European Innovation Council

PATHFINDER CHALLENGE

Biotech for Climate Resilient Crops and Plant-Based Biomanufacturing

EIC Work Programme reference: HORIZON-EIC-2025-PATHFINDERCHALLENGES-01-01
Call deadline date: 29/10/2025
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EIC will hold an Info Session on this Pathfinder Challenge topic in spring 2025. You will be able to find the information about the Info day, when it is available, at Events - European Commission. Participation in the meeting, although encouraged, is optional and is not required for the submission of an application. A recording of this Info Session will be made available on EIC Pathfinder Challenges 2025 - European Commission**.**

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1. About this document

The Challenge Guide serves as guidance and background for the common understanding, participation rules and obligations for the EIC beneficiaries that are involved in the Challenge Portfolio. Contractual Obligations are further detailed in the EIC Work Programme 2025.

The Challenge Guide is a guidance document accompanying a topic of the Pathfinder Challenge call for proposals to provide further information about how portfolio considerations will be considered in the evaluation of proposals for that topic.

The Challenge Guide is prepared by and under the responsibility of the relevant EIC Programme Manager (information about the EIC Programme Managers is available on the EIC Website (https://eic.ec.europa.eu/eic-communities/eic-programme-managers_en). It complements the Scope, Specific Objectives, Expected Outcomes and Impacts, and Specific Conditions set out in the EIC Work Programme by a description of the additional categories and the portfolio considerations that will be used in portfolio building and explains how a portfolio will be built. Please note that in no case does the Challenge Guide contradict or supplant the Work Programme text.

Following the selection of a proposals to be funded under the Challenge, the Programme Manager will work together with the consortia of the selected projects to develop a strategic plan for the Challenge, including a common roadmap. This strategy plan will integrate the activities and milestones of the individual projects into a shared set of objectives and activities across and beyond the projects. It serves as a common basis for the project portfolio and may affect the project implementation - including possible adjustments, reorientations, or additional support to projects. The strategic plan will be updated in light of emerging results or issues during the implementation.

2 Scope and objectives of the Challenge as defined in the Work Programme

This section is a copy of the Challenge call in the EIC work programme text. Proposals to this Challenge are expected to explain how they relate to and intend to go beyond the state of the art, and how they interpret and contribute to the objectives of the Challenge.

Background and scope

Land based agricultural production is the source of approximately 95% of human food nutrients (UN FAO). Intensive and often inappropriate practices in agriculture have however resulted in severe soil degradation, thereby reducing the capacity of soils to support food production and other important ecosystem services such as the regulation of water, nutrients, and carbon cycles. Soil degradation is further accelerated by the effects of climate change, with abiotic stresses such as heat, drought, salinity, and waterlogging, often in combination, having negative effects on the world's crop production. The direct impact of a changed climate is also frequently accompanied by indirect impacts due to alterations in the composition and behaviour of weeds, insects, pathogens, and soil microbiome, alongside the impacts of increased amounts of human-generated pollutants.

Plants react to such stresses with what are often conflicting physiological and metabolic responses. These may prioritise one acclimatisation/adaptation strategy over the other, a blend of one or more

responses, and/or through developing a completely new strategy, all of which can, in turn, impact final production including nutrient content.

When combined with an increasing human population, likely to increase net demand for food, there is a clear rationale to reinforce existing food and nutrient production systems and explore complementary routes to food production that are more efficient, resilient, sustainable and maintain or increase biodiversity.

This Pathfinder Challenge therefore aims to support projects that enhance adaptation pathways for the production of climate-resilient crops and develop alternative pathways to produce high value ingredients in plants by increasing nutrient profile of crops based on plant native and/or non-native ingredients.

Specific objectives

Innovative ideas put forward under this Challenge must go beyond incremental changes to the state-of-the-art and result in novel production processes that must deliver energy- and resource-efficient, low emission foods that maintain or increase biodiversity and are integral to a healthy diet.
Funded projects are expected to develop breakthrough technologies that reach TRL4 (validation in laboratory environment) with viable plants at the end of the projects. The proposals should work on both the following objectives:

- Increasing plant growth, yields and resistance to stress through:
    - Enhancing tolerance to stress combinations occurring due to different climate scenarios that include the simultaneous exposure of crops to different stresses e.g. heat combined with drought, salinity, flooding, high CO2 levels, as well as indirect effect of climate change via altered composition and behaviour of weeds, insects, pathogens and soil microbiome and possible impact of human-generated pollutants.
    - Increasing water use efficiency and nutrient use efficiency compared to current crops in commercial use.
    - Improving plant reproduction and seed filling processes under unfavourable conditions caused by combination of at least two stress factors.
    - Investigating and enhancing plant and soil microbiome interactions.
- Substantially increasing the nutritional value (e.g. proteins, vitamins) in crops through plant native and non-native ingredients in crops.

Projects must also develop a complete methodology for assessing the increase of plant growth, yields, and climate resilience to single and multiple stresses, and/or assess changes to the nutritional value of crops, as appropriate. Proposals should include multi-omics approaches including genomics, transcriptomics, proteomics, metabolomics and phenomics. These approaches can be further underpinned by leveraging technologies such as, but not limited to nanoparticle technology, chemistry, and advanced artificial intelligence to develop and introduce novel defence and acclimation strategies, currently not present in crops to achieve greater tolerance to harsh environmental conditions and/or biomanufacturing of non-native ingredients, to enable the time required for that development to be significantly shortened. Proposals should also look to address the narrow genetic diversity of novel crops and are also expected to consider regulatory aspects and to build on the work carried out so far by the European Food and Safety Authority (EFSA), where appropriate.

Expected outcomes and impacts

In support of Building the future with nature: Boosting Biotechnology and Biomanufacturing in the EU[1], the Mission Soil[2], the EU Green Deal[3], Farm to Fork strategy[4], , the Nature Restoration Law[5], Fit for 55[6], and REPowerEU[7] policy actions, the key overall goal of this Challenge is to support the production of sustainable and nutritious food from plants.

This Challenge aims to support the development of climate smart crops and the production of high value plant native and non-native ingredients in a cost-effective and environmentally friendly manner. In the medium to long-term this will:

- Improve the sustainability, efficiency, biodiversity and resilience of the European food supply chain.
- Secure long-term competitiveness of EU Food supply chain while decreasing EU dependency on imports of inputs for primary production, feed, and food.

The following principles will be used to select the portfolio of projects:

i. Selected projects for the portfolio should have a synergy with one another in terms of a common component, for instance projects address similar stress factors for different crops or are leveraging a similar technology.
ii. A balanced representation of native and non-native ingredients.
iii. A balanced representation of conventional and New Genomic Techniques (NGTs).
iv. Diverse type of crops to ensure that the portfolio covers a broad spectrum, if possible, ensuring European geographical coverage where these crops are grown.
v. Diverse stress factor combinations to ensure that a broad spectrum of stress factors is covered.
vi. Diversity in technological approaches to compare their efficiency.

All projects will participate in a work package dedicated to the development of monitoring and prediction methodologies for climate adaptation assessment and life-cycle-analysis.

3 Portfolio considerations for the evaluation of applications to the Challenge

This section describes how portfolio considerations will be taken into account in the second evaluation step. For more details of the full evaluation process please refer to the EIC Work Programme 2025 pages 28-35.

[1] https://ec.europa.eu/commission/presscorner/detail/en/IP_24_1570
[2] https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/soil-deal-europe_en
[3] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/story-von-der-leyen-commission/european-green-deal_en
[4] https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en
[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401991
[6] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/delivering-european-green-deal/fit-55-delivering-proposals_en
[7] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

After the submission of your proposal, it will be evaluated in two steps:

1. The EIC expert evaluators will assess each proposal separately against the award criteria and the EIC evaluation committee will ensure consistency across scores.
2. The EIC evaluation committee, consisting of EIC expert evaluators and an EIC Programme Manager will map all the proposals above the threshold in a number of categories, sub-categories and elements stemming from the overall goal and specific objectives of the Challenge. Examples of possible categories are building blocks or subsystems, technical areas and/or competing technologies, platforms, applications areas, risk level and stage of technology readiness level, size, etc.

Following this mapping of proposals against categories, a suitable portfolio of proposals will be selected by the evaluation committee by applying portfolio considerations to propose for funding a coherent set of projects that will achieve the expected outcomes and impacts of the Challenge and maximise their impact.

Categories

All proposals of which the assessment in Step 1 of the evaluation process resulted in a score above the threshold will be mapped to the following four categories:

1. Crops such as but not limited to potatoes, wheat.
2. Stress factors combinations such as but not limited to combinations of heat, drought, salinity, flooding, high CO2 levels, altered composition and behaviour of weeds, insects, pathogens and soil microbiome, human-generated pollutants.
3. Native or non-native ingredients increasing the nutritional value of the crop such as but not limited to increasing content of potato native protein patatin, introduction of non-native ovoalbumin in potatoes.
4. Methodological approach used, e.g. conventional breeding technologies and New Genomic Techniques. Leveraging technologies such as, but not limited to genomics, transcriptomics, proteomics, metabolomics and phenomics. nanoparticle technology, chemistry, and advanced artificial intelligence to speed-up the selection process,

Portfolio considerations

The process of building a balanced and impactful project portfolio will adhere to the following principles:

1. Selected projects for the portfolio should have a diversity in crops as much as possible and should ensure European geographical coverage where these crops are grown, if applicable.
2. At least two main groups in the portfolio will be selected, each one focusing on a specific stress factor combination.
3. A balanced representation of native and non-native ingredients will be sought.
4. In addition, a diversity in core and leveraging technologies will be aimed for.

4 Implementation of the Challenge portfolio

Once funded, projects will be expected and obliged to work collectively during the implementation of their projects under the guidance of an EIC Programme Manager. This section summarises some of the key aspects of this pro-active management which applicants should take into account in preparing their proposals.

Proposal preparation and Grant negotiations

Applicants may be requested to make amendments to their proposed project in order to take into enhance the portfolio. Such changes may for instance include additional tasks to undertake common/ joint activities (workshops, data exchanges, joint research, etc) with other projects in the portfolio.

Based on first experience, it is proposed to foresee in your proposal a dedicated work package for portfolio activities and to allocate at least 10 person-months (see below for the purpose and examples of such activities). Annex 1 provides a template for such a workpackage. It is currently used by projects selected in the context of the Pathfinder Challenges of the EIC Workprogramme from 2023. You are encouraged to use this template.

If you fail to do this during proposal time, your proposal will not be scored lower during the evaluation, but in case your proposal is selected for grant agreement preparation, you will be requested to add the portfolio work package to your grant agreement. Please be aware that in that case the maximum grant you receive will not change, and you will need to find the resources for portfolio activities within the foreseen project budget.

It is also proposed that in your proposal you make a self-assessment of how your proposal maps to the categories used for portfolio building by adding the following table. The evaluation committee will confirm or update this and use it in the step 2 of the evaluation.

Portfolio activities

The aims of the portfolio activities are:

1. **Enhancing the development potential of each individual project, as a result of its active participation in the portfolio activities:** Ensuring that portfolio members, can access a much higher number of relevant partnerships.
2. **Enhancing the commercialisation potential of each individual project, as a result of its active participation in the portfolio activities:** Ensuring that portfolio members, can access the right industry partners to explore key partnerships.

In order to accomplish the above the Programme Manager will guide the projects to develop and agree on a strategic plan for the portfolio.

Portfolio Strategic Plan

Following the selection of a proposals to be funded under the Challenge, the Programme Manager will work together the consortia of the selected projects to develop a common strategy plan/roadmap for the Challenge. This plan will integrate the activities and milestones of the

individual projects into a shared set of specific objectives and activities across and beyond the projects. The roadmap serves as a common basis for the project implementation - including possible adjustments, reorientations, or additional support to projects. The roadmap will be updated in light of emerging results or issues during the implementation. The objectives can be revised, for instance based on projects' unexpected achievements, new technology trends, external inputs (other projects, new calls…).

In particular, the Challenge roadmap/ strategy plan will include activities on the transition to innovation and commercialisation, and to stimulate business opportunities. These activities may be reinforced during the implementation with additional funding and expertise through pro-active management. Non-exhaustive examples of activities towards the above-mentioned aims are:

Non-exhaustive examples of activities towards the above-mentioned aims are:

Technology:

- Comparing performance of technologies, developing common benchmarks and standards.
- One project may use the results of another project, building future value chains.
- Providing access to Open Innovation Test Beds and other research infrastructure to validate the technology.

Regulatory:

- Portfolio activities that support, inform, participate in discussions around, or identify gaps in on-going legislative processes.

Transition of technology to innovation

- Portfolio activities developing techno-economic views on the future implementation, adoption, and scaling potential of the various technologies in realistic real-world conditions.
- Market analysis: Map the targeted players in a market and exchange the market research analysis results with other the portfolio projects to identify specific players with which the entire portfolio can establish partnership(s) of much higher impact as opposed to that of the individual project.
- Discussions on IP, licensing and business models and commercialisation strategy.
- Discussions with early stage private and corporate investors focused on relevant fields.
- Providing access to new markets through multipliers like Enterprise Europe Network.

Ethics

- Discussing the relevant for the Challenge ethics issues, especially when within the portfolio there are projects, subject to ethics reviews.
- Perform activities that support, inform, and participate in discussions around the process of putting forward relevant ethical principles and discussing the appropriate approaches for compliance.

Communication and dissemination:

- Effectively communication of any key outcome of the research work of the portfolio members collectively and/or an individual project, to early stage private and corporate investors focused on the same field. Such communication might also be addressed to the general public to increase social acceptance for proposed solutions, or to other researchers and stakeholders through common dissemination activities at scientific conferences or trade fairs.
- Organising joint conferences, workshops, summers schools, etc.

These tasks require the active participation of portfolio members to a series of meetings called for and steered by the Programme Manager. Portfolio projects will be expected to exchange information on the proposed research methodologies, experimental tests, techno-economic input data and relevant results achieved, to collectively use the available resources. This exchange of data between portfolio members can enhance the potential of individual projects, use of results originating from the analysis of common databases, as well as their chances to establish key partnerships.
The exchange of information for the purpose of EIC portfolio activities will fall under the conditions and non-disclosure obligations as specified in the EIC Work Programme 2025 (Annex 6, section 2).

Tools though which projects can receive additional support

Projects in the portfolio may be offered additional support, either individually or collectively, in order to reinforce portfolio activities or explore the transition to innovation. Such additional support includes:

- Booster grants of up to €50k (see Annex 5 of the EIC Work Programme).
- Access to additional EIC Business Acceleration Services (see https://eic.ec.europa.eu/eic-funding-opportunities/business-acceleration-services_en)
- Access to the Fast Track to the EIC Accelerator, which would follow a project review (see Annex 3 of the EIC Work Programme).
- The possibility to apply for EIC Transition if your Pathfinder project resulted in an experimental proof of concept (TRL 3), or a technology validated in the lab (TRL 4)
- Access to the EIC Market Place, once operational, to connect with innovators, investors and other selected partners.
- Interactions with relevant projects and initiatives outside the portfolio, including other EU funding initiatives as well as those supported by national, regional or other international bodies.

5. Annex 1: Template workpackage portfolio activities

WPX PORTFOLIO MANAGEMENT
Start Month 1, End Month (full project duration)
Objectives
Explore synergies and collaborations among the projects of the portfolio, to maximize the achievement of the scientific results, the exploitation potentials, the outreach opportunities with key stakeholders, the identification and overcoming of major barriers to introduce the innovation to the market ….
Specific objectives:

- **Contribute to the elaboration of the strategic plan** of portfolio and sub-portfolio activities, which is composed by a list of the specific **techno-scientific joint collaborations** between two or more portfolio projects, with the respective timeline and expected achievements. Potential synergies identified by a comprehensive in-depth analysis of shared components and complementarities amongst the portfolio members is expected to unlock additional value for each portfolio member.
- Developing a common understanding within the portfolio members of the existing and developing **regulatory environment**) in view of the future implementation of the technologies that are developed by the portfolio members. By identifying regulatory barriers for innovation, the portfolio of projects can jointly contribute to potential improvements and further development of the regulatory framework. Through common communication activities addressed at policy makers and other relevant stakeholders such as dissemination at scientific conferences or trade-fairs, social acceptance for proposed solutions can be increased, and regulatory barriers for innovation can be highlighted.
- **Sharing life cycle analysis and life cycle thinking and developing novel/common metrics or ways of benchmarking** the potential environmental impact associated with each solution is expected to contribute to the acceptance and future implementation of the technologies developed by the portfolio members.
- **Define common scenarios and strategies for commercialization and exploitation.** Identify key stakeholders such as relevant end-users, investors, supply-chain actors. Effectively communicate key outcomes of the research work of the portfolio members collectively and/or as individual project to early stage private and corporate investors focused on the same field to attract early feedback. Exchanging such techno-economic insights and commercialization scenarios with other portfolio members is expected to have more impact than individual projects can achieve and may also trigger new partnership(s). Also, collective understanding of IP strategies and IP management is expected to add portfolio value to each project.

Description

Task X.1: Portfolio management and governance This task will require regular meetings and exchanges among the portfolio projects, to identify collaborations on specific technical aspects and exchange of information, best practices, strategies, etc.. A steering committee where each project is represented will be set up and steered by the Programme Manager. It will include the kick off meeting and the annual portfolio meeting in presence, and additional regular online meetings. 4 WGs will be set up to organize and implement activities in: WG1: Technological synergies; WG2: Regulatory environment, outreach events and awareness practices; WG3: LCA activities and WG4: Commercialization, exploitation, IP protection. Each consortium will nominate a representative for each WG. A chair will be nominated from among them. The chair will be responsible to prepare meeting agendas, links to the meeting and minutes of the meetings. WG Meetings are expected to be online and to be scheduled approximately every 3 months. The exchange of information for the purpose of EIC portfolio activities will fall under the conditions and non-disclosure obligations as specified in the EIC Work Programme 2023 (Annex 6, section 2.2).

Task X.2: Portfolio actions to foster collaboration towards innovation. This task will create opportunities to nurture innovations arising from portfolio collaboration, for example: common understanding of license agreements, EIC Business Acceleration Services, access to coaching and mentoring, European IP Helpdesk services, access to additional funding opportunities such as the EIC Booster grant. To stimulate innovation opportunities, the projects shall be involved in actions aimed at strengthening the EU research community. Therefore, this task can also include: the mapping and categorization of all the stakeholders and potential establishment of key

partnership(s), the sharing of best practices, the exchange of researchers, access to research facilities, etc.

Task X.3: Implementation of portfolio dissemination and communication activities Design and participate in outreach events (e.g., stakeholder matchmaking, industry trade fairs) at the portfolio level to facilitate connection with stakeholders and to showcase the technologies under development. Meetings could be restricted to portfolio beneficiaries (e.g., to discuss the progress of the portfolio as a whole) or could involve external participants (e.g., to facilitate successful completion of shared objectives by interaction with regulatory entities). Early-on common and continuous engagement with strategic AEC sector stakeholders to raise awareness of the possibility to reduce emissions by reducing and changing traditional build materials with computational design and digitalized fabrication is foreseen.

Task X.4: Techno-economic benchmark and comparative assessment Compare LCA practices and metrics of the different projects and analyse the performance of the proposed solution with the other portfolio technologies using common agreed metrics and KPI and produce a portfolio report on competitiveness, business potentials in different market segments and key barriers towards innovation of the portfolio technologies in comparison to benchmark.

Task X.5: Implementation of portfolio protection and exploitation activities Mapping, landscaping, categorization, and analysis of patents and include if needed the establishment of key partnership. Early on and continuous engagement with strategic partners and stakeholders (e.g., investors and corporations) with the aim to catalyse potential R&D opportunities and to commonly tackle investment barriers. Design and participate in events at the portfolio level to facilitate connection with stakeholders or fundraising with private stakeholders (e.g., corporates or financial investors). Exchange of the market research analysis results in between the portfolio projects.

Task X.6: Portfolio Strategic plan and other common documents: Elaboration of the portfolio strategic plan under the guidance of the Programme Manager and updated on a yearly basis. It will contain details of the techno-scientific collaborations and synergies of the portfolio projects (could be only one or more projects). It contains the actions already carried out, but also an overview of upcoming actions in the form of a roadmap. It will specify the common documents that the projects will deliver because of the other tasks specified in this work-package. Individual projects do not need to add these documents as a deliverable, they explain the contribution that they made to this report in their corresponding annual deliverable "Report on portfolio activities". A public version of the strategic plan will be published on the EIC website at year 1 and updated annually afterwards.

Deliverable X.1: Contribution to the Portfolio Strategic Plan (single deliverable)

This deliverable is the initial project's contribution to the Portfolio Strategic Plan. It will be integrated with the other projects' contributions in the overall Portfolio Strategic Plan under the guidance of the EIC Programme Manager.

Type: R: Document, report (excluding the periodic and final reports)

Dissemination level: SEN – Sensitive, limited under the conditions of the Grant Agreement

Due date: month 6.

Deliverable X.2.i: Report on portfolio activities (i=number of each implementation year. One deliverable per year; 3 deliverables for a 36-months project and 4 deliverables for a 48-months project)

The report will present the portfolio activities that have been carried out in each reporting period and contain relevant material (e.g., PowerPoint presentations, minutes of meetings, etc.). It also explains how the portfolio activities and the EIC proactive project management approach contribute to the achievement of the project objectives and help the transition to market.

Type: R: Document, report (excluding the periodic and final reports)

Dissemination level: SEN – Sensitive, limited under the conditions of the Grant Agreement

Due date: The report on portfolio activities will be submitted every 12 months.

Final considerations

- Effort to be allocated to this work package: **10 p.m.**

- In Month 1 the project should set up an operational internal **governance** to cover the following three main roles (with at least two distinct persons that are not necessarily from the coordinator) and with responsibilities in the four aforementioned WGs under Task X.1:

1) **Portfolio manager**, in charge of:
   - Coordination of the portfolio activities (including the writing of the task's reports and deliverables).
   - Identification and establishment of synergies, shared components and collaboration opportunities with one or more projects in the portfolio.
   - Assessment of the competitiveness of the proposed technologies for different applications.
   - Participation in data collection for monitoring the technology development.

2) **Innovation manager**, in charge of:
   - Elaboration of the exploitation strategies and set-up of the project exploitation plan (including the IPR strategy).
   - Identification of market needs, coordination of market analysis, identification of business opportunities and fundraising options.
   - Assessment of the key stakeholders, analysis of the value chain.

3) **Communication manager** with the following roles and tasks:
   - Defines the portfolio communication strategy.
   - Implements the portfolio communication and dissemination activities.
   - Manages a common database for events and a shared database of scientific instruments.