PÁLYÁZATI FELHÍVÁSOK 2024-BEN

AZ AKKUMULÁTOR SZEKTORBAN ÉS AZ ÉPÜLETENERGETIKA TERÜLETÉN:

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NKFIH – Nemzetközi Főosztály

2024. január 19.

Nemzeti Kutatási, Fejlesztési
és Innovációs Hivatal

BATT4EU és BUILT4People pályázati lehetőségek

- HORIZONT EURÓPA keretében működő **közös –programozású public-private partnerségek**
- Felhívások elérhetők: **Funding and tenders portálon**
- A pályázatértékelés és projekt megvalósítás is HORIZONT EURÓPA szabályok alapján zajlik
- **Közös programozású (co-programmed) partnerségek**: az **Európai Bizottság** és az **iparági szereplőket tömörítő szövetségek** szerződéses megállapodásán (Memorandum of Understanding) alapuló kezdeményezések, amelyek megvalósítása a megállapodásban rögzített és közösen kialakított kutatási és innovációs menetrend alapján zajlik.
- A Bizottság pénzügyi hozzájárulását a Horizont Európa költségvetéséből biztosítja, a kapcsolódó pályázati felhívások a munkaprogram megfelelő részében jelennek meg (5. Klaszter-Klíma, Energia, Mobilitás).
- Az iparági szereplők saját, természetbeni (in-kind) hozzájárulásukkal vesznek részt a közös program megvalósításában.
- Eltérően a közös finanszírozású partnerségektől (pl. CETP) a tagállamok közvetlenül nem finanszírozzák a pályázati, viszont véleményt nyilvánítanak a kutatás-finanszírozási célok/priorítások meghatározásában, az ún. NRCG (National and Regional Coordination Group) ülések keretében.

A felhívások struktúrája

- **Budget** ammount (pályázható alap), contribution/project (hozzávetőleges támogatás projektenként), projects expected to be funded/támogatandó pályázatok száma. Általában 1, 2-3 támogatás/felhívás (lump sum –egyes esetekben);
- **Deadline model**: single stage (egylépcsős)
- **Expected outcome**: eredmények a projekt végén.
- **Scope**: a felhívás tudományos-szakmai háttere, a state of the art; gyakran az is, hogy mi nem tartozik a felhívás céljaihoz; az elvárt technológiai fejlettségi szint(TRL), esetleges kapcsolódás más korábbi felhívásokhoz.
- **RIA(research and innovation action)/IA(Innovation action):**az elvárt kutatásfeljesztési tevékenység típusa;
- **TRL:** a technológiai fejlettségi szint a projekt végén
- **Eligibility conditions:** General Annex B.
- **Legal and financial set-up:** General Annex G

Egyes fogalmak és azok kapcsolódásának tisztázása: RIA –IA/TRL

RIA (research innovation action): új ismeretek szerzése, új vagy továbbfejlesztett technológiák, termékek, folyamatok, szolgáltatások és megoldások megvalósíthatóságának vizsgálata, beleértve az alkalmazott kutatásokat, technológia fejlesztéseket és integrálást; kis-léptékű prototípus laboratóriumi vagy szimulált környezetben történő tesztelést, bemutatása és validálása;

IA (innovation action): új vagy továbbfejlesztett termékekre, folyamatokra vagy szolgáltatásokra vonatkozó tervek, megoldások, design, beleértve prototípusokat, tesztelést, bemutatást, pilot fázist, nagy léptékű termék validálást működési környezetében, valamint a piaci multiplikálást.

TRL – technology readeness level

A 'tehnológiai fejlettségi szint' a technológia értettségét méri. A HE 9 kategóriába sorolja a pályázatok keretében elvárt kutatásfejlesztési tevékenységeket

- TRL1- alapelvek megfogalmazása
- TRL2- a technológiai elképzelés megfogalmazása
- TRL3- kísérleti ellenőrzése a tudományos megközelítésnek
- TRL4 - technológia validálás laboratóriumi körülmények között
- TRL5 - technológia validálás a releváns ipari környezetben kulcs alaptechnológiák esetén
- TRL6 - technológia demonstrálás releváns ipari környezetben kulcs alaptechnológiák esetén
- TRL7 - prototípus rendszer bemutatása működési környezetében kulcs alaptechnológiák esetén
- TRL8 - a rendszer teljes és minősített
- TRL9- a rendszer ki lett próbálva működési környezetében

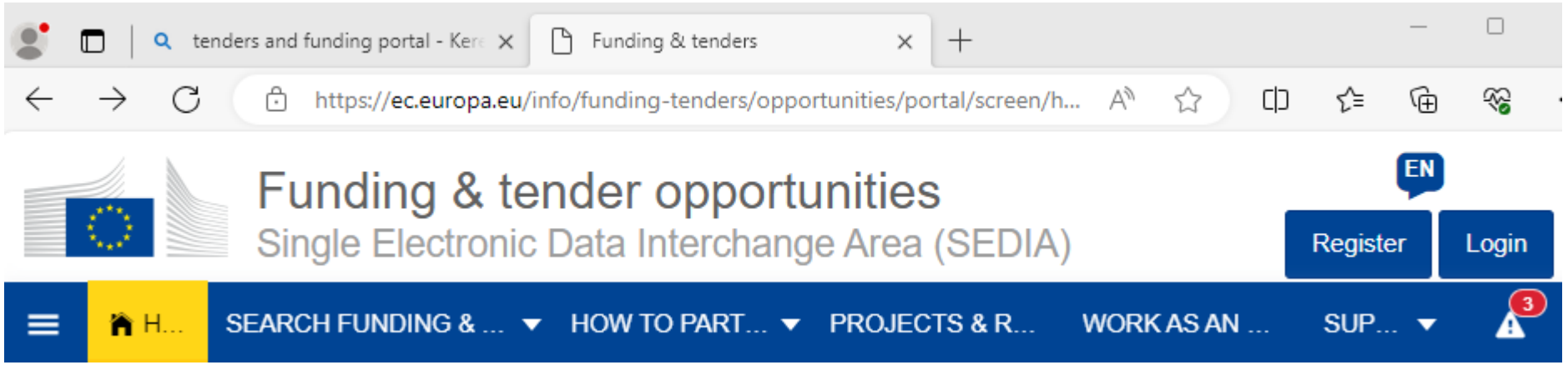
TRL: technology readiness level (https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-13-general-annexes_horizon-2023-2024_en.pdf)

(Bizottsági útmutatások: *TRL Guiding principles for Renewable Technologies; Guiding notes to use the TRL self assessment tool)*

A felhívások elérése – pályázati felület

- https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home

Funding and tender opportunities

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Border Management and Visa Policy Instrument (BMVI)
Citizens, Equality, Rights and Values Programme (CERV)
Connecting Europe Facility (CEF)
Creative Europe Programme (CREA)
Customs Control Equipment Instrument (CCEI)
Customs Programme (CUST)
Digital Europe Programme (DIGITAL)
Erasmus+ (ERASMUS+)
EU External Action (RELEX)
EU4Health Programme (EU4H)
Euratom Research and Training Programme (EURATOM)
Europe Direct (ED)
European Defence Fund (EDF)
European Maritime, Fisheries and Aquaculture Fund (EMFAF)
European Parliament (EP)
European Social Fund + (ESF)
European Solidarity Corps (ESC)
Fiscalis Programme (FISC)
Horizon Europe (HORIZON)
Information Measures for the EU Cohesion policy (IMREG)
Innovation Fund (INNOVFUND)
Internal Security Fund (ISF)
Interregional Innovation Investments Instrument (I3)
Just Transition Mechanism (JTM)
Justice Programme (JUST)
Neighbourhood, Development and International Cooperation Instrument – Global Europe (NDICI)
Pilot Projects and Preparation Actions (PPPA)
Programme for the Environment and Climate Action (LIFE)
Programme for the Protection of the Euro against Counterfeiting (PERICLES IV)
Promotion of Agricultural Products (AGRIP)
Research Fund for Coal & Steel (RFCS)
Single Market Programme (SMP)
Social Prerogative and Specific Competencies Lines (SOCPL)
Technical Support Instrument (TSI)
Union Anti-fraud Programme (EUAF)
Union Civil Protection Mechanism (UCPM)
Union Renewable Energy Financing Mechanism (RENEWFM)
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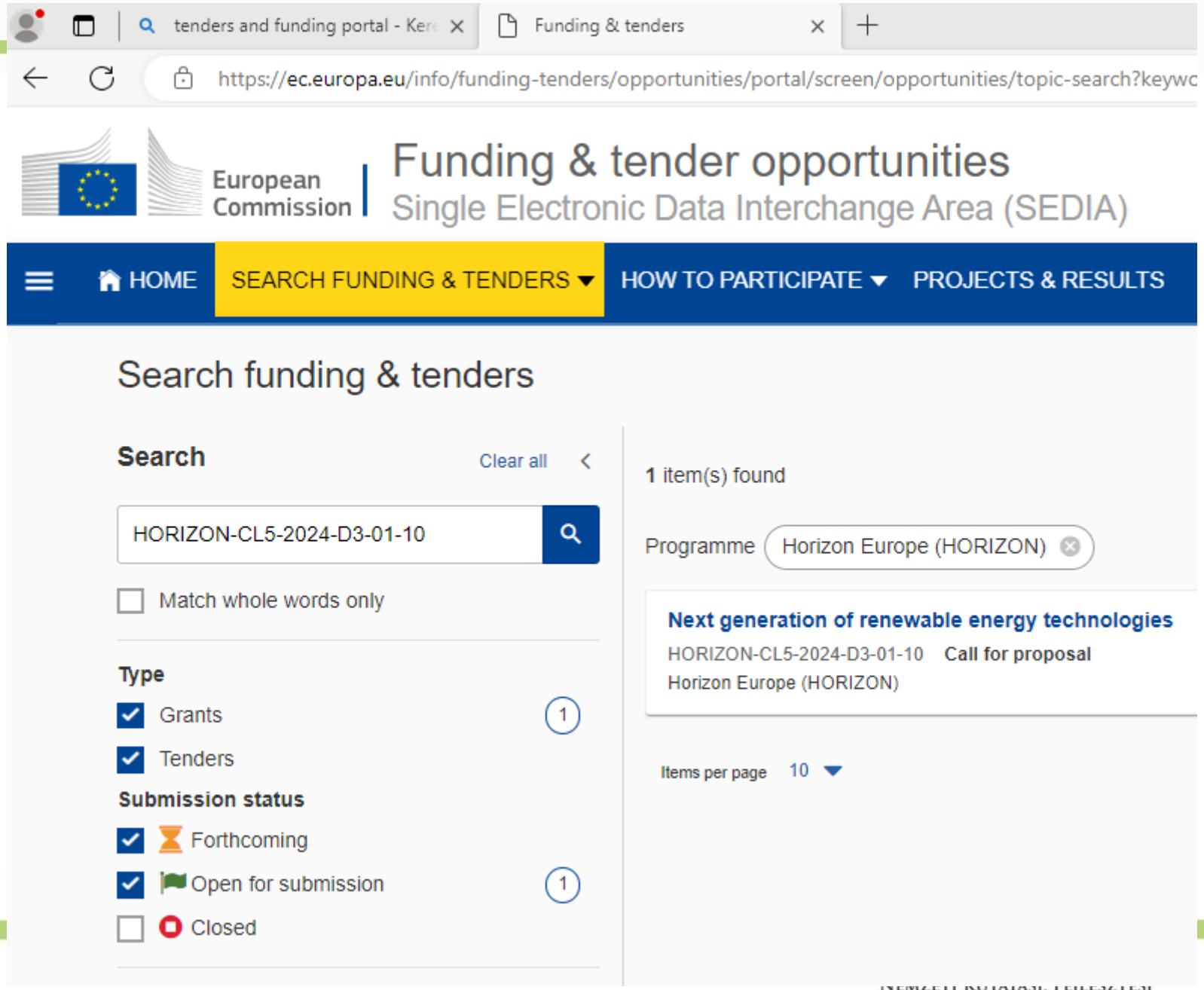
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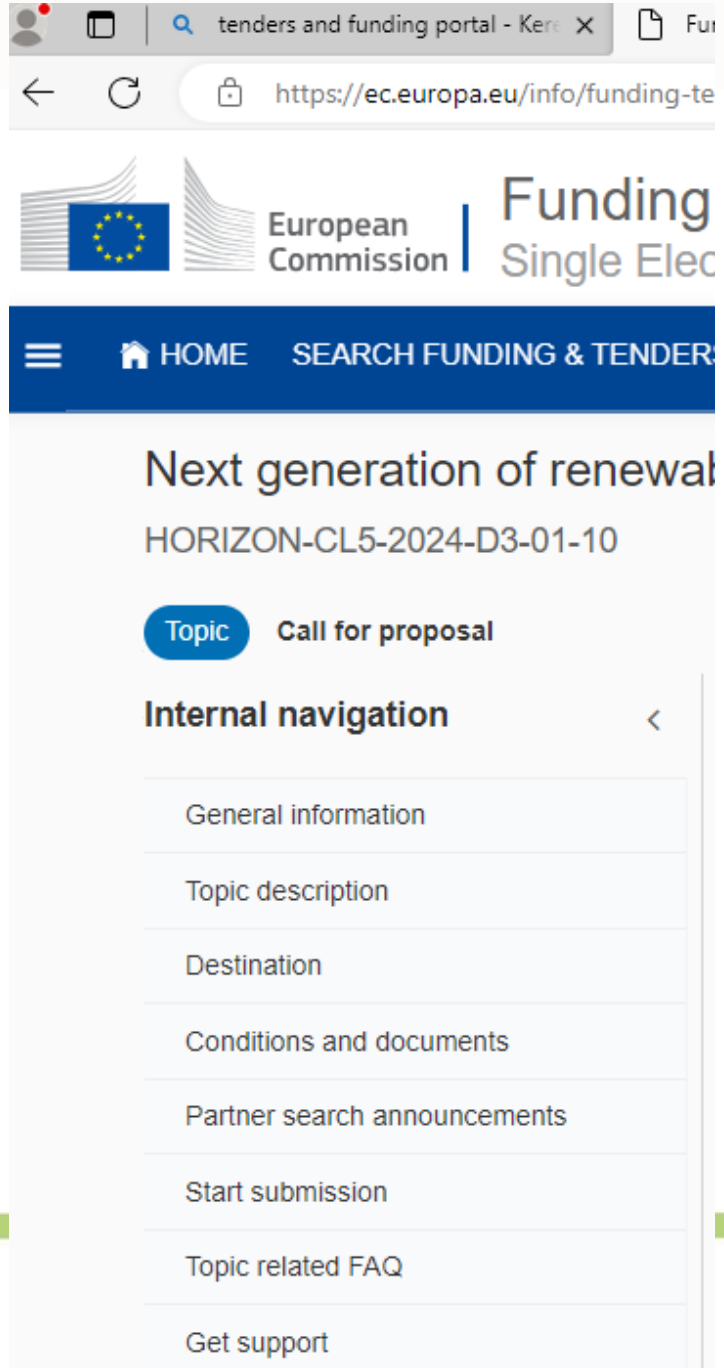
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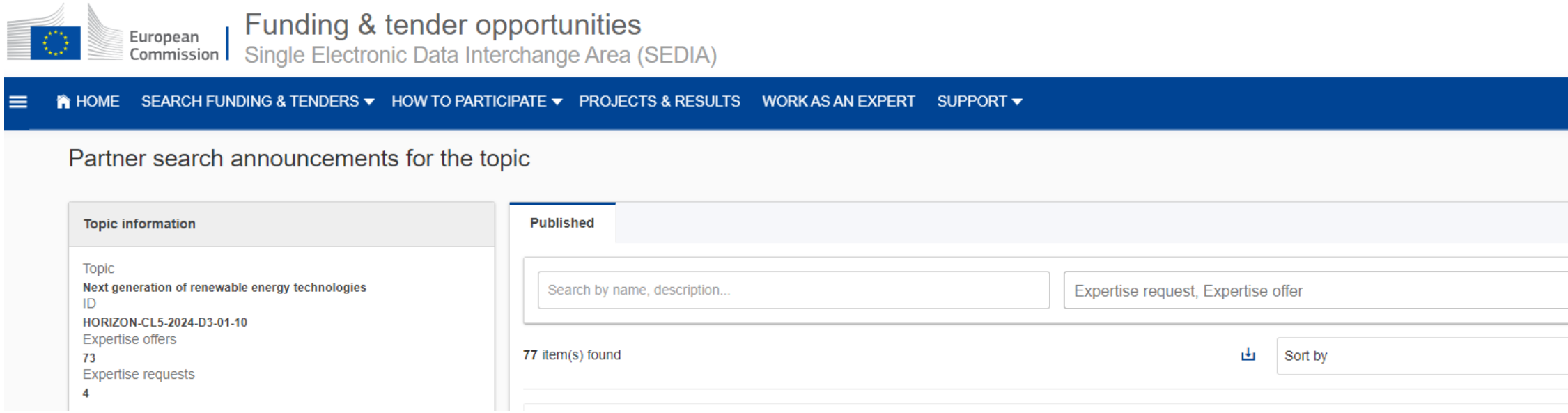
Partnerkeresők felhívásonként



Általános pályázási feltételek

1. **Admissibility conditions:** described in Annex A and Annex E of the Horizon Europe Work Programme General Annexes

   Proposal page limits and layout: described in Part B of the Application Form available in the Submission System

2. **Eligible countries:** described in Annex B of the Work Programme General Annexes

   A number of non-EU/non-Associated Countries that are not automatically eligible for funding have made specific provisions for making funding available for their participants in Horizon Europe projects. See the information in the Horizon Europe Programme Guide.

3. **Other eligibility conditions:** described in Annex B of the Work Programme General Annexes

   If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).

4. **Financial and operational capacity and exclusion:** described in Annex C of the Work Programme General Annexes

5. **Evaluation and award:**

   Award criteria, scoring and thresholds are described in Annex D of the Work Programme General Annexes

   Submission and evaluation processes are described in Annex F of the Work Programme General Annexes and the Online Manual

   Indicative timeline for evaluation and grant agreement: described in Annex F of the Work Programme General Annexes

6. **Legal and financial set-up of the grants:** described in Annex G of the Work Programme General Annexes

Útmutatók és egyéb anyagok

HE Main Work Programme 2023–2024 – 1. General Introduction
HE Main Work Programme 2023–2024 – 8. Climate, Energy and Mobility
HE Main Work Programme 2023–2024 – 13. General

Annexes
HE Programme Guide
HE Framework Programme and Rules for Participation Regulation 2021/695
HE Specific Programme Decision 2021/764
EU Financial Regulation
Rules for Legal Entity Validation, LEAR Appointment and Financial Capacity Assessment
EU Grants AGA — Annotated Model Grant Agreement
Funding & Tenders Portal Online Manual
Funding & Tenders Portal Terms and Conditions
Funding & Tenders Portal Privacy Statement

HORIZON EUROPE -CLUSTER 5 events and webinars

Webinars (europa.eu):

- Finding opportunities and submitting a proposal in Horizon Europe
- **Lump Sum** Funding in Horizon Europe: How does it work? How to write a proposal?
- Horizon Implementation Day: Grant Management in Horizon Europe
- Funding & Tenders Portal **Partner Search and person profile**
- A successful proposal for Horizon Europe: Scientific-technical excellence is key, but don't forget the other aspects

Eligibility: kik pályázhatnak?

- Kik pályázhatnak? Bárki jogi személy, akár III. országokból részt vehet a pályázatban

„Any legal entity, regardless of its place of establishment, including legal entities from nonassociated third countries or international organisations (including international European research organisations) is eligible to participate (whether it is eligible for funding or not), provided that the conditions laid down in the Horizon Europe Regulation have been met, along with any other conditions laid down in the specific call topic."

- Kedvezményezett: az, aki támogatására jogosult (támogatásra jogosultak az alábbi országok pályázói):

EU tagállamok: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden.

Horizont Európa programhoz társult országok: Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Iceland, Israel, Kosovo14, Moldova, Montenegro, North Macedonia, Norway, Serbia, Tunisia, Turkey, Ukraine.

Alacsonyjövedelmű és középjövedelmű országok: Afghanistan, Algeria, Angola, Argentina, Azerbaijan, Bangladesh, Belarus, Belize, Benin, Bhutan, Bolivia, Botswana, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, Colombia, Comoros, Congo (Democratic Republic), Congo (Republic), Costa Rica, Côte d'Ivoire, Cuba, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt (Arab Republic), El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Fiji, Gabon, Gambia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Indonesia, Iran (Islamic Republic), Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Korea (Democratic People's Republic), Kyrgyz Republic, Lao (People's Democratic Republic), Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Micronesia (Federated States), Mongolia, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Palestine16, Papua New Guinea, Paraguay, Peru, Philippines, Rwanda, Samoa, São Tomé and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Africa, South Sudan, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tonga, Turkmenistan, Tuvalu, Uganda, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic), Vietnam, Yemen Republic, Zambia, Zimbabwe.

Konzorcium elvárások:

Csak konzorciumok pályázhatnak!

Olyan konzorciumok pályázhatnak, amelynek minimum 3 egymástól független tagja van, amelyből min. 1 uniós tagállamban van bejegyezve és a minimum másik kettő más-más tagállamban vagy társult országban lett bejegyezve.

„at least one independent legal entity established in a Member State; and at least two other independent legal entities, each established in different Member States or Associated Countries."

Nemzetközi partnerkeresés: funding and tenders portálon + NCP-k révén

Értékelés: Excellence – Impact –Quality and efficiency of implementation

Kiválóság:

- **a projekt célja** mennyire világos és meghatározott, ambiciózus és milyen mértékben lépi át a kutatás és innováció jelenlegi eredményeit (state of the art);
- **a módszertan** mennyire világos, fogalmak szintjén, tudomány feltételezések szintjén, mennyire interdiszciplináris, mennyire van tekintettel a nemek arányos képviseletére., az Open-Science gyakorlat minősége, a kutatás menedzsment és az eredmények közzététele, az innovációs output, mennyire vonja be a civil társadalmat és a végfelhasználókat.

Hatás:

- **mértéke és jelentősége az eredményeknek és hatásoknak,** beleértve a transznacionális együttműködés hozzáadott értékét; hihetősége annak, hogy a munkaprogramban betervezett célkitűzések és hatások megvalósíthatók (megvalósíthatóság);
- alkalmassága és minősége az intézkedéseknek, amelyek az eredmények maximalizálását szolgálják, a hasznosítási és népszerűsítési tervnek megfelelően, beleértve az eredményekre vonatkozó kommunikációt;
- projekt hozzájárulása az energiaátmenthez, a végső felhasználók, privátszféra és a 'need-owners'-ek megfelelő bevonásával;

A megvalósítás minősége és hatékonysága:

- a munkaterv minősége és hatékonysága, a kockázatelemzés, a munkacsomagok és erőforrások megfelelő súlyozása;
- szerepe és minősége mindegyik résztvevőnek és, hogy a konzorcium milyen mértékben tudja a szükséges szakértelmet biztosítani.

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Work as an expert

he European Union Institutions appoint external experts to assist in the evaluation of grant applications, projects and tenders, and to provide opinions and advice in specific cases.

In particular, experts assist in:

- **Evaluation** of proposals, prize applications and tenders
- **Monitoring** of actions, grant agreements, public procurement contracts

In addition, experts provide opinion and advise on:

- **Preparation, implementation and evaluation of EU programmes and design of policies.**

In order to select experts, the European Union Institutions publish regularly calls for expression of interest (see list below) detailing the selection criteria, the required expertise, the description of the tasks, their duration and the conditions of remuneration.

Interested? Please join the database of external experts!

Register as expert

As new expert, you will be first requested to create your EU login account and register your profile.

Registered experts can update the profile via the My Expert Area after **login**.

Calls for expressions of interest for experts

- Call for expressions of interest for experts (2021-2027)
- Calls for expressions of interest for experts (2014-2020)

Információs lehetőségek

Info Days (HORIZINT EURÓPA Klaszter 5.)

Kérdések/válaszok konkrét felhívás kapcsán:

a) Funding and tenders portálon

b) NCP közvetítésével

Partnerkeresés:

a) Matchmaking platformon

b) NKFIH NCP-én keresztül is (továbbítjuk a többi tagállami NCP-nek)

BATT4EU-BATT4EU (bepassociation.eu)

- HORIZONT EURÓPA keretében működő **közös –programozású public-private partnerség**
- Egyrészt az **Európai Bizottság,** másrészt az akkumulátor szektorban működő kutatás-fejlesztő és innovációs cégek valamint az egyetemi közösség között (az utóbbiak a **BEPA- Batteries Europe**-be tömörülve)
- **BEPA** - **Batteries European Partnership Association**, nemzetközi non-profit egyesület, amely a BATT4EU piaci és egyetemi/kutatási pillérét adja, 217 tagot tömörít, számos olyan céget valamint egyetemet és kutatóintézetet, amely kész hozzájárulni a HE KF céljaihoz az akkumulátor szektorban.
- Magyar tagot nem említ (még) a BEPA honlap

- **Batteries Europe** feladatköre: azonosítja a KF szükségleteket a teljes akkumulátor értéklánc mentén, minden TRL szinten, szakmai javaslatokat tesz a Bizottságnak a kutatásfejlesztési prioritások meghatározására valamint arra, hogy milyen pályázati felhívás témakörök kerüljenek be HE munkaprogramba;

- **BATT4EU Partnership** állítja fel a prioritásokat összhangban a HE céljaival az európai akkumulátor szektor versenyképességének és fenntarthatóságának növelése érdekében.
  - **Közös munkacsoportok** keretében dolgozzák ki a stratégiai munkatervet (**Strategic Research and Innovation Agenda- SRIA)**, amelyen alapszanak a konkrét pályázati felhívások.
  - E mellett **Task Force** csoportok keretében horizontális témákban együttműködnek a teljes akkumulátor értékláncra vonatkozóan.

  (magyar részvétel a munkacsoportokban)

BATT4EU célkitűzései:

Versenyképes innovációs ökoszisztéma létrehozása 2030-ra.

Költségvetése 925 millió €

2024-ben 2 pályázati időszak van:

- 2023.december 13 -2024. április 18. (4 felhívás)
- 2024. május 4 - 2024.szeptember 5. (3 felhívás)

újrahasznosítás, költséghatékonyság, fenntarthatóság, digitalizáció

- HORIZON-CL5-2024-D2-01-01:Advanced sustainable and safe pre-processing technologies for End-of-Life (EoL) battery recycling (Batt4EU Partnership)
- HORIZON-CL5-2024-D2-01-02: Non-Li Sustainable Batteries with European Supply Chains for Stationary Storage (Batt4EU Partnership)
- HORIZON-CL5-2024-D2-01-03:Development of technical and business solutions to optimise the circularity, resilience, and sustainability of the European battery value chain (Batt4EU Partnership)
- HORIZON-CL5-2024-D2-01-05: Furthering the development of a materials acceleration platform for sustainable batteries (combining AI, big data, autonomous synthesis robotics, high throughput testing)
- HORIZON-CL5-2024-D2-02-01: Sustainable high-throughput production processes for stable lithium metal anodes for next generation batteries (Batt4EU Partnership)
- HORIZON-CL5-2024-D2-02-02: Post-Li-ion technologies and relevant manufacturing techniques for mobility applications (Generation 5) (Batt4EU Partnership)
- HORIZON-CL5-2024-D2-02-03:Size & weight reduction of cell and packaging of batteries system, integrating lightweight and functional materials, innovative thermal management and safe and sustainable by ….(Batt4EU Partnership)

The **following areas should not be covered**, as they fall within either partnerships or other calls:

- Renewable energy technologies covered under the call D3-1-49 on 'Next generation of renewable technologies) and renewable hydrogen production.
- Batteries and especially long-term electricity storage technologies, covered under D3-2-17 as well as flow batteries.
- Material research.

HORIZON-CL5-2024-D2-01-01:

Advanced sustainable and safe pre-processing technologies for End-of-Life (EoL) battery recycling (Batt4EU Partnership)

Research Innovation Action | TRL **5** | 8M EUR/project | 2 to be funded | Opening:7 Dec 2023 | Deadline 18 April 2024

Terület: lítium –ion akkumulátorok újrahasznosítása/recycling of Lithium-ion batteries (LIBs)

Expected outcome:

The pre-treatment process is the first and indispensable step in recycling Lithium-ion batteries (LIBs), which significantly affects the recycling rate of the spent devices and the extraction rate of the high-value metals in the subsequent metallurgical processes. The batteries also contain toxic chemicals, which should be preventatively separated to promote environmental protection and sustainability. Moreover, the pre-treatment processes also help to reduce the scrap volume and allow the separation of the battery components.

Projects are expected to contribute to all of the following outcomes:

- A European economic base which is stronger, more resilient, competitive and fit for the green and digital transitions, by reducing strategic dependencies for critical raw materials by promoting a circular economy.
- The direction of the EU battery industry towards the zero-waste concept by developing holistic, materials and energy efficient recycling processes that can increase the content of recovered mass and by improving the cooperation between recyclers and battery manufacturing through a vertical integration strategy, for those cases where battery and/or component repurposing is not a viable option.
- The circularity of battery materials, where also non-metallic elements (electrolyte, solvent, salts and polymers) are recycled back to use (as raw materials or valuable chemicals). The "cradle to cradle approach" will be addressed though waste pre-treatment by safe and sustainable separation and recovery.
- Environmentally beneficial processes for battery pre-treatment (pre-processing and separation) of the main elements to decrease the CO_2 footprint and other emissions of the recycled materials.
- Safe technologies aimed at improved recovery yield, increased quality and purity level of the recycled/recovered materials, improved impurity removal.

HORIZON-CL5-2024-D2-01-01:

Scope:

The current EOL LIB recycling technologies are focused on improving the recovering efficiency of Cobalt that is the most valuable material. However, other no-Co battery contents need to be extracted in one go to develop recycling processes with economic, societal and environmental perspectives. They, for instance, include low-density plastics, metal shells and foils, binders, separators, organic solvents, Li salt, anode active materials. Successful separation methods have the potential to enrich the constituent of targeted materials and improve the profit for recycling. In recent years, several pre-treatment processes were tested at least at lab-scale (usually mechanical, thermal and chemical options).

The goal is to develop and integrate new advanced pre-processing concepts that enable more efficient and safe technologies for recycling EoL LIBs.

Substantial improvements should be achieved in the processes environmental and economic viability and in the circular economy, narrowing the sustainability gaps in the whole battery recyclates pre-treatment.

HORIZON-CL5-2024-D2-01-01:

The following **pre-treatment concepts** are expected to be addressed:

- Battery sorting at component level that should be more efficient, accurate, also including recommendations for the standardisation of labelling of battery components, due to the huge variation of physical configurations, cell types and chemistries, with the aim of re-using the suitable components.
- Advanced pre-processing methods including (but not limited to) physical, mechanical, dry, thermal and aqueous pre-treatment methods that allow improved pre-concentration while minimising as much as possible waste side products.
- Process design enabling the recovery and valorisation of anode materials.
- Electrolyte valorisation through the development of sustainable and safe processes for the recovery of Li-salts.
- Separation of all the strategic battery materials that should be integrated into existing/innovative recycling processes to mitigate potential effect of impurities.
- Recovery of electrode current collectors (Al and Cu) that should be improved by developing more efficient separation methods of the metal foils from the electrode materials and easier removal of the organic binder.
- Other recoverable not-active materials from the EoL battery (solvent as EC, DEC, DMC, binders, separator).
- Pre-assessing concepts by their life cycle sustainability and safety impacts and studying overall techno-economical solutions for recovery systems in order to minimize cost, environmental impact and system losses.
- Plans for the exploitation and dissemination of results for proposals submitted under this topic should include a strong business case and sound exploitation strategy, as outlined in the introduction to this Destination. The exploitation plans should include preliminary plans for scalability, commercialisation, and deployment (feasibility study, business plan).
- Pre-treatment should not impede on second life, according to the principles of the waste hierarchy.

The topic will generate insights that may be of use for on-going research and innovation on new recycling processes and concepts from topic HORIZON-CL5-2023-D2-01-02.

Projects may collaborate and/or contribute to the activities of the Coordination and Support Action defined under the topic HORIZON-CL5-2022-D2-01-08.

HORIZON-CL5-2024-D2-01-02:

Non-Li Sustainable Batteries with European Supply Chains for Stationary Storage (Batt4EU Partnership)

Innovation Action | TRL **6-7** | 7M EUR/project | 3 to be funded | Opening:7 Dec 2023 | Deadline 18 April 2024 (lump sum grant)

Terület: nem lítium alapú akkumulátorok/topic open to all non-lithium battery chemistries.

Projects are expected to contribute to all of the following outcomes:

- A European economic base which is stronger, more resilient, competitive and fit for the green and digital transitions, by reducing strategic dependencies for critical raw materials.
- Development of post-lithium cell chemistries with target cell- and system-level cost, safety, energy density and power metrics suitable for the selected stationary energy storage markets.
- Credible projected storage costs of less than 0.05 €/kWh/cycle by 2030, particularly for applications with a (minimum) storage durations of up to 8 hours.
- Set out a clear route to a feasible, European-based supply chain that reduces reliance on critical raw materials, substituting with abundant, non-toxic, inherently safe raw materials and minimises the impact of possible international trade disruptions and customs tariffs, taking account of the requirements for a range of stationary storage use cases.
- Demonstration of system operated in end-user conditions for at least 3,000 hours.
- Projected product cycling life 5,000 cycles in conditions operating conditions typical of the selected application.
- A battery storage solution, that works safely and efficiently across a wide range of ambient conditions.
- A defined concept for demonstrable, highly sustainable, circular manufacturing for the selected battery type, with sustainability measured in terms of recognised economic, environmental, social and ethical metrics.

HORIZON-CL5-2024-D2-01-02:

Projects are expected to:

- Develop and demonstrate sustainable and safe non-lithium battery solutions from abundant, non-toxic raw materials, capable of deployment in a large share of stationary energy-storage markets aligning the safety and sustainability assessment with the Commission Recommendation on safe and sustainable by design chemicals and materials
- Develop and demonstrate an innovative non-lithium battery technology with energy density and power metrics suited to stationary energy storage applications; and
- Prove the battery system's sustainability and compatibility with a European supply chain.
- Risks will be demonstrably managed to the lowest possible level and within standard acceptable societal limits for toxicity and safety.

HORIZON-CL5-2024-D2-01-02:

Projects are encouraged to:

- Develop new materials that improve techno-economic performances and/or the ability to meet sustainability targets.
- Show how cell and system design and material improvements optimise techno-economic performance by defining (i) technical and commercial targets, and (ii) quantified success criteria/KPIs by which progress toward achieving the targets may be evaluated during both development and validation phases of the project.
- Demonstrate a credible commercial and technical path, from end-of-project outcomes to a stationary-energy-storage product, and which takes account of future manufacturing and recycling requirements.
- Provide evidence of current and future sustainability, viable European supply chains and rigorous analyses of the complex sustainability and recyclability issues including compatibility with regulation, including recycling regulations.
- Demonstrate minimal towards no maintenance requirements.
- BMS development is within scope where relevant but should not be the main focus of the project. In any case, developments of the BMS need to take into account the renewable energy directive and any pending amendments, notably for the requirements for real-time access to the data of the BMS.
- Projects which, in addition, demonstrate the suitability of the solution under development for other emerging energy storage markets, such as motive power for off-road and transport applications with similar system requirements are encouraged.
- Projects focussed on materials discovery for novel chemistries are out of scope. However, material refinements of known chemistries undertaken to achieve performance, sustainability, safety and cost targets are in scope.
- Plans for the exploitation and dissemination of results for proposals submitted under this topic should include a strong business case and sound exploitation strategy, as outlined in the introduction to this Destination. The exploitation plans should include preliminary plans for scalability, commercialisation, and deployment (feasibility study, business plan) indicating the possible funding sources to be potentially used (in particular the Innovation Fund).
- **Proposals should indicate to which chapters of the Strategic Research and Innovation Plan for chemicals and materials[2] they will contribute.**
- In order to achieve the expected outcomes, international cooperation is encouraged for use cases, particularly with India, Africa and Australia.

HORIZON-CL5-2024-D2-01-03:

Development of technical and business solutions to optimise the circularity, resilience, and sustainability of the European battery value chain (Batt4EU Partnership)

Research Innovation Action | TRL **5** | 5M EUR/project | 1 to be funded | Opening:7 Dec 2023 | Deadline 18 Feb 2024

Terület: körforgásosság, kiszámíthatóság, fenntarthatóság optimalizálása

Project results are expected contribute to all the following outcomes:

- A European economic base which is stronger, more resilient, competitive and fit for the green and digital transitions, by reducing strategic dependencies for critical raw materials by promoting a circular approach to manufacturing and resource efficiency.
- Advancing circular and sustainable design and business practices relating to advanced batteries and associated value chains.
- Improving the life cycle sustainability performance of batteries produced in the EU, both in terms of reducing environmental impacts and maximising socio-economic benefits, including increased closed-loop practices.
- Enhancing European strategic independence in terms of battery raw materials, the competitiveness of European industry, and maximising socio-economic benefits at the EU level and beyond.
- Supporting the achievement of established EU recycling efficiency targets for 2030 and beyond.

Contribution to the following outcomes is optional, depending on the scope of the project:

- Enabling tools and best practice for multiple industry sectors in order to improve the European industrial ambitions and global leadership beyond batteries.
- Improving batteries and their materials/components circularity through the promotion of more material efficient designs by enabling longer material/component lifetimes, improving added-value remanufacturing, refurbishing (including exchangeable battery systems), repairing and recycling and ultimately decreasing the cost of using secondary materials/components in batteries.

HORIZON-CL5-2024-D2-01-03:

Scope: proposals should cover at least two of three scope categories (business models, cross-industry tools, sustainable design) and at least three bullet points in total:

- Business models
  - Definition of assessment approaches for sustainable business models, including value proposition, value creation and delivery and value capture including environmental, social and economic dimensions. This activity will include analysis of best practice examples for sustainable business models.
  - Development of sustainable business methods for technical, economic, and environmental evaluation of cycle life options: retrofit, second life, and recycling.
  - Development of new business models and social innovations that promote the sustainable mobilisation of resources.
  - Development of business methods to address outstanding issues, such as on-liability, across applications.
- Cross-industry tools
  - Quantitative methodologies and tools that enable understanding whether recycling or second life is the preferred sustainable option, and at which level (pack, cell, electrode, material) recycling should be deployed.
  - Optimisation of design and operation using LCA. Using high-quality data, exploring trade-offs between i) impacts at fabrication stage, ii) design for durability, iii) energy usage, iv) other functional aspects such as optimal sizing, hybridisation, electronic management, thermal management.
  - Development of a central data information system and database (users of resources can see who offers which type and amount of battery system) and prototype Europe-wide information system for accident vehicles and their available battery systems for re-use.
- Sustainable design
  - Innovations in battery design and architecture at all levels (system, pack, cell) supporting dismantling and recycling at the end of life. These could include the choice of materials and assembly methods and should not compromise the performance.
  - Design of innovative sourced materials for improving sustainability in batteries by sustainable processes that avoid toxic/dangerous solvents and require controlled environments.
  - Research and design of batteries from recycled materials and fully recyclable.

Komplementarítások (!):

Cooperation with complementary projects launched specifically in the Cluster 5 work program and specifically, in the Destination *"A competitive and sustainable European battery value chain"* **is required.** Examples of collaborative activities includes information sharing, promotion of results at thematic transnational events, conferences and open webinars.

Plans for the **exploitation** and **dissemination** of results for proposals submitted under this topic should include a strong business case and sound exploitation strategy, as outlined in the introduction to this Destination. The exploitation plans should include preliminary plans for scalability, commercialisation, and deployment (feasibility study, business plan).

Projects may collaborate and/or contribute to the activities of the Coordination and Support Action defined under the topic HORIZON-CL5-2022-D2-01-08.

Proposals could consider the involvement of the European Commission's Joint Research Centre (JRC) whose contribution could consists of providing added value regarding various aspects of battery sustainability.

HORIZON-CL5-2024-D2-01-05:

Furthering the development of a materials acceleration platform for sustainable batteries (combining AI, big data, autonomous synthesis robotics, high throughput testing)

Research Innovation Action | TRL 3-4 | 20M EUR/project | 1 to be funded | Opening:7 Dec 2023 | Deadline 18 Feb 2024

Terület: digitális megoldások az akkumulátor szektorban

Expected Outcome:

- Batteries have complex and dynamic processes taking place in and between materials and at the interfaces/interphases within a battery cell. For each new battery chemistry explored, new challenges in understanding these processes are revealed. To accelerate the finding of new materials and their combinations for both existing and future battery chemistries the iterative and fragmented trial and error approach used today needs to be replaced since it is slow and insufficient.
- To accelerate the discovery of battery interfaces, materials and new sustainable concepts with high energy and/or power performance there is a need to develop a fully autonomous and chemistry neutral Materials Acceleration Platform (MAP) for battery materials and interfaces. This is a key and long-term challenge for European battery community. The aim is to integrate advanced multi-scale computational modelling, materials synthesis, characterisation and testing to perform closed-loop autonomous materials findings and interphase engineering that would accelerate by at least a factor of five the discovery of new battery chemistries with ultra-high performances.
- Building upon the shared data infrastructure, standards and protocols developed in the BATTERY 2030+ initiative, this call topic addresses the need of increasing the level of autonomy in the MAP-based discovery and development process. The proposal should also cover the contribution and collaboration to the BATTERY 2030+ large scale initiative.

HORIZON-CL5-2024-D2-01-05:

Project results are expected to contribute to all of the following expected outcomes:

- Develop new tools and methods for significantly accelerating the development and optimisation of battery materials and interfaces, in order to increase the competitiveness of the battery material and cell industry in Europe.
- Demonstrate a fully autonomous battery-MAP capable of integrating computational modelling, materials synthesis and characterisation of both Li-ion and beyond Li-ion chemistries.
- Scale-bridging, multi-scale battery interface models capable of integrating data from embedded sensors in the discovery and prediction process, e.g. to orchestrate proactive self-healing.
- Community wide state-of-the-art collaborative environment to access data and utilise automated workflows for integrated simulations and experiments on heterogeneous sites, e.g., exploiting European HPC architectures and Large-scale facilities in collaboration with LENS and LEAPS.

HORIZON-CL5-2024-D2-01-05:

Scope:

- Infrastructure tools for secure remote data access, data analysis and predictive modelling: Develop a FAIR data infrastructure for raw and curated experimental and modelling data, which can be accessed remotely and securely by relevant stakeholders, including industry. Develop the software infrastructure required to operate this platform, also with regard to future reproducibility and further exploitation of the results of the research activities. The software should provide specific access right and allow remote data access, complemented by distributed workflows using software-agnostic workflow engines that provide rapid-prototyping. Inverse materials design using hybrid physics- and data-driven battery interface genome models should also be demonstrated.
- Automated high throughput characterisation and integrated experimental and computational workflows: High throughput, multimodal operando experimental techniques using standardised battery cells and established protocols should be optimised to perform effective screening of new materials and on-line diagnosis of realistic devices. A central objective is to establish, structure, operate and dynamically refine such facility platform to harmonise, mutualise and optimise the global demand for battery characterisation. This includes automated experimental and computational workflows and modules for data acquisition and multimodal/multiscale analysis. Particular attention should be paid to battery interfaces and direct observation of interfaces under dynamic conditions, which are key to improve the performances and the lifetime of batteries.
- Autonomous synthesis robotics and orchestration software: The transition from low/no automated robotics for the synthesis of battery materials requires several R&I steps towards fully autonomous systems. Within the scope of this proposed call are partially autonomous systems following standard synthesis routes for inorganic and organic battery materials, especially also multi-step and high-temperature synthesis, that so far are challenging to automate for high throughput. AI-based orchestration and optimisation software modules and packages specifically targeting battery materials and interfaces are also central to the scope.
- Inverse design and AI-assisted scale-bridging models for multiple time- and length-scale processes: To develop scale-bridging models correctly describing the multiple mechanisms occurring at atomistic scale and the mesoscopic scale on the cell level. The new model approaches should be able to incorporate data from the advanced sensing in virtual design optimisation and battery control algorithms for SoX estimation. Sensitivity analysis and uncertainty quantification of the developed SoX models is also a requirement to assess the robustness of the developed models. These models should achieve a challenge based rational balance of accuracy and computational effort. They should accurately describe the actual state of the system, but also enable diagnosis and prediction, e.g., when self-healing procedures should be initiated. Multiscale Modelling approaches should be developed for the control of safety between BOL (Beginning Of Life) and EOL (End of Life) of a battery system by different uses and diagnosing the safety state of a battery system by innovative methods.

HORIZON-CL5-2024-D2-02-01:

Sustainable high-throughput production processes for stable lithium metal anodes for next generation batteries (Batt4EU Partnership)

Innovation Action | TRL **6-7** | 8M EUR/project | 1 to be funded | Opening:7 May 2024 | Deadline 5 Sep 2024

Terület: európai gyártólánc létrehozása Li fém anódok gyártására Gen 4b, Gen 4c és Gen5 akkumulátorok előállításához, a beszállítás biztonságának növelésére

The proposed project is expected to contribute to all the following outcomes:

- Reduction of strategic dependencies for critical raw materials by promoting resource efficiency.
- Energy consumption/carbon footprint of processing 10% lower than SoA.
- Throughput of Li foil and/or electrode production to support cell manufacturing, including a technical pathway towards production at MWh/(sub-)GWh scale.
- Ensure stability of Li during handling, processing and operation using coatings or other protective technologies (e.g. barriers/protective layers).
- Processing of Li (Metal) and Li electrodes within cell assembly at industrial scale, including, but not limited to, high-quality cutting of the Li foil and/or electrode.
- Homogeneous Li films with thickness below 20µm, contributing towards energy density levels of 400-500 Wh/kg.
- The developed process should be compatible with recycling targets (with respect to purification of scrap with protective coating) and assure recyclability to more than 70% of Li metal in battery waste, (90% Li metal for production scrap).
- The proposed project is encouraged to contribute to a competitive price of 75€/kWh at pack level.
- A demonstration of the performance of Li at cell level in SoA benchmark cell (at least TRL5 with at least 1 Ah capacity). Validation in Generation 4b, 4c and/or Generation 5 cells is highly encouraged.

HORIZON-CL5-2024-D2-02-01:

Proposals under this topic are expected to cover all of the following bullet points:

- Sustainable, cost-efficient and large-scale production of Li-metal foils and/ or electrodes, demonstrated up to pilot level during the project. Activities can include, but are not limited to, extrusion, comparison extrusion / electrostatic spray, rolling and co-rolling. However, extensive cell design and development are out of the scope as this topic focuses on the Li anode production.
- Control of the passivation of Li metal films, and to understand how the passivation is linked with the dry room conditions and requirements. The goal is to find the optimal way: high passivation and lower quality dry room, or low passivation and higher quality dry room, and how these selections are linked with cost, energy consumption and performance of the cells.
- The project is expected to also guarantee safety of the Li film production and handling, which has to be demonstrated in a process that is compatible for large scale production.
- Plans for the exploitation and dissemination of results for proposals submitted under this topic should include a strong business case and sound exploitation strategy, as outlined in the introduction to this Destination. The exploitation plans should include preliminary plans for scalability, commercialisation, and deployment (feasibility study, business plan).

Collaboration with other projects from calls HORIZON-CL5-2023-02-01 Advanced materials and cells development enabling large-scale production of Gen4 solid-state batteries for mobility applications and/or HORIZON-CL5-2024-02-02 Post-Li-ion technologies and relevant manufacturing techniques for mobility applications (Generation 5) **is expected.**

The project is encouraged to cooperate with projects stemming from call topic HORIZON-CL5-2023-01-01 Technologies for sustainable, low carbon and cost-efficient downstream processing and production of battery-grade materials.

HORIZON-CL5-2024-D2-02-02:

Post-Li-ion technologies and relevant manufacturing techniques for mobility applications (Generation 5) (Batt4EU Partnership)

Research Innovation Action | TRL **5** | 15M EUR/project | 3 to be funded | Opening:7 May 2024 | Deadline 5 Sep 2024

Terület: energia technológiák a közlekedés szektornak; gyártási technológia, amelyek pozitív hatással vannak a teljesítményre, biztonságra, költségekre; olyan cellák tervezése, amelyek újrahasznosíthatók; kompatibilitás az előállításban a már létező lítium-ion gyártó infrastruktúrával

Projects are expected to contribute to <u>at least one</u> of the following outcomes:

- Conversion systems based on metallic anodes with enhanced safety, delivering on cost, performance, sustainability and recyclability, with clear prospects for the feasibility of the scale-up of the manufacturing processes.
- Metallic anode protection and/or activation for conversion systems (polymer, ceramic and hybrid electrolytes) with increased safety, cycle life and low cost.
- Post lithium-ion cells based on cations other than lithium with long cycle-life (Sodium-ion is excluded and covered by topic HORIZON-CL5-2024-D2-01-02).

HORIZON-CL5-2024-D2-02-02:

In addition, projects are expected to contribute to creating rechargeable batteries that will work in realistic environments, are recyclable and with low environmental impact, and have safe manufacturing processes. To the extent possible the safety and sustainability of developed materials should be assessed in alignment with the Commission Recommendation on safe and sustainable by design chemicals and materials.

Translating these outcomes into indicative KPIs to guide the R&I efforts, projects are expected to show a credible technical pathway to achieve all the following targets by 2030 and beyond:

- A safe behaviour at cell level: expected EUCAR Hazard level below 4 for automotive; level 2 for aviation and waterborne applications;
- Specific energy at cell level targeting 500 Wh/kg, and volumetric energy density at cell level targeting 600 Wh/l;
- Charge and discharge with a C-rate between 2 and 10;
- 800+ cycles at 50%DoD or 400 cycles at >80%DoD;
- Cost at cell level < 75 euro/kWh.

HORIZON-CL5-2024-D2-02-02:

Proposals should address improvements in **sustainable materials designs**, to reach the manufacturability and high safety of the selected technology.

Successful projects are expected to cover at least three of the following bullet points:

- Improvement of materials:
  - Scalable and manufacturable surface coating materials for metallic anode protection and/or activation (e.g. CVD, PLD, ALD…) to increase safety and cycle life.
  - Binders with high chemical and thermal stability to reduce toxicity and enable the use of water-based manufacturing processes.
  - Design and development of new cell technologies with higher capacities compared to Li-ion cells.
  - Improve and increase the electrodes-electrolyte compatibility with additives to increase over cell time.
  - Improve the understanding of the chemical and/or electrochemical reaction mechanisms using advanced techniques in the cells for Gen5 technologies developed.
  - Improve the insertion cathode with high charge-storage capacity.
  - Use of safe and non-toxic materials.
  - New efficient and sustainable catalysts that can promote polysulfide conversion in Metal-S batteries or the oxygen evolution/reduction reactions in rechargeable Metal-air batteries.
- Design and manufacturing:
  - Innovative cell design ensuring high performances, low cost and ready for recycling.
  - Develop relevant manufacturing processes and assess the possible manufacturing compatibility with the existing lithium-ion production infrastructure and production lines.
  - Proof of concept possibly at small pilot line scale.
  - Design production with low environmental impact, safe and healthy environment for workers, low energy consumption.

Projects are encouraged to demonstrate also techno-economic suitability of the solution for other emerging markets, such as motive power for off-road applications, or energy storage applications.

Plans for the exploitation and dissemination of results for proposals submitted under this topic should include a **strong business case** and **sound exploitation strategy,** as outlined in the introduction to this Destination. **The exploitation plans should include preliminary plans for scalability, commercialisation and deployment (feasibility study, business plan).**

Projects are **expected to collaborate** and contribute to the activities of the Coordination and Support Action defined under the topic HORIZON-CL5-2022-D2-01-08, including the definition of a long-term research roadmap for this topic.

HORIZON-CL5-2024-D2-02-03:

Size & weight reduction of cell and packaging of batteries system, integrating lightweight and functional materials, innovative thermal management and safe and sustainable by ….

Innovation Action | TRL **6-7** 16M EUR/project | 2 to be funded | Opening:7 May 2023 | Deadline 5 Sep 2024

Terület: magas teljesítményű, biztonságos akkumulátor rendszerek, amelyek biztosítani tudják a szükséges energiát a villamos mobilitás (közlekedés) számára; kisebb méretű és súlyú fenntartható akkumulátorok előállítása.

Successful projects are expected to deliver on both following points:

- An increase of the net useful mass and volumetric energy density of the battery system between 10% and 30% compared to the state-of-the-art battery systems.
- The improvement of the safety by design measures throughout the battery lifetime and during operation.
- Projects are furthermore expected to deliver innovative thermal management to
- Increase performance over the complete operational conditions
- Enable fast charging requirements 10%-80% in 10 minutes maximum.
- The solutions should be demonstrated and validated at application level and should comply with all relevant standards (performance and safety). They are also encouraged to contribute to standardisation of measures for safe thermal management.

HORIZON-CL5-2024-D2-02-03:

Scope:

Projects should **achieve size and weight reduction by integrating different technologies such as**:

- Integration of advanced cell technologies/generations, sensing technologies,
- The use of lightweight and multi-functional materials (including, but not limited to, the use of nanomaterials) that are safe and sustainable by design in alignment with Commission Recommendation (EU/2022/2510) and lightweight structures for battery casing.
- Improvement of the cell to system ration by adopting innovative packaging approaches to enable smart battery cell concepts. Approaches to reduce the complexity of HV and BMS architecture and substitution by alternatives.
- To reach those targets, improvements in both components in the cell and in the pack will be considered.
- Proposals are expected to also address innovations in the manufacturing processes that result in size and weight reduction of the packs.

In addition, projects are expected to **improve battery performance and safety by demonstrating innovative thermal management systems**, which enhance fast charging capability or high-power application during operational lifetime (heating and cooling).

HORIZON-CL5-2024-D2-02-03:

Finally, projects should **enhance the safety throughout the full battery lifetime and for failure conditions by developing and demonstrating safe by design measures**, for example such as:

- Thermal propagation measures.
- Fire retardant properties.
- Mechanical properties ameliorations.
- Reliability, default propagation/thermal runaway modelisation and simulation.
- The effectiveness of safety measures should be demonstrated by simulation at pack level.
- The projects are to focus on the battery system level, i.e., on the integration of battery cells into a battery system (e.g., a battery pack), considering mechanical, electrical and thermal aspects.
- The integration of battery systems into larger systems of application (e.g., into vehicles structure) can be part of scope (e.g. cell to casing integration) as long as it can be demonstrated as a possibility to reduce overall packaging space, battery weight and battery performance improvement.

HORIZON-CL5-2024-D2-02-03:

All solutions are expected to consider optimal design for manufacturing, end of life management and LCA analysis and disassembly.

The Commission initiative for Safe and Sustainable by Design will set a framework for assessing safety and sustainability of chemicals and materials and which should be considered as a reference in the proposal.

Plans for the exploitation and dissemination of results for proposals submitted under this topic should include a **strong business case** and **sound exploitation strategy**, as outlined in the introduction to this Destination. The exploitation plans should include **preliminary plans for scalability, commercialisation**, and deployment (feasibility study, business plan) **indicating the possible funding sources to be potentially used** (in particular the Innovation Fund).

In order to achieve the expected outcomes, **international cooperation** is encouraged, in particular with the USA.

BUILT4 People (Built4People Home - Built4People)

Közös programozáson alapuló partnerség: **Európai Bizottság** + iparági szereplők szervezeteinek tömörülési között létrejött kezdeményezés (**ECTP és WorldGBC Europe**).

ECTP= European Construction and Sustainable Built Environment Technology Platform (ECTP) Home: ECTP; Több mint 150 tagja van az építő iparból és más területekről az teljes épített környezet értéklánc mentén 24 országból (nagy vállalatok, KKV-k, egyetemek, kutató intézetek, szakmai testületek) Egy ipar vezette platform, amelyet az Európai Bizottság kulcs szereplőnek ismert el, az innováció és versenyképesség előmozdítása terén.

WorldGBCEurope= World Green Building Council Europe https://worldgbc.org/europe/

Az európai regionális hálózat 20 nemzeti zöld építési tanácsot, 8 regionális partnert és közel 5000 tagot számlál uniós tagállamokból és nem uniós európai országokból. HuGBC- Magyar Környezettudatos Építés Egyesülete

HORIZONT EURÓPA program keretében működik, HE alapból van finanszírozva, pályázatértékelés és implementálás a HE szabályoknak megfelelően;

Célja: felgyorsítani az emberközpontú innovációkat egy fenntartható épített környezet biztosítása érdekében.

A partnerség katalizálja az átmenetet az embercentrikus, klímasemleges, fenntartható, okos épített környezet felé.

A partnerség működése

- **Built4People Partnership Board:** (**Európai Bizottság+ ECTP és WorldGBC Europe** képviselői)
- **Built4People Stakeholders Forum:** (szakma képviselőinek fóruma, ajánlásokat fogalmaz meg a kutatásfinanszírozási szükségletekre és célokra vonatkozóan a Strategic Research and Innovation Agenda (SRIA) és a HE célkitűzései mentén.
- **Built4People State Representative Groups:** az uniós tagállamok és társult országok küldöttjeinek testülete, véleményezési hatáskörrel.

BUILT4People: : 17 Sep 2024-21 Jan 2025

- HORIZON-CL5-2024-D4-02-01: Industrialisation of sustainable and circular deep renovation workflows (Built4People Partnership)
- HORIZON-CL5-2024-D4-02-02: Robotics and other automated solutions for construction, renovation and maintenance in a sustainable built environment(Built4People Partnership)
- HORIZON-CL5-2024-D4-02-03: BIM-based processes and digital twins for facilitating and optimising circular energy renovation (Built4People Partnership)
- HORIZON-CL5-2024-D4-02-04: Design for adaptability, re-use and deconstruction of buildings, in line with the principles of circular economy (Built4People Partnership)
- HORIZON-CL5-2024-D4-02-05: Digital solutions to foster participative design, planning and management of buildings, neighbourhoods and urban districts (Built4People Partnership)

HORIZON-CL5-2024-D4-02-01:

Industrialisation of sustainable and circular deep renovation workflows (Built4People Partnership)

Innovation Action | TRL **6-8** 8M EUR/project | 2 to be funded | Opening:7 Sep 2024 | Deadline 21 Jan 2025 (lump-sum)

ExpectedOutcome:

Project results are expected to contribute to all of the following expected outcomes:

- Streamlining resource-efficient nearly zero-energy performance renovation processes.
- Renovations with reduction of at least 30 % waste, 25% cost, and 30% work time (to 1-2 days per dwelling/building unit), compared to current deep renovation processes.
- Reduced energy performance gap between as-built and as-designed (difference between theoretical and measured performance), and higher construction quality.
- Innovative, tailored business models for deep renovation, generating economies of scale and contributing to an increased rate of renovation.
- Improved comfort, Indoor Air Quality and Indoor Environmental Quality.

Scope: In line with the Renovation Wave and in order to meet long-term climate and energy targets, more action is needed to increase the rate and depth of building renovation. Several recent projects and calls have focused on prefabrication for deep renovation, but more work is needed to develop innovative, seamless workflows from design to off-site prefabrication, to installation, construction on-site, maintenance and future dismantling, reuse and recycling of prefabricated elements, duly considering life cycle performance, sustainability, and the potential to use the buildings as carbon sinks.

- **Proposals are expected to address all of the following:** Investigate innovative approaches for industrialised deep circular renovation, covering the whole workflow from design through to off-site prefabrication, installation, construction on-site and strategies for maintenance, operation and end of life. Ensure the proposed approaches aim to achieve the highest level of energy performance (at least NZEB level) with a view toward zero-emission buildings, ensuring a high level of indoor environment quality, keeping costs in an attractive range for owners and investors. Make use of innovative processes and technologies, including those delivered by previous research, such as design based on circularity principles, prefabricated components, and digital tools that allow to optimise workflows (cost, time, quality, resource use). Demonstrate a seamless integration of the proposed approaches with state-of-the-art digital technologies for construction and renovation (Building Information Modelling, Digital Twins, etc.). Select processes and technologies that can be easily tailored to give a maximum potential for rapid and broad deployment at European level. Investigate innovative business models (e.g. as-a-service models), accounting for potential market and regulatory barriers, in view of mass deployment and Europe-wide impact. Apply the proposed workflows to at least three demonstrations to assess the proposed approaches for different buildings typologies representative of the European building stock, ensuring the most adequate coverage of the respective climatic conditions. The demonstrations can be either single buildings or clusters of buildings, and at least one of the demonstrations has to address residential buildings.

HORIZON-CL5-2024-D4-02-02:

Robotics and other automated solutions for construction, renovation and maintenance in a sustainable built environment (Built4People Partnership)

Research Innovation Action | TRL 4-5 8M EUR/project | 2 to be funded | Opening:7 Sep 2024 | Deadline 21 Jan 2025 (grant budget based)

Terület:

Project results are expected to contribute to all of the following expected outcomes:

- Reduction of construction and renovation time on-site (at least 40% reduction).
- Reduction of errors in construction and renovation works.
- Improved resource efficiency.
- Reduction of construction and renovation costs.
- Reduction of greenhouse gas emissions resulting from, and improved energy efficiency of the works on-site.
- Reduced environmental impact of construction works, including pollution, particulate matter235 and noise, in the immediate vicinity.
- Reduction of waste generated from the works on-site.

HORIZON-CL5-2024-D4-02-02:

Scope: The transformation of the built environment should take place in a way that minimises the environmental impact of the works themselves. With the increasing rollout of highly energy efficient, sustainable buildings and deep renovation, there is a growing need for the development of robotic and automated solutions to support sustainable building construction, renovation and maintenance processes that are less disruptive, cleaner and faster.

HORIZON-CL5-2024-D4-02-02:

- **Proposals are expected to address all of the following**: Investigate the use of robotic systems (including those used for 3D printing) and automation for construction and deep renovation, in order to reduce time of construction and renovation works, reduce construction errors, as well as facilitate maintenance, also minimising the impact of the works on the surrounding built environment. Explore the potential for lower construction costs through automation and robotics resulting from increased speed, improved resource efficiency and avoidance of errors. Develop robotic and automated design and construction techniques that increase energy efficiency and reduce greenhouse gas emissions from construction and renovation works on-site. Develop approaches that use digitally assisted design to improve resource efficiency and safety, reduce waste, and reduce construction time. Investigate the use of automated technologies for surveying, inspection and monitoring of the site. Investigate the use of automated support to augment workers' capability and safety (e.g., lift robots, exoskeletons, automated construction site monitoring, use of augmented and virtual reality). Test and validate the prototyped solutions in at least three prototypes to assess the proposed approaches for a variety of buildings typologies representative of the European building stock. These prototypes should be validated in a lab or another relevant environment. The testing and validation are expected to address both new construction and renovation. Contribute to the activities of the Built4People partners and to the Built4People network of innovation clusters.

HORIZON-CL5-2024-D4-02-03:

BIM-based processes and digital twins for facilitating and optimising circular energy renovation(Built4People Partnership)

Innovation Action | TRL **6-8** 8M EUR/project | 2 to be funded | Opening:7 Sep 2024 | Deadline: 21 Jan 2025 (lump-sum)

The funding rate is 60% of the eligible costs, except for non-profit legal entities where is up to 100% of the total eligible costs.

Project results are expected to contribute to all of the following expected outcomes:

- Reduced buildings construction and renovation time and costs.
- Increased buildings material reuse and recycling.
- Improvement of buildings performance (energy, sustainability including whole life-cycle carbon and the potential to store carbon in built works, comfort, health and well-being, and accessibility).
- Enhanced, interoperable and accessible buildings information across the lifecycle.
- Improvement of interoperability with existing Building Information Modelling (BIM) and Digital Twin solutions.
- Broader application of BIM and Digital Twin solutions, in particular within SMEs.

HORIZON-CL5-2024-D4-02-03:

Proposals are expected to address all of the following: Develop and integrate solutions based on BIM and Digital Twins to support the whole buildings life cycle from design to deconstruction and reuse, including operation.

Ensure the solutions developed address all the following aspects:

- Supporting optimal, adaptable and reversible building design for energy efficiency, circularity and sustainability.
- Allowing to track buildings materials and construction products, and supporting cost-effective deconstruction and reuse, recycling and recovery of building materials at end of life.
- Integrating buildings monitoring data (e.g. from sensors and IoT devices) into an interoperable Digital Twin for automated, optimised building performance monitoring and management, and preventive maintenance.
- Enabling buildings data interoperability, quality and integrity across the life cycle, in particular to reliably assess and track building performance over the lifecycle, enabling tailored data access for all life cycle's stakeholders (architects, engineering companies, contractors, building owners, financing institutions, etc.).
- Relying where possible on open BIM standards and linking, where relevant, to digital logbooks and relevant initiatives (e.g. the Smart Readiness Indicator under the Energy Performance of Buildings Directive).
- Easiness of use and cost effectiveness, in particular for SMEs and companies with limited experience in digital solutions, and high potential for replication and commercialisation.

HORIZON-CL5-2024-D4-02-03:

- Apply the solutions delivered on a set (at least two) of real-life residential and non-residential building construction and renovation projects which, taken together, allow to demonstrate the potential of the solutions across all aspects listed in the topic and across the life cycle.

- Ensure that the demonstrations of the solutions delivered:
  - Cover at least two different countries, with diverse climatic conditions.
  - Involve local and regional values chains, in particular SMEs, based on participatory approaches to increase innovation acceptability.
  - Result in clear and, where relevant, quantified and measurable indicators on the improvements due to the use of the solutions, for all aspects listed in the topic and across the life cycle.

HORIZON-CL5-2024-D4-02-04:

Design for adaptability, re-use and deconstruction of buildings, in line with the principles of circular economy (Built4People Partnership)

Research Innovation Action | TRL **5-6** 4M EUR/project | 2 to be funded | Opening: 17 Sep 2024 | Deadline 21 Jan 2025 (grant budget based)

Project results are expected to contribute to all of the following expected outcomes:

- Improved adaptability of buildings and building units to new uses.
- Increased reuse and recycling of building elements and products.
- Extended service life of buildings.
- Increased awareness on best practices for design for adaptability, reuse and deconstruction.

HORIZON-CL5-2024-D4-02-04:

Scope: Based on the integration of innovative tools, products and techniques, to enable construction and renovation that embeds the principle of extending the service life of buildings, and facilitate adaptability to changing user needs (e.g. for optimal use of indoor space or to improve working and living conditions), reuse, and deconstruction, in a life-cycle optimisation and circular economy perspective.

- Proposals are expected to address all of the following:
  - Validate construction and renovation solutions based on the integration of innovative tools, products, techniques, processes and methods, that facilitate deconstruction and reuse, based on life-cycle approaches across the value chain.

HORIZON-CL5-2024-D4-02-04:

Ensure the solutions validated:

- Consider the adaptability and reversibility of buildings and building units to changing uses, and to other relevant factors (e.g. evolution of surroundings).
- Improve the ease of reuse of construction elements and products from existing buildings, also facilitating recycling when reuse is not possible.
- Develop building elements and products that can be disassembled and reused, including those made from CO2-storing materials such as sustainably sourced long-lived bio-based materials and products and, innovative lower emission materials /aggregates.
- Address all components of buildings, including structural elements, envelopes, interior fixtures and fittings, and technical building systems
- Are rooted in local and regional value chains, based on participative approaches for social acceptability of innovation, in particular with regard to the workforce's practices and skills.
- Can flexibly adapt to local / regional sourcing of innovative products and materials to increase replication.
- Address climate change mitigation, minimising emissions.

HORIZON-CL5-2024-D4-02-04:

- Allow to minimise any negative impacts of pollution and biodiversity loss from renovation and construction works.

Validation of the solutions in a relevant environment (real-life or close to real-life) that:

- Covers residential and non-residential projects, half of which at least should be renovation projects.
- Covers at least two different countries, with diverse climatic conditions.
- Involves local and regional values chains, in particular SMEs, based on participatory approaches to increase innovation buy-in from users.
- Results in clear and, where relevant, quantified and measurable indicators on the improvements due to the use of the solutions.

HORIZON-CL5-2024-D4-02-04:

- Deliver guidance and recommendations for technology providers, regulatory authorities, certification and standardisation bodies, and define and implement ambitious dissemination actions, to promote the approaches demonstrated and support their replication.
- Where relevant, contribute through specific and targeted actions to standardisation and regulatory evolutions that can foster reuse and deconstruction of buildings materials and products.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities.

HORIZON-CL5-2024-D4-02-05:

Digital solutions to foster participative design, planning and management of buildings, neighbourhoods and urban districts (Built4People Partnership)

Innovation Action | TRL **6-8** 5M EUR/project | 2 to be funded | Opening:7 Sep 2024 | Deadline 21 Jan 2024 (lump sum)

Project results are expected to contribute to all of the following expected outcomes:

- Greater engagement of representative groups of end users as well as citizens of the impacted urban context.
- Increased acceptability and uptake of sustainable deep renovation solutions in the built environment.
- Reduced energy and mobility poverty.
- Increase in plans for climate neutral and sustainable, aesthetic and inclusive built environments with enhanced climate adaptation and resilience (e.g. based on nature-based solutions).
- Enhanced climate change adaptation and resilience in built environments.

HORIZON-CL5-2024-D4-02-05

Scope: The transition to a climate-neutral society requires that Europe's building stock also becomes climate-neutral. At the same time, Europe's building stock has to become climate resilient. This requires a comprehensive approach beyond individual buildings, namely at the level of neighbourhoods or urban districts. However, the decarbonisation of the built environment and its adaptation to a changing climate and to societal needs in terms of comfort, accessibility, inclusiveness, and aesthetics cannot happen without active participation of the buildings' users and occupants, individual / collective property owners, and energy communities as beneficiaries of the value chain. Professionals, such as project developers, architects, engineers, building owners, planners and statutory authorities, require solutions that develop, analyse, model, visualise and present a multitude and complex set of information in such a way that facilitates such co-design processes. This topic focuses on the development of digital solutions for a stronger participation of end users, citizens and other relevant stakeholders in the design, planning and management of the renovation of existing buildings, neighbourhoods and / or districts.

HORIZON-CL5-2024-D4-02-05

Proposals are expected to address one or both of the following points:

- Digital solutions that facilitate participative design and planning through visualisation, analysis and engagement with data that is directly relevant to building users as well as citizens in the surrounding urban area (including e.g. immersive and interactive technologies, Virtual Reality / Augmented Reality, simulations and scenario modelling).

- Digital solutions that allow to analyse and model different scenarios for to-be-renovated buildings, neighbourhoods and / or districts in terms of energy use and generation; users' health and wellbeing; impact on the energy grid; provisions for active and electric mobility, and sustainable delivery solutions; life-cycle environmental and micro-climatic impacts, and; socio-economic impacts for citizens, building users, owners and occupiers.

HORIZON-CL5-2024-D4-02-05

In addition, proposals are expected to address all of the following:

- Address aspects of climate-neutrality and climate-resilience, respecting the 'energy efficiency first' principle.
- Ensure the digital solution complements, builds on and/or uses existing tools (including, where relevant, on conventional, low-tech ones) and standards recognised by the market.
- Engage citizens (seeking coverage of different genders and social characteristics), end users of the tools and other relevant stakeholders involved in the design, planning and management of urban development projects in the development process of the digital solution.
- Ensure the digital solution offers different means to exchange information and provide input that are tailored to the specific needs of laypersons, including vulnerable, minority and disadvantaged groups as well as persons with disabilities and older persons.
- Demonstrate the prototype in at least three real-life urban development projects to apply, evaluate and refine the digital solution and inform its market launch and / or commercialisation strategy.
- Ensure the project's dissemination activities include actions that contribute to the activities of the NEB Community, and to sharing information, best practices and results within the NEB Lab.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise (including social innovation), in order to produce meaningful and significant effects enhancing the **societal impact of the related research activities.**

Köszönöm a figyelmet!
Sikeres pályázást!