS

While the LIFE Programme puts more emphasis on nature-based carbon removals, the 2023 call for proposals also welcomed applications in the field of CCS. The action 'Climate Governance and Information' under the sub-programme 'Climate Change Mitigation and Adaptation' encourages applications helping public administrations, in cooperation with the private sector and citizens, to draw regional or national CCS plans based on geological data for building new storage sites in compliance with the CCS Directive.⁴⁸ The focus group of this funding opportunity will be public authorities rather than the industry itself.

Eligible criteria

Proposals submitted to LIFE's calls for proposals are evaluated against the five following criteria:

- **Relevance:** Degree to which the project's proposal matches the objectives of the LIFE Programme and sub-programme, concept and methodology of the intervention, etc.
- **Impact:** Sustainability of the project's outcomes beyond its conclusion, replicability of the results in other sectors or regions, etc.
- **Quality:** Work plan, engagement with stakeholders, quality of the plan for monitoring and reporting impacts, etc.,

⁴⁵ Regulation (EU) 2021/783 of the European Parliament and of the Council of 29 April 2021 establishing a Programme for the Environment and Climate Action (LIFE), and repealing Regulation (EU) No 1293/2013, OJ L 172

⁴⁶ Adapted from PNO (2021) LIFE 2021-2027: More opportunities for the green economy. Available at: <https://www.pnoconsultants.com/be/insights/life-2021-2027-more-opportunities-for-the-green-economy/>

⁴⁷ European Commission (2023) List of Participating Countries in the LIFE Programme, version of September 2023. Available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/life/guidance/list-3rd-country-participation_life_en.pdf

⁴⁸ European Climate, Infrastructure and Environment Executive Agency (CINEA) Programme for the Environment and Climate Action (LIFE), Call for proposals, Climate Change Mitigation and Adaptation Standard Action Projects (SAP), 18 April 2023. Available at: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/life/wp-call/2021-2024/call-fiche_life-2023-sap-clima_en.pdf

- Resources: Composition of the project team, coherence of the budget and resources, etc.,
- Bonus points: Offered when the project creates synergies with other LIFE sub-programmes or is located in an outermost region of Europe.

To be eligible for funding, LIFE Programme applications must meet both the individual thresholds (10 out of 20) and the overarching threshold (55 out of 90).

Funding rate

If a standard action project is selected, the LIFE Programme can contribute up to 60% of its eligible costs, such as personnel, equipment or land purchase costs.

Combination with other public support

It is possible to combine support from LIFE and another EU fund, provided that:

- The two financial supports do not cover the same eligible costs (double funding),
- The cumulation of the two financial supports does not exceed the funding rate associated with the type of the project.

SUCCESS STORY: CO₂toCH₄, GREECE

Funded by the 2020 LIFE envelope, the CO₂toCH₄ initiative⁴⁹ received €2.1 million of EU support to enhance the capacity of power-to-gas in an economically competitive way. To this end, it will develop and demonstrate an innovative, integrated and sustainable industrial process that will both allow energy storage and CO₂ capture and utilisation (CCU) at the same time. The technology will produce renewable hydrogen generated from renewable electricity and water electrolysis that will be biologically converted into methane by relying on CO₂ from exhaust gases.



⁴⁹ European Commission (2023) Demonstration of a mobile unit for hybrid energy storage based on CO₂ capture and renewable energy sources, LIFE Public database. Available at: [https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE20-CCM-GR-001642/demonstration-of-a-mobile-unit-for-hybrid-energy-storage-based-on-CO₂-capture-and-renewable-energy-sources](https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE20-CCM-GR-001642/demonstration-of-a-mobile-unit-for-hybrid-energy-storage-based-on-CO2-capture-and-renewable-energy-sources)

3.0 CONCLUSION

The European Union has instituted various funds that can, directly or indirectly, facilitate and bolster the development of CCS projects throughout the continent. These include the Horizon Europe, the Innovation Fund, the Connecting Europe Facility – Energy, the Recovery and Resilience Facility, the Just Transition Fund, the InvestEU, and the LIFE Programme.

This high-level analysis of these funding opportunities offers key insights, tips, and success stories, providing a valuable reference for developers aiming to materially improve the business case for their projects.

As the CCS sector evolves from nascent pioneering projects into a multitude of initiatives, several additional funding instruments are being evaluated at both the EU and national levels. These tools aim to finance, de-risk and support the realisation of projects along the carbon management value chain, such as:

- Carbon contracts for difference,
- Government-backed loan guarantees,
- Regulated tariffs/regulated asset base models,
- Tradable carbon removal certificates.

The future Net-Zero Europe Platform presents a unique opportunity for the European Commission and Member States to reflect on the effectiveness of existing forms of public support, highlight their combination or seek to create further synergies.



4.0 ANNEX

EU FUND	ELIGIBLE COUNTRIES	TYPES OF CCS PROJECTS ELIGIBLE	MAXIMUM CO-FUNDING RATES	OPERATING PERIOD
Horizon Europe	EU Member States and associated countries	CCS research Projects (TRL 3-7)	Between 60% and 100% of eligible costs	2021-2027
Innovation Fund	EU Member States, Norway, Iceland and Liechtenstein	EII with CCS, BECCS, CO ₂ transport and storage (TRL7-9)	60% of relevant costs	2020-2030
Connecting Europe Facility – Energy	EU Member States, Ukraine and Moldova	CO ₂ infrastructure (from the fence of emitters to the well head of the storage site)	Between 50% and 75% of eligible costs	2021-2027
Recovery and Resilience Facility	EU Member States	Depends on the scope of national recovery and resilience plans	Depends on national calls for funding	2021-2026
Just Transition Fund	EU Member States but restricted to projects located in their Territorial Just Transition Plans	CCS projects applied to EU ETS installations upon strict conditions	Between 50% and 85% of relevant costs, depending on the region where the project is located	2021-2027
InvestEU	EU Member States, EFTA, candidate countries, etc.	Various components of the CCS value chain		2021-2027
LIFE	EU Member States, Iceland, Moldova, North Macedonia, and Ukraine	CCS, excluding construction of carbon capture and storage infrastructure	60% of eligible costs for standard action projects	2021-2027

Table 2 – Main elements to consider when applying to the selected EU funds

EU FUNDING PROGRAMME	PUBLIC DATABASE
Horizon Europe	Reference
Innovation Fund	Reference
Connecting Europe Facility – Energy (including also PCIs-PMIs)	Reference
Recovery and Resilience Facility	Reference
Just Transition Fund	Coming soon
InvestEU	Reference
LIFE	Reference

Table 3 – Overview of public databases of projects that received support from the selected EU funds

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