The EU future for advanced biofuels

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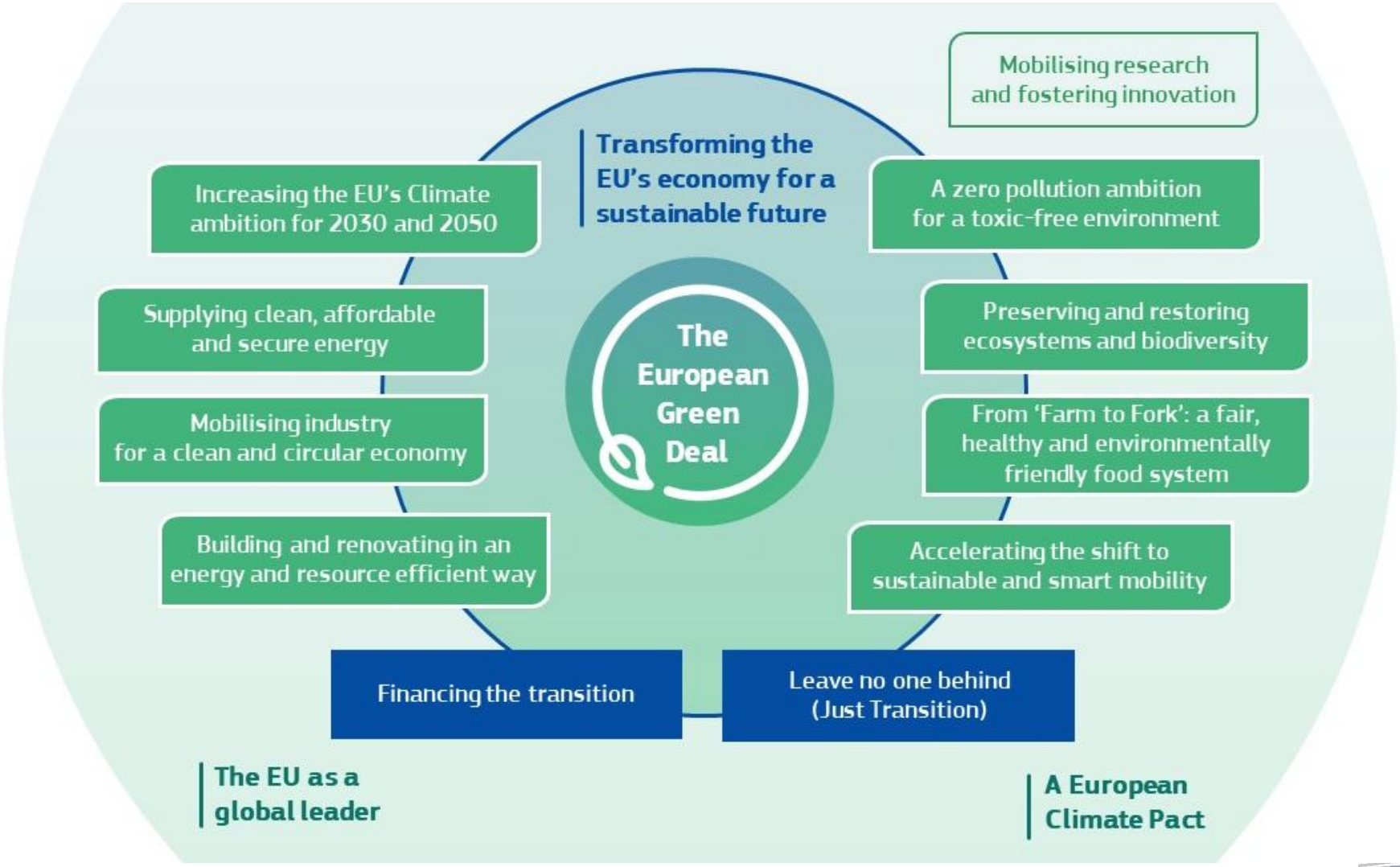
Innovations in advanced biofuels production Workshop 18 May 2022

The European Green Deal



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European Climate and Energy Policy

European Climate Law Regulation of 30 June 2021 REG (EU) 2021/1119

At least 55% net GHG emissions reduction in 2030 and EU climate-neutrality in 2050

An EU Strategy for Energy System Integration COM(2020)299 final

Renewables, sustainable biomass & biofuels, green hydrogen, synthetic fuels

A Hydrogen strategy for a climate-neutral Europe COM(2020)301 final

Industrial chain, demand in industry and mobility, clean hydrogen R&I

EU Biodiversity Strategy for 2030 COM(2020)380 final

Restoring forests, soils and wetlands, green spaces in cities

Sustainable and Smart Mobility Strategy – putting European transport on track for the future COM(2020) 789 final

Zero-emission vehicles, vessels and aircrafts, automatic mobility

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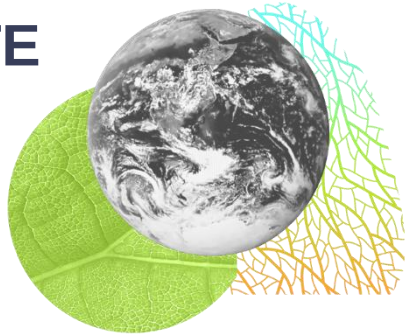
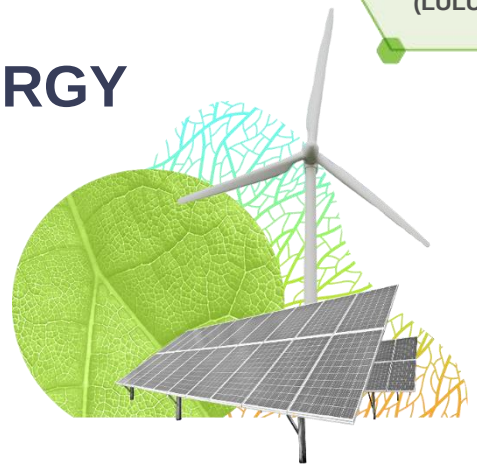
Delivering on the “Fit for 55” commitment

CLIMATE



TRANSPORT

ENERGY



TAXATION AND TRADE

- Revision of the EU Emissions Trading System (EU ETS)
- Revision of the EU ETS in alignment with the CORSIA system for reducing international aviation emissions
- Revision of the Alternative Fuels Infrastructure Directive
- Revision of the Effort Sharing Regulation
- NEW ReFuelEU Aviation Initiative
- Revision of the Regulation on Land use, Land use change and Forestry (LULUCF)
- **Fit for 55**
- NEW FuelEU Maritime Initiative
- Revision of CO2 emissions standards for cars and vans
- Revision of the Energy Taxation Directive
- Revision of the Renewable Energy Directive
- Revision of the Energy Efficiency Directive
- New Carbon Border Adjustment Mechanism

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“Fit for 55” package

Revision of Renewable Energy Directive II

- Collective binding target of renewables in EU’s energy mix to **40%** by 2030
- **Advanced biofuels** and **biogas** produced from Annex IX Part A feedstock in energy supplied to transport at least 0,2 % in 2022, 0,5 % in 2025 and **2,2 %** in 2030, renewable fuels of non-biological origin at least **2,6 %** in 2030
- GHG intensity reduction at least **13 %** in 2030 by all renewable fuels and renewable electricity supplied to transport

Revision of the Effort Sharing Regulation

- EU-wide reduction of **40% by 2030** in the transport, buildings, agriculture and waste sectors compared to 2005

Revision of the Emissions Trading System Directive

- By 2030 reduce sectors’ GHG emissions by **61%**, compared to 2005 levels
- Carbon pricing for maritime, aviation, buildings and road transport from 2026

Revision of the Land Use Land Change and Forestry regulation

- Increase EU’s natural carbon sinks with new EU target of net GHG removals in the LULUCF sector of **310 Mt CO2eq** from 2026 to 2030

ReFuelEU Aviation legislative proposal

- In **2030** SAF at least **5%** of which synthetic aviation fuels share at least **0.7%,** rest being advanced biofuels(**4,3%**)
- In **2050** SAF at least **63%** of which synthetic aviation fuels at least **28%,** rest being advanced biofuels (**35%**)

FuelEU Maritime legislative proposal

- Biofuels, biogas, renewable fuels of non-biological origin and recycled carbon fuels are taken into account to reduce the GHG content of the energy in ships by **-6% in 2030 and -75% in 2050** from the 2020 average

Revision of the Energy Taxation Directive

- Exemptions for renewable electricity, renewable fuels, advanced biofuels/ bio liquids/ biogas/ biomass fuels

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REPowerEU: Joint European action for more affordable, secure and sustainable energy COM(2022) 108 final

Increase the resilience of the EU's energy system by controlling energy prices, securing gas storage and reduce dependency on fossil fuel imports by ramping up the production of biomethane and hydrogen, decarbonizing industry and increasing renewable energy use

- Speed up **renewables permitting** to roll-out renewable projects and grid infrastructure improvements
- More rooftop **solar panels, heat pumps and energy savings** to reduce our dependence on fossil fuels, making our buildings more energy efficient
- Diversify **gas supplies**
- Double the EU **biomethane** goal to produce **35 billion cubic meters** per year by 2030
- A **Hydrogen Accelerator** to develop infrastructure, storage facilities and ports, and provide additional **15 million tones** renewable hydrogen (5 Mt domestic and 10 Mt imported)
- **Decarbonize industry** by accelerating the switch to electrification and renewable hydrogen and enhancing our low-carbon manufacturing capabilities

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HORIZON EUROPE

EURATOM

SPECIFIC PROGRAMME: EUROPEAN DEFENCE FUND

Exclusive focus on defence research & development

- Research actions
- Development actions

SPECIFIC PROGRAMME IMPLEMENTING HORIZON EUROPE & EIT*

Exclusive focus on civil applications

Pillar I
EXCELLENT SCIENCE

- European Research Council
- Marie Skłodowska-Curie
- Research Infrastructures

Pillar II
GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS

Clusters

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital, Industry & Space
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Joint Research Centre

Pillar III
INNOVATIVE EUROPE

- European Innovation Council
- European Innovation Ecosystems
- European Institute of Innovation & Technology*

WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA

- Widening participation & spreading excellence
- Reforming & Enhancing the European R&I system

EURATOM

- Fusion
- Fission
- Joint Research Center

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

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Horizon Europe

Cluster 5, 'Climate, Energy and Mobility'

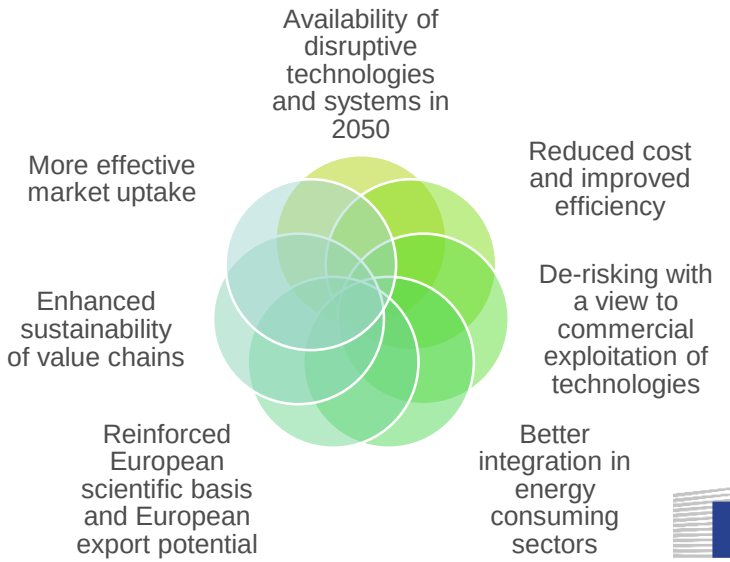
Destination - Sustainable, secure and competitive energy supply

More efficient, clean, sustainable, secure and competitive energy supply through new solutions for smart grids and energy systems based on more performant renewable energy solutions

- **Fostering the European global leadership in affordable, secure and sustainable renewable energy technologies**
- **Energy systems, grids and storage**
- **Carbon capture, utilization and storage (CCUS)**
- **Cross-cutting and leveraging more public and private investments in clean energy systems**

Renewable energy technologies provide major opportunities to replace or substitute carbon from fossil origin in the power sector, in heating/cooling, transportation, agriculture and industry

Advanced renewable fuels, including synthetic and sustainable advanced biofuels, needed to provide long-term carbon-neutral solutions for the transport and energy-intensive industrial sectors



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Horizon Europe - Work Programme 2021-2022

Climate, Energy and Mobility - Destination 3 Renewable Energy

Renewable fuels Topics

- Hybrid catalytic conversion
- Carbon negative biofuel production
- Algal and non-biological renewable fuel technologies
- Bio methane production
- Viable advanced biofuel production
- Value chains for renewable fuels
- International cooperation for scale-up of sustainable biofuels
- Renewable energy technologies in agriculture and forestry for energy and waste needs
- Renewable energy carriers from variable renewable electricity and carbon emissions
- Coupling solar fuel technologies to other renewables
- Artificial photosynthesis technologies

Bioenergy Topics

- Micro-CHP and hybrid heating systems
- Large-scale CHP technologies from biogenic residues and wastes
- Industrial and low-emission combustion and gasification from biogenic residues and wastes
- Renewable energy carriers for heating
- Direct integration of renewable energy into chemical process energy

Other actions

- Studies on development of industrial capacity for drop-in advanced biofuels, pre-commercial procurements for commercial cargo-shipping and aviation advanced biofuels, prizes for development of renewable energy systems

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HORIZON-CL5-2022-D3-02-07

Renewable energy incorporation in agriculture and forestry

Combine innovative and compatible renewable, circular and regional value chains from different renewables and adapted storage options trans-seasonally to improve sustainability and cost-effectiveness of seasonal energy demand / agricultural waste & land management (IA, EUR 15 million, Opening 26 May 2022, Deadline 27 Oct 2022)

HORIZON-CL5-2022-D3-02-08

Demonstration of complete value chains for advanced biofuel and non-biological renewable fuel production

Demonstrate innovative and cost effective sustainable value chains for advanced biofuels or synthetic renewable fuels of non-biological origin (other than for hydrogen as a final product), over the entire cycle from feedstock to end use (IA, EUR 20 million, Opening 26 May 2022, Deadline 27 Oct 2022)

HORIZON-CL5-2022-D3-03-02

Best international practice for scaling up sustainable biofuels

Foster international cooperation to develop best practices and concepts along the entire value chain for accelerating the scale-up of sustainable biofuels worldwide (RIA, EUR 9 million, Opening 6 Sep 2022, Deadline 10 Jan 2023)

HORIZON-CL5-2022-D3-03-07

Development of algal and renewable fuels of non-biological origin

Develop and improve algal and/or non-biological renewable fuel technologies (other than for hydrogen as a final product), through developing synthetic pathways including biological, biochemical, thermochemical, electrochemical processes or combinations of them(RIA, EUR 15 million, Opening 6 Sep 2022, Deadline 10 Jan 2023)

HORIZON-CL5-2022-D3-02-03
Innovative renewable energy carrier production for heating from renewable energies

Demonstrate cost-effective and energy-, catalyst and equipment material-efficient transformation of renewable energy into renewable energy carriers for heating, while ensuring very good combustion properties in respect of efficiency and avoidance of pollutants and environmental and socioeconomic sustainability of the respective heating supply and value chains(IA, EUR 10 million, Opening 26 May 2022, Deadline 27 Oct 2022)

HORIZON-CL5-2022-D3-02-04
Technological interfaces between solar fuel technologies and other renewables

Development of energy transmitting technological interfaces to couple solar fuel technologies to other renewables such as from e.g. bio-sources or directly connected renewable power generation, which allow for efficient feed in of other forms of renewable energy into solar fuel conversion technologies and allow for efficient and continuous renewable fuel production (RIA, EUR 10 million, Opening 26 May 2022, Deadline 27 Oct 2022)

HORIZON-CL5-2022-D3-02-05
Renewable energy carriers from variable renewable electricity surplus and carbon emissions from energy consuming sectors

Demonstration of renewable energy carrier synthesis from variable renewable electricity surplus and carbon emissions from energy consuming sectors, which is targeting improvement of the overall synthesis value chain efficiency and viability while making best use of the CO2 emissions in synergy with renewable electricity generation (IA, EUR 20 million, Opening 6 Sep 2022, Deadline 10 Jan 2023)

HORIZON-CL5-2022-D3-02-06
Direct renewable energy integration into process energy demands of the chemical industry

Development of the technology and the methodology of integrating renewable energy in chemical processing by substituting fossil process energy in chemical industry, which has a high carbon footprint due to processing relative to the mass of the final product (RIA, EUR 10 million, Opening 26 May 2022, Deadline 27 Oct 2022)

HORIZON-CL5-2022-D3-03-03
Efficient and circular artificial photosynthesis

Development of novel artificial photosynthesis technologies, which allow for improved efficiency of light harvesting, conversion to electrochemical potential and energy fixation to carriers with strictly implementing circularity by design and efficient use of carrier and (photo)catalyst materials through novel photo electrochemical or bio-based (bio-hybrid) or biological pathways for solar fuel production (RIA, EUR 10 million, Opening 6 Sep 2022, Deadline 10 Jan 2023)

HORIZON-CL5-2022-D3-03-06
Efficient and low-emission technologies for industrial use of combustion and gasification systems from low-value biogenic residues and wastes

Development of technologies for optimization of advanced biofuel flexible systems regarding upstream multi-feedstock, logistics, feeding, ash management, combustion or gasification processes and effluent emissions and their effective integration into industrial process energy environment (RIA, EUR 10 million, Opening 6 Sep 2022, Deadline 10 Jan 2023

EU Catalyst Partnership

Clean Hydrogen

Production of hydrogen using methods that substantially reduce carbon emissions

Direct Air Capture

Reducing overall CO2 by capturing CO2 directly from the ambient air and storing it permanently

Support innovative green technologies, drive down the green alternatives cost, create markets and supply chains for sustainable solutions

Accelerate deployment of large-scale, innovative first of-a-kind solutions

Projects are to develop, test and operate the installations at industrial scale

Sustainable Aviation Fuels

Production of low-carbon jet fuel, for example by using bio-food waste, wood waste, or algae

Long Duration Energy Storage

Storage of energy in a system that can discharge electricity over time for extended durations

1:1 risk sharing

The EU and Breakthrough Energy Catalyst share the risk. Grants and investments will be matched 1:1

$1bn / €820m mobilized

The EU and Breakthrough Energy Catalyst will together mobilize $1bn / €820m for a minority stake in the project. Projects will at least match that with their own contribution.

1:3 leverage

The EU-Catalyst partnership will provide up to 50% of the required financing. The projects need to raise at least 50% themselves. So for each euro from the EU budget, the partners will raise at least 3 euros themselves.

The EU-Catalyst partnership offers different forms of finance to close the financing gap of a project. This includes grants and other types of investments, such as quasi-equity, equity and contract subsidies, for example **companies committing to purchase** the resulting green products.

HOW TO APPLY

During 2022-26, requests for proposals in the four focus areas evaluated against ambitious criteria, including: scalability, impact and path to economic viability.

Select and propose potential projects to the EIB to assess them based on agreed processes and rules, in relation to the Horizon Europe and the Innovation Fund funding contributions. The assessment and the decision to use EU funds will be independent from that of Breakthrough Energy Catalyst

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HORIZON-CL5 - Other Actions – Indirectly Managed Actions - 7

Contribution to InvestEU blending operation under the Green Transition product

Framework to identify European projects deploying innovative technologies, business models and approaches to reduce the green premium
Renewable H_2: electrolysers, at 100 MW and above, large scale hydrogen end-use industry applications Sustainable aviation fuels**:** innovative SAF notably advanced biofuels and RFNBOs Long duration energy storage: Chemical, electrochemical, thermal and mechanical technologies and optimized storage system for large capacity and long duration Direct air capture of CO2: viability regarding fate of the captured CO2 (i.e. underground storage or use), renewable energy source for capture, vicinity to CO2 transport and storage infrastructure
EIB loans and quasi-equity (or a combination) drawn from Innovation Fund, this Horizon Europe action, or InvestEU budget, blended with non-reimbursable components funded by this Horizon Europe action
Open to all applicants meeting the set eligibility criteria here and InvestEU Green Transition product
Projects' selection and financing procedure follows the InvestEU Regulation: EIB checks financial viability and performs full due diligence, the Commission assures eligibility under the 'policy check' procedure
Ensure technologies and IP benefit EU interest, in particular by focusing on MS/AC projects
Indirectly Managed Action, EUR 50 million, TRL 6-8, Opening 2nd quarter 2022, Legal Entity EIB as the implementing partner under InvestEU

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Mission Innovation 2.0

Launched on 2 June 2021, supports in the next decade action and investment in research, development and demonstration to make clean energy affordable, attractive and accessible to all this decade and accelerate progress towards the Paris Agreement goals and pathways to net zero

Innovation Platform: Insights, Collaborate, Accelerate	**Innovation for International Sustainable Aviation Fuel:** forge global partnerships for sustainable and cost-effective strategies for Sustainable Aviation fuels, **co-lead India**, USA, participants **EU**, CN, NL, DK
	Materials for Energy
	The Innovation Community on Affordable Heating and Cooling of Buildings
	MI Call series
Missions: Bring together dynamic and delivery-focused, high ambition alliances between countries, corporations, investors and research institutes	**Renewable Fuels, Chemicals and Materials through Integrated Bio refineries,** co-lead **India**, NL, participants **EU**, BR, CA, …
	Green Powered Future
	Zero Emission Shipping
	Clean Hydrogen
	Carbon Dioxide Removal
	Urban Transitions
	Net-Zero Industries

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Integrated Biorefineries Mission

Launched 4 April 2022

Develop and demonstrate innovative solutions to accelerate the commercialization of integrated biorefineries, with a target of replacing 10% of fossil-based fuels, chemicals and materials with bio-based alternatives by 2030

Advance sustainable biorefining pathways and technologies to support the development and commercialization of bio-based fuels, chemicals and materials, by also considering process energy demands.

Support de-risking new and emerging technology, while improving the cost-competitiveness of bio-based alternatives, notably biofuels.

Members will (a) promote research, development, and innovation across the biorefining supply and value chain, (b) advance pilot-scale demonstration projects for sustainable biorefining technologies, and (c) collaborate with industry and standards-setting organizations to support regulatory development for these new products

The Co -Leads	**India**: (Department of Biotechnology, Ministry of Science and Technology, Gov of India
	Netherlands: Ministry of Economic Affairs and Climate Policy
Members	Brazil, Canada, European Commission, United Kingdom
The Knowledge Partners	IEA, IEA Bioenergy (Task42), HLCAC, Nova Institute (Germany), CEM, Biofuture Initiative

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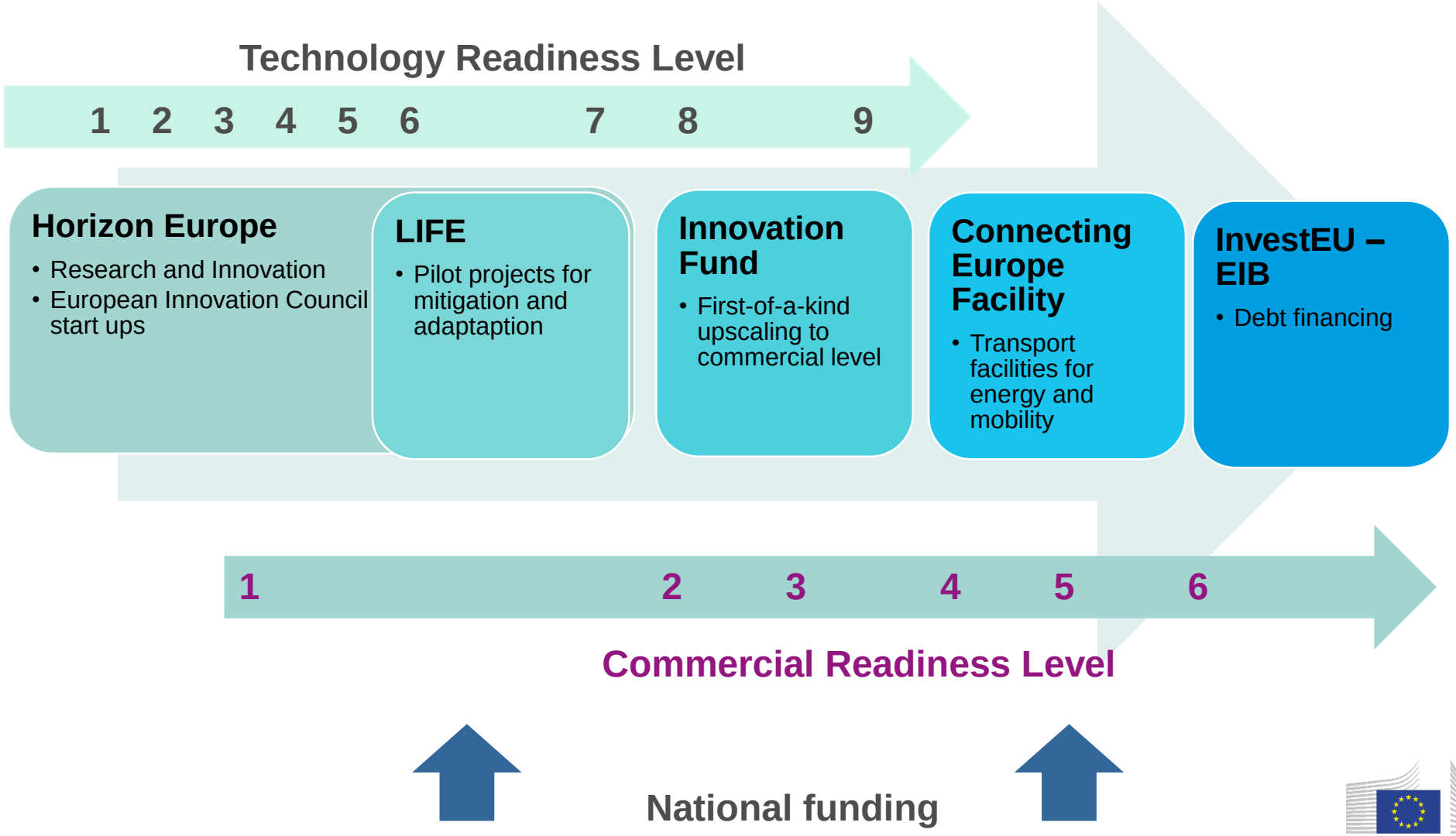
EU Funding Programmes



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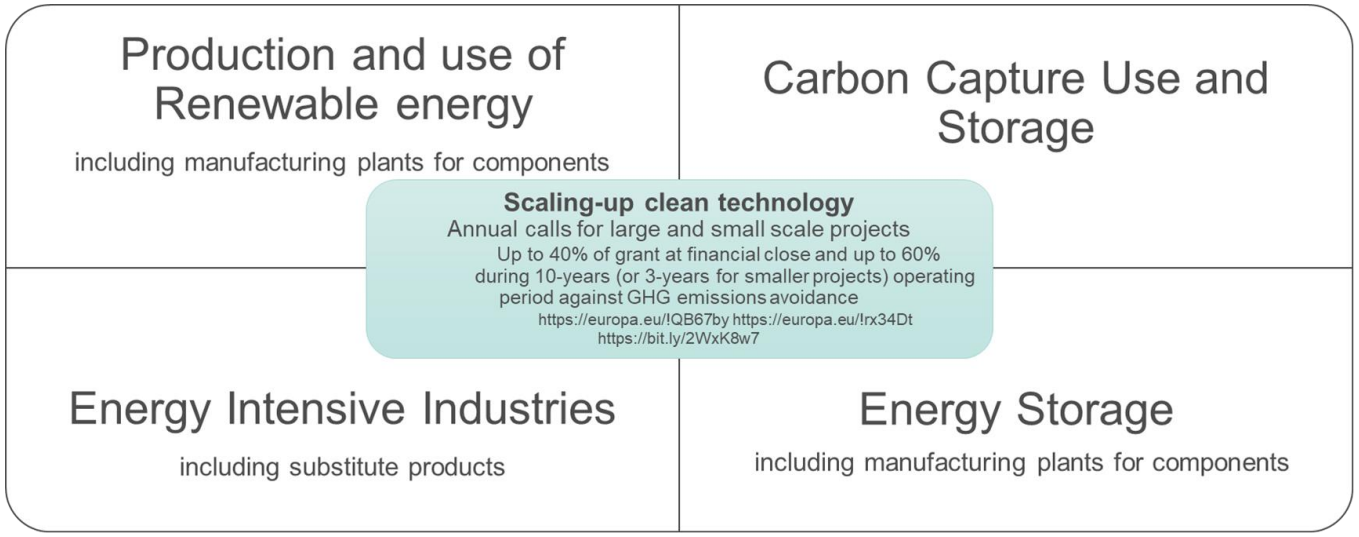
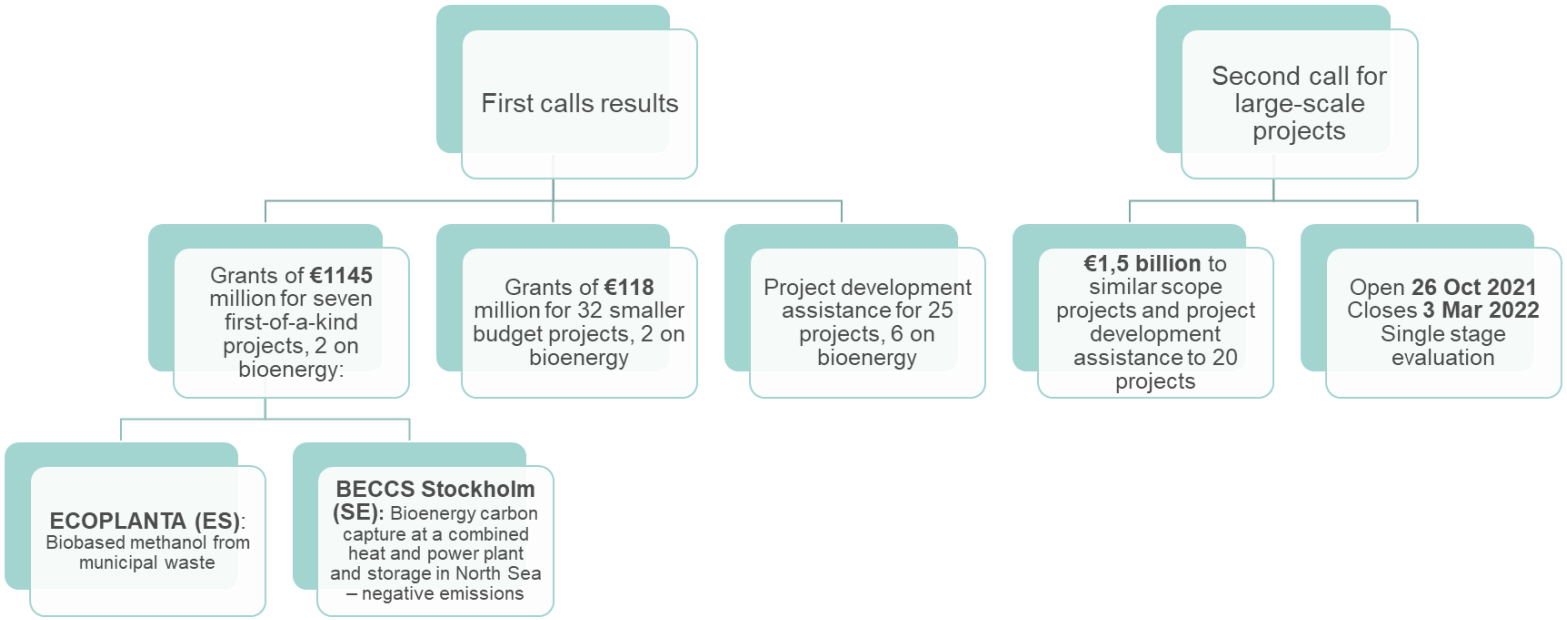
Innovation fund





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Thank you!

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