

Overview of the upcoming R&I funding opportunities for deep geothermal

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Agenda

- **H2020 EU Green Deal Call**
- **Horizon Europe**
- **LIFE Programme**
- **Innovation Fund**
- **Modernisation Fund**

H2020 EU Green Deal Call

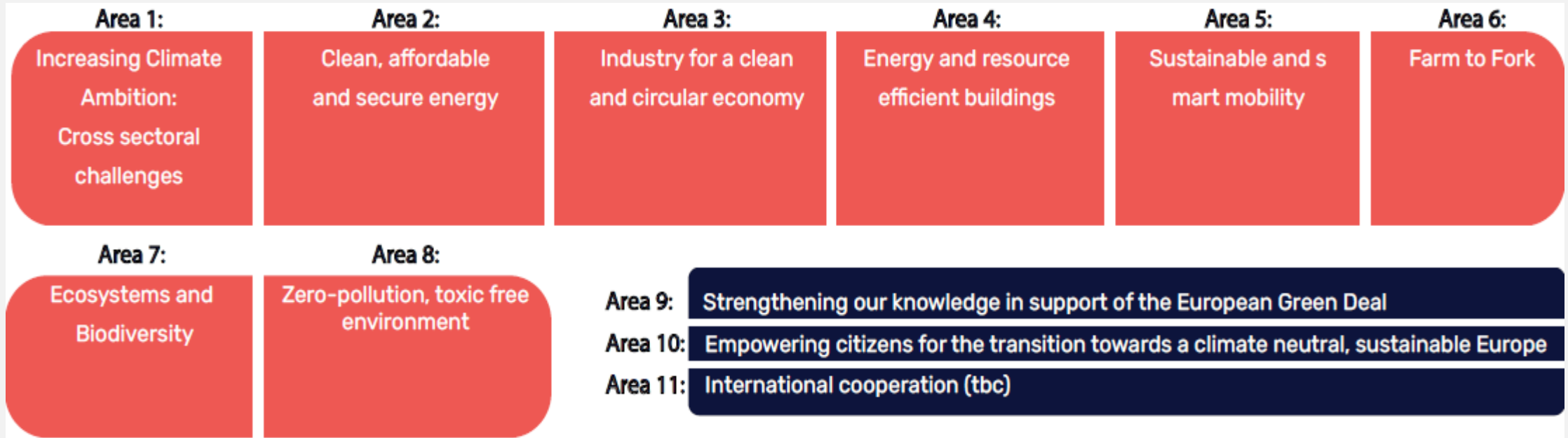
- The last and biggest call under Horizon 2020 programme
- Tailored for R&I projects that will accelerate Europe's recovery from the coronavirus crisis
- Project proposals should demonstrate **tangible results** in a relatively short time frame

Budget	€1 billion
Deadline for submissions	26 January 2021
Evaluation of project proposals	Q2 2021
Selected projects expected to start	Q4 2021



H2020 EU Green Deal Call

- The structure of the Green Deal Call reflects the 8 work streams of the European Green Deal and is complemented by 3 horizontal areas:



Horizon Europe: Outline

- Latest budget proposal for HE **€84,9 billion**

(final amount depends on the MFF negotiations)

Lessons Learned from Horizon 2020 Interim Evaluation

-  Support breakthrough innovation →
-  Create more impact through mission-orientation and citizens' involvement →
-  Strengthen international cooperation →
-  Reinforce openness →
-  Rationalise the funding landscape →
-  Encourage participation →

Key Novelties in Horizon Europe

European Innovation Council

R&I Missions

Extended association possibilities

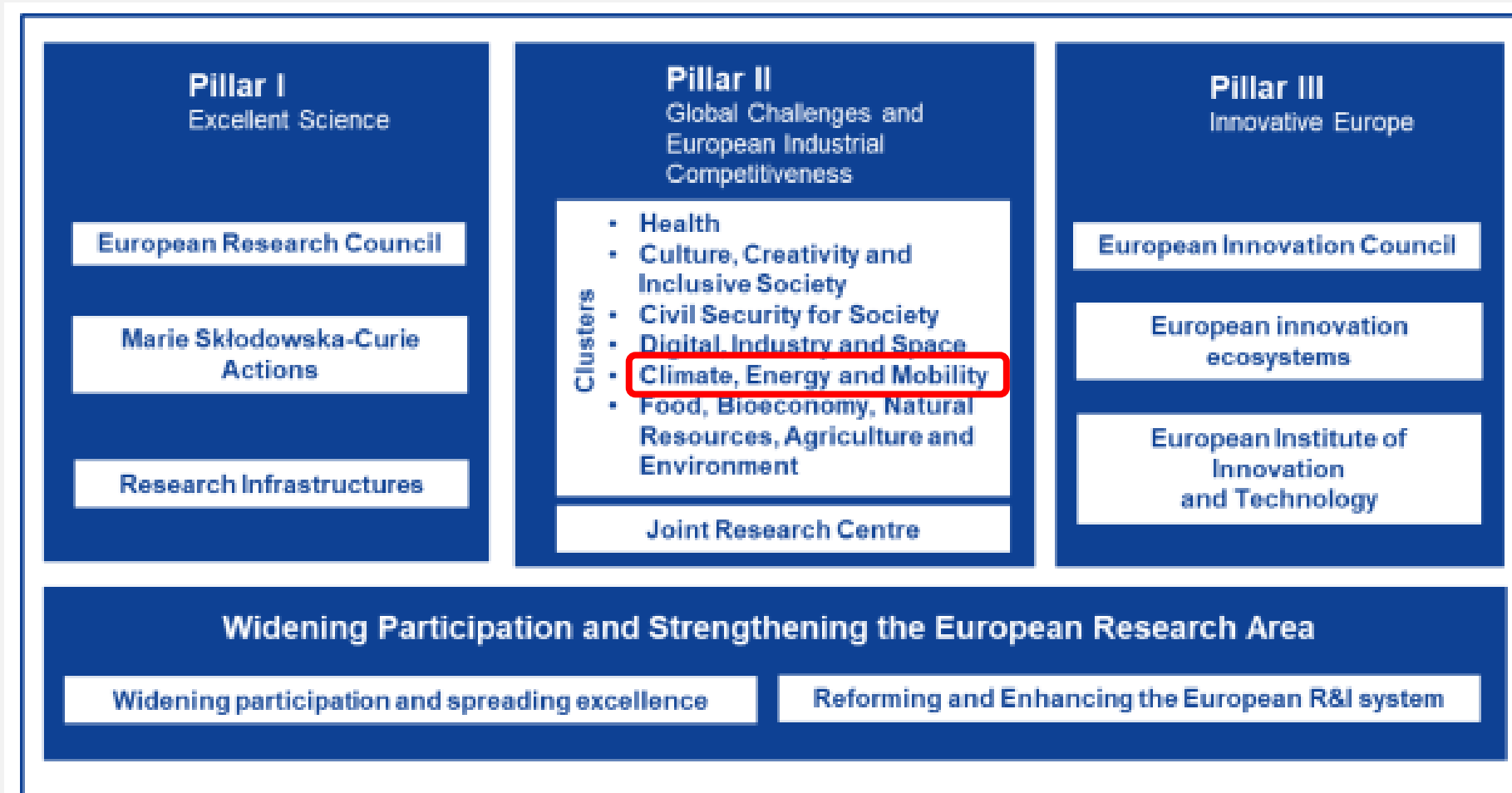
Open science policy

New approach to Partnerships

Spreading Excellence

Source: [European Commission](#)

Horizon Europe: Cluster-specific orientations



ETIP-DG PRIORITIES FOR HORIZON EUROPE WP 2021-2023

Topic	Description
1	Efficient resource development
2	Closed loop, combined power, heating & cooling plants and integration in circular economy
3	Assessing deep geothermal resource potential
4	Enhancing flexibility and availability of geothermal plants, its energy use and system integration
5	Developing hybrid plants
6	New electronics and sensor systems to monitor and operate intelligent geothermal wells
7	Exploiting mineral production from geothermal sources
8	High temperature (>50°C) thermal energy storage, towards smart thermal grids
9	Improvement of processes, materials and equipment life time to reduce the impact of scaling and corrosion
10	Cutting edge geothermal resources with enhanced exploration and innovative development methods
11	Improving social welfare

ETIP-DG PRIORITIES FOR HORIZON EUROPE WP 2021-2023

Topic 1 Efficient resource development

Scope: Increase the ability to optimally design and operate the whole geothermal system (reservoir, well field, powerplant) and heat and power distribution network, and improve the efficiency of geothermal power and CHP plants (TRL 5 to 9 until 2030)

Topic 2 Closed loop, combined power, H&C plants and integration in circular economy

Scope: Develop reliable, safe and cost-efficient technologies to improve the environmental performance of geothermal power and CHP systems over their entire lifecycle. This can be achieved via technologies which implement the total reinjection of the geothermal fluid including NCGs into the original reservoir and/or by developing technologies for the abatement of NCGs and/or capture for their sustainable use (TRL 4 to 9 until 2026)

Topic 3 Assessing deep geothermal resource potential

Scope: Produce a comprehensive mapping and reporting of geothermal resources for different applications in Europe in 2025 (to be continuously updated)
Enhanced exploration methods: both for shallow (< 2km) and deep resources in different geological setting (magmatic/basement&sedimentary), and in urban areas, where conventional exploration is challenging due to logistic reasons.

ETIP-DG PRIORITIES FOR HORIZON EUROPE WP 2021-2023

Topic 4
Enhancing
flexibility and
availability of
geothermal plants,
its energy use and
system integration

Scope: Demonstrate the technical and economic feasibility of responding to the grid operator's requests at any time is the primary objective. In the case of geothermal plants this includes the ability to increase or decrease output and ramp up and down. Flexible power plants responding in less than 20 seconds (for power) / up to 2 hours (for heat) and optimisation in two to four existing plants. (from TRL 5-6 to 8, 2020-2023 period)

Topic 5
Developing hybrid
plants

Scope: to couple geothermal with other RES for power&heat generation and with storage facilities, notably by integrating thermoelectric energy storage with district heating networks and dedicated equipment (e.g. heat pumps, ORC turbo- expanders, and heat exchanger networks with hot and cold reservoirs able to cover variable demand for heat, cold and electricity). Development of hybrid plant equipment (combining geothermal with waste heat, biomass, etc; from TRL 5 to 7-8, 2023-2026)

ETIP-DG PRIORITIES FOR HORIZON EUROPE WP 2021-2023

Topic 6
New electronics
and sensor
systems to
monitor and
operate intelligent
geothermal wells

Scope: Development of electronics and sensors to be used in high-temperature geothermal wells during drilling operations. This will lead to better control of the drilling process, reducing the risk of wellbore instability and lost-in-hole incidents. From TRL 5 to 7-8, 2025)

Topic 7
Exploiting mineral
production from
geothermal
sources

Scope: develop novel and potentially disruptive technological solutions that can help satisfy European needs for energy and strategic metals as well as other economical non-metallic materials in a single interlinked process. Technologies for metal extraction: (from TRL 4-5 in 2020-2023 period to 7-8 in 2023-2026 period)

ETIP-DG PRIORITIES FOR HORIZON EUROPE WP 2021-2023

Topic 8
High temperature (>50°C) thermal energy storage, towards smart thermal grids

Scope: develop technologies and workflows to boost HT-UTES system implementation by improving heat-storage and production performance. The objective is the integration of underground thermal energy storage to cope with daily, weekly and seasonal variations in heat demand and handle available heat from the large number of industrial processes with excessive heat. Advanced technologies and components (from TRL 5 to 7-8) in 2020-2023 period. Optimisation of two to three new demonstration plants (from TRL 6 to 7-8 in 2023-2026 period)

Topic 9
Improvement of processes, materials and equipment life time to reduce the impact of scaling and corrosion

Scope: to prolong the lifetime of geothermal wells, piping and equipment by making the materials used more resistant to the detrimental effects of temperature, fluid chemistry and flow. Development of environmentally benign measures (TRL 6 – 8 by 2023, TRL 9 by 2026). Development of materials for submersible pumps and tubing (TRL 5 – 7 by 2023, TRL 8 – 9 by 2026). Development of eco-friendly drilling fluids stable under high-temperature and high-pressure (TRL 4 – 5 by 2023, TRL 6 – 7 by 2026, TRL 8 – 9 by 2030).

ETIP-DG PRIORITIES FOR HORIZON EUROPE WP 2021-2023

Topic 10
Cutting edge geothermal
resources with enhanced
exploration and innovative
development methods

Scope: Develop advanced methods and technologies for cost-effective exploration and exploitation of Enhanced Geothermal Systems (EGS), super-hot and deep resources, offshore systems abandoned mines and exhausted water, and oil and gas wells. From TRL 3 to TRL 6 in 2025- 2030 period.

Topic 11
Improving social welfare

In order to move from R&I to deployment, a series of non-technical barriers for deep geothermal must be removed. 9 key topics have been identified:

- a) Setting the right Policies
- b) Engaging with the public and other stakeholders
- c) Reinforcing competitiveness
- d) Establishing Financial Risk Management schemes
- e) Geothermal deployment support schemes
- f) Establishing a legal and regulatory framework
- g) Embedding geothermal energy into the circular economy
- h) Harmonised protocols for defining the environmental and health impacts of geothermal energy and mitigation planning

ETIP DG contribution to the Work Programme 2021-2022 - -- Cluster 5 (Climate, Energy and Mobility)

ETIP DG Topic Proposals	Topics in the draft WP 2021-2022	Comments
Enhancing flexibility and availability of geothermal plants, its energy use and system integration	C5-D3-RES-37-2021: Solutions for more sustainable geothermal energy	EC also includes in this topic the aspects of performance and reliability improvement of deep-geothermal systems plus increasing citizen acceptance
Exploiting mineral production from geothermal sources	C5-D2-BAT-01-2021: Sustainable processing, refining and recycling of raw materials. Raw materials processing technologies	EC emphasises the relevance of innovative technologies for lithium extraction
High temperature (>50°C) thermal energy storage, towards smart thermal grids	C5-D3-RES-49-2022: Demonstrate the use of high temperature geothermal reservoirs to provide energy storage for the energy system	EC emphasises the relevance of deep geothermal for providing energy storage
Lobbying action for ensuring support for ETIPs	C5-D3-CC-03-2021: Support to the activities of the ETIPs and technology areas of the SET-Plan	Recognises the importance of ETIPs and SET Plan

More opportunities for deep geothermal

Topics in the draft WP 2021-2022	Comments
C5-D3-RES-46-2022: Innovative renewable energy carrier production for heating from renewable energies	Projects expected to demonstrate cost-effective and energy-, catalyst and equipment material-efficient transformation of RE energy into RE energy carriers for heating, while ensuring very good combustion properties and sustainability of the respective heating supply and value chains.
C5-D4-IND-02-2022: Development and pilot demonstration of heat upgrade technologies with supply (sink) temperature in the range 150-250°C	Projects are expected to validate the technical feasibility of industrial heat upgrade systems capable of supplying useful sink heat in the temperature range of 150 – 250 °C from (waste) heat sources in various industrial processes.
C5-D4-BEE-06-2022: Smarter buildings for better energy performance	Improvement and cost-reduction of technologies to predict, assess, monitor and control in real time the energy performance of buildings, including energy efficiency, renewables, storage and their optimisation.
C5-D3-RES-56-2021: Market Uptake Measures of renewable energy systems	Projects are expected to facilitate the wider uptake of renewable energy systems in the energy and industrial sectors leading to an increase share of renewable energy in the final energy consumption by 2030.

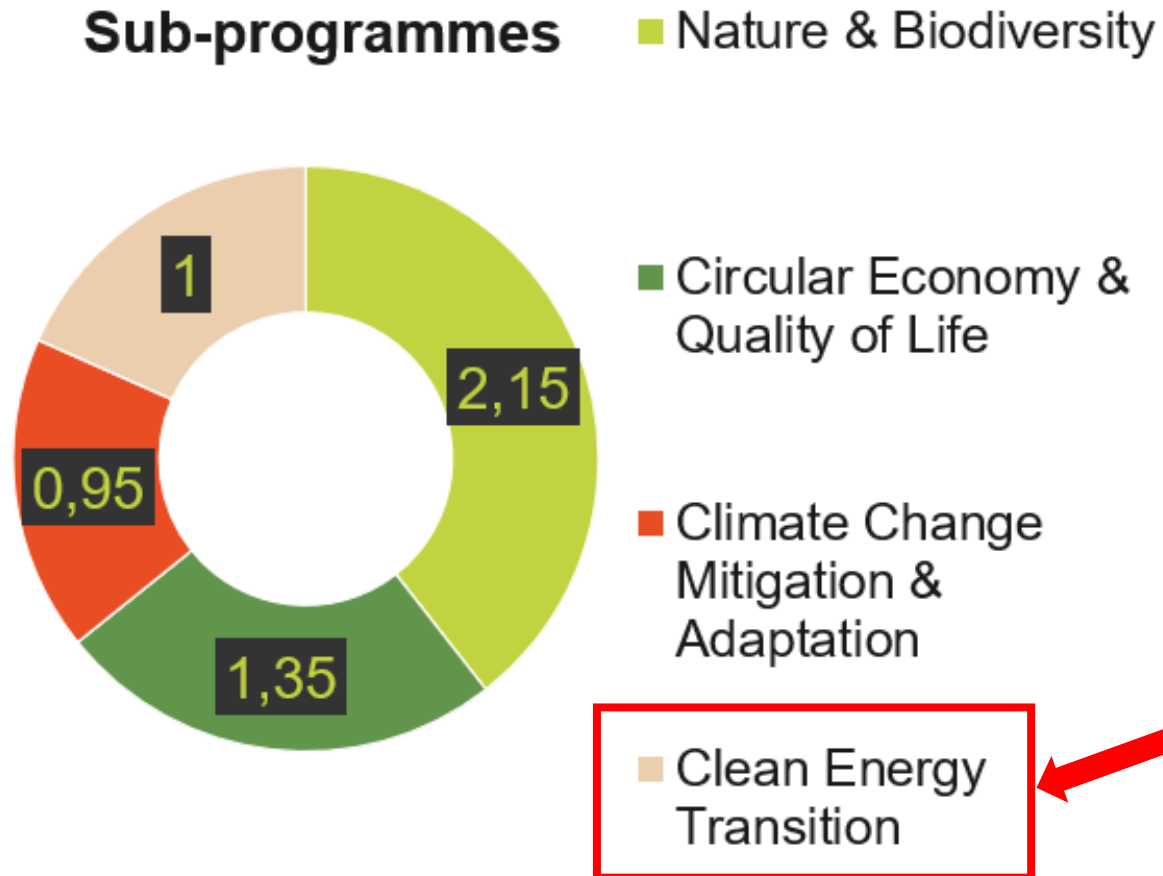
Horizon Europe: Partnerships

Successor of ERA-NET Cofund

- Partnerships - policy approach provide mechanisms to link R&I closely to policy needs, develop close synergies with national and regional programmes, and turn research into socio-economic results.
- total 49 Partnership candidates, including:
 - ❖ **Clean Energy Transition Partnership** - towards a renewable-based and carbon-neutral energy system
 - ❖ **People-centric sustainable built environment (Built4People)**
 - ❖ **European Partnership for an Industrial Battery Value Chain**

LIFE Programme for environment and climate action

Sub-programmes



**Total budget envelope
for 2021-2027 € 1 bn**

Clean Energy Transition sub-programme

Objective: to leverage finance and improve access to finance for energy transition by acting on both clean energy financing supply and demand

It will structure its actions around the following **five intervention areas:**

1. Building the energy transition framework in Member States, regions and cities/local communities
2. **Accelerating technology roll-out**, digitalisation, new services and business models
3. Unlocking flows of financing
4. Supporting local and regional investments
5. Engaging and protecting consumers / citizens

Innovation Fund

- Finances innovative clean energy technology projects
- Around EUR 10 billion (size of the Fund depends on the ETS carbon price)
- Up to 60% of the additional costs
- Projects applying must be in EU ETS countries (Applying companies does not need to be from these countries)

Innovation Fund vs Horizon 2020

Innovation Fund	vs	Horizon 2020
Build and operate large-scale industrial assets with breakthrough technologies	Objective	R&I programme
Single entity, i.e. international consortia not required	Applicants	At least 3 legal entities from at least 3 Member States
Technical, business, and financial viability	Selection criteria	Focus on research & innovation
Lump-sum payments upon milestones and performance (verified GHG emissions avoidance)	Disbursement of grant	Upon final report and approval of the eligible costs

Calls

- 1st call - Large Scale Project Call for Proposals: deadline was until 29/10/2020
- **2nd call** for proposals under the Innovation Fund will be launched in December 2020:
- focus on small-scale projects in renewable energy, energy-intensive industries, energy storage, and carbon capture, use, and storage, with total **capital costs below EUR 7.5 million.**

Modernisation Fund

- Goes live on 1st January 2021
- **70% of the funds must be spent on:**
 - Generation and use of electricity from renewables;
 - Improvement of energy efficiency (including in transport, buildings, agriculture and waste) except energy generation using fossil fuels;
 - Energy storage;
 - Modernisation of energy networks, including district heating pipelines, grids for electricity transmission, increase of interconnections between EU Member States
 - Just transition in carbon-dependent regions to support the redeployment, re-skilling and up-skilling of workers, job-seeking initiatives and start-ups.
- The Modernisation Fund will support 10 lower-income EU Member States in their transition to climate neutrality: **Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.**

MODERNISATION FUND

How does the financing process work?

EU Member State submits the investment proposal

The European Investment Bank confirms priority status

PRIORITY INVESTMENT

NON-PRIORITY INVESTMENT

The European Investment Bank assesses proposal

The Investment Committee votes

The European Commission takes disbursement decision

The European Investment Bank disburses funds

EU Member State implements investment and reports to the European Commission

STATE AID CLEARANCE

More information: <https://www.deepgeothermal-iwg.eu/factsheets>

Deep GEOTHERMAL IWG

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- DG-IWG MEMBERS
- PARTNERS

Innovation Fund

The Innovation Fund just like its predecessor, NER300, is one of the world's largest funding programmes for demonstration of innovative low-carbon technologies and a key funding instrument for delivering the EU's economy-wide commitments under the Paris Agreement. It also supports the European Commission's strategic vision of a climate neutral Europe by 2050. The Innovation Fund will focus on:

- Innovative low-carbon technologies and processes in energy intensive industries, including products substituting carbon intensive ones;
- Carbon capture and utilisation (CCU);
- Construction and operation of carbon capture and storage (CCS);
- Innovative renewable energy generation;
- Energy storage.

Recovery and Resilience Facility

The Resilience and Recovery Facility (RRF), launched in July 2020, is designed to inject additional funding into Member States to aid their economic recovery after the COVID-19 pandemic. It supports projects and programmes (sometimes referred to as reforms) which deliver "green and digital transitions," and contribute to "strengthening the growth potential, resilience and cohesion of the Member State concerned".

€310 billion grants and €250 billion loans will be made available, in conjunction with other Next Generation EU funds, to Member States.

The aim is for governments to outline how they will stimulate and reform their economies to deliver (some) tangible outcomes by 2024. The funds are dispersed depending on the applications made from Member States in their national R&R Facility bids.

Just Transition

Just Transition Mechanism

The Just Transition Mechanism is a new funding instrument of the EU that has been announced by the Commission President Ursula von der Leyen as part of the European Green Deal. To ensure no one is left behind, the Just Transition Mechanism will mobilise at least €100 billion of investments over 2021-2027 with financing coming from the EU budget, co-financing from Member States as well as contributions from InvestEU and the European Investment Bank (EIB). Extrapolated over ten years, the Just Transition Mechanism will mobilise around €143 billion.

Just Transition Mechanism at least EUR 100 billion investments in green and digital sectors and employment

