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ANNEX

**Work programme for the three calls for proposals in 2025 under the Research Programme of the Research Fund for Coal and Steel to finance research in the sectors related to the coal and steel industry**

***1. Introduction***

The new legal basis of the Research Fund for Coal and Steel (RFCS)<sup>1</sup> provides for annual EU funding of EUR 111 million until 2027 to finance research in sectors related to the coal and steel industry. On this amount, EUR 40 million are to finance collaborative research in those sectors and EUR 71 million to finance research for breakthrough technologies leading to near-zero-carbon steelmaking and research projects for managing the just transition for coal mines already closed or being closed down, and related infrastructure in line with the Just Transition Mechanism.

To meet these objectives, EUR 111 million will be committed in 2025. In addition, EUR 64 million not awarded by RFCS calls in 2021 are carried over to 2025, approximately EUR 17 million for coal and EUR 47 million for steel.

Legal basis

Council Decision (EU) 2021/1094 of 28 June 2021, Council Decision (EU) 2021/1207 and Council Decision (EU) 2021/1208 of 19 July 2021.

Budget lines

General Budget, 01.200301 (Steel)  
General Budget, 01.200302 (Coal)

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<sup>1</sup> Council Decision (EU) 2021/1094 of 28 June 2021 amending Council Decision (EU) 2008/376/EC on the adoption of the Research Programme of the Research Fund for Coal and Steel and on the multiannual technical guidelines for this programme, OJ L 236/69.

Council Decision (EU) 2021/1207 of 19 July 2021 amending Council Decision (EU) 2003/77/EC laying down multiannual financial guidelines for managing the assets of the ECSC in liquidation and, on completion of the liquidation, the Assets of the Research Fund for Coal and Steel.

Council Decision (EU) 2021/1208 of 19 July 2021 amending Council Decision (EU) 2003/76/EC establishing the measures necessary for the implementation of the Protocol, annexed to the Treaty establishing the European Community, on the financial consequences of the expiry of the ECSC Treaty and on the Research Fund for Coal and Steel, OJ L 261/54.

## **2. Grants**

The global annual budget allocations are:

- EUR 40 million for the 2025 RFCS annual call and
- EUR 71 million for the two ‘Big Tickets’ calls for coal and steel is EUR 71 million, of which EUR 52 million for steel research and EUR 19 million for coal research, under the new legal basis.

Part of the budget committed for grants in 2021 has not been awarded – EUR 17 million for the Big Tickets in coal and EUR 47 million for the Big Tickets in steel. This budget can be carried over to 2025.

### **2.1. Objectives pursued**

The research objectives for the standard RFCS annual call are set in Articles 4 to 10a of Council Decision (EU) 2008/376/EC of 29 April 2008, as amended by Council Decision (EU) 2021/1094 of 28 June 2021. No specific conditions have been set, except for the accompanying measures for steel, for which the relevant themes are specified in the dedicated section below.

For the two calls for proposals RFCS 2025 Big Tickets – Coal and RFCS 2025 Big Tickets – Steel, the specific conditions, the call objectives and the individual project size expected are further specified in the relevant sections below.

#### **2.1.1. Supporting research activities related to the EU steel sector in the call for proposals RFCS 2025 – Annual call – Steel**

The steel proposals for accompanying measures should address at least one of the following themes:

- i) talent attraction and skill formation for the steel industry, possibly built on existing projects;
- ii) providing decision-makers and policymakers with an up-to-date and comprehensive overview of innovative steelmaking technologies and decarbonisation zero-pollution scenarios, using information collected from:
  - a. previous projects run or still running under the RFCS programme or other European and national programmes, as a possible benchmark for identifying recent transformation in the sector;
  - b. programmes run in countries outside EU, to contribute to the international dimension of the study.

## **2.1.2. Supporting research activities related to the EU steel sector in call for proposals RFCS 2025 – Big Tickets – Steel**

### **Background – Big Tickets – Steel**

The Big Tickets calls are dedicated calls for proposals under the RFCS programme. In relation to steel, under Article 17a of Council Decision (EU) 2021/1094<sup>2</sup>, dedicated calls for proposals are used for funding activities under the European Partnership for Clean Steel. Specifically they implement part of the Research Programme, namely research on innovative technologies for the reduction of CO<sub>2</sub> emissions in the steel industrial sector.

The RFCS programme is framed around the European Commission’s policy objectives, with the European Green Deal (EGD) as the cornerstone. The Commission’s EGD Communication<sup>3</sup> is a growth strategy that aims to transform the EU into an equal-opportunity and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and in which economic growth is decoupled from resource use. The climate neutrality objective is at the heart of the EGD, and is a legally binding objective set out in the European Climate Law. The EGD Communication also states that all EU actions and policies should work towards the goal of enabling the EU to achieve a successful and just transition towards a sustainable future.

The RFCS legislation is in line with the EGD’s objectives; it enables the Fund to tackle the sectors’ climate and environmental challenges and to assist the steel industry in reducing emissions.

This transition is additionally boosted by the gradual phasing out of the Emission Trading System (ETS) free allowances from 2026 to 2034; at the same time, another instrument at trade level, the Carbon Border Adjustment Mechanism will gradually start intervening to protect the European steel market from imported steel manufactured with traditional carbon-intensive methods. The industry is facing major challenges from competition with non-EU countries, increased energy prices, and lack of available primary resources, such as hydrogen, renewable energy, high-grade scrap and ore, environmentally-friendly carbon, and skills.

To strengthen the commitment to a climate-neutral future, the Commission’s policy context has evolved rapidly in the last few years.

The EGD has been additionally supported by the ‘Fit for 55’<sup>4</sup> legislative package with amendments to existing EU legislation to help cut the EU’s net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels and speed up progress towards climate neutrality.

Following Russia’s full-scale invasion of Ukraine in early 2022, on 18 May 2022 the Commission presented the REPowerEU, a plan to rapidly reduce dependence on Russian fossil fuels and fast-forward the green transition. The REPowerEU plan highlights that around 30% of the primary steel production in the EU is expected to be decarbonised by

<sup>2</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021D1094>

<sup>3</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN>

<sup>4</sup> [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_23\\_4754](https://ec.europa.eu/commission/presscorner/detail/en/IP_23_4754)

2030 using renewable hydrogen. On 21 February 2023 the Council formally adopted an amending regulation to include REPowerEU chapters in the Recovery and Resilience Facility<sup>5</sup>. Furthermore, to address the effects of the energy prices crisis, on 14 September 2022, the Commission proposed an emergency intervention to reduce electricity bills, notably by reducing electricity demand by 5% during peak hours, as a way to reduce gas use for power generation.

In early 2023, two additional pieces of legislation were proposed by the Commission: the Net Zero Industry Act (NZIA)<sup>6</sup> and the Critical Raw Materials Act (CRMA)<sup>7</sup>.

The NZIA legislation aims support the scaling-up net-zero technology manufacturing in the EU to provide at least 40% of the EU's annual deployment needs for strategic net-zero technologies by 2030. The clean technologies covered by the NZIA, which includes commercially available equipment and technologies soon to come on the market, rely on steel products, in many cases with specific characteristics, to support their deployment. But also deployment of these technologies (especially hydrogen and renewable energy) is key to decarbonising the steel production process itself in Europe. The NZIA as finally adopted now also covers the 2024<sup>8</sup> industrial carbon management and the value chain for steel-related products.

The CRMA tackles the problems related to Europe's dependence on critical raw materials and the consequent level of vulnerability of EU supply chains depending on those materials. It will help to ensure that the EU has sufficient access to rare earths, precious metals and other critical raw materials, which are vital for manufacturing key technologies for the green transition. EU research and innovation (R&I) is key to ensure that net-zero technologies use fewer resources and are more circular in their use of critical raw materials. It aims to support the development of innovative solutions for their recycling, substitution and reuse. In this context, the circularity of steel and the recovery of rare earths and critical raw elements other than iron is crucial for the European economy and security.

Acting within the outlined EU policy context, the RFCS programme complements the activities carried out in the Member States and within the existing EU Framework Programme for research, technological development and demonstration. The Commission encourages complementarity and sequencing among research programmes and supports the exchange of information between the RFCS programme and projects financed under national and other EU financial instruments for R&I, including Horizon Europe, cohesion policy funds (in particular the European Regional Development Fund<sup>9</sup> and Just Transition Fund<sup>10</sup>), the Innovation Fund and the LIFE programme.

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<sup>5</sup> <https://eur-lex.europa.eu/eli/reg/2023/435/oj>

<sup>6</sup> [https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act\\_en](https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act_en)

<sup>7</sup> [https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act\\_en](https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials/critical-raw-materials-act_en)

<sup>8</sup> <https://www.consilium.europa.eu/en/press/press-releases/2024/02/06/net-zero-industry-act-council-and-parliament-strike-a-deal-to-boost-eu-s-green-industry/>

<sup>9</sup> <https://eur-lex.europa.eu/eli/reg/2021/1058>

<sup>10</sup> <https://eur-lex.europa.eu/eli/reg/2021/1056>

The RFCS Research Programme (Council Decision (EU) 2021/1094)<sup>11</sup> has the following research objectives for the steel sector:

- new, sustainable and low-carbon steelmaking and finishing processes (Article 8).
- advanced steel grades and applications (Article 9).
- conservation of resources, protection of the environment and circular economy (Article 10).
- management of work force and working conditions (Article 10a).

### **Objectives – *Big Tickets - Steel***

Proposals must address at least one of the following call objectives<sup>12</sup>.

#### **(1) Cross cutting issues: digitalisation, skills and social innovation in the steel sector**

Proposals should address at least one of the following aspects.

1.1 Develop standardised sets of data for the evaluation of environmental footprint as a whole, together with methods and tools applied to measure and demonstrate the improvement of energy efficiency and greenhouse gases (GHG) emissions avoidance.

1.2 Develop new digital methodologies and tools to monitor, control, or analyse new material, intermediates, residues and processes.

1.3 Develop and use smart and soft sensors to be integrated into the manufacturing chain for improving monitoring, control and management of steel production processes.

1.4 Demonstrate integrated digital strategies relying on skills monitoring and assessment, with consequent suitable training for new technological solutions.

#### **(2) CO<sub>2</sub> neutral iron ore reduction (Increasing the use of pre-reduced iron carriers).**

Proposals should cover at least one of the following aspects.

<sup>11</sup> Council Decision (EU) of 29 April 2008 2008/376/EC amended by the Council Decision (EU) 2017/955 of 29 May 2017 and Council Decision (EU) 2021/1094 of 28 June 2021 (OJ L 130, 20.5.2008, p. 7).

<sup>12</sup> A *call objective* defines the scope as the totality of outputs and benefits and the work required to produce them. Each call objective lists various aspects that are representing the goals of the work performed within a project, in terms of its research and innovation content.

2.1 Demonstrate conversion of iron oxide to crude steel by reduction using H<sub>2</sub>, by integrating reduction processes, DRI smelting or melting at industrial scale, into new or existing hardware or steelmaking processes and sites.

2.2 Enhance the iron reduction process and boost competitiveness, resilience, and reliability:

- create industrial partnerships (e.g., with H<sub>2</sub> producers).
- expand H<sub>2</sub> supply options for eco-friendly steelmaking.
- explore alternatives, e.g. ammonia (NH<sub>3</sub>), liquid organic hydrogen carriers, and metals as H<sub>2</sub> carriers.
- assess economic risks and benefits.
- prove the effectiveness and efficiency of H<sub>2</sub> supply methods by comparing at least two options.

2.3 Improve highly innovative processes for iron production. They could include highly innovative non-DRI and non-hydrolysis processes, as well as iron ore or liquid metal oxide electrolysis. Demonstrate the processes at steel making sites.

2.4 Limit the use of water resources and enhance water recovery related to hydrogen-based conversion of iron oxide to crude steel and consider the recovered water as input material for further utilisation.

2.5 Demonstrate the injection of secondary carbon carriers with a clear focus on carbon direct avoidance independent of the origin of carbon. Consider the impact of trace elements on iron and steelmaking operations both on the liquid steel, by-products and on the off-gas.

**(3) Technologies to improve energy efficiency, increase heat recovery and enhance process integration (PI) approaches in steel production.**

Proposals are encouraged to involve expertise from sectors other than steel manufacturing.

Proposals should cover at least one of the following aspects; they should outline how they would be beneficial in the context of full or near full decarbonisation pathways for the production technologies concerned and should not be limited to facilitating incremental change.

3.1 Demonstrate optimised grid integration and smart energy use by integrating solutions for electricity production and/or storage/buffer solutions in electrical, chemical or heat form into steel plants for intermediate preservation of energy. Target issues of grid balance through demand-response balancing, adapt the system to variable demand and generation, reduce energy demand during peak hours.

3.2 Develop and integrate new technologies or approaches for heat recovery and/or heat production in steel plants. Provide alternative heat sources that do not directly depend on grid electricity and/or recover heat from gases or intermediate products.

3.3 Introduce and demonstrate embedded sensors on parts of heat-generating and/or heat-

exchanging technologies to validate the working conditions, better control the steel production processes and their energy efficiency, and collect relevant data for modelling purposes. Evaluate performance, quality, and reliability of the sensors, especially when exposed to harsh environments.

3.4 Develop and integrate novel approaches to efficiently reheat or heat-treat semi-finished products with non-fossil fuels and/or electricity. Consider the impact on the overall system and the flexibility of the process depending on the availability of energy carriers.

3.5 Improve post combustion control for metallurgical processes regarding their specific equipment and system integration.

3.6 Develop and integrate novel scrap or raw materials preheating technologies using available heat sources. Consider integration into new or existing steel plants.

3.7 Demonstrate reducing gas preheating or novel or improved injection technologies for iron ore reduction processes.

#### **(4) Advanced steel alloys for special applications**

Proposals should cover at least one of the following aspects.

4.1 Evaluate the effects of process variables fluctuations when moving towards a carbon neutral steel production route, focusing on the development of special steel grades/alloys with specific mechanical and physical properties for the green economy and harsh environment applications. Develop and validate the necessary process-tuning to enable production of special steels.

4.2 Develop steel types with high scrap input that can fulfil the requirements of construction, automotive and other large offtake sectors, and work towards certification/standards development to address arbitrary barriers to high recycled content.

4.3 Demonstrate technological improvement needed to address the production of advanced steel alloys.

4.4 Demonstrate at industrial scale the manufacture of advanced and special steel grades with improved life cycle contributions to CO<sub>2</sub> emission reduction. Define new test approaches and needs for standardisation of 'carbon neutral steel' production and products.

4.5 Develop and validate advanced steel grades with increased use of new input materials and test them under real-world operating conditions to understand possible quality and reliability issues influencing lifetime performance.

4.6 Develop and validate predictive simulations to define product characteristics and physical and/or mechanical properties, based on specific process variables in CO<sub>2</sub> neutral steel routes.

4.7 Introduce and demonstrate new ad hoc sensors coupled with innovative digital

monitoring systems at significant stages of the carbon-neutral steel production route which would generate data for monitoring the manufacturing process and reconstructing the history of a product to improve quality control and detection of faults and defects. Inspect problematic parts via specific tests, associate in-depth microstructure analysis to detect specific signatures, collect statistical data and ultimately develop and validate predictive reliability models.

#### **(5) Circular economy and sector coupling solutions to meet the zero-waste goal for steelmaking**

Proposals should cover at least one of the following aspects, as well as outline links existing between circular economy, innovative digitalisation technologies and approaches.

5.1 Develop and implement highly efficient processes and advanced technologies to improve metal and/or mineral fractions recovery from in-plant steel making residues and by-products associated with present or next-generation iron ore and steelmaking processes. This may include the introduction of process changes and/or novel processes to modify the composition of residues to make them more suitable for internal and external reuse.

5.2 Demonstrate the use of secondary carbon carriers in iron and steelmaking processes as a substitute for a significant fraction of fossil carbon sources proving that new/improved preparation and processing processes enable operating steel plants to achieve a low environmental impact.

5.3 Develop and integrate energy-efficient technologies to improve ferrous scrap preparation, and scrap tracking and handling, including also scrap yard management, scrap charge preparation for quality upgrading and valorisation of scrap from specific chains. This may include approaches to removing undesired tramp elements from scrap before remelting in EAF or BOF. Prove an overall reduction of environmental impact.

5.4 Improve and/or develop technologies to broaden the use of different types of ore grades and/or residues containing iron oxides. Demonstrate the use of the technologies in different iron and steelmaking processes.

5.5 Develop dynamic environmental impact analysis and assessment, including simulation and optimisation of by-product pre-treatment and utilisation, digital tracking of secondary raw materials, new management systems for continuous monitoring of circularity solutions and performance.

5.6 Identify and develop innovative technologies to enable new routes for valorisation of slag from secondary metallurgy and/or processes using DRI such as BF, EAF or smelter.

#### **(6) Carbon capture of steel CO/CO<sub>2</sub> gases**

Proposals should cover at least one of the following aspects.



6.1 Evaluate, validate and demonstrate the compatibility of metallurgical gas streams from steel plants with current and/or future carbon capture infrastructures, including also compatibility with technologies for heterogeneous catalysis routes for CO<sub>2</sub> conversion into chemicals and fuels.

6.2 Develop and integrate in-process pre-/post preparation steps for CO/CO<sub>2</sub> capture steps.

6.3 Demonstrate the conditioning and separation of gas streams to meet specifications for carbon capture applications and possible reuse.

6.4 Integrate energy-efficient preparation steps for reliable carbon capture approaches in existing steel plants.

6.5 Demonstrate the use of synthetic fuels elaborated with technologies for capturing and storing CO/CO<sub>2</sub>, in steel thermal treatment processes. This allows for the possibility of applying an industrial symbiosis approach. Perform a system impact analysis covering cost/benefit, efficiency, reliability, sustainability and environmental impact.

### **Expected outcomes and impact – *Big Tickets - Steel***

Project results are expected to contribute to all the following outcomes<sup>13</sup>.

- Contribute and clearly quantify the CO<sub>2</sub> reduction achieved in the steel sector or in the target group.
- Make it technically and economically feasible for novel technologies and processes to produce the same products as current industrial processes, as demonstrated and validated at suitable scale.
- Demonstrate overall positive environmental and, if relevant, health and safety effects of the technology and/or the approach pursued.
- Outline a plan for technology scalability and greater expansion, ultimately linked to a viable business case.
- Provide high visibility dissemination of lessons learnt and continue to contribute to the development of skills and creation/conversion of jobs.

Project results are expected to contribute to the following impact<sup>14</sup>.

- Contribute to the ambitious targets of the European Green Deal and the set of European Commission policy guidelines applicable to the steel industry for full decarbonisation

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<sup>13</sup> The *expected outcomes* are the expected effects, over the medium term, of projects supported under a given call objective. The results of a project should contribute to these outcomes, fostered in particular by the dissemination and exploitation measures. Outcomes generally occur during or shortly after the end of the project.

<sup>14</sup> The *expected impacts* are wider long term effects on society (including the environment), the economy and science, enabled by the outcomes of R&I investments. Impacts generally occur some time after the end of the project.

of the steel sector.

### **Activities that can be funded and type of action – *Big Tickets - Steel***

- Applicants may submit proposals for either Pilot or Demonstration projects (see Articles 15 and 16 of Council Decision (EU) 2008/376/EC)<sup>15</sup>.
- Proposals are expected to achieve technology readiness level 7-8 (TRL 7-8) by the end of the project. Research activities must take account of the requirements of the selected TRL levels.
- Proposals must be in line with the general and specific objectives listed in the Memorandum of Understanding<sup>16</sup> for the European partnership on Clean Steel launched in Horizon Europe<sup>17</sup>.
- Proposals need to show in the excellence and/or impact part of the application form how they contribute to the multiannual strategic R&I agenda<sup>18</sup> of the Clean Steel Partnership.
- Proposals must address the application of innovative technologies related to one or two of the six call objectives listed above. If addressing two call objectives, proposals should clearly identify which work packages address which area(s) of which call objective(s).
- Proposals must include an exploitation strategy outlining possible integration of the outcomes of the project (including the pilot/demonstrators) in an industrial environment and a preliminary assessment of their economic viability.
- When addressing the call objectives, proposals should pay particular attention, where relevant, to Article 10a of RFCS Council Decision (EU) 2021/1094 and, more precisely, include activities to address potential solutions that can improve the working conditions of employees at steelmaking facilities, in particular health, safety and ergonomics in and around the workplace.
- Targeted improvements (compared to the existing installation or, for new projects, to the relevant ETS benchmark) must be clearly quantified and demonstrated with energy system and materials balance assessments (including emissions) clearly defined by the applicants. This requirement applies to all the call objectives, with the exception of objective 1.
- Collaborations with start-ups and small and medium-sized enterprise are encouraged.

### **Individual project size for projects to be funded – *Big Tickets - Steel***

<sup>15</sup> 2008/376/EC: Council Decision (EU) of 29 April 2008 on the adoption of the Research Programme of the Research Fund for Coal and Steel and on the multiannual technical guidelines for this programme, (OJ L 130, 20.5.2008, p. 7). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008D0376>.

<sup>16</sup> <https://www.estep.eu/assets/Uploads/signed-2021-09-08-MoU-Clean-Steel-Low-Carbon-Steelmaking.pdf>

<sup>17</sup> [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_21\\_2943](https://ec.europa.eu/commission/presscorner/detail/en/IP_21_2943)

<sup>18</sup> <https://www.estep.eu/assets/Publications/2024-CSP-SRIA.pdf>

The Commission estimates that an EU contribution of EUR 5 million to EUR 25 million would allow the objectives of this call to be addressed appropriately. This does not preclude submission and selection of a proposal requesting different amounts.

Projects should be of a size and type of action that makes them eligible for RFCS funding.

### **2.1.3. Supporting research activities related to the EU coal sector in the call for proposals RFCS 2025 – Big Tickets - Coal**

#### **Background – Big Tickets - Coal**

In line with the Paris Agreement, on 11 December 2019, the Commission adopted the Communication on the European Green Deal (EGD), committing to tackling climate and environmental-related challenges and to transform the Union into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. On 7 February 2024, the Commission also adopted a Communication ‘Securing our future’ (COM (2024) 62) suggesting options for reaching a CO<sub>2</sub> emissions reduction target by 2040 and a Communication ‘Towards an Ambitious Industrial Carbon Management’ (COM (2024) 62).

The Communications are supported by the ‘Fit for 55’ set of legislation adopted in 2023<sup>19</sup> that will help the EU cut its net greenhouse gas emissions and reach climate neutrality. They state that all actions and policies should pull together to help the Union achieve a successful and just transition towards a sustainable future. In line with the ‘do no harm’ principle referred to in the Communication, the objectives of the RFCS Research Programme have been revised and no longer cover activities that perpetuate the extraction, processing and unabated use of coal.

Following the Commission Communication on the Sustainable Europe Investment Plan and the EGD Investment Plan, Council Decision (EU) 2008/376/EC for the RFCS has been amended and updated to enable research activities in the coal sector to be funded in line with the principles of the Just Transition Mechanism. The RFCS Research Programme will support collaborative research in the coal sector and provide support for research projects relating to management of the just transition of formerly operating coal mines or coal mines in the process of closure and related infrastructure in compliance with Article 4(2) of Council Decision (EU) 2021/1094).

This call is in line with Council Decision (EU) 2021/1094 which, together with the Council Decisions (EU) 2021/1207 and 2021/1208 constitute the new legal basis for the RFCS Research Programme, with the newly adopted objectives of the RFCS programme. The call is also aligned with the existing legislation, such as REPowerEU, the Just Transition Mechanism, the Critical Raw Material Act, the Net Zero Industry Act, the EU strategy to reduce methane emissions, the EU biodiversity strategy for 2030, the EU Soil Strategy for 2030 and the Mission ‘A Soil Deal for Europe’.

The RFCS Research Programme (Council Decision (EU) 2021/1094) has the following research objectives for the coal sector:

- supporting the just transition of the coal sector and regions (Article 4);
- improving health and safety (Article 5);
- minimising the environmental impacts of coal mines in transition (Article 6).

Special attention will be given to proposals focusing on repurposing former coal and lignite

<sup>19</sup> [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_4754](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4754)

mines as well as coal-related infrastructure, including power supply services, in line with a climate-neutral and environmentally friendly transition in compliance with Article 4(1)(d).

Proposals will aim to build and strengthen synergies with other EU initiatives when relevant. This will include but not be limited to increased cooperation with cohesion policy (including the Just Transition Fund, the European Regional and Development Fund, the Cohesion Fund and the European Social Fund Plus), LIFE, the Processes4Planet Partnership, the Clean Energy Transition Partnership, and the Clean Hydrogen Partnership. Projects will also seek complementarity with projects funded under Horizon Europe.

### **Objectives – *Big Tickets* – Coal**

Proposals must address at least one of the following call objectives<sup>20</sup>.

#### **(1) Repurposing of formerly operating coal and lignite mines or those in the process of closure and coal-related infrastructure including power supply services**

Proposals addressing this objective must support the just transition of the coal sector and regions, as described in Article 4 of RFCS Council Decision (EU) 2021/1094, and in line with the goals set by the REPowerEU plan. Research projects must support the transition towards a climate-neutral Union economy by 2050, the phasing out of fossil fuels and the developing alternative activities on formerly operating mine sites or those in the process of closure.

Proposals are expected to demonstrate and/or deploy viable technical solutions that contribute to the repurposing of formerly operating coal and lignite mines or those in the process of closure and coal-related infrastructure. These solutions must accelerate the development and prepare the deployment of climate neutral, clean, socially responsible, and economically viable alternative uses of existing infrastructure.

Where possible, the solutions will look for complementarity to existing projects under Horizon Europe Cluster 4 (Destination: Destinations ‘Climate neutral, Circular and Digitised Production’) and Cluster 5 (Destination: Sustainable, secure, and competitive energy supply).

Proposals addressing this objective should cover at least one of the following areas.

1.1 Use of geothermal energy on formerly used coal and lignite sites or those in the process of closure. Project results are expected to contribute to at least one of the following expected outcomes.

1.1.1 Advanced exploration technologies for geothermal energy suitable for addressing the specific environmental concerns and challenges posed by coal and lignite sites, with a focus on improving the performance, reliability, and circularity of deep geothermal

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<sup>20</sup> A *call objective* defines the scope as the totality of outputs and benefits and the work required to produce them. Each call objective lists various aspects that are representing the goals of the work performed within a project, in terms of its research and innovation content.

- systems. Projects must include the development and application of new tools and techniques specific to coal and lignite sites.
- 1.1.2 Smart use of geothermal electricity and heating and cooling in the energy system. The focus will be on improving system integration of geothermal heat and formerly used coal power plants or those in the process of closure coping with changing demand for electricity, heat and cooling and intermittent renewable power generation.
  - 1.1.3 Development of geothermal resources in former coal mines or coal mines in the process of closure. Projects must demonstrate energy efficient, environmentally sound, and economically viable generation of electricity, and/or heating and cooling from geothermal resources in an operating or formerly used coal or lignite mine or one in the process of closure.
- 1.2 Use of energy storage solutions on formerly used coal and lignite sites or those in the process of closure. Proposals must include deliverables addressing possible solutions to existing market barriers such as regulatory barriers, permitting and environmental concerns. Proposals are expected to contribute to at least one of the following expected outcomes.
- 1.2.1 Demonstrate the use of energy storage addressing the specific adaptability challenges to formerly operating coal and lignite sites or those in the process of closure. Energy storage solutions can include but are not limited to: thermal energy storage, compressed air storage and gravitational batteries.
  - 1.2.2 Deployment of pumped storage hydropower addressing the specific adaptability challenges to formerly operating coal and lignite sites or those in the process of closure.
- 1.3 Deployment of renewable and sustainable energy (other than geothermal), carbon capture and use, Power-to-X, and renewable hydrogen on formerly operating coal and lignite sites or those in the process of closure.
- 1.4 Demonstrate the use of small and/or medium-sized modular reactors in an operating coal power plant site connected to the electric grid. Small modular reactors could play a role through dispatchable and flexible low-carbon electricity and heat, and increased energy efficiency of the associated processes<sup>21 22</sup>.
- 1.5 Demonstrate and/or deploy viable technical solutions for the processing of methane emissions (either by destroying/oxidising the methane molecules or by recovering and using them as an energy source) from operating, closed and abandoned coal mines. Proposals must demonstrate a significant reduction of emissions, and where relevant, a reduction in overall environmental and atmospheric pollution.
- 1.6 Deployment of viable, non-energetic solutions that contribute to the repurposing of formerly operating coal and lignite sites or those in the process of closure by leveraging the existing infrastructure.

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<sup>21</sup> The European Industrial Alliance on Small Modular Reactors is aiming to accelerate the development, demonstration and deployment of Small Modular Reactors (SMRs) in Europe by the early 2030s [https://single-market-economy.ec.europa.eu/industry/strategy/industrial-alliances/european-industrial-alliance-small-modular-reactors\\_en](https://single-market-economy.ec.europa.eu/industry/strategy/industrial-alliances/european-industrial-alliance-small-modular-reactors_en)

<sup>22</sup> The Net Zero Industry Act, a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem [https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act\\_en](https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act_en)

**(2) Materials and waste reuse, and development of alternative materials, including recovery of critical raw materials.**

Proposals addressing this objective must support non-energetic uses and production of raw materials (minerals and metals) from mining wastes and residues from formerly operating coal mines or those in the process of closure, as described in Articles 4 (c) and 6 (c) of RFCS Council Decision (EU) 2021/1094.

Proposals are expected to demonstrate and/or deploy viable solutions that contribute to the development of alternative materials or demonstrate and/or deploy alternative drilling, extraction, recovery, and/or processing techniques for critical raw materials in coal-related sites.

Alternatively, proposals can instead demonstrate and/or deploy viable solutions that contribute to the reuse of materials used in connection with mines and/or coal-related infrastructure, refurbishing waste heaps, and using industrial residues from coal production and consumption in coal regions.

These solutions must prove a significant reduction of environmental impacts on for example soil, water, air quality, biodiversity, and climate, in line with the European Green Deal, the EU biodiversity strategy for 2030, the EU soil strategy for 2030, the EU zero pollution action plan. Projects must also demonstrate circularity and economic potential.

Proposals addressing this objective should address at least one of the following areas.

2.1. Demonstrate and/or deploy economically viable exploitation operations within coal and lignite sites for the extraction of critical raw materials, in particular strategic raw materials. Proposals are encouraged to leverage existing infrastructure.

2.2. Demonstrating and/or facilitating non-energetic uses and the production of raw materials (minerals and metals) from mining wastes and residues from coal and lignite sites. Proposals must pursue circularity and ensure a climate, environmental, and health impact that is lower than alternative solutions.

2.3. Demonstrate environmentally friendly and circular solutions on the reutilisation of mining waste, fly ash, and desulphurisation products as well as, where relevant, other forms of waste in coal and lignite sites.

**(3) Land monitoring, modelling, stabilisation and/or restoration**

Proposals under this objective will support the minimising of the environmental impacts of coal mines in transition, as described in Article 6 of RFCS Council Decision (EU) 2021/1094. Projects under this objective will support environmental restoration of formerly operating coal mines or those in the process of closure, as well as affected adjacent areas and communities.

Projects are expected to demonstrate and/or deploy viable technical solutions that contribute to the land restoration, in particular surrounding and nearby water, land, soils, and biodiversity affected by the activity of mines and related infrastructure. When relevant, these solutions must address potential secondary issues indirectly linked to land restoration that give rise to relevant environmental damage, such as methane emissions or soil acidification.

Proposals addressing this objective should address at least one of the following areas.

3.1 Demonstration and/or deployment of technological solutions aimed at restoring the environment of coal and lignite mines that have closed or are in the process of closure and their surroundings, in particular water, land, soils, and biodiversity.

3.2 Demonstration and/or deployment of technological solutions aimed at protecting surface infrastructure against the effects of subsidence, ground movements in the short and long term and extreme weather events.

#### **(4) Processing of methane emissions**

Proposals under this objective must support the reduction of environmental impacts of coal mines in transition, as described in Article 6 of RFCS Council Decision (EU) 2021/1094. Proposals must aim to process methane emissions, including low concentration emissions, either by destroying / oxidising the methane molecules or by recovering and using them as an energy source.

Proposals are expected to demonstrate and/or deploy viable technical solutions for the energy recovery or mitigation of methane emissions from closed or abandoned coal mines or those in the process of closure. In the case of operating coal mines, proposed methane processing solutions reduce the overall amount of the greenhouse gases associated with that asset.

Where possible, the solutions should look for complementarity to existing projects under Horizon Europe Cluster 4 (Destinations: ‘Climate neutral, circular and digitised production’ and ‘Increased autonomy in key strategic value chains for resilient industry’), Cluster 5 (Destination: Sustainable, secure and competitive energy supply) and Cluster 6 (Destination: Clean environment and zero pollution).

Proposals addressing this objective should demonstrate and/or deploy new or improved technologies for capturing and utilising greenhouse gas emissions, in particular methane, in the relevant coal and lignite sites. Alternatively, proposals should demonstrate and/or deploy new or improved technologies for mitigating methane emissions. In both cases, proposals must demonstrate a significant reduction of emissions, and where relevant, a reduction in overall environmental and atmospheric pollution. Proposals must also guarantee that they will not lead to any delay in the planned closures of the mines.

#### **(5) Monitoring, management and/or treatment of mine water and water tables in coal mines in the process of closure and formerly operating mines.**

Proposals under this objective must support the reduction of environmental impacts of coal mines in transition, as described in Article 6 of RFCS Council Decision (EU) 2021/1094. Proposals must aim at demonstrating and/or deploying environmentally sustainable and viable technical solutions that contribute to the monitoring, management and/or treatment of mine water and water tables in closing or closed coal or lignite mines.

Proposals addressing this objective should cover at least one of the following areas.



5.1 Demonstration and/or deployment of technological solutions for the repurposing of formerly operating coal and lignite mines **or those in the process of closure** as water storage facilities, especially deployment of these technologies in regions at risk of droughts.

5.2 Demonstration and/or deployment of technological solutions for the purification of mine drainage water and/or protection of water tables.

### **Expected outcomes and impact – *Big Tickets - Coal***

Project results are expected to contribute to all the following outcomes<sup>23</sup>.

- Contribute to the ambitious targets of the European Green Deal.
- Outline a continuation plan for technology scalability and greater expansion, ultimately linked to a viable business case.
- Provide high visibility dissemination of lessons learnt and continue to contribute to the development of skills and creation/conversion of jobs.

Project results are expected to contribute to all the following impacts<sup>24</sup>.

- Contribute to achieving the European Green Deal goals.
- Demonstrate overall positive environmental and, if relevant, health and safety impact of the technology and/or the approach pursued.

### **Activities that can be funded and type of action – *Big Tickets - Coal***

Applicants may submit proposals for either pilot or demonstration projects (see Articles 15 and 16 of Council Decision (EU) 2021/1094).

Proposals must be in line with Council Decision (EU) 2021/1094.

Proposals should address the application of innovative technologies related to one or two of the four call objectives listed above. If addressing two call objectives, proposals should clearly identify which work packages address which call objective(s).

Proposals must include an exploitation strategy outlining possible integration of the deliverables of the project (including the pilot/demonstrators) in an industrial environment and a preliminary assessment of their economic viability. Where relevant, they can also describe activities related to economic analysis for the purposes of constructing a business case or new business models.

<sup>23</sup> The *expected outcomes* are the expected effects, over the medium term, of projects supported under a given call objective. The results of a project should contribute to these outcomes, fostered by the dissemination and exploitation measures. Outcomes generally occur during or shortly after the end of the project.

<sup>24</sup> The *expected impacts* are wider long-term effects on society (including the environment), the economy and science, enabled by the outcomes of R&I investments. Impacts generally occur sometime after the end of the project.

Activities are expected to achieve technology readiness level 7-8 (TRL 7-8) by the end of the project.

In line with Article 2 of RFCS Council Decision (EU) 2021/1094, research and technological development funded under the RFCS must be in line with the Just Transition Mechanism goals.

Proposals will have to demonstrate how they will support the social and economic revitalisation of the former coal mine regions, in line with the relevant Territorial Just Transition Plans<sup>25</sup>. Proposals must involve the local community and focus on communication with stakeholders, including the public.

Proposals are expected to include activities to:

- promote the development of efficient reskilling and upskilling programmes for workers affected by a coal phase-out, including research on the training and reskilling of workers employed or previously employed in the coal sector, in accordance with Article 4 (e) of RFCS Council Decision (EU) 2021/1094.
- address potential solutions that improve working conditions for employees of the coal mines being phased out, in particular health, safety, and ergonomics in and around the workplace, in accordance with Article 5 of RFCS Council Decision (EU) 2021/1094.

### **Individual project size for projects to be funded – *Big tickets – Coal.***

The Commission estimates that an EU contribution of EUR 5 million to EUR 9 million (and exceptionally up to EUR 18 million for large demonstrators) would allow the objectives of this call to be addressed appropriately. This does not preclude submission and selection of a proposal requesting different amounts.

Projects should be of a size and type of action that makes them eligible for RFCS funding.

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<sup>25</sup> [https://ec.europa.eu/regional\\_policy/funding/just-transition-fund/just-transition-platform\\_en](https://ec.europa.eu/regional_policy/funding/just-transition-fund/just-transition-platform_en)

### **3. Participation, eligibility and evaluation criteria of the three RFCS calls in the year 2025**

#### Eligibility criteria

- Any undertaking, public body, research organisation or higher and secondary education establishment, or other legal entity, including natural persons, established within the territory of a Member State or a candidate country may participate in the Research Programme and apply for financial assistance, provided that they intend to carry out a research, development and innovation, activity or can substantially contribute to such an activity (entities in non-EU countries and associated countries are entitled to participate in individual projects without receiving any financial contribution under the Research Programme, provided such participation is in the interest of the European Union).
- For research projects: at least three independent legal entities established in at least two different EU Member States.
- For pilot and demonstration projects and for accompanying measures: at least two independent legal entities established in at least two different EU Member States.

#### Selection criteria

The consortium must demonstrate that its members have the professional capacity (knowledge, scientific resources and technical installations) to carry out the proposed project. Each member of the consortium must ensure that it has the financial capacity to implement the work packages assigned to it for the duration of the project.

#### Award criteria

The following criteria will be used to evaluate proposals for research projects, for pilot and demonstration projects and for accompanying measures :

1. excellence
2. impact
3. quality and efficiency of the implementation

### **4. Implementation of the three RFCS calls in the year 2025**

The action will be implemented in **direct management** by the Commission (DG RTD or Research Executive Agency as delegated authorising officer).

Proposals will be assessed by independent experts appointed by the Commission or REA. The Coal and Steel Committee of Member States' representatives will approve the list of proposals ranked by the Commission.

## 5. *Timetable and indicative amount of three RFCS calls in the year 2025*

<b>Call</b>	<b>Reference</b>	<b>Opening Date</b>	<b>Amount</b>
<i>Annual Call RFCS 2025</i>	Article 25 of the legal basis of Council Decision (EU) 2008/376/EC	18 June 2025	<b>EUR 40 000 000</b>
<i>RFCS 2025 – Big Tickets - Steel</i>	Article 25 of the legal basis of Council Decision (EU) 2008/376/EC	4 February 2025	<b>EUR 100 000 000</b>
<i>RFCS 2025 – Big Tickets - Coal</i>	Article 25 of the legal basis of Council Decision (EU) 2008/376/EC	4 February 2025	<b>EUR 35 000 000</b>

## 6. *Other actions: support measures and preparatory actions*

Support measures and preparatory actions for the RFCS programme provided for in Article 18 of Council Decision (EU) 2008/376/EC, and Article 39, as amended by Council Decision (EU) 2021/1094/EC, include costs for IT – eGrants, expert evaluators, expert monitors and Technical Group meetings, and meetings of the Coal Advisory Group and Steel Advisory Group for an overall amount of EUR 2 000 000. The amount is divided between IT costs and other costs, as shown in points 6.1 and 6.2 below.

### 6.1. *IT costs*

#### **Indicative amount for 2025**

**EUR 500 000 for 2025**

#### **Description**

IT services related to the development and support of the eGrants information systems, conferences or workshops referred to in Article 17 of Council Decision (EU) 2008/376/EC, and any late interest due for late payment on the basis of Article 116(5) of the Financial Regulation.

#### **Implementation**

The IT services related to the development and support of the eGrants information systems will be implemented in direct management by the Commission (DG RTD or by DG

Informatics (DIGIT)), as per the Commission Internal Rules.

## **6.2. Other costs**

### **Indicative amount for 2025**

**EUR 1 500 000 for 2025**

### **Description**

Costs related to expert evaluators, expert monitors and Technical Groups meetings, and meetings of the Coal Advisory Group and Steel Advisory Group.

### **Implementation**

These support actions will be implemented in direct management by the Commission (European Research Executive Agency as authorising officer by sub-delegation).