



**BECQUEREL
INSTITUTE**

Innovation Fund, proposal writing

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3rd Large Scale Call 2023

- Large scale call 2022 is divided in four separate calls:
- INNOVFUND-2022-LSC-01-GENERAL — Large Scale Projects — General decarbonisation : low-carbon projects, CO2 capture and storage, general renewable energy projects (eg installations) – EUR 1 bn
- INNOVFUND-2022-LSC-02-INDUSTRY-ELEC-H2 — Large Scale Projects — Innovative electrification in industry and hydrogen production and use - EUR 1 bn
- INNOVFUND-2022-LSC-03-MANUFACTURING — Large Scale Projects — Clean-tech manufacturing: Construction of manufacturing facilities and their operation to produce specific components for renewable energy installations (eg in photovoltaics), electrolysers, energy storage, heat pumps – EUR 0.7 bn
- INNOVFUND-2022-LSC-04-PILOTS — Large Scale Projects — Mid-sized breakthrough pilots focusing on validation of deep decarbonization technologies - EUR 0.3 bn

The objective is to support projects to build industrial capacity, technology leadership, supply chain resilience and strategic autonomy on these decarbonisation technologies within the EU.

Launched 3rd November 2022

Deadline 16th March 2023

Evaluation: May-June 2023

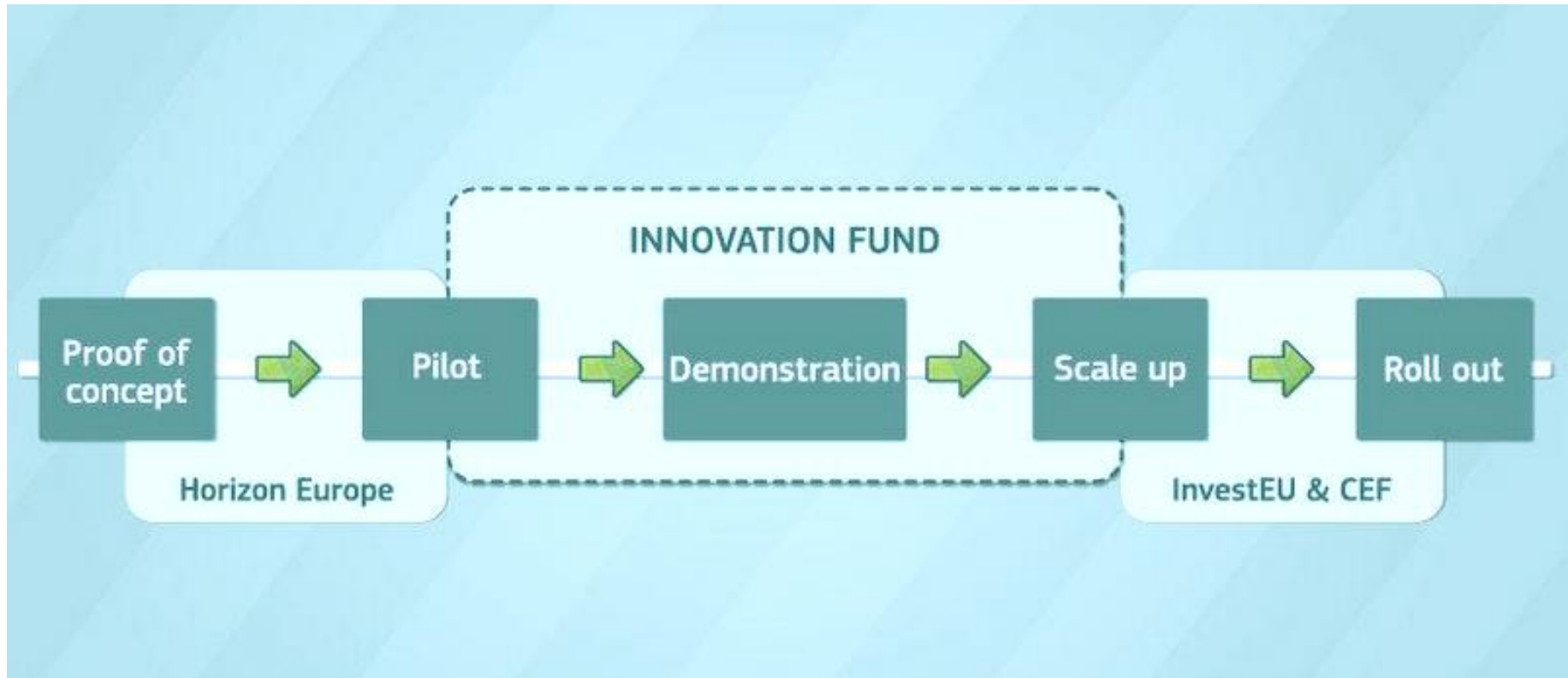
Information on evaluation results: ~July-August 2023

Grant Agreement signature: ~Dec 2023

✓ Not too late to start but time is running out

Innovation Fund scope

- Focus on demonstration and scale up
- Necessary to have Proof of concept / Pilot



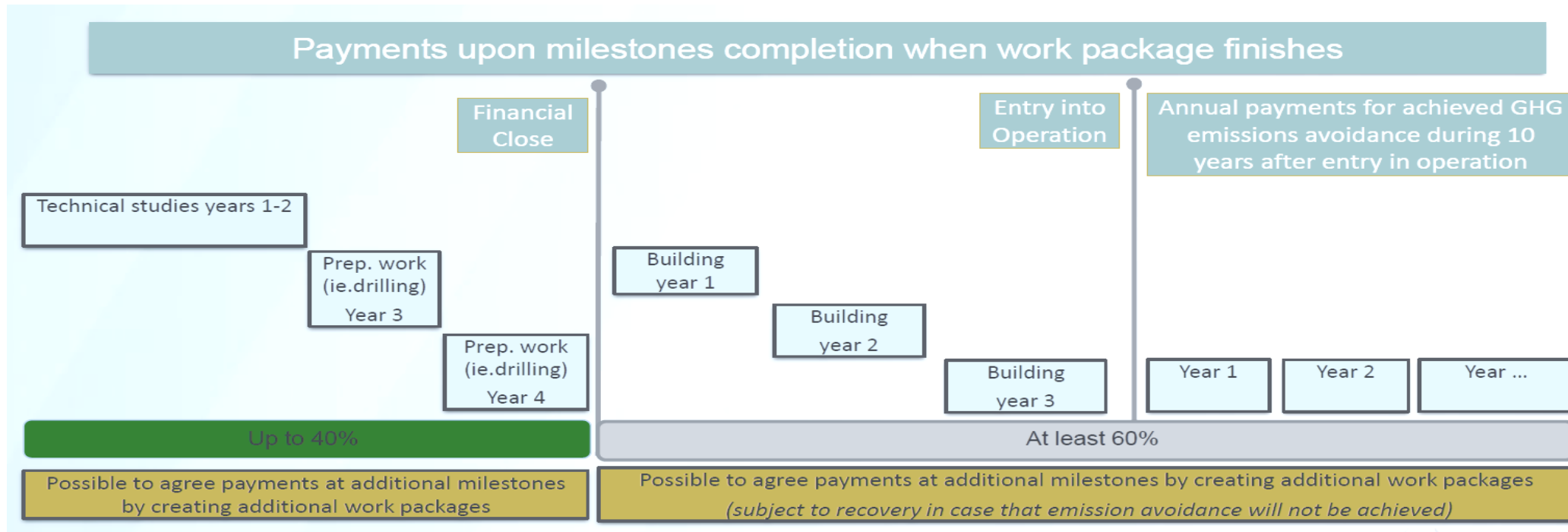
Eligibility

- Financial capacity
 - Applicants must have **stable and sufficient resources to maintain their activity** throughout the period for which the grant is awarded.
 - In order to demonstrate that this criterion is fulfilled, *applicants whose proposals are successful* will be required to submit the following documents:
 1. Profit and loss account for the last two financial years
 2. Balance sheet for the last two financial years
 3. Explanatory notes and/or annexes that form part of the above financial statements (if available)
 4. External audit report certifying the accounts for up to the last two available financial years.
 - For newly created entities, the business plan and financial model over the lifetime of the project might replace the above documents.
- Operational capacity
 - Applicants must have the know-how and qualifications needed to successfully implement the project, including sufficient experience with projects of a comparable size and with implementation of projects in the Member State where the project will be located.
 - To assess this capacity, applicants must provide the following documents:
 1. description of the profiles of the people primarily responsible for managing and implementing the project (accompanied by a curriculum vitae)
 2. explanation of activities in company's operations relevant to delivery of the project for at least the last year and
 3. a list of relevant previous projects and/or activities carried out in comparable projects in related fields.

Start-ups / newly established companies can apply, when there is *sufficient support from mother company*

Grant financing

- The Innovation Fund will support **up to 60% of the additional capital and operational costs** of large-scale projects
- The grants will be disbursed in a flexible way based on project financing needs
- Up to **40% of the grants** can be given based on **pre-defined milestones** before the whole project is fully up and running.



Award criteria

1. **Effectiveness** of greenhouse gas emissions avoidance
2. Degree of **innovation**
3. Project **maturity**
4. **Scalability**
5. **Cost efficiency**

1. GHG emissions avoidance

- **Absolute GHG emissions avoidance**

$$\Delta\text{GHG}_{\text{abs}} = \sum (\text{Ref}_y - \text{Proj}_y)$$

Timescale: 10 years from entry in operation

Emissions factors are fixed

Project emissions: related only to energy consumption at the installed power plants (not during manufacturing)

Include cost factors (PV modules vs total system cost ratio)

- **Relative GHG emissions avoidance**

$$\Delta\text{GHG}_{\text{rel}} = \Delta\text{GHG}_{\text{abs}} / \sum \text{Ref}_y$$

- **Third-party validation** of these calculation is required !
- **Annual reporting** on monitoring of GHG avoided will be requested during the project implementation
- **Bonuses** are possible for net carbon removals, other GHG savings from emissions sources that go beyond the IF methodology, commitment to use additional RES.

2. Degree of Innovation

- Innovation in relation to the state-of-the-art

Main innovation can lie:

- in the product (e.g. achieving lower cost when fully mature, higher performance, higher durability, convenience... as compared to the SOTA) or
- in the production processes (e.g. higher use of recycled materials, less use of critical materials, lower environmental footprint, improved automation...)

3.1. Technical maturity

- Technology readiness:
 - Has the proposed technology already been proven in a pilot scale demonstration ?
 - Product qualification
 - Pilot PV system / outdoor tests
 - The characteristics of the proposed plant: are they credible and in line with basic engineering principles?
 - Equipment selection, plant layout
- Technical feasibility of delivering the expected output (e.g. in terms of volume of the products) and, ultimately, achieving the GHG emissions avoidance within its operational environment:
 - Assumptions used for operational characteristics of the plant and expected outputs: have these been selected in a conservative yet accurate manner, i.e. to avoid under/over estimation of the estimated GHG emissions avoidance?
 - Electricity production calculation assumptions: efficiency, bifaciality, degradation rate, etc
 - Volume of products: refer to production and sales roadmap
- Technology risks and proposed mitigation measures:
 - Describe key risks identified in relation to the proposed technology, proposed risk mitigation measures and why they are suitable
 - Focus on major technical risks
 - Risk matrix and risk heat map

3.2. Financial maturity

- Credibility of the business model and business plan:
 - Proposed project business model, including the project competitive advantage, targeted market(s) and products, barriers to entry, market gaps
 - Main revenues and cost assumptions (CAPEX and OPEX). Include a detailed breakdown and description of prices and volumes
 - Strategy to secure key contracts with off takers, key suppliers, etc.
- Robustness of the cash flow projections and project profitability
 - Ensure that the financial projections are coherent with the assumptions of the business plan and across the other application documents
 - Describe project returns over the entire project lifetime with/without the grant and compare it to the WACC
 - Project risks and WACC in line
- Soundness of financial plan:
 - **Project Financial Close must be reached 4 years after signing of the Grant Agreement**
 - Justify the planned date for Financial Close, clearly describe the work packages, milestones and deliverables up to that date and explain how the project will be financially prepared to enter into operation as expected
 - Make sure that grant disbursement is in line with the call text
- Commitment of project funders:
 - Provide corresponding evidence like letters of interest/support, **letters of approval from funders/shareholders** or board confirming the support of the financing plan, including conditions to taking Final Investment Decision
 - Other supports

3.3. Operational maturity

- Project implementation plan covering all project milestones and deliverables:
 - Project milestones: at least **financial close**, **entry into operation** and annual reporting after the entry into operation
 - Provide timeline from signature of the grant up to the end of the operation period
- Project management team and project organisation:
- Permits, Rights, Licences and Regulatory Procedures:
- Ensuring public acceptance of the project:
 - Detailed description of all environmental impacts expected throughout the whole project life cycle (from construction to operation to decommissioning), and associated mitigation measures
- Operational risks and proposed mitigation measures:
 - Describe key project implementation risks
 - Propose convincing risk mitigation measures and explain in detail why they are suitable

4. Scalability

- Scalability in terms of efficiency gains:
 - expected technology cost reductions
 - efficient use of resources or other ways to address resource constraints notably in terms of reduction of use and more efficient use of critical raw materials, biomass and other scarce resources, and in terms of circularity, recycling and recyclability of such resources
- Scalability in terms of further technology or solutions deployment:
 - plans and evidence of planning for further expansion at the project site and the project's possible technology transfer to other sites
 - extent to which the technology of the project can be applied within the sector, regionally or across the EU economy or globally where relevant
 - potential for technology transfer beyond sector
 - related expected additional emission avoidance
 - impacts on economic growth and jobs
 - potential to create new value chains or reinforce existing ones in Europe, in particular with regard to the contribution to the development of strategic autonomy in industrial supply chains
 - positive impacts on competitiveness.
- Quality and extent of the knowledge sharing, communication and dissemination activities initiated by the project at the various project stages

5. Cost efficiency

- Directly calculated from **relevant costs** and GHG emissions avoidance
- Cost efficiency = Grant amount / Absolute GHG emission avoidance during 10 years after entry into operation
- Maximum grant is 60% of total relevant costs
- Relevant costs:
 - “Additional costs” borne by applicants as a result of the application of the innovative technology related to GHG emissions avoidance, in comparison with the state-of-the-art reference process
 - Levelised Cost Product model: RC is equal to LCOP minus reference price minus premium

$$LCOP \left[\frac{\text{€}}{\text{Product}} \right] = \frac{CAPEX + \sum_n^N \frac{O\&M \text{ cost}}{(1+r)^n} + \sum_n^N \frac{\text{Fuel cost, Materials cost etc.}}{(1+r)^n}}{\sum_n^N \frac{Units_{Produced}}{(1+r)^n}}$$

Where:

r = discount rate (WACC)

n = the year

N = lifetime

- Reference price is by default 2-year historic average price for reference technology: PERC PV modules
- Relevant costs for the project can vary hugely depending on the assumptions
- If the cost efficiency ratio is higher than 600 EUR/t CO₂-eq, the score is zero points, otherwise:
12 – (12 x (cost efficiency ratio / 600))

In a nutshell

- IF call is a perfect tool to partially finance a PV manufacturing project
- Competitive process: being good is essential but not enough (cf Horizon Europe projects).
- The evaluation is impartial and transparent, no need to lobby ;-)
- Readiness must be high, you have not time to invent a business plan in three months.
- All criterias are essential, and weighted. So you must be good at everything at the same time.
- Several successes in the PV sector in small and large scale, it is doable !

- Thank you for your attention



Innovation Fund – third call for large-scale projects

Roxana CHESOI, DG CLIMA



Agenda

Presentation of the third large scale call and RePowerEU topics

Practical tips related to the application

Q&A

Key features

Financed from the revenues of the **EU Emissions Trading System**
450 million allowances plus unspent revenues from NER 300 Programme

Volume: **EUR 38 billion*** until 2030 (depending on carbon price)
**at EUR 75 / tCO₂*

Grants: Large projects: Support of up to **60% of additional capital and operating costs** (up to 10 years)
Small projects: **up to 60% of CAPEX**

Grants: **Up to 40%** of grant disbursed at financial close

Grants: **At least 60%** of grant disbursed during construction and up to **5-years** monitoring period against GHG emission avoidance

Pilots and Small scale projects – shorter **3 years** period

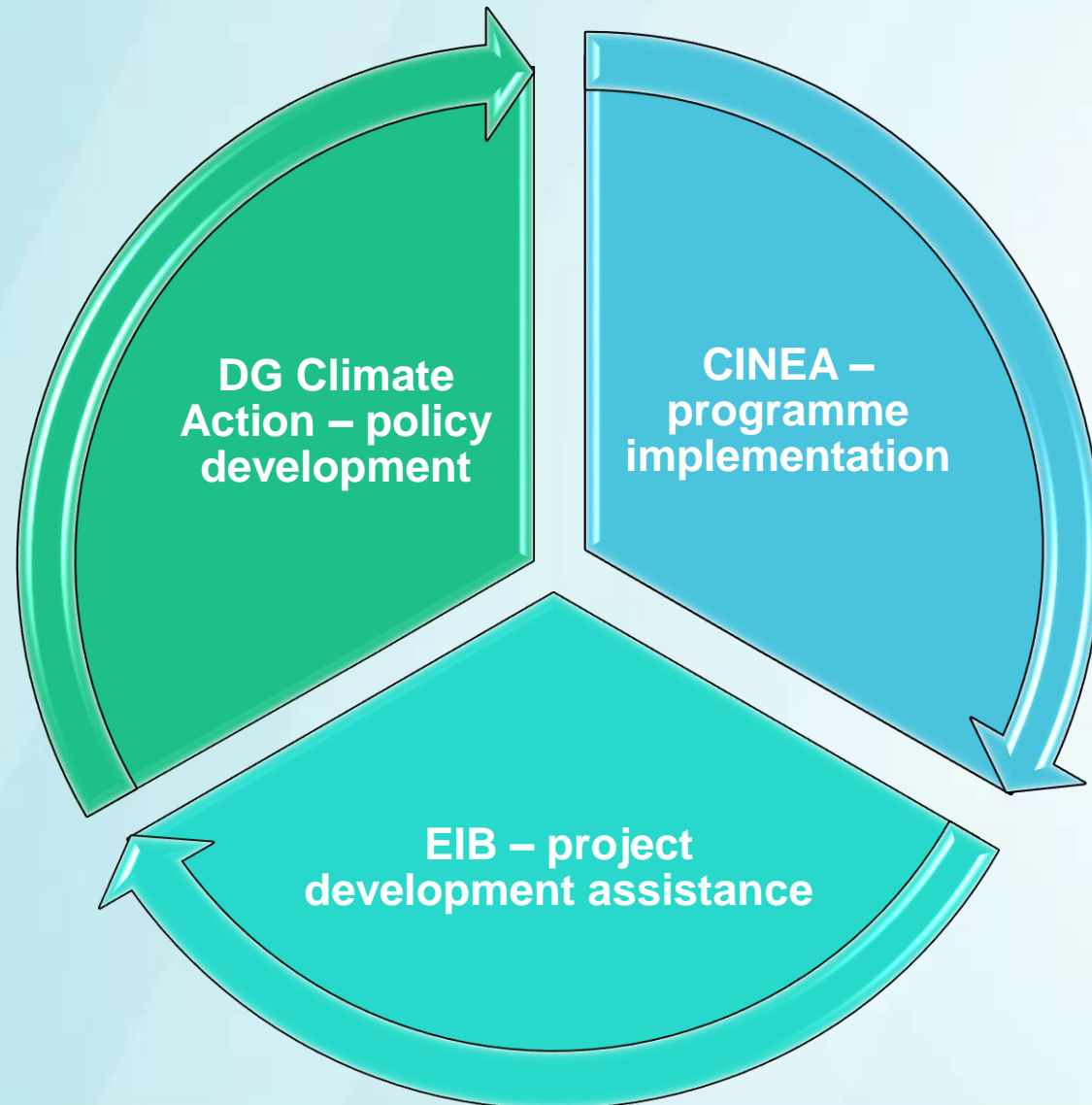
Grants: **Annual calls** for large-scale and small-scale projects

Single applicant or consortium
Projects must be implemented in the EU, NO and IC

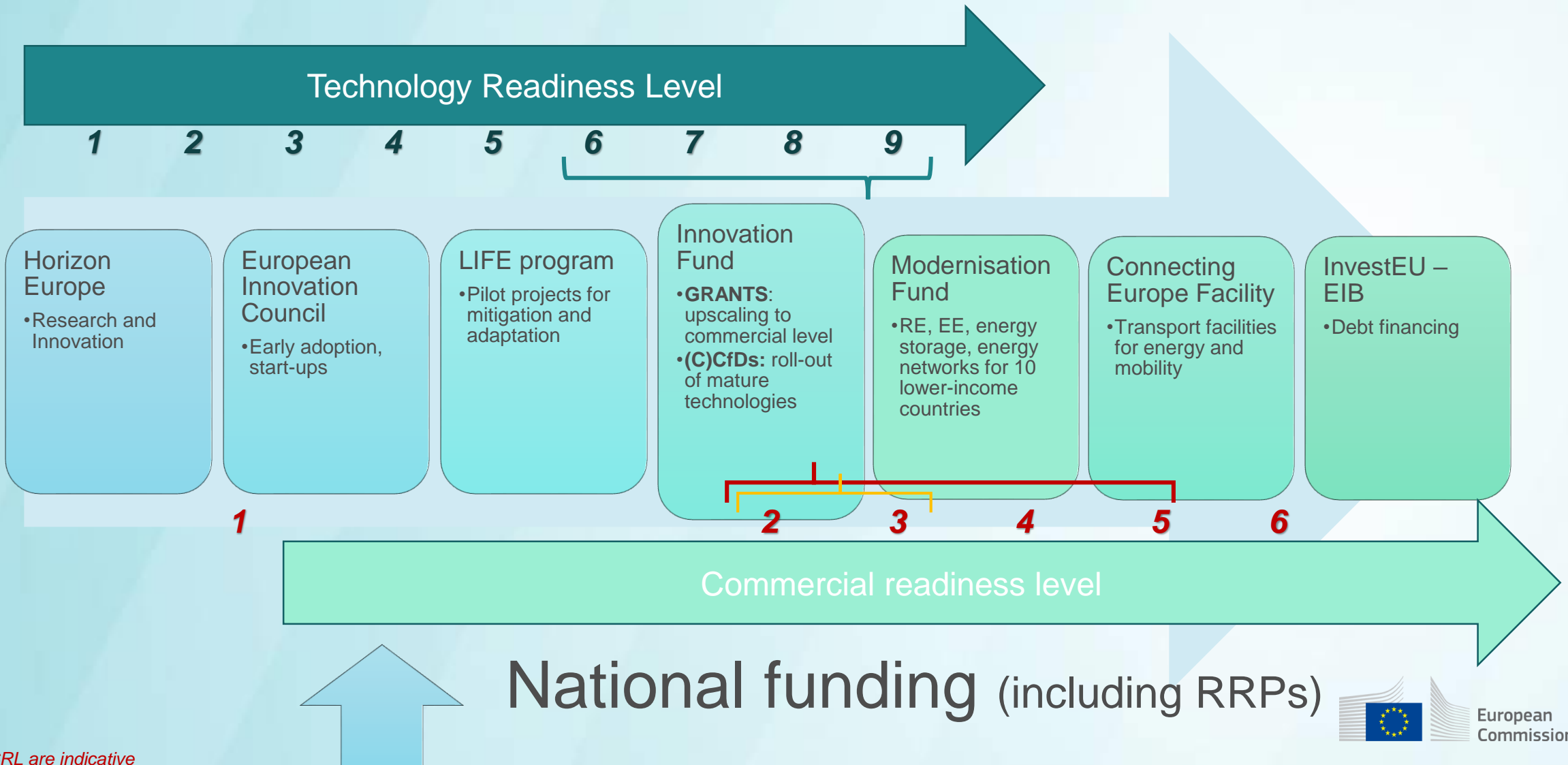
Project development assistance by EIB

Large-scale projects: CAPEX above EUR 7,5 million
Small-scale projects: CAPEX up to EUR 7,5 million

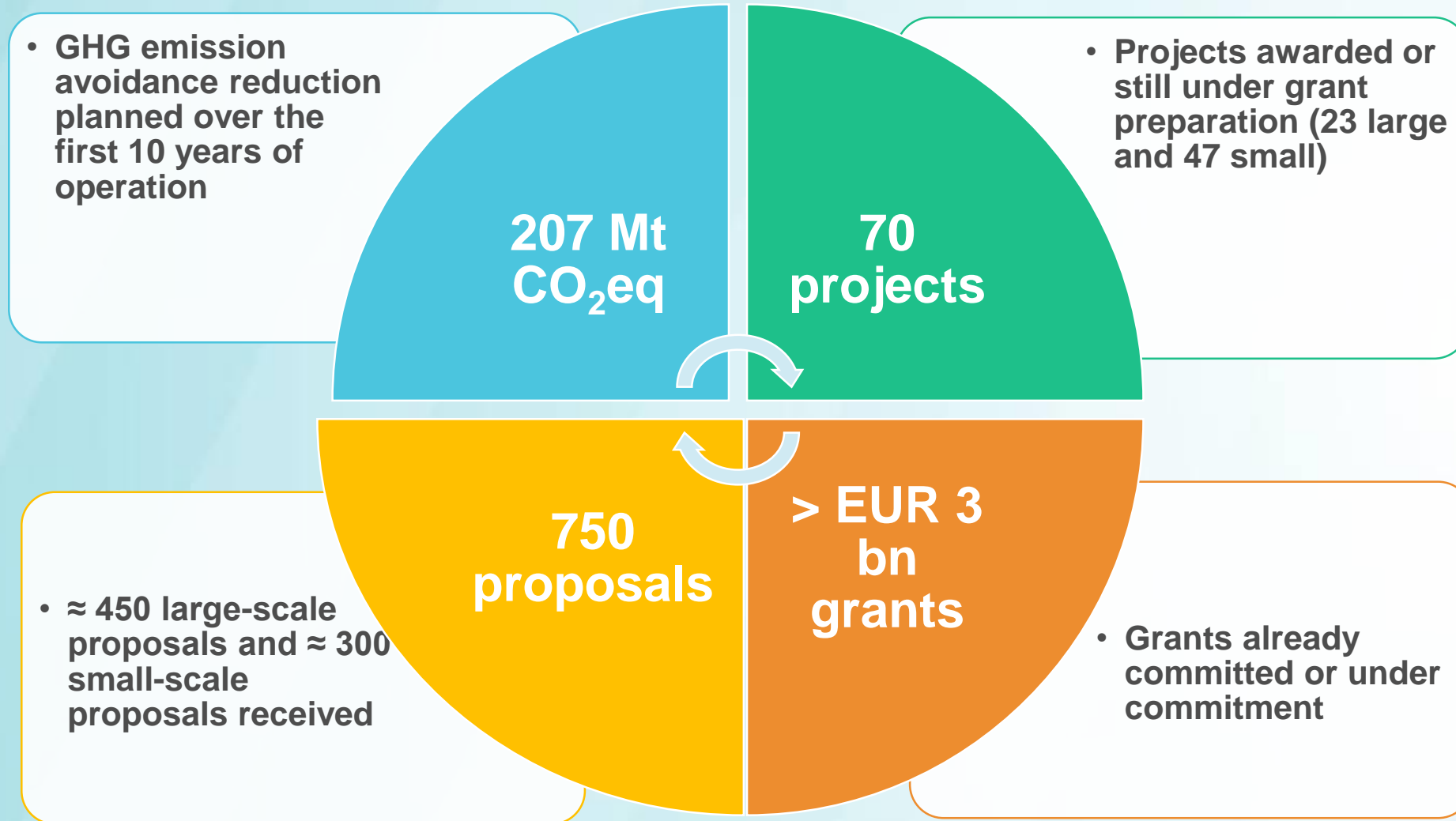
Innovation Fund - Governance



Innovation Fund – targeted project portfolio

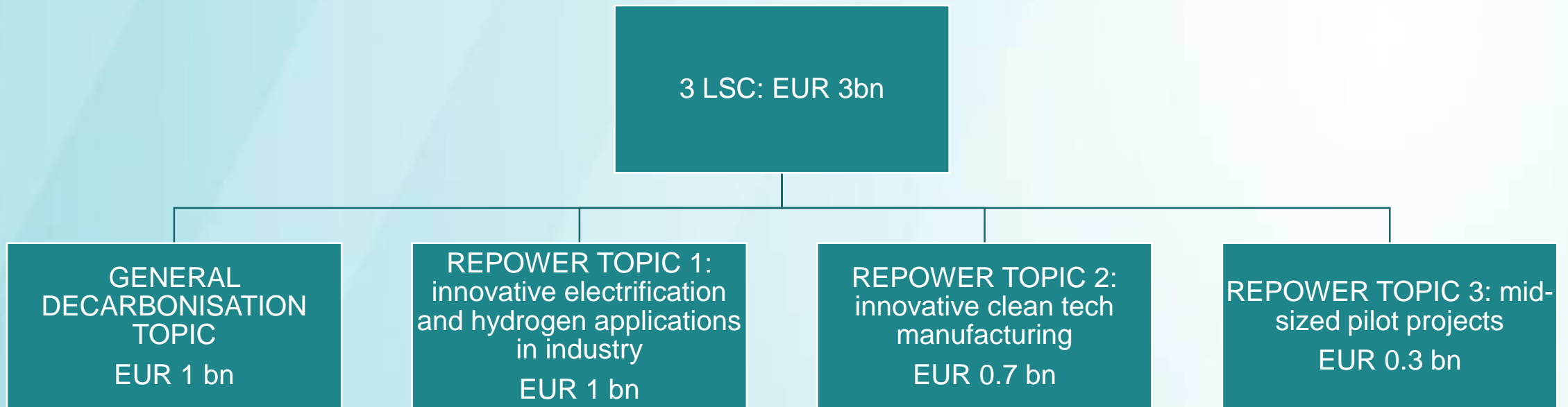


Results achieved (November 2022) – key indicators



Innovation Fund and the REPowerEU Plan

- Budget made available for **3LSC: € 3bn** + 20% flexibility reserve
- In the 3LSC, thanks to **increased budget** and to **reflect the REPowerEU priorities**, the Innovation Fund will become **more focused** by creating 3 dedicated topics
- Launch: 03 Nov 2022, Deadline 16 March 2023, Results Q4 2023



Award criteria

DEGREE OF INNOVATION

- Innovation beyond state-of-the-art
- at European level for LSC
 - at national level for SSC

* **NEW**: consider the ongoing InnovFund projects

GHG EMISSIONS AVOIDANCE

- **Absolute** emissions avoidance (*compared to sector depending on median avoidance*)
- **Relative** emissions avoidance
- **Quality and credibility** of the calculation and minimum requirements

* **NEW**: additional minimum requirement for PILOT projects

PROJECT MATURITY

- Technical maturity
- Financial maturity
- Operational maturity

SCALABILITY

- Efficiency gains: costs & resources
- Further technology or solutions deployment
- Quality and extent of the knowledge sharing plan

COST EFFICIENCY

- Cost efficiency ratio (i.e. the EU contribution requested per tCO₂ avoided)*
- Quality and credibility of the relevant costs calculation

* **NEW**: different formula for PILOT projects

Structure of the 3rd large-scale call

The topics allow to cater for specific **policy priorities**

The topics definitions aim to **benefit numerous/all sectors** eligible under the IF

The topics reserve a **dedicated budget envelope**

The topics make **competition among projects more focused**

RePowerEU topics apply **weighting of award criteria** in order to reflect policy priorities (fast project maturity, higher degree of innovation) and amplify scores of projects that perform best in this respect.

RePowerEU topics have specific conditions (in scope or, in case of PILOTS in award criteria).

Topics were designed not to overlap and **one** project application can be made to only **one** topic.

General Decarbonisation Topic

The following **activities can be funded** under this topic:

- activities that support innovation in low-carbon technologies and processes in sectors listed in **Annex I to the EU ETS Directive**, including environmentally safe carbon capture and utilisation (**CCU**), as well as **products substituting carbon-intensive ones** produced in sectors listed in Annex I
- activities that help stimulate the construction and operation of projects that aim at the environmentally safe capture and geological storage of CO₂ (**CCS**)
- activities that help stimulate the construction and operation of innovative **renewable energy** and **energy storage technologies**.

Carbon capture and utilisation can be funded if the capture of CO₂ occurs within one of the activities listed in Annex I, or if the utilisation of CO₂ results in products substituting carbon-intensive ones from the sectors listed in Annex I, even if carbon is captured outside the activities of Annex I.

REPowerEU Topic: Innovative industry electrification and hydrogen

- **A.** Activities that support the **innovative direct electrification of industry** replacing conventional fossil fuels use, both in sector-specific and cross-sectoral uses.
- **B.** Activities that support **innovative hydrogen production and applications** (i.e. hydrogen use as an energy carrier/reducing agent/feedstock) in industry.
 - **B.1 those where the main innovation lies in the use of hydrogen in industrial applications.** As the focus in this topic is to reduce the use of and the dependence on fossil fuels, the use of fossil fuel-based hydrogen is excluded from this topic.
 - **B.2 those where the main innovation lies in renewable hydrogen production** and production of hydrogen-derived renewable fuels (i.e. renewable fuels of non-biological origin) and feed-stocks.
- Projects can include either one or both of the activities described under B.1 and B.2.

4. REPowerEU Topic: Innovative Clean Tech manufacturing

The following activities can be funded under this topic: construction of manufacturing facilities and their operation to produce specific components for:

- **renewable energy installations** (in photovoltaics, concentrated solar power, on-shore and offshore wind power, ocean energy, geothermal, solar thermal, and others), including their connection to the electricity/heat grid;
- **electrolysers and fuel cells**;
- **energy storage solutions** for stationary and mobile use for intra-day and long duration storage;
- **heat pumps**.

This topic is targeted at **the innovation in manufacturing of components**.

Components, in line with GHG methodology guidance, are to be understood to **include also final equipment** such as wind turbines, solar panels, batteries, heat pumps or electrolysers.

4. REPowerEU Topic: Innovative Clean Tech manufacturing

- Topic is targeting those **components that are a significant factor** in the performance and/or cost of the final equipment.
- Activities relating to the **recycling of critical materials** to be used in the above equipment categories or components thereof may also be funded under this topic.
- Equipment and components can be **sold on the EU market and in third countries.**
- The topic seeks to enhance the Union's innovation and technological leadership in clean tech manufacturing. Activities that can be funded include those where the main innovation lies in the **product as well as in the production processes.**
- Innovation can concern one or several steps of the manufacturing process.

Excluded activities: use of innovative components (including the final equipment) in power/heat generation/energy storage/production of hydrogen. (but see Topic General)

Excluded activities: testing new components/final equipment (but see Topic Pilots)

4. REPowerEU Topic: Innovative Clean Tech manufacturing

Award criteria	Minimum pass score	Maximum score	Weight
Degree of innovation	9	15	2
GHG emission avoidance potential			
Absolute GHG emission avoidance	n/a	2	1
Relative GHG emission avoidance	n/a	5	1
Quality of the GHG emission avoidance calculation, minimum requirements	3	5	1
Total GHG emission avoidance potential		12	
Project maturity			
Technical maturity	3	5	2
Financial maturity	3	5	2
Operational maturity	3	5	2
Total Project maturity		15	
Scalability	9	15	1
Cost efficiency			
Cost efficiency ratio	n/a	12	1
Quality of the cost calculation	1.5	3	1
Total Cost efficiency		15	
Total (without bonus points)	n/a	102	
Bonus points			
Bonus point 1 [Net carbon removals]	n/a	1	1
Bonus point 2 [Other GHG savings]	n/a	1	1
Bonus point 3 [Commitment to use electricity from additional renewable sources]	n/a	1	1
Total (with bonus points)		105	

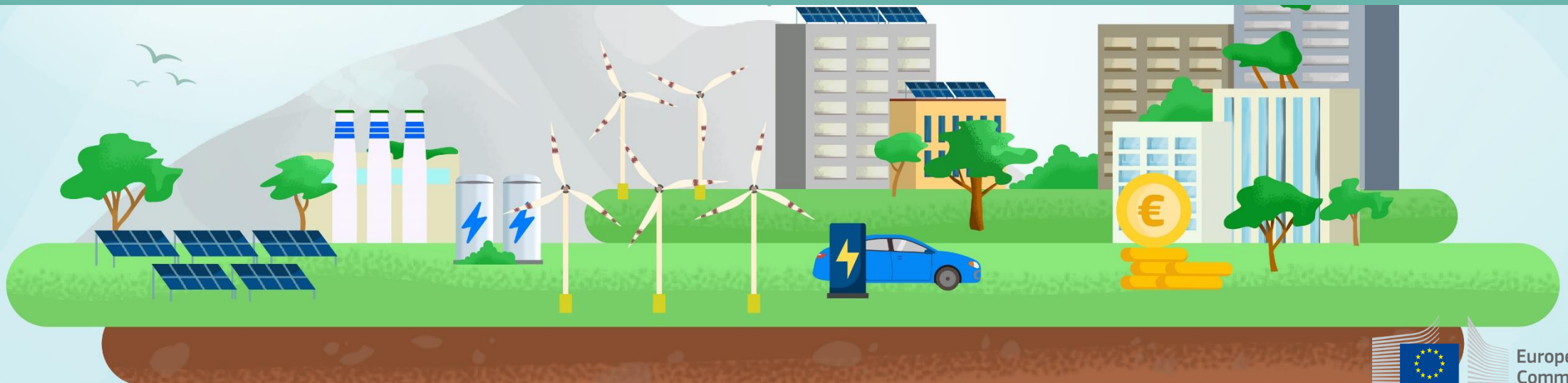
4. REPowerEU Topic: Mid-sized pilots

The following activities can be funded under this topic:

- Construction and operation of **pilot projects that focus on validating, testing and optimising** highly innovative, **deep decarbonisation solutions** in sectors eligible for Innovation Fund support.
 - Pilot projects can thus concern: industrial sectors listed in Annex I to the EU ETS Directive, including environmentally safe (CCU) that contributes substantially to mitigating climate change, as well as products substituting carbon-intensive ones produced in sectors listed in Annex I to the EU ETS Directive or construction and operation of innovative energy or CO2 storage solutions or construction and operation renewable energy installations.
- Activities that can be funded are those that **tackle technical risks** of innovative technologies and solutions, e.g. **optimising process** and operational parameters of the innovation, and/or **improving the characteristics of the final products**.

Innovation Fund 3rd Large-Scale Call - Practical tips related to the application

Ugo SIMEONI, Project Adviser, CINEA
Quentin NERINCX, Financial Engineer, CINEA



Innovation Fund – Solar Portfolio



€ 137.6 Million
EU contribution



4
Countries



12
Beneficiaries

TANGO

CO2-FrAMed

DMC

HELEXIO Line

SUN2HY

AGRIVOLTAIC
CANOPY



Large Scale Call Projects



€ 117.7 Million
EU contribution



25 Million
tCO2eq avoided

TANGO

Development of an industrial-scale pilot line for the manufacture of innovative and high-quality bifacial heterojunction (B-HJT) photovoltaic (PV) cells. The project will scale up production from 200 MW/y to 3 GW/y of B-HJT photovoltaic modules.

Beneficiary Enel green Power Italia Srl, Italy

Small Scale Projects



€ 20 Million
EU contribution



261 513,69 tCO₂eq
avoided

SUN2HY

First small-scale deployment of a pre-commercial plant based on photoelectrocatalytic technology for hydrogen production (capacity of 200 tH₂/year)

Beneficiary Sun2Hy, Spain

DMC

Largest scale in EU for industrial application solar thermal (20MWth), heat storage (4000m³/500GWh) and 2 types of heat pumps

Beneficiary NEWHEAT, Croatia

CO₂- FrAMed

12 distributed stand-alone PV irrigation systems, totalling 7.35 MWp, in the Ebro River Valley

Beneficiary
ACCIONA GENERACION RENOVABLE S.A., Spain

HELEXIO

Manufacturing for innovative BIPV roof components (yearly production capacity up to 220,000 m² of PV module)

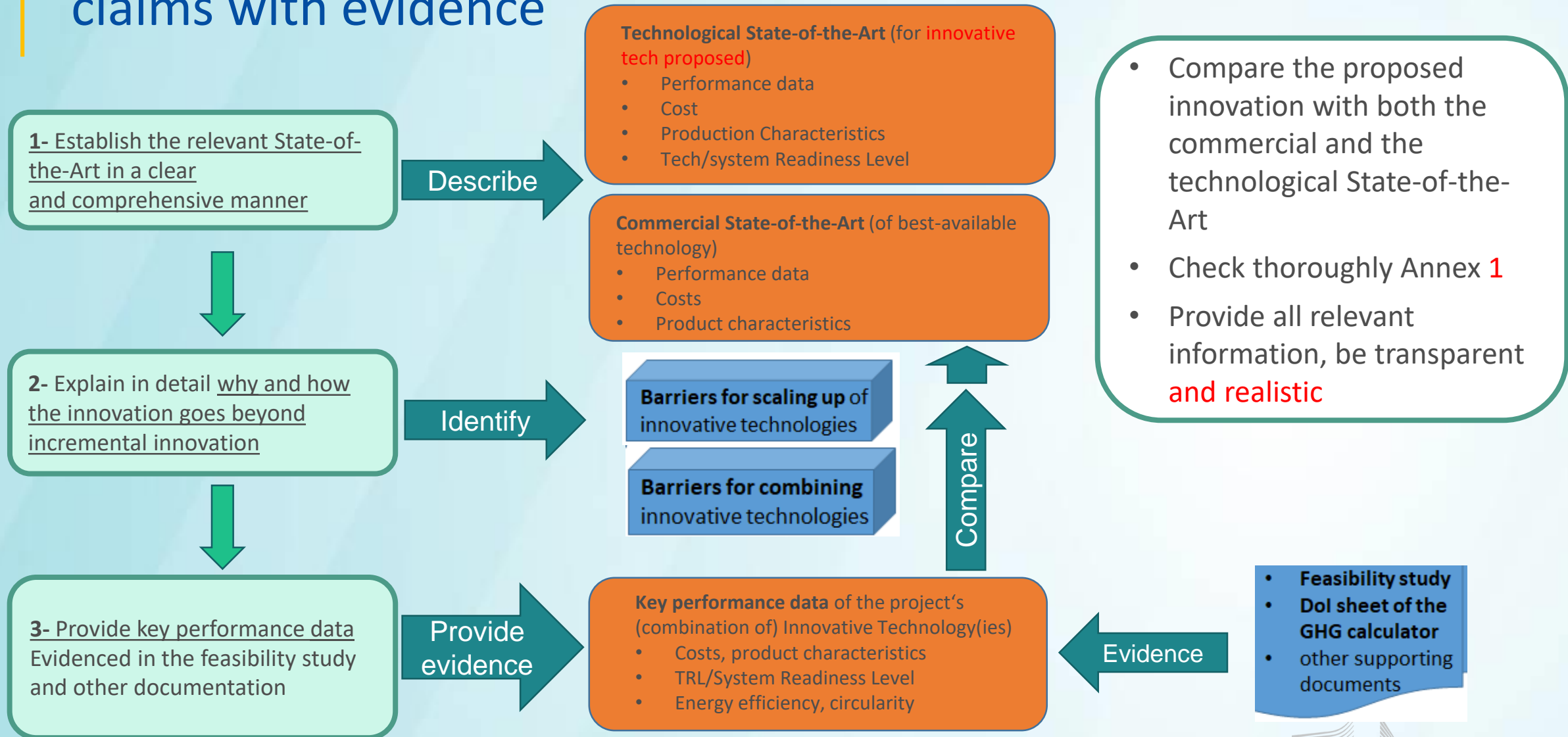
Beneficiary
ARCELORMITTAL CONSTRUCTION FRANCE, France

AGRIVOL ATIC CANOPY

Innovative PV canopy aiming to achieve about 3MW

Beneficiary
TSE, France

Degree of Innovation (DoI): Be exhaustive and underpin your claims with evidence



Main mistakes on GHG emissions avoidance

- Ensure calculations and reporting are aligned with the Innovation Fund specific GHG emission methodology
- Identify the principal product(s), select the correct sector accordingly, reference scenario and applicable methodology section
- Make sure you use the correct emission factor(s) that apply to your project, in line with the methodology
- Deviations from the project boundary, methods, and emission factors are only possible in few limited cases as identified in Annex C to the call text. Make sure your case can use such deviations, and if so document and justify them
- Assumptions have to be robust and properly justified

Technical Maturity

How mature is your technology: **Describe the actual readiness level of your technology/solution**

Resubmissions are welcome, particularly if the readiness of your technology has improved

1 Provide a thorough analysis and technical description

- Be concise and focus on key facts and figures

2 Justify and provide evidence for the claimed expected output, e.g.:











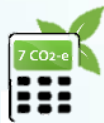
- Evidence and performance data from previous stage/site/pilot
- Third party confirmations, quotes from vendors or suppliers, signed letters of agreements or head of terms

3 Analysis of technical risks and their mitigation is required

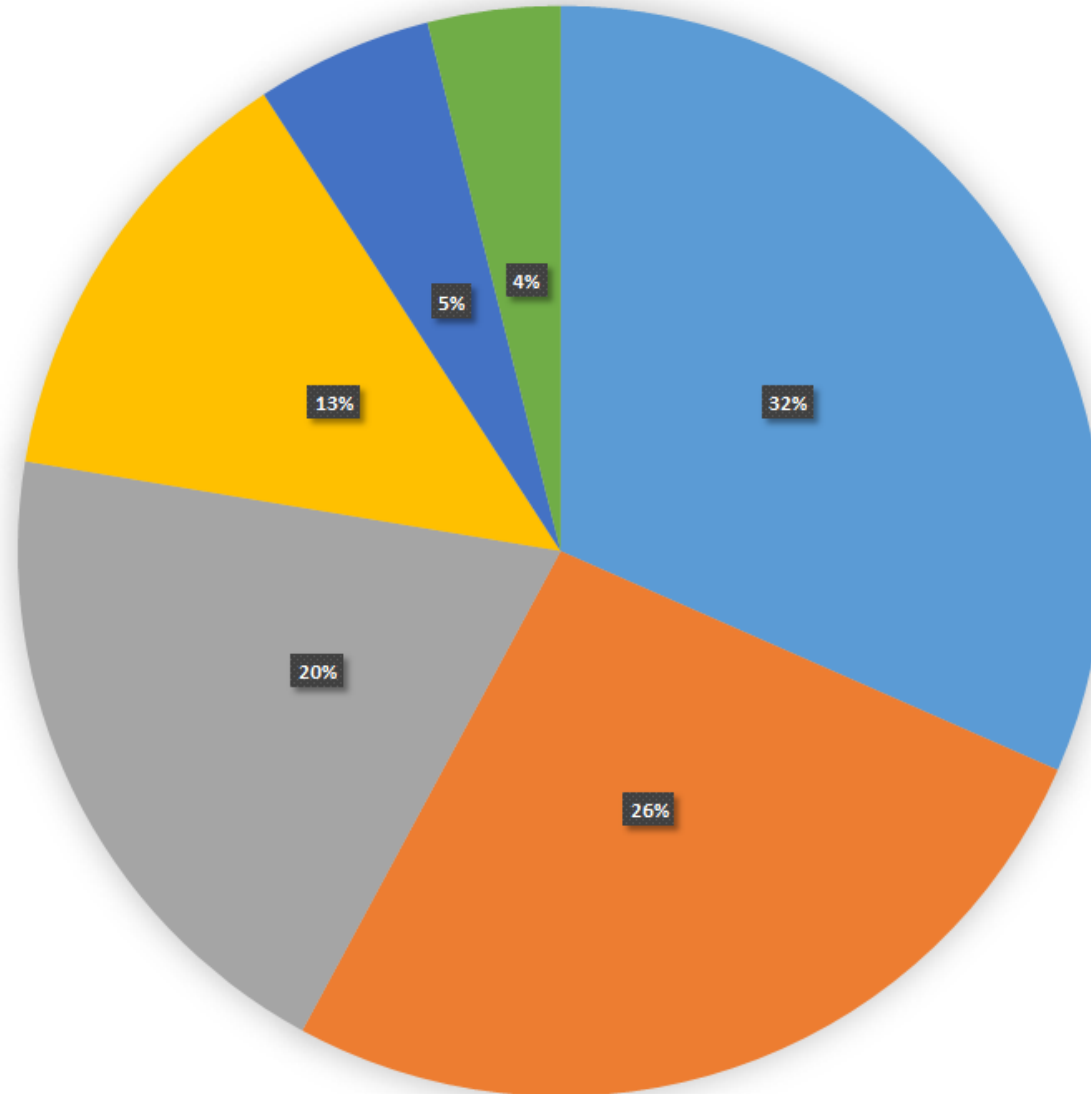
- Use due diligence report when available

Ensure consistency between project implementation plan, feasibility study, business plan and GHG calculations

Technical maturity: Manufacturing HJT and tandem solar cells

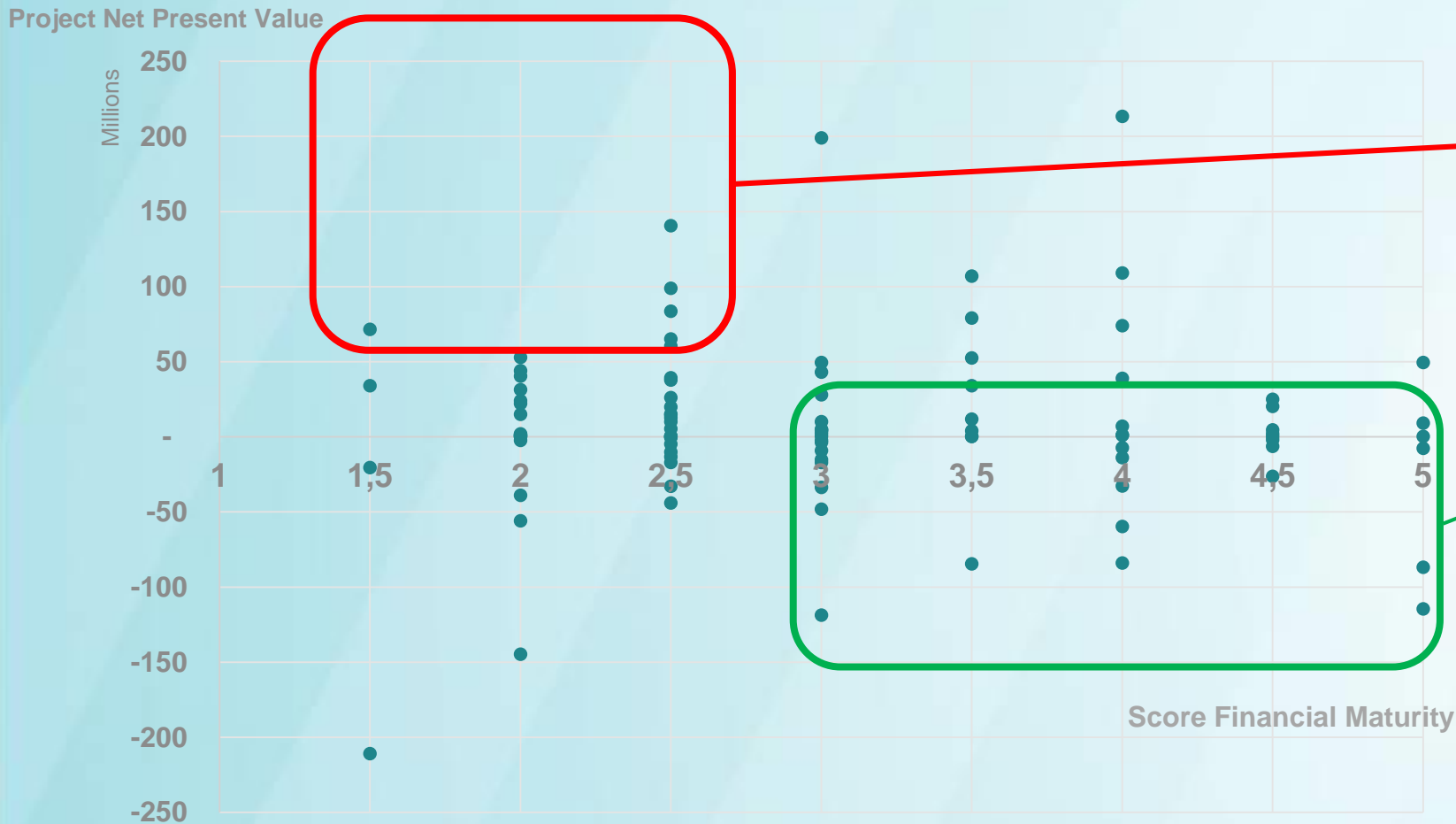
Checklist	Justify evidence with demonstrated TRL 	Provide analysis with performance data 	Ensure consistency among the documents 
Examples	 <p>10 years pilot line operations 100 MW/year</p>  <p>AMPERE H2020 project AUTOMATED PHOTOVOLTAIC CELL AND MODULE INDUSTRIAL PRODUCTION TO REGAIN AND SECURE EUROPEAN RENEWABLE ENERGY MARKET</p>	 <p>Capability cells production (expansion of the facility)</p>  <p>Cells efficiency</p>  <p>LCOE</p>	 <p>Feasibility Study</p>  <p>Business Plan</p>  <p>GHG calculator</p>

Financial Maturity - Most frequent Significant Weaknesses



- The project is not profitable + the financing plan is not credible
- The business plan is not credible + assumptions are not substantiated nor credible
- There are inconsistencies between RC - BP - FMSS - Detailed Business Model
- The WACC is not credible : there are inconsistencies or is not calculated according IF Methodology
- The business and financial risks and their mitigations are not identified nor substantiated
- The scope of the business plan is inconsistent and not substantiated

Profitability is not the whole story



Profitable proposals could be penalized severely if their business and/or financing plans lack credibility

Proposals with low returns could still meet scoring thresholds in particular, if the funders provide strong evidence that they are committed to fund the project

Profitability is only one element considered in the evaluation of financial maturity

The 7 golden rules of FM

1. Clearly outline project scope, legal structure (*) and potential interdependencies with other projects

2. Identify & provide effective mitigation measures for key risks

3. Ensure your business plan is fully funded and provide evidence of funding commitment

4. Follow our guidance on how to calculate your project WACC

5. Give evidence of preliminary contract

6. Substantiate and justify your business assumptions

7. Assess market, competitive landscape and commercialisation



Operational Maturity



Properly associate work packages (WPs) with activities and with their planned costs



Define adequate deliverables, milestones and means of verification



Do not underestimate the risk analysis



Present a detailed and realistic strategy to obtain all relevant permits and licenses



Make sure that the role and responsibility of each entity and party is clearly explained



Ensure consistency

Scalability

Objective: assess the scalability and the knowledge sharing

Scalability in terms of efficiency gains

Scalability in terms of further technology or solutions deployment

Quality and extent of the knowledge sharing

- Efficiency gains:
 - expected technology **cost reductions**;
 - **efficient use of resources** or other ways to address resource constraints notably in terms of **reduction of use** and **more efficient use** of critical raw materials biomass and other scarce resources, and in terms of **circularity, recycling and recyclability** of such resources.
- Scalability in terms of further technology or solutions deployment:
 - at project site and possible transfer to other sites;
 - at sector level, regionally or across the EU economy or globally;
 - + potential for technology
 - transfer beyond sector

Follow the guidance provided in the Application form, section 4

Project fiches for on-going projects

Innovation Fund Dashboard

Updated April 2022

INNOVATION FUND

Driving clean innovative technologies towards the market

Beccs Stockholm: Bio Energy Carbon Capture and Storage by Stockholm Exerg

The Innovation Fund is 100% Funded by the EU Emissions Trading System

COORDINATOR
Stockholm Exerg

LOCATION
Stockholm, Sweden

SECTOR
Bio-electricity

AMOUNT OF INNOVATION FUND GRANT
EUR 180 000 000

RELEVANT COSTS
EUR 608 863 394

CAPEX
EUR 455 661 141

TOTAL PROJECT COSTS
EUR 2 707 463 271

GHG EMISSION AVOIDANCE
7.8 Mt CO₂e

STARTING DATE
01 July 2021

PLANNED DATE OF ENTRY INTO OPERATION
Q3 2026

Project summary

The Beccs Stockholm project will create a world-class, full-scale Bio-Energy Carbon Capture and Storage (BECCS) facility at its existing heat and power biomass plant in Stockholm. The project will combine CO₂ capture with heat recovery, making the process much more energy-efficient than the process in a conventional Carbon Capture Storage (CCS) plant. It will capture and permanently store large quantities of biogenic CO₂, leading to carbon removals from the atmosphere, also called negative emissions. The Beccs Stockholm project has a potential to remove around 7.0 Mt CO₂e over the first ten years of operation. Net carbon removals are seen as an increasingly important technology-based solution to climate mitigation, indispensable to reach climate neutrality in 2050. The project will also be a catalyst for paving the way for a new market of net carbon removals. Besides the actual negative emissions achieved, Beccs Stockholm will also have a positive impact on the balance for renewable heat and electricity, resulting in additional reduction of around 0,8 Mt CO₂e over the same period.

A world-class, full-scale Bio-Energy Carbon Capture and Storage (BECCS) plant

Beccs Stockholm will make use of a novel combination of existing technologies (Hot Potassium Carbonate for CCS and bio-fueled CHP) on a new scale, to develop the first, large commercial BECCS plant in Europe. The HPC-technology is well proven with multiple installations over the years. Its application with flue-gases from a bio-fueled CHP-plant is, however, not tested in full scale. Therefore, Stockholm Exerg has designed, constructed and now operates a smaller-scale R&D facility at the plant site with support from the Swedish Energy Agency with the objective to gain practical experience and results before designing the full scale plant. The Beccs Stockholm implementation will represent the first-of-a-kind global integration of CO₂ capture in an existing combined heat and power (CHP) plant that uses biomass-based fuels. By using the excess heat of the CO₂ capture facility to supply Stockholm's district heating network, the extra energy required for the CCS process (i.e. the energy penalty) will be greatly reduced. This energy penalty is normally in the range of 15-29%, of the energy produced, while Beccs Stockholm will reduce it to a mere 2%. Importantly, 90% of the CO₂ in the flue gas will be captured by use of the HPC technology. Stockholm Exerg selected this CO₂ absorption technology based on several advantages, such as its non-toxicity, the high selectivity for CO₂ and as a result high purity of captured CO₂, its low regeneration heat, and, the compact layout of the technology in comparison to other CO₂ absorption solutions. After liquefaction and buffering, the CO₂ will be transported by ship to an underground storage site in the North Sea (although being part of relevant cost-calculation, this part of the technology chain is not part of the project).

Beccs Stockholm actively supports the climate neutrality goal and multiple European strategies

The scaling up of carbon removal solutions that capture CO₂ from the atmosphere and store it for the long term is vital to achieve the EU objective of economy-wide Climate Neutrality by 2050. Beccs Stockholm will support the achievement of this climate goal by capturing and storing almost 800 000 tonnes of biogenic CO₂ per year, with the aim to further improve the technology in the future. CCS, as well as bioenergy – the building blocks of the project – are among the ten main priority actions of the European Strategic Energy Technology Plan (SET Plan) to accelerate the energy system's transformation. In particular, the SET Plan highlights

that CCS needs to become a cost-competitive technology and gain public acceptance, to be eventually commercially deployed. Beccs Stockholm will remove/avoid the emissions of 7.8 Mt CO₂e of absolute GHG emissions during its first ten years of operation. This is the equivalent to more than the 2018 GHG emissions from public electricity and heat production in Sweden. From the overall emissions removed/avoided, 90% will come from CO₂ capture and storage (removal), and 10% will be associated with renewable electricity and heat generation from a renewable source.

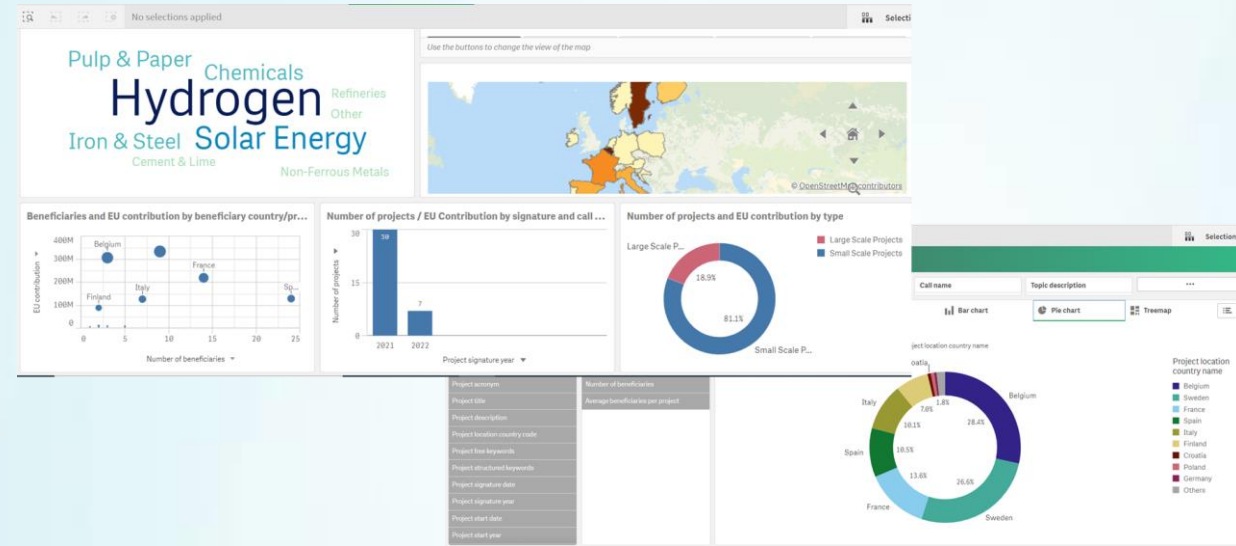
At site-level, the project will implement solutions in line with the Circular Economy Action Plan, using locally-sourced biomass waste, as a feedstock in the electricity and heat generating plant, reusing process water to eliminate or diminish the use of fresh water, and with the opportunity to supply sustainably managed forests with fly ash coming from the co-incineration of the current biomass waste with phosphorus-rich sludge, with the potential to increase Swedish forest sequestration of carbon by 0.45 Mt CO₂e per year. In line with the EU recovery ambition, the project will also create direct jobs locally and outside Sweden, acting as a springboard for many more highly-skilled engineering, construction and operation-related jobs throughout the CCS value chain.

Measures taken during the preparation phase increased the support of the project among citizens, living as close as 1.40 metres from the facility. For Stockholm Exerg, nurturing a strong and transparent relation with citizens, is and has always been a priority. One example of this, was the launch of a public acceptance survey at an early stage in the project's planning. This is an essential prerequisite for successful implementation within the boundaries of a populated city. Stockholm Exerg, which is already active in the field, will continue its efforts to establish a market for net CO₂ removals as a novel product. This will make the net carbon removals at Beccs Stockholm profitable for a CHP-plant, paving the way for other actors to join.

Strategic location to support scalability and technology transfer

The Beccs Stockholm technology can be replicated in other sites. For example, two locations have already been identified in the region where the solution could be implemented by 2030. These two sites have the potential to avoid 1.1 Mt CO₂e per year, of which 0.8 Mt from biogenic sources, thereby contributing to the necessary net carbon removals foreseen by relevant scenarios reaching climate neutrality.

The solution also has the potential to be scaled up across the economy, by replicating the technology in other industries, such as the pulp and paper industry, waste incinerators and heat plants. The project overall will help to establish a new European market for net carbon removals. By contributing to the establishment of all necessary links in the CCS value chain in Northern Europe including transport by ship of the CO₂ for storage in saline aquifers or depleted gas/oil-fields in the North Sea basin, Beccs Stockholm project – are among the ten main priority actions of the European Strategic Energy Technology Plan (SET Plan) to accelerate the energy system's transformation. In particular, the SET Plan highlights



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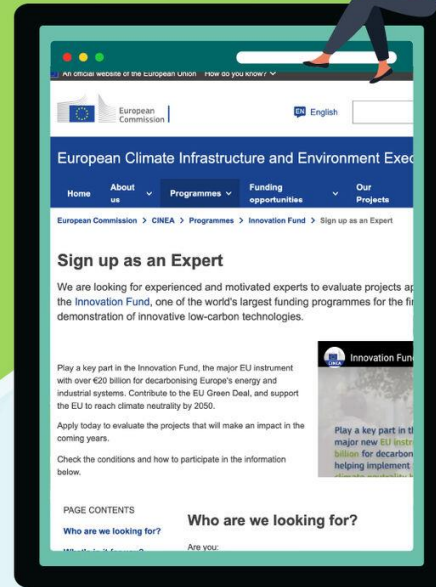
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Forthcoming events

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Clean Tech
conference

8 February 2023



European Framework
Programme for R&I -
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Synergies Workshop

16 March 2023 17:00



**Large-scale call
Submission Deadline**

Where to find more information?



All (past) call documents available on the **Funding and Tenders Portal** including:

- ✓ Guidance and calculation tools on GHG emissions and relevant costs
- ✓ Frequently asked questions

<https://europa.eu/!QB67by>



Further info, planning of new calls, recorded webinars and videos available on the IF Website:

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