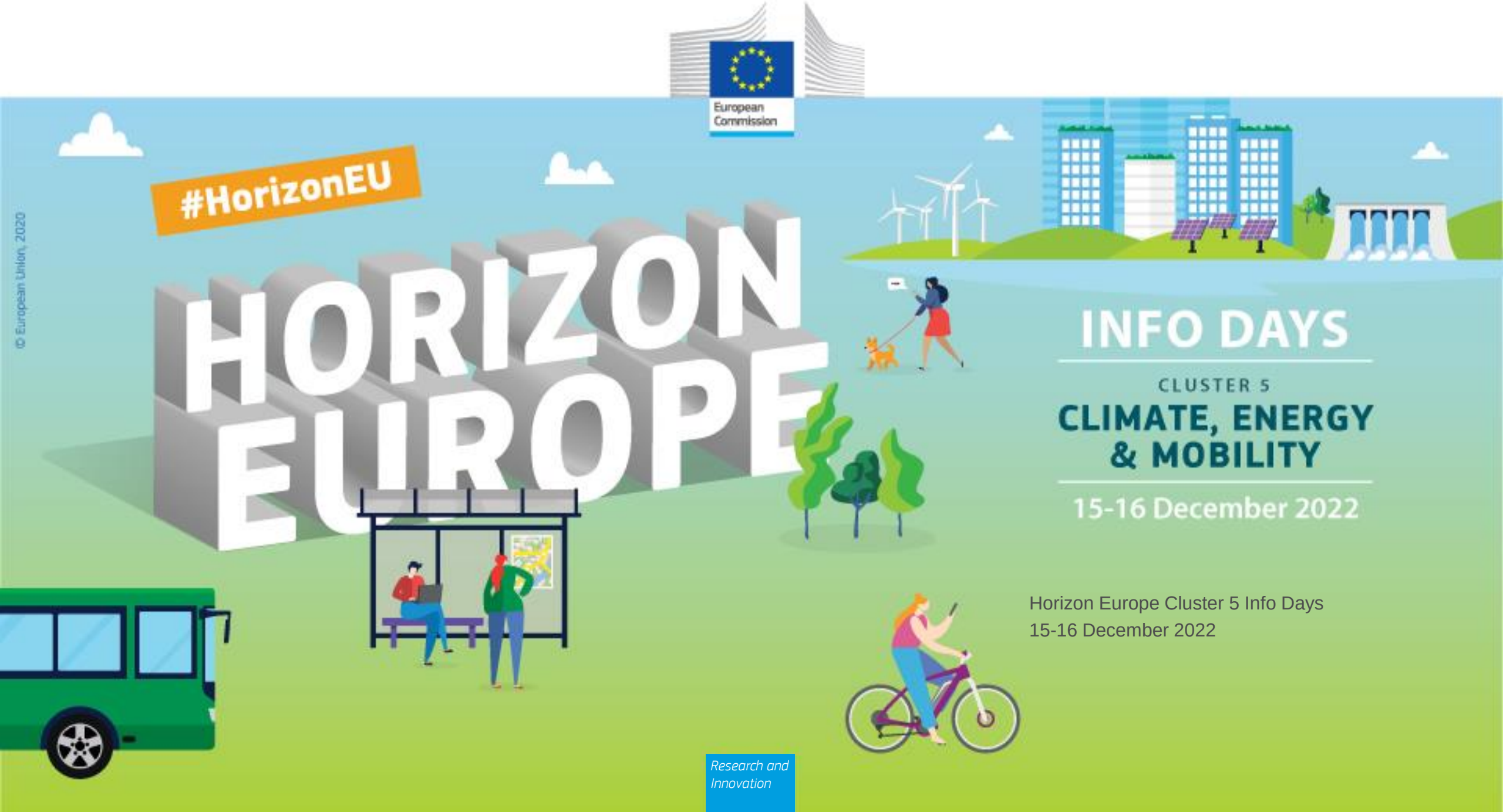
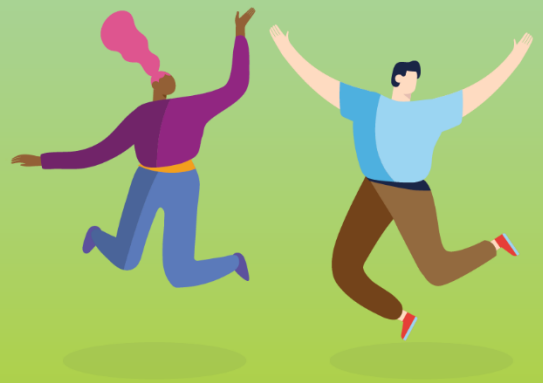


Horizon Europe Cluster 5 Info Days
15-16 December 2022

Destination 5

Clean and competitive solutions for all transport modes



European Commission

Thematic area

Zero-emission road transport

Guido SACCHETTO, Maurizio MAGGIORE

European Commission

HORIZON-CL5-2023-D5-01-01
User-centric design and operation of EV for optimised energy efficiency

SCOPE

- Develop optimised **heating/cooling and demisting concepts/components** to greatly reduce energy consumption.
- Develop **automatic pre-conditioning and self-adjusting control strategies** – e.g. vehicle systems, AI-based powertrain management of EV users/patterns, route/weather conditions..
- **Data-driven decision making** enabling optimal interior design fulfilling driver needs – e.g. AI adjustment of system's operation/controls, components, cabin comfort..
- Optimise system layout/interactions through **multiple scalable digital twins**
- New **modular interoperable systems** to enable the use of automatic real-life data

HORIZON-CL5-2023-D5-01-01
User-centric design and operation of EV for optimised energy efficiency

EXPECTED OUTCOME

- **More affordable and energy efficient EVs** with innovative user-centric solutions, system concepts and components
- **Increased comfort and safety** leading to a **real range increase of 20%**
- Component sizing and performance to **reduce costs** by **at least 5% at vehicle level**
- **Reduced development time by 30%** through AI in EV holistic thermal management and powertrain systems

European Commission

HORIZON-CL5-2023-D5-01-01
User-centric design and operation of EV for optimised energy efficiency

TYPE OF ACTION

- **IA –** Innovation Action
- Expected **TRL 6** by the end of the project

EU CONTRIBUTION

- Per project: **4-5 M€**
- Total: **15 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-02
Innovative battery management systems for next generation vehicles

SCOPE

- **Predictive sensor-based SoX diagnostics** to accurately predict the **end of-life**, leveraging connectivity and storage.
- **Physics-based, data-driven or hybrid models (for example Artificial Intelligence (AI) –based)**
- **Secure, real-time and databased BM** to safely reduce margins in all modes of operation, providing accurate classification for a **second life**
- Coordination between **BMS and ECU** of the vehicle to allow using data (weather, temperature, speed, topographies, etc.) **to optimize monitoring, diagnostics, lifetime and driving range.**
- Proposal to leverage and not duplicate IPCEI and Batteries partnership activities and link with projects funded under topics: HORIZON-CL5-2022-D2-01-05; HORIZON-CL5-2022-D2-01-09; where appropriate, links with projects funded under topic HORIZON-CL5-2024-D5-01-03.

HORIZON-CL5-2023-D5-01-02
Innovative battery management systems for next generation vehicles

EXPECTED OUTCOME

- A **simplified, efficient and connected BMS** including reduction of parts and cost.
- **Improved/optimised diagnostics** for efficient maintenance (data-driven, over-the-cloud, self-testing and on-board diagnostics) accessible to 3rd parties.
- **Interfaces to access BMS and database** by charging infrastructure/mobility services providers through an appropriate user interface.
- Improved exploitation of **battery performance** (faster charging, higher energy recovery..), and increased **battery pack density** (BMS contribution of 10% or more), **safety and battery life-time** (at least 30%) – validation under **real driving conditions**.
- **Improved control of battery operating conditions (SoX),** increased accuracy and improved warning capability on all battery system levels.
- **New simulation tools and test methods** for faster development, validation and integration, and 30% testing time reduction.
- **Enhanced communication** between battery and VCU

European Commission

HORIZON-CL5-2023-D5-01-02
Innovative battery management systems for next generation vehicles

TYPE OF ACTION

- **IA –** Innovation Action
- Expected **TRL 6** by the end of the project

EU CONTRIBUTION

- Per project: **5 M€**
- Total: **10 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-03
Frugal zero-emission vehicles concepts for the urban passenger challenge

SCOPE

- **User centric needs'** analysis in **emerging and established markets'** use cases and infrastructure development (e.g. charging infrastructure, communication technologies..)
- **Development and demonstration of at least two variations** of the modular scalable vehicle. L-category to include swappable and interoperable standard battery systems
- **Validation of the solutions**, in particular capabilities in terms of payload, charging requirements, vehicle efficiency and battery sizing – with confirmation of user acceptability
- **Assess emissions reduction' impact** considering scale-up of higher impact use cases
- Take into consideration **future development pathways** for public, semi-public, private charging infrastructure adapted for the developed urban vehicle concepts
- Deliver **digital twin models** of the demonstrator vehicles

International cooperation with emerging economies e.g. from Asia and Africa

European Commission

HORIZON-CL5-2023-D5-01-03
Frugal zero-emission vehicles concepts for the urban passenger challenge

EXPECTED OUTCOME

- **Accelerated global uptake of affordable, user/mission centric solutions** tailorable for usage models
- Effective design, assessment and deployment of **innovative low-cost but upgradable EV solutions** (two-wheelers, light cars, microbuses) for clean urban transport
- **Higher sustainability and lower cost** by leveraging economies of scale and modularity
- Ensured **ease of use in targeted urban/sub-urban areas** considering traffic/parking conditions and battery charging/swapping points
- **Lower energy consumption** (e.g. lighter mass, suitable range/dynamic performances, local resources, reuse of components/systems, eco-sustainable materials)

HORIZON-CL5-2023-D5-01-03
Frugal zero-emission vehicles concepts for the urban passenger challenge

TYPE OF ACTION

- **IA –** Innovation Action
- Expected **TRL 7-8** by the end of the project

EU CONTRIBUTION

- Per project: **7-12 M€**
- Total: **20 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-04
Circular economy approaches for zero emission vehicles

SCOPE

- Elaborate consistent **circularity strategy**, from production until End-of-Life and **demonstrate** its feasibility on vehicle level **over the full life cycle**
- Assess **refurbished/reused potential,** energy or rare material content components
- Enhance **digital tools for higher circularity** along the automotive value chain
- **Maintenance and repair technologies/strategies** to ensure higher circularity
- Concepts for **measuring/assessing the circularity** of EV solutions and exchange of information along the automotive supply chain
- Concepts for **training/increasing skills** in the automotive industry regarding CE
- A **digital twin of the demonstrator** to assess various scenarios, including the exclusive use of recycled/bio-based materials

European Commission

HORIZON-CL5-2023-D5-01-04
Circular economy approaches for zero emission vehicles

EXPECTED OUTCOME

- **Increased circularity of EVs and reduced footprint** over the full life cycle
- Increased **awareness and acceptability** of circular economy and LCA based design
- Support **harmonisation** in measuring the automotive circularity
- Demonstration of **circular car prototype** aiming at 0% virgin material use by mass for all components except cells, e-machines and electronics
- Accelerating the **transformation of Europe** towards being the first digitally enabled, circular, climate-neutral and sustainable economy
- Contributing to **Europe's world leadership** in automotive through increasing skills and uptake of innovative circular economy-based solutions, **reducing the dependency on critical raw materials** via recovery/use of secondary materials

European Commission

HORIZON-CL5-2023-D5-01-04
Circular economy approaches for zero emission vehicles

TYPE OF ACTION

- **RIA –** Research and Innovation Action
- Expected **TRL 5** by the end of the project

EU CONTRIBUTION

- Per project: **12 M€**
- Total: **12 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-05
Measuring road transport results towards 2ZERO KPIs

SCOPE

- **Assess and measure results related to the 2Zero partnership KPIs** and predictions (as a consequence of projects' outcomes) between the period 2025-2035
- Exploit the **capabilities and techniques** generated through development/delivery of **digital twin** representations and the 2Zero projects' results
- Address **means of measuring of all relevant parameters** related to the 2Zero KPIs, also with quantitative projection of climate, air quality and circular economy aspects

Project's **governance** shall include all **relevant stakeholders** and **relevant EC services** and is expected to cooperate with the 2Zero partnership

HORIZON-CL5-2023-D5-01-05
Measuring road transport results towards 2ZERO KPIs

EXPECTED OUTCOME

- Analyse the **effectiveness and impact of the R&I actions of the 2Zero SRIA** via the identified KPIs, not all directly under control of the partnership.
- Account for the **contribution of the 2Zero partnership** and the **results of its projects**, towards its main goals (against the **whole set of the KPIs**).
- Identification and **quantification of interactions, impacts and effectiveness** of the partnership from the 2Zero partnership project results.
- **Recommendations** for further development and **analysis of means of measurement** and evaluation of the partnership within the road transport challenge

HORIZON-CL5-2023-D5-01-05
Measuring road transport results towards 2ZERO KPIs

TYPE OF ACTION

- **CSA –** Coordination and Support Actions

EU CONTRIBUTION

- Per project: **1 M€**
- Total: **1 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-06
EU Member States/Associated countries research policy cooperation network to accelerate zero-emission road mobility

SCOPE

- Address **zero-emission road mobility (people and goods R&I programmes)** in all phases, also building on the policy cooperation network of **previous ERA-NET activities**
- Develop a **long-lasting network** of public and private stakeholders (under the **2ZERO States Representative Groups (SRG)**) to share knowledge, coordinate activities, synergies and complementarity in R&I plans, efforts, etc.
- **Support MS/AC** in implementing and accelerating **priority actions** identified in the 2ZERO SRIA, in coordination with 2ZERO SRG
- **Collect and share information** on EU and national **R&I funding programmes and related activities** in the field of zero emission mobility in Europe and beyond
- Exchange **knowledge and experiences** building on and connecting with existing database (such as TRIMIS, 2ZERO events, RTR conferences series, other MS/stakeholders' information sharing portals).

HORIZON-CL5-2023-D5-01-06
EU Member States/Associated countries research policy cooperation network to accelerate zero-emission road mobility

EXPECTED OUTCOME

- Stronger **harmonised national policy plans, efforts, approaches** on R&I funding programmes of EU MS/AC to accelerate zero-emission road mobility
- **Synergy effects, pooled resources and aligned R&I programmes** to support the CO2 emission goals in an affordable and effective way
- **Exchange of knowledge and experiences, coordination at multiple levels** (EU/ national / regional / cities, stakeholders, funding organisations, OEMs, fleets, users, etc.)
- **Holistic overview of policy plans and R&I programmes** across MS/AC to maximise synergy effects and utilisation of resources (e.g. recovery packages and cohesion funds)
- Clear **overview of the national projects**
- Data on **national projects** (at least equivalent to CORDIS database) to be made available by MS/AC, with **harmonised registration** of data
- Strong coordination/cooperation EC, MS/AC and stakeholders, facilitated by 2Zero SRG

HORIZON-CL5-2023-D5-01-06
EU Member States/Associated countries research policy cooperation network to accelerate zero-emission road mobility

TYPE OF ACTION

- **CSA –** Coordination and Support Actions

EU CONTRIBUTION

- Per project: **1,5 M€**
- Total: **1,5 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

Thematic area

Aviation

Michael KYRIAKOPOULOS

European Commission

HORIZON-CL5-2023-D5-01-07
Hydrogen-powered aviation

SCOPE

- **Assessing and validating potential liquid hydrogen demand models** at air transport ground infrastructures in Europe and globally
- **Testing and demonstrating innovative and safe ground-based refuelling, storage and supply systems** for liquid hydrogen at air transport ground infrastructures
- **Developing and demonstrating new aircraft-based hydrogen refuelling technologies**, with emphasis on operational feasibility, safety, interoperability, standardisation, scalability and cost optimisation, to showcase a clear technical and business case
- **Performing small-scale demonstration pilots** of zero-emission hydrogen-powered aircraft ground movements, in one or two airports (e.g. taxi-in / taxi-out)
- **Initiating and developing new standards and certification procedures**

European Commission

HORIZON-CL5-2023-D5-01-07
Hydrogen-powered aviation

EXPECTED OUTCOME

- Innovative ground-based refuelling and supply systems for liquid hydrogen at air transport ground infrastructures, with the potential to be up-scaled at system level by 2027
- Transformative aircraft-based hydrogen refuelling technologies
- Zero-emission hydrogen-powered aircraft ground movements, demonstrated and scalable across airports of different sizes, locations and capacities in Europe
- Comprehensive and validated liquid hydrogen demand models at air transport ground infrastructures in Europe and globally
- New standards and certification procedures for the roll-out of the new technologies and solutions at large scale

HORIZON-CL5-2023-D5-01-07
Hydrogen-powered aviation

TYPE OF ACTION

- **RIA –** Research and Innovation Action

EU CONTRIBUTION

- Per project: **8-10 M€**
- Total: **20 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-08
Accelerating climate neutral hydrogen-powered/electrified aviation

SCOPE

- **Better understanding of advanced materials' compatibility and capability in aircraft hydrogen and electrified powertrain applications** including effect of water vapour from hydrogen burning
- **Computational materials science and innovative characterisation techniques** across different length scales
- **Fundamental hydrogen research** – relevant to aviation – which can be combined to any of the expected outcomes

European Commission

HORIZON-CL5-2023-D5-01-08
Accelerating climate neutral hydrogen-powered/electrified aviation

EXPECTED OUTCOME

- **Deliver transformative aircraft energy storage, conversion and distribution technologies** for hydrogen and electrified propulsion that exceed the state-of-the-art
- **Deliver novel heat dissipation, thermal management and recuperation technologies** for megawatt class, that exceed the state-of-the-art
- **Deliver advanced simulation tools, validation methodologies and control approaches** for an aircraft hydrogen and electrified powertrain of megawatt class

HORIZON-CL5-2023-D5-01-08
Accelerating climate neutral hydrogen-powered/electrified aviation

TYPE OF ACTION

- **RIA –** Research and Innovation Action

EU CONTRIBUTION

- Per project: **3-4 M€**
- Total: **17 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-09
Competitiveness and digital transformation in aviation – advancing further capabilities, digital approach to design

SCOPE

- **Further development of advanced computational / experimental procedures / methodologies** and industrial aircraft design capabilities that have potential to contribute to the digital transformation of the European aircraft supply chain

- Development of methodologies and approaches dedicated to the use of **combined experimental testing with numerical simulation in order to enhance the testing results and their integration - and therefore accelerate the development cycle**

- **Urban air-mobility safety critical and hazardous missions** – specific testing of the whole aerial vehicle after system integration

HORIZON-CL5-2023-D5-01-09
Competitiveness and digital transformation in aviation – advancing further capabilities, digital approach to design

EXPECTED OUTCOME

- **Multi-disciplinary and multi-fidelity design and optimisation** integrated tools for industrial environment
- **New advancements in aerodynamics and aeroacoustics** (with emphasis on interference), **including data-driven** (Artificial Intelligence – Machine Learning, Hybrid modelling) **high-performance computing** and **advanced validation-verification procedures**
- **Advance further design for manufacturing optimisations, including additive manufacturing, circularity and sustainability aspects.**
- **Methodologies for simulation, testing and further certification of urban air-mobility** safety critical applications, considering for example, virtual or extended reality technologies

European Commission

HORIZON-CL5-2023-D5-01-09
Competitiveness and digital transformation in aviation – advancing further capabilities, digital approach to design

TYPE OF ACTION

- **RIA –** Research and Innovation Action

EU CONTRIBUTION

- Per project: **3-5 M€**
- Total: **15 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

HORIZON-CL5-2023-D5-01-10
Aviation research synergies between Horizon Europe, AZEA and National programs

SCOPE

- **Coordination and support of synergies between European, National and Regional R&I aviation programmes,** including joint calls or other co-funding mechanisms aligning EU, National and Regional activities in specific fields. Close collaboration with ACARE is expected
- Organisation and preparation of the **European Aerodays 2024-2025**
- **Communicate the impact of EU aviation research** and relevant policies (Fit for 55, Industrial Strategy, Alliances, Space Policy) and provide **support the Alliance on Zero Emission Aviation (AZEA)**

HORIZON-CL5-2023-D5-01-10
Aviation research synergies between Horizon Europe, AZEA and National programs

EXPECTED OUTCOME

- Coordinate and support synergies between European, National and Regional R&I aviation programmes
- Contribute to the preparation of the European Aerodays 2024-2025
- Support the Alliance on Zero Emission Aviation (AZEA)

European Commission

HORIZON-CL5-2023-D5-01-10
Aviation research synergies between Horizon Europe, AZEA and National programs

TYPE OF ACTION

- **CSA –** Coordination and Support Action

EU CONTRIBUTION

- Per project: **2 M€**
- Total: **2 M€**

TIMING

- Call opening: **13 December 2022**
- Call closing: **20 April 2023**

European Commission

European Commission

Thank you!

HorizonEU

http://ec.europa.eu/horizon-europe