European Commission

Research and Innovation

European Research on Environment and Health

Projects Funded by Horizon Europe and Euratom from Calls for Proposals 2021-2024

European Research on Environment and Health:
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European Research on Environment and Health

Projects Funded by Horizon Europe and Euratom from Calls for Proposals 2021-2024

edited by Tuomo KARJALAINEN

Directorate-General for Research and Innovation

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Contents

1. Horizon Europe projects addressing chemical safety and human health 3
2. Horizon Europe projects on safety of nanomaterials and microplastics 17
3. Horizon Europe projects on air quality and health 22
4. Horizon Europe projects on urban health 30
5. Horizon Europe projects on climate change and health 32
6. Horizon Europe projects on biological safety 41
7. Projects on non-ionizing and ionizing radiation and health 46
8. Horizon Europe projects focused on support for environment and health action 50
9. Horizon Europe projects on the exposome: environmental risk factors of health and disease 56
10. Horizon Europe projects focused on pollution monitoring and mitigation 68

INTRODUCTION

Facing increasing environmental challenges and needing to protect public health, the European Union has established in recent decades an extensive framework of thematic programmes and regulatory actions related to environment and health. They need constant updating and must rely on solid scientific evidence to be credible. The EU has also responded since 1998 by providing increasing financial support for the necessary underpinning research to consolidate the scientific knowledge base through its framework programmes of research and innovation. This has resulted in the funding of over 800 multi-national, multi-partner research projects with an estimated EU contribution of close to € 3.3 billion since 2000. Details on these projects are available.

This project catalogue provides a snapshot of a collection of environment and health-related projects funded from all the several thematic clusters and programmes in Horizon Europe and Euratom, covering the projects issued from the first four years of calls for proposals (2021-2024). As far as environment and health research is concerned, at the midterm of the current Framework of research and Innovation (Horizon Europe), running from 2021-2027, 203 projects have been funded, with an overall EU contribution of around € 1,042 million. The project ensemble includes significant initiatives such as The European Partnership for The Assessment of Risks from Chemicals (PARC), the largest ever initiative funded by the environment and health research portfolio by the EU, and a number of clusters working together on a common theme including (European Cluster on Indoor Air Quality and Health [IDEAL], European Cluster on Climate Change and Health, European Research Cluster on EMF and Health [CLUE-H], Methods for Assessing Health-Related Costs of Environmental Stressors Cluster [METEOR]), Cluster on endocrine disrupting chemicals and knowledge on health-related effects [ENKORE].

The new projects and initiatives are described below, classified thematically. For each project, their potential to contribute to various policy actions and programmes is indicated. At this time, the main policy drivers have been the initiatives launched under the European Green Deal, mainly the Chemicals Strategy for Sustainability Towards a Toxic-Free Environment and the Zero Pollution Action Plan for Water, Air and Soil, and the EU climate policies. Once more calls for proposals will be launched and new projects selected, this catalogue will be updated accordingly.

HORIZON EUROPE AND EURATOM PROJECTS IN DIFFERENT ENVIRONMENT AND HEALTH DOMAINS

1. Horizon Europe projects addressing chemical safety and human health

40 projects have been allocated funding from various parts of Horizon Europe (Table 1) in the first four years of Horizon Europe (€336 million commitment). 83% of the budget for this area was provided by Cluster 1: Health, in which is embedded the

core environment and health activity under Horizon Europe, referred to as 'Destination 2. Living and working in a health-promoting environment'.

It should be noted that many other projects addressing chemicals exposures are included in other chapters of this publication (e.g., those focused on mitigation of pollution, the exposome etc). This further attests to the importance of this research area, with the potential to underpin numerous chemical policies, as described in the last column of Table 1, not the least the European Green Deal-related EU Chemical Strategy for Sustainability and the Zero Pollution Action Plan for water, air and soil.

The most significant initiatives launched in the first four years of Horizon Europe:

- **European Partnership for the Assessment of Risks from Chemicals - PARC**: The largest investment ever in environment and health research by a European Union research framework programme. This co-funded European partnership, coordinated by the French Agency for Food Safety, Environmental Protection and Occupational Health (ANSES), has an overall budget of €400 million for 7 years (50% from the EU). The aim of the partnership is to establish an EU-wide research and innovation programme supporting the EU and national chemical risk assessment/management authorities and processes with new data, knowledge, methods and skills to address current, emerging and novel chemical safety challenges. In line with the European Green Deal's zero-pollution ambition for a toxic free environment, and the Chemical Strategy for Sustainability, the partnership will facilitate the transition to the next generation of risk assessment to better protect human health and the environment. Part of the activities of HBM4EU, the European Human Biomonitoring Initiative, which run from 2017 until 2022, continue under PARC. PARC involves close to 200 institutions working in the areas of the environment or public health from 28 countries and three EU authorities, including the European Chemical Agency (ECHA), the European Food Safety Authority (EFSA) and the European Environment Agency (EEA).

- **Cluster on endocrine disrupting chemicals and knowledge on health-related effects - ENKORE**: As a follow-up to the **EURION** cluster funded under Horizon 2020, a call for proposals was launched in 2023 to consolidate the scientific basis to support evolving EU policies on exposure to and the impacts of endocrine-disrupting chemicals EDCs (e.g., Chemicals strategy for sustainability towards a toxic-free environment and the Comprehensive European Union Framework on Endocrine Disruptors). The focus of the call was on closing existing knowledge gaps in the understanding of EDC effects such as the understanding of the mechanistic effects of endocrine disruptors and their dose-response relationships, the impact of exposures at critical life stages as regards

development of diseases later in life, focusing on the several health endpoints for which there is currently less information available. Five projects were selected for funding for a period of five years, receiving approximately €35 million from the EU. The five projects (**EDC-MASLD**, **ENDOMIX**, **HYPIEND**, **MERLOW**, **NEMESIS**) have formed a cluster, which will synchronise activities by, e.g., establishing working groups around specific science/policy issues.

Table 1. Horizon Europe projects on chemical safety and human health

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
101150779 **ARCHEM** *Nontarget analysis of Arctic sediments: An empirical indicator of persistent chemicals overlooked by regulation* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023; € 206 887 Fellow: Dr Xiaodi Shi, Stockholm University, SE	Global chemical pollution; ecosystems and human health; long-range transport to the Arctic; identification of persistent contaminants of global concern; statistical and modelling approaches to understand their emission sources and transport	EU Strategy for Managing the Arctic Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
ARCHIMEDES 101043848 **ARCHIMEDES** *A holistic data platform to accelerate the development of better and safer drugs and chemicals* 60 months (2022-2027) European Research Council (ERC) consolidator grant; € 2 000 000 Principal investigator: Dr Dario Greco, University of Tampere, FI Additional information in CORDIS	Toxicogenomics; mechanism of action (MOA) of chemicals; Adverse Outcome Pathways (AOP); big data; artificial intelligence; Toxicology Knowledge Graph (TKG); associations between exposures and diseases	Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
101061889 **AQUADRUGS** *Uncovering the effects of pharmaceuticals in the wild, beyond individuals to animal communities* 24 months (2023-2024) MSCA Postdoctoral Fellowships 2021, €222 727 Fellow: Dr Marcus Michelangeli, Swedish University of Agricultural Sciences, Uppsala, SE	Pharmaceutical pollutants in waterways; mixtures; behavioural changes in animals leading to high-order ecological effects; fish; ecotoxicology	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe

101153110 **BIOBREAM** *Bioplastics and plastic additives as emerging environmental pollutants on a marine key species, gilthead sea bream* 36 months (2024-2027) MSCA Postdoctoral Fellowships 2023, € 206 641 Fellow: Dr Isabel Forner-Piquer, Spanish National Research Council (CSIC), Barcelona, ES	Exposure to biodegradable plastic (BP); toxicological threats; key marine species (gilthead sea bream); tran-scriptomic and epigenetic responses; mixture impacts	Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
101135037 **CONTRAST** *Contaminants of emerging concern: An integrated approach for assessing impacts on the marine environment* 48 months (2024-2027) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 5 249 178 Research and innovation action Coordinator: Dr Steven Brooks, Norwegian Institute for Water Research (NIVA), Oslo, NO Additional information in CORDIS	Integrated assessment and effect-based monitoring framework to measure the impacts of contaminants of emerging concern (CECs) on the marine environment; measurements of biological effect endpoints; chemical prioritisation schemes; *in silico*, *in vitro* and *in vivo* bioassays; mechanisms of toxicity	Chemicals strategy for sustainability towards a toxic-free environment EU Water Framework Directive
101108489 **ECOPFAS** *Ecotoxicogical assessment of banned and novel PFAS as individuals or in mixture* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2022, € 191 760 Fellow: Dr Opeoluwa Motunrayo Ogunsuyi, Luxembourg Institute of Science and Technology, LU	Per- and polyfluoroalkyl substances (PFAS); alternatives; aquatic toxicity; acute and developmental toxicity; genotoxicity and toxicity pathways for PFAS alternatives in three freshwater species	Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
101136259 **EDC-MASLD** *Investigation of endocrine-disrupting chemicals as contributors to progression of metabolic dysfunction-associated steatotic liver disease* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 6 612 652 Coordinator: Prof Tuulia Hyötyläinen, Örebro University, SE Additional information in CORDIS Belongs to the **ENKORE**	Metabolic dysfunction-associated steatotic liver disease (MASLD); exposure to endocrine-disrupting chemicals (EDCs); internal exposome (metabolome, gut microbiome, epigenome, proteome, immunome); interactions between EDC exposure, sex, genotype, diet, socioeconomic and lifestyle factors;	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors

cluster on endocrine disrupting chemicals and knowledge on health-related effects	European NAFLD (Nonalcoholic fatty liver disease) Registry; *in vitro* and *in vivo* models	
101110766 **EIG** *Environmental impact of genotoxicants* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2022; € 211 754 Fellow: Dr Raphaël Santos, Agency for Environmental and Occupational Health Safety (ANSES), Maisons Alfort, FR	Onco-proteomics; next-generation biomarkers for European endemic freshwater fish species; toxicity pathways; genotoxicants	EU Biodiversity Strategy for 2030
ENDOMIX 101136566 **ENDOMIX** *Understanding how endocrine disruptors and chemical mixtures of concern target the immune system to trigger or perpetuate disease* 48 months (2024-2027) Cluster 1: Health, €6 488 875 Research and innovation action Coordinator: Prof Ana Zenclussen, Helmholtz Centre for Environmental Research, Leipzig, DE Additional information in CORDIS ENKORE Belongs to the **ENKORE** cluster on endocrine disrupting chemicals and knowledge on health-related effects	Exposure to multiple endocrine disrupting chemicals (EDCs) during life course including windows of susceptibility; cohorts; real-life EDC mixtures targeting the immune system to initiate, trigger or perpetuate diseases; mechanistic pathways and transgenerational impact; *in vitro*, *in silico*, *in vivo* data for strengthening causal inference	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors
enviromed 101057844 **ENVIROMED** *Next generation toolbox for greener pharmaceuticals design & manufacturing towards reduced environmental impact* 36 months (2022-2025) Cluster 1: Health, €7 518 062 Research and innovation action Coordinator: Dr Stephanos Camarinopoulos, Risa Sicherheitsanalysen GMBH, DE Additional information in CORDIS	Pharmaceuticals; metabolites; emerging environmental toxicants; persistence; environmental occurrence and fate; toxicity (*in-vitro, in-vivo* models); *in-silico* methods; Lifecycle Assessment (LCA); green-by-design in-silico drug development	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe

101057668 **ETERNAL** *Boosting the reduction of the environmental impact of pharmaceutical products throughout their entire life cycle* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 5 922 396 Coordinator: Dr Jesus Latorre Zacares, AIMPLAS, ES Additional information in CORDIS	Environmental risks of active pharmaceutical ingredients (API) and residues/metabolites, other chemicals and by-products of the production process green manufacturing; case studies; pollution; waste; ecotoxicity and environmental fate of pharmaceuticals	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe EU Zero Pollution Action Plan
101104517 **EXPO-IS-OMICS** *The chemical exposome in pregnant women and metabolic dysregulations analysis towards the prioritization of hazardous chemicals* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2021, € 169 326 Fellow: Dr Ruben Gil-Solsona, The National and Kapodistrian University of Athens, EL	External and internal chemical exposome in pregnant women to study contaminants that can cause metabolic dysregulation; cheminformatics; *in-silico* predicted molecular predictors; Rhea cohort	Chemicals strategy for sustainability towards a toxic-free environment
101156353 **EXPOSIGNALZ** *Dissecting brain pollutant exposure and its contribution to neurodegeneration and Alzheimer's disease: from signatures to prevention strategies to protect and maintain a healthy brain* 60 months (2025-2029) Research and innovation action Cluster 1: Health, € 9 309 880 Coordinator: Dr Véronique Perrier, INSERM, Université de Montpellier, FR Additional information in CORDIS Belongs to the EXPOHEALTHNET cluster (under development)	Hazardous waste; dementia; pollutants likely to have neurotoxic effects and pro-amyloidogenic properties predictive of a neurodegenerative trajectory related to Alzheimer's disease (AD); pollutant signatures associated with brain aging and AD in four European population-based cohorts; mechanisms of action; impact of pollutants on early neurodevelopment as a factor of susceptibility for later neurodegenerative diseases	EU Zero Pollution Action Plan Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
101130769 **FRANKIE** *Impact of exposure to chemicals to the onset and progression of Lewy Body dementia* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2021, € 150 438	Neurodegenerative diseases; Lewy body dementia (LBD); chemical exposome in patients with LBD; underlying mechanisms of exposure-related	Chemicals strategy for sustainability towards a toxic-free environment

Fellow: Dr Žiga Tkalec, Masaryk University, Brno, CZ	neurotoxicity; association of chemical exposures with dysregulated metabolic pathways to identify biomarkers of effect	
 101137440 **HYPIEND** *Understanding and preventing the impact of endocrine disruptors on the hypothalamus-pituitary axis in sensitive populations* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 6 694 438 Coordinator: Dr Chiara Baudracco, Fundacio Eurecat, ES Additional information in CORDIS  Belongs to the **ENKORE** cluster on endocrine disrupting chemicals and knowledge on health-related effects	Co-exposure to endocrine disrupting chemicals (EDC); epigenetic programming of hypothalamus-pituitary (HP) axis; perinatal period and puberty; neuroendocrine system; *in vitro*, *in silico* and *in vivo* models of placenta and blood brain barrier diffusion; organ-on-chip; preclinical models	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors
 101099775 **IDEFIX** *Multiorgan toxicity and efficacy test platform* 36 months (2022-2025) Innovation action European Innovation Council transition project; €2 496 073 Coordinator: Dr Jeremy Cramer, Cherry Biotech, Montreuil, FR Additional information in CORDIS	Animal testing; prediction of drug effects (toxicity and efficacy) in humans; organ-on-chip/MPS solution based on microfluidic technology; reconstruction of complex tissues (vascularisation, immune system, circulating metastasis, multiorgan interconnection)	Directive on the protection of animals used for scientific purposes REACH regulation
101111269 **LEOTHREAT** *Assessment of the threat of metal exposure to lions (Panthera leo) in East Africa* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2022, € 210 911 Fellow: Dr Pablo Sánchez Virosta, Norwegian University of Science and Technology, NO	Lion population decline in East Africa; exposure to pollution; heavy metals; exposure routes; mining; biomonitoring; contaminated water and prey	EU Biodiversity Strategy for 2030

101067260 **MANGO** *The chemical exposome of pregnant women with gestational diabetes mellitus* 36 months (2023-2026) MSCA Postdoctoral Fellowships 2021, €261 380 Fellow: Dr Marques Bueno Montserrat, Columbia Mailman School of Public Health (USA) and Universitat Rovira i Virgili, ES	Gestational diabetes mellitus (GDM); effects of chemical exposure during pregnancy; occurrence of chemicals in biological samples from 400 pregnant women and evaluation of association between exposure to chemicals and clinical data	Chemicals strategy for sustainability towards a toxic-free environment
101137411 **MERLON** *Merging scientific evidence with regulatory practices and leveraging identification of endocrine disruptors using new approach methodologies* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 6 987 974 Coordinator: Prof Terje Svingen, Technical University of Denmark, DK Additional information in CORDIS Belongs to the **ENKORE** cluster on endocrine disrupting chemicals and knowledge on health-related effect	Endocrine disrupting chemical (EDC)-mediated effects on sexual development; human data on the role of EDC exposure during foetal development and changes in mini-puberty, connecting to puberty, reproductive function, and gender incongruence; existing biobanks and cohorts; 3R-compliant New Approach Methodologies (NAMs); Adverse Outcome Pathways (AOPs); roadmap for EDC identification	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors
101191595 **NAMWISE** *NAMS within integrated safety & efficacy evaluation of chemicals and pharmaceuticals* 36 months (2024-2027) Cluster 1: Health, € 1 977 390 Coordinator: Dr Laure Geoffroy, National Institute for Industrial Environment and Risks (INERIS), Verneuil-en-Halatte, FR Additional information in CORDIS	Animal-free chemical and drug assessments; New Approach Methodologies (NAMs); combining expertise on in silico tools and in vitro assays; case-studies for hazard/risk assessment; standardization and validation of NAMs; white paper animal-free chemical and drug assessments	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan Directive on the protection of animals used for scientific purposes

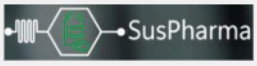
 101137405 **NEMESIS** *Novel effect biomarkers for metabolic disruptors: evidence on health impacts to answer science and policy needs* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 7 881 685 Coordinator: Prof Jaana Rysä, University of Eastern Finland, FI Additional information in CORDIS ENKORE Belongs to the **ENKORE** cluster on endocrine disrupting chemicals and knowledge on health-related effect	*In silico, in vitro, in vivo*, epidemiological and systems biology data on metabolic effects of endocrine-disrupting chemicals (EDCs) and mixtures; metabolic disruption in liver and pancreas; impact on the microbiota; human exposure data; effect biomarkers for metabolic disruption; Adverse Outcome Pathways (AOP)s; Integrated Approaches to Testing and Assessment (IATA)	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors
101068090 **NEUROMICS** *Novel methods to identify endocrine disruption induced neurotoxicity* 36 months (2023-2026) MSCA Postdoctoral Fellowships 2021, €277 535 Fellow: Dr Rikke Poulsen, Aarhus University, DK	Neurodevelopmental disorders; developmental neurotoxicity (DNT); endocrine disruption; exploratory omics; novel hypotheses on how endocrine disrupting chemicals affect the brain; cosmopolitan tadpole model American bullfrog; adverse outcome pathways (AOPs)	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors
101168892 **NEXED** *Network for cross-disciplinary assessment of endocrine disrupting compounds: training the next generation of toxicologists* 48 months (2025-2028) MSCA Doctoral Networks 2023, € 3 871 908 Coordinator: Prof. Dries Knapen, University of Antwerp, BE	Endocrine disrupting chemicals (EDCs); advances in test methods for assessment of EDCs; training of 15 doctoral candidates of toxicologists; integration of human and environmental EDC assessment; One Health approach; complex mixtures; new test methods covering less well-characterised mechanisms and effects	Chemicals strategy for sustainability towards a toxic-free environment European Union framework on endocrine disruptors European Partnership for the Assessment of Risks from Chemicals (PARC)

101057014 **PARC** *European Partnership for the Assessment of Risks from Chemicals* 84 months (2022-2029) Programme Co-fund Action Cluster 1: Health, € 200 000 000 Coordinator: Dr Pascal Sanders, Agency for Environmental and Occupational Health Safety (ANSES), Maisons Alfort, FR Additional information in CORDIS	Chemical risk assessment and risk management; data, knowledge, methods, networks and skills; current, emerging and novel chemical safety challenges; transition to next generation risk assessment; EU-wide sustainable cross-disciplinary network; joint EU research and innovation activities; strengthening existing capacities and building new trans-disciplinary platforms to support chemical risk assessment	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan REACH regulation European Union framework on endocrine disruptors EU strategic framework on health and safety at work 2021-2027
101065928 **PEARL** *Novel biomarkers of pollution in avian models: Paternally-transmitted epigenetic alterations in response to heavy metal exposure* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2021, € 199 694 Fellow: Dr Lisandrina Mari, University of Jyväskylä, FI	Birds in polluted environments; avian models; heavy metal pollution; morphological and molecular traits in paternal sperm and their transmission to offspring; sperm molecular traits as biomarkers of heavy metal exposure	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan
101150484 **PESTBAN** *Hazardous pesticide bans and early-life health outcomes* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023, €148 478 Fellow: Dr Cavit Baran, Sabanci University, Istanbul, TR	Data on hazardous pesticide use and established bans in Türkiye, agricultural production and crop prices; acquisition of individual health data from national birth registry and national health surveys; analyses of economic and health effects of pesticide cancellations established between 2005 and 2015	Chemicals strategy for sustainability towards a toxic-free environment EU Farm to Fork Strategy

101058697 **PFAS-ITOX** *Developmental immunotoxicity of perfluoroalkyl substances (PFASs) in a population of highly-exposed children* 24 months (2022-2024) MSCA Postdoctoral Fellowships 2021, € 222 727 Fellow: Dr Christel Nielsen, Lund University, SE Additional information in CORDIS	Perfluoroalkyl substances (PFAS); immunotoxicity; cohort of children with a range of PFAS exposures; effect of prenatal and childhood PFAS exposures on health outcomes, including COVID-19 incidence	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan
101141686 **PFAS FOREVERYWHERE** *PFAS exposure; relationship to serum lipids in children and adults, mechanism of action and potential treatment of high exposed individuals* 60 months (2024-2029) European Research Council (ERC) advanced grants; € 2 500 000 Fellow: Dr Lone Ladegaard Laursen, University of Southern Denmark, DK	Perfluoroalkyl substances (PFAS); determine whether PFAS exposure in children and adults is causally linked to increased serum cholesterol and liver enzymes and if PFAS elimination can be enhanced; randomized cross-over trial; causal effects; mechanism of action of PFAS on lipid metabolism and the relation with serum cholesterol and liver enzymes	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan
101119261 **PHARM-ERA** *Improving monitoring and environmental risk assessment of pharmaceuticals, antimicrobial resistance and pathogens from terrestrial to aquatic environments* 48 months (2024-2028) MSCA doctoral network; €2 657 779 Coordinator: Dr Stépane Pesce, Agency for Environmental and Occupational Health Safety (ANSES), Maisons Alfort, FR Additional information in CORDIS	Contamination of soil and aquatic ecosystems by pharmaceuticals, antimicrobial-resistant microorganisms and pathogens; 10 doctoral projects; impacts on ecosystem health and repercussions on humans and animals; ecotoxicology	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe
101163024 **POLIS** *Understanding the impact of environmental pollution on the adaptive immune system* 60 months (2025-2029) European Research Council (ERC) starting grant, € 1 499 749 Fellow: Dr Lorenzo Bonaguro, Deutsches Zentrum für	Chemical pollution; perfluoroalkyl and Polyfluoroalkyl Substances (PFAS); potential to molecularly interfere with organ functionalities at the single-cell level using	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan

Neurodegenerative Erkrankungen EV, DE	state-of-the-art high-resolution omics technologies; non-communicable diseases	
 101135005 **POLLINERA** *Understanding pesticide-pollinator interactions to support EU environmental risk assessment and policy* 48 months (2024-2027) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 5 499 473 Research and innovation action Coordinator: Prof Christopher John Topping, Aarhus University, DK Additional information in CORDIS	Ecotoxicological data to predict the source and routes of exposure and impact of pesticides on pollinators; co-monitoring scheme for pesticides and pollinators across European cropping systems and landscapes; mixture exposure; pesticide toxicological effects on pollinators for chemicals and organisms; risk and policy assessment; toxicological testing, *in silico* models	EU actions to protect pollinators
 101130724 **QUANTUM-TOX** *QUANTUM-TOX - Revolutionizing computational toxicology with electronic structure descriptors and artificial intelligence* 48 months (2024-2028) European Innovation Council (EIC) Pathfinder; € 1 994 770 Coordinator: Dr Alessandra Roncaglionis, Mario Negri Institute of Pharmacological Research, Milano, IT Additional information in CORDIS	Assessment of toxic effects of chemicals and pharmaceuticals; computational toxicology; tools and methods for toxicity prediction; development of a new type of descriptor based on quantum mechanics; Electronic SIGNatures (ESigns); artificial intelligence	Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
QTOX DOCTORAL NETWORK 101072531 **QTOX** *Quantitative extrapolation in ecotoxicology* 48 months (2023-2027) MSCA doctoral network; €2 727 057 Coordinator: Prof. Ronny Blust, University of Antwerp, BE Additional information in CORDIS	Chemical risk assessment; development of mechanistic knowledge and data-efficient modelling tools to bridge the gap between standard toxicity data and ecologically relevant end points arising from chronic, time variable exposures to chemical mixtures; intersectoral	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation EU Water Framework Directive

	research and training programme with 10 doctoral candidates	
101178148 **RADAR** *Renewable and safe aromatic compounds as replacements for substances of concern* 48 months (2024-2028) Innovation action Cluster 4: Digital, Industry and Space, € 13 924 216 Coordinator: Prof Bert Sels, Catholic University of Leuven, BE Additional information in CORDIS	Benign replacements for aromatic chemicals such as bisphenol A (BPA) and derivatives; Safe and Sustainable-By-Design (SSbD); molecular design of novel biobased compounds as alternatives for substances of very high concern (SVHC) via an inventive catalytic biorefinery of biomass side streams; new approach methodologies (NAMs) for hazard assessment of human health and environmental toxicity; machine learning; in-silico impact assessment; upscaling to multi kg scale and investigation in industrial applications	Chemicals strategy for sustainability towards a toxic-free environment
101182588 **SAFERCOAT** *A multidisciplinary and circular approach towards the development of innovative, safe-by-design, (bio)degradable multifunctional coatings* 48 months (2025-2028) MSCA Staff Exchanges 2023, € 703 800 Coordinator: Dr Roberto Martins, University of Aveiro, PT Additional information in CORDIS	Staff mobility and knowledge-sharing; eco-friendly polymeric coating formulations with enhanced biodegradability for aeronautical, maritime, and cultural applications; optimization, testing, and validation; assessment of the environmental and health impacts	Chemicals strategy for sustainability towards a toxic-free environment
101107353 **SEASOL** *From the sea to the solution. An integrative assessment of marine pollution in a changing Arctic* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2022, € 226 751	Marine chemical pollution; identification of the pathway(s) of mercury (Hg) bioaccumulation in marine food webs of the High Arctic Kongsfjorden	Chemicals strategy for sustainability towards a toxic-free environment EU Strategy for Managing the Arctic

Fellow: Dr Marianna Pinzone, Norwegian Polar Institute, Tromsø, NO	(Svalbard); stable isotope analysis to identify the sources of Hg within the fjord system and the pathways to Hg accumulation within sentinel marine species; environmental change	EU Zero Pollution Action Plan
 101134958 **STOPP** *Strategies to prevent and reduce plastic packaging pollution from the food system* 36 months (2024-2026) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 3 998 450 Research and innovation action Coordinator: Dr Sarianna Palola, VTT Technical Research Centre of Finland Ltd, Espoo, FI Additional information in CORDIS	Food plastic packaging; decrease the amount of generated waste; effect of littered plastic food packaging on the environment with analysis of different ecosystems, biological organizational levels and key sentinel organisms; safe and high-performance material development	EU policy on packaging and packaging waste EU Strategy for Plastics in a Circular Economy
 101057430 **SUSPHARMA** *Merging sustainable and digital chemical technologies for the development of greener-by-design pharmaceuticals* 48 months (2022-2026) Cluster 1: Health, € 6 205 434 Coordinator: Prof. Renzo Luisi, University of Bari Aldo Moro, Bari, IT Additional information in CORDIS	Safe- and sustainable-by-design chemicals; reduce pollution generated during drug manufacturing; greener-by-design approach to synthesis; novel purification methods and robust digital solutions to eliminate carcinogenic impurities in pharmaceuticals	Chemicals strategy for sustainability towards a toxic-free environment Pharmaceutical Strategy for Europe
 101172693 **VICT3R** *Developing and implementing virtual control groups to reduce animal use in toxicology research* Research and innovation action 48 months (2024-2028) Cluster 1: Health (Innovative Health Initiative), € 13 524 750 Coordinator: Dr Ferran Sanz, Pompeu Fabra University, Barcelona, ES Additional information in CORDIS	Public-private partnership under European Innovative Health Initiative; reduction of the number of animals used in experimental studies performed during the nonclinical drug and chemical safety evaluation; Replacement of animals of the concurrent controls groups (CCGs) with	Chemicals strategy for sustainability towards a toxic-free environment Pharmaceutical Strategy for Europe Directive on the protection of animals used for scientific purposes REACH regulation

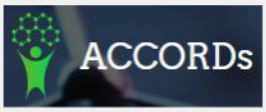
	Virtual Control Groups (VCGs); statistical or artificial intelligence (AI) approaches; validation; repeated dose toxicity studies	
101092164 **ZEROF** *Development of verified safe and sustainable PFAS-free coatings for food packaging and upholstery textile applications* 36 months (2023-2025) Research and innovation action Cluster 4: Digital, Industry and Space, € 4 998 888 Coordinator: Dr Miika Nikinmaa, VTT Technology Centre, FI Additional information in CORDIS	Safe-and-sustainable-by-design (SSbD) coating alternatives to replace PFAS compounds in food packaging and upholstery textiles; environmental impacts; toxicology (e.g. hazard and law, green toxicology principles); toxicology modelling; reduce *in-vitro* testing	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan Directive on the protection of animals used for scientific purposes

2. Horizon Europe projects on safety of nanomaterials and microplastics

Nanosafety research emerged as an important sub-area in environment and health in the Seventh Framework of Research and Innovation (FP7), partially due to public concerns and thanks to policy initiatives such as the European strategy for nanotechnology and the nanotechnology Action Plan, adopted in 2004. Many of the projects funded have participated or are participating in the European NanoSafety Cluster, a platform for coordinating nanosafety research in Europe. It provides strategic direction for the EU and member states, enhances synergies between running and newly starting projects, preserves the outputs and data from ended projects and promotes FAIR data.

13 Horizon Europe projects address the environmental and human health impacts of nanomaterials (Table 2), with an EU commitment of around €18.5 million. The multi-partner projects emerged from a dedicated call '*Advanced characterisation methodologies to assess and predict the health and environmental risks of nanomaterials*', launched under the Cluster 4: Digital, Industry and Space of Horizon Europe.

Table 2. Projects on safety of nanomaterials and microplastics

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
 101092796 **ACCORDS** *Green Deal inspired correlative imaging-based characterization for safety profiling of 2D materials* 48 months (2023-2026) Coordination and support action Cluster 4: Digital, Industry and Space, € 1 669 149 Coordinator: Prof. Damjana Drobne, University of Ljubljana, SI Additional information in CORDIS	Graphene family materials (GFMs); 2D nano-materials; assessment and prediction of nanomaterials health and environmental risks; ACCORDs framework; safe and sustainable by design; user guidance; reference *in vitro* tests; new reference 2D nanomaterials	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation Directive 2010/63/EU on the protection of animals used for scientific purposes
101151569 **CFENPLS** *In situ monitoring of the toxicological evolution of nanoplastics in living organisms* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023, € 203 464 Fellow: Dr Zhou Haifeng, Leiden University, NL	Nanoplastics (NPLs); toxicological mechanisms in living organisms; monitoring the concentration of NPLs ingested by a single cell that is actually causing adverse effect and the release of toxicological markers from cellular damage	EU Strategy for Plastics in a Circular Economy Chemicals strategy for sustainability towards a toxic-free environment European Partnership for the Assessment of Risks from Chemicals (PARC)
101108795 **CHEMFISHPLAST** *Identification of chemicals in edible fish containing microplastics as potential source for human exposure* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2022; €181 152 Fellow: Dr Ayman Saber, University of Cordoba, ES	Microplastics (MPs); identification of chemicals arising from potential human exposure sources; chemical-microplastic contamination in edible marine species from the Mediterranean Sea	EU Strategy for Plastics in a Circular Economy EU Mission: Restore our Ocean and Waters
 101092971 **ICARE** *Integrated assessment and advanced*	Imaging technologies to quantify physical-chemistry properties in complex matrices;	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation

characterisation of neuro-nanotoxicity 48 months (2023-2026) Research and innovation action Cluster 4: Digital, Industry and Space, € 2 744 654 Coordinator: Dr Ernesto Alfaro, International Iberian Nanotechnology Laboratory, Braga, PT Additional information in CORDIS	impact of nanomaterials on brain health to prevent the toxicity nanomaterials; toxicology testing protocols; vitro and *in vivo* testing	Directive 2010/63/EU on the protection of animals used for scientific purposes
101109403 **IMPACT** *Implementation of a novel in vitro methodology to assess pulmonary toxicological response mechanisms to high aspect ratio and complex materials* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2022, € 173 847 Fellow: Dr Carla Ribalta Carrasco, German Federal Institute for Occupational Safety and Health (BAuA), DE	*In vitro* methodology for lung toxicity testing of high aspect ratio nanomaterials (HARN); particle toxicity	REACH regulation Directive 2010/63/EU on the protection of animals used for scientific purposes EU Strategic Framework on Health and Safety at Work 2021-2027
101090291 **IMPACTAS** *Improving micropollutants analysis and controlling of terrestrial and aquatic systems* 30 months (2022-2025) ERA fellowship Widening participation and spreading excellence; €226 441 Coordinator: Prof. Jose Juan Santana Rodriguez, University of Las Palmas de Gran Canaria, ES	Microplastics; contaminants; analytical methodologies and strategies for the determination of organic pollutants adsorbed to MPs; monitoring in different environmental compartments; risks for natural ecosystems	EU Strategy for Plastics in a Circular Economy Blue Growth strategy of the European Union
101162646 **3M-2MNP-FE** *Microscopic, mesoscopic, and macroscopic approaches to mitigate micro- and nano-plastics in the food and environment* 24 months (2024-2026) ERA fellowship Widening participation and spreading excellence; € 221 564 Fellow: Dr. Floirendo Flores, University of Malta, MT	Plastic packaging polymers; degradation products; micro- and nanoparticles (MNPs); mitigate environmental risks upon exposure to MNPs; environmentally sound enzymatic technology to treat MNPs	EU Strategy for Plastics in a Circular Economy

 101092686 **MACRAME** *Advanced characterisation methodologies to assess and predict the health and environmental risks of advanced materials* 36 months (2022-2025) Research and innovation action Cluster 4: Digital, Industry and Space, € 4 201 652 Coordinator: Dr Steffi Friedrichs, Acumenist, Brussels, BE Additional information in CORDIS	Detection, characterisation and quantification of advanced materials (AdMas) during their processing and product-life-cycle; (eco)-toxicology; impact on (human) health and the environment; standardisation and harmonisation of the developed test- and characterisation methods	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation Directive 2010/63/EU on the protection of animals used for scientific purposes
101063905 **NANOEXOS** *Towards a mechanistic understanding of nanoparticle interactions with exosome secretion* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2021, € 199 694 Fellow: Dr Ester Canepa, University College Dublin, National University Of Ireland, IE	Interaction mechanisms between nanoparticles (NPs) and living systems; impact that cell-internalised NPs on exosome (cell-released vesicles involved in numerous biological processes) secretion	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation
 101092741 **NANOPASS** *Bridging the gaps in nanosafety for animal-free prediction of adverse outcomes* 36 months (2023-2026) Research and innovation action Cluster 4: Digital, Industry and Space, € 3 073 736 Coordinator: Prof. Iktok Urbancic, Jožef Stefan Institute, Ljubljana, SI Additional information in CORDIS	High-throughput screening; focus of nanosafety testing on early key events (KEs) leading to adverse outcomes (AOs); intravital *in vivo* microscopy; quantitative time-lapse *in vitro* microscopy; single-cell omics; computational modelling of structure-function relationships; new *in vitro* systems; quantitative *in silico* models to predict AOs; validation of AO predictions	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation Directive 2010/63/EU on the protection of animals used for scientific purposes

101180609 **PLASTHEALTH** *Hazards of microplastics to the marine ecosystem: A novel mesocosm approach to evaluate the dynamic and effects of microplastic on marine organisms' health* 24 months (2025-2026) ERA-fellowship Widening participation and spreading excellence; € 156 778 Fellow: Dr Dekanová Vladimíra, NOVA University Lisbon, PT	Microplastic debris pollution (MP); effects of MP exposure on the health (such as the gut content, gut damage, metabolic activity, oxidative stress) of three functional groups mesocosm model system – a prey (arthropod Artemia salina), a predator (fish Sparus aurata), and a filter feeder (mussel Mytilus sp.)	EU Strategy for Plastics in a Circular Economy Chemicals strategy for sustainability towards a toxic-free environment Integrated maritime policy
101072777 **PLASTICUNDERGROUND** *Integrated cross-sectoral solutions to micro- and nanoplastic pollution in soil and groundwater ecosystems* 48 months (2022-2026) MSCA doctoral network; €2 489 724 Coordinator: Dr Laurent Simon, University Claude Bernard of Lyon, FR Additional information in CORDIS	Environmental and public health risks of micro- and nanoplastics (MnP) in soils and groundwater; Doctoral Network; fate, transport and impacts of MnPs; multidisciplinarity	EU Strategy for Plastics in a Circular Economy
101092901 **POTENTIAL** *Platform optimisation to enable nanomaterial safety assessment for rapid commercialisation* 36 months (2023-2026) Research and innovation action Cluster 4: Digital, Industry and Space, € 2 999 787 Coordinator: Dr Luisa Diomede, Mario Negri Institute of Pharmacological Research, Milano, IT Additional information in CORDIS	Advanced Nanomaterials (Ad-NMs); harmonised protocols for characterisation, testing, grouping and read-across of Ad-NMs; advanced imaging protocols; methodologies for accelerated testing; in vitro multi-cellular models; *in vivo* (invertebrate) models; ecotoxicological models for assessing the environmental and health hazard of Ad-NMs	Chemicals strategy for sustainability towards a toxic-free environment REACH regulation Directive 2010/63/EU on the protection of animals used for scientific purposes

3. Horizon Europe projects on air quality and health

It is widely agreed that air pollution is the major environmental stressor human populations are exposed to in Europe. This environmental challenge is addressed by 22 projects (Table 3), with an EU commitment of around €85 million. This area of research received a considerable boost as the Health cluster launched a call for proposals '*Indoor air quality and health*' in 2021 under 'Destination 2. Living and working in a health-promoting environment'. This topic received increasing attention as the Covid pandemic started due to evident links of viral transmission to indoor air quality issues.

Noteworthy initiative:

- **European Cluster on Indoor Air Quality and Health (IDEAL):** As the call for proposal stated that 'All projects funded under this topic are strongly encouraged to participate in networking and joint activities, as appropriate', the seven projects selected (**EDIAQI**, **INCHILDHEALTH**, **INQUIRE**, **K-HEALTHINAIR**, **LEARN**, **SYNAIR-G**, **TWINAIR**) for funding (around €52 million from the EU) have formed a cluster, to optimize synergies, avoid overlaps and increase the impact of the projects at the level of dissemination and outreach to policy-makers and other stakeholders. The cluster formed working groups on issues of common interest such as data analysis/management and protection or sensors. It has organised workshops and training activities, among other things.

Table 3. Projects on air quality and health

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
101151542 **AGE-ADAPT** *Adaptation strategies for the elderly in multi-domain indoor environments - well-being and building energy consumption* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023, € 214 934 Fellow: Dr Yu Dong, Technical University of Denmark, Kongens Lyngby, DK	Indoor air quality and well-being; energy consumption; living labs; effects of multi-domain indoor environments on the physiological, behavioural, and psychological adaptation of older adults	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World Energy efficient buildings
101168425 **DUST-DN** *Doctoral network on atmospheric dust*	Expertise on mineral dust in the atmosphere; networking; understanding of dust microphysical	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World

48 months (2024-2028) MSCA Doctoral Networks 2023, € 3 343 197 Coordinator: Dr Franco Marenco, The Cyprus Institute, Nicosia, EL Additional information in CORDIS	properties and processes; socio-economic impacts of dust on health, aviation and energy production; dust in the global climate system	European Green Deal
101095457 **EASVOLEE** *Effects on air quality of semi-volatile engine emissions* 48 months (2023-2027) Cluster 5: Climate, Energy and Mobility: € 2 999 051 Research and innovation action Coordinator: Prof. Spyros Pandis, Foundation for Research and Technology – Hellas, Heraklion, EL Additional information in CORDIS	Secondary aerosol formation from transport engines; health-related metrics and mechanisms; mitigation strategies and policies to improve air quality; emissions of transport engines under real driving conditions; formation of secondary particulate matter (PM); toxicity of both the fresh and aged PMs	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World European Green Deal
101057497 **EDIAQI** *Evidence driven indoor air quality improvement* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 7 876 015 Coordinator: Dr Francesco Mureddu, Lisbon Council for Economic Competitiveness, BE Additional information in CORDIS Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	Indoor air pollution; characterization of sources and routes of exposure and dispersion of chemical, biological, and emerging indoor air pollution in multiple cities in EU; small-scale and long-term, large-scale monitoring of target indoor air pollutants	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101066362 **FACEINQ** *Innovative dynamic façade systems for indoor environmental quality* 15 months (2023-2024) MSCA Postdoctoral Fellowships 2021, € 127 165 Fellow: Dr Marcel Loomans, Eindhoven University of technology, NL	Energy efficiency of buildings; computational models validated with measured data and feedback from building occupants; impact of indoor environment on building occupants	Energy efficient buildings

	and the impact of occupants' behaviour on the operation of façade systems	
101123382 **FORECAST-AIR** *Open-access forecasting system of the health effects of air pollution* 12 months (2024-2025) European Research Council (ERC) proof of concept grant, € 150 000 Fellow: Dr Nuria Parera, Barcelona Institute for Global Health - ISGlobal, ES	Epidemiological models to convert air quality predictions into health forecasts; assess predictability; create early warning systems that prioritise well-being of vulnerable groups	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
 10109546 **FRESHAIR4LIFE** *Implementation research on the tailored, multidisciplinary NCD prevention package FRESHAIR4LIFE: Targeting tobacco and air pollution exposure in mid- to late adolescents in disadvantaged populations* 48 months (2024-2026) Cluster 1: Health, € 2 149 813 Coordinator: Dr Rianne van der Kleij, Leiden University Hospital, NL Additional information in CORDIS	Non-communicable diseases (NCD); implementation of multi-level, evidence-based tobacco and air pollution exposure prevention packages targeting adolescents in disadvantaged populations in Greece, the Kyrgyz Republic, Pakistan, Romania and Uganda; youth advocacy digital initiatives; community leadership schools; Teach-the-Teacher programmes	EU Global Health Strategy: Better Health for All in a Changing World EU Zero Pollution Action Plan Relevant EU public health policies
101060679 **GRAPHICS** *Integrated analysis of air pollution, human health and income inequality for alternative climate change scenarios* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2021, € 181 152 Fellow: Dr Jon Sampedro, BC3 Basque Centre for Climate Change, ES	Health impacts attributable to ambient and household air pollution; current and future contribution of different population groups to air pollution for alternative scenarios at regional level; business as usual scenario; alternative scenarios	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World

101119726 **HUMANIC** *Human - centric indoor climate for healthcare facilities* 48 months (2024-2027) MSCA Doctoral Networks 2022, € 2 707 840 Coordinator: Dr Anna Bogdan, Warsaw University of Technology, PL Additional information in CORDIS	Healthcare-associated infection (HAI); exposure to airborne pathogens; indoor air quality and environment; tools and techniques to enable effective design and operation of healthcare environments	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101056883 **INCHILDHEALTH** *Identifying determinants for indoor air quality and their health impact in environments for children: measures to improve indoor air quality and reduce disease burdens* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 7 368 144 Coordinator: Prof. Heidi Salonen, Aalto University, FI Additional information in CORDIS Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	Determinants for and impact of indoor air quality; school children; chemicals, particle concentrations, microorganisms and physical parameters in schools, homes, sports halls and transport; epidemiology; interventions in three European cities; respiratory infections, allergies, and neurological and cognitional symptoms; cytotoxicity testing	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101057499 **INQUIRE** *Identification of chemical and biological determinants, their sources, and strategies to promote healthier homes in Europe* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 7 830 787	Determinants of indoor air quality (IAQ) in homes; exposure to hazardous chemical and biological determinants; infants and young children; low-cost, non-invasive sampling strategies (sensors, indoor/ outdoor passive sampling, urine biomonitoring); data analysis techniques (e.g., machine learning,	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World

Coordinator: Dr Pernilla Bohlin Nizzetto, Norwegian Institute for Air Research (NILU), Oslo, NO Additional information in CORDIS Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	exposure modelling, geospatial analysis)	
101057693 **K-HEALTHINAIR** *Knowledge for improving indoor air quality and health* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 7 984 484 Coordinator: Dr Jose Fermoso Domínguez, CARTIF Technology Centre, Boecillo (Valladolid), ES Additional information in CORDIS Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	Indoor air quality (IAQ) at home and in workplaces; effects on health; monitoring of chemical and biological indoor air pollutants; *in vivo/vitro* assays; clinical trials; equipment and tools	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101057510 **LEARN** *Development of novel assessments for indoor air quality monitoring and impact on children's health* 48 months (2022-2026) Research and innovation action Cluster 1: Health, €7 550 974 Coordinator: Dr Ernesto Alfaro-Moreno, International Iberian Nanotechnology Laboratory, Braga, PT Additional information in CORDIS Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	Air quality; schools; impact on cognition of children; development and deployment of novel sensors to detect the presence of air pollutants; characterisation of indoor and outdoor air pollutants; biomarkers of exposure and effect; *C. elegans*; human-based *in vitro* models of lung and skin	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101156161 **MARKOPOLO** *Noise and/or ultrafine particulate matter induced cerebral and cardiovascular damage: novel insights from experimental and*	Air pollution; particulate matter (PM); traffic noise; experimental and computational models in clinical, interventional and	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World

epidemiological brain-heart axis biomarkers and computational models 48 months (2025-2028) Research and innovation action Cluster 1: Health, € 7 999 000 Coordinator: Prof Andreas Daiber, University Medical Center Mainz, DE Additional information in CORDIS Belongs to the EXPOHEALTHNET cluster (under development)	epidemiological studies; identify disease-relevant biomarkers and understand the molecular pathways of cerebral, pulmonary and cardiovascular NCDs; harmful signalling pathways via the brain-heart axis; impact on vulnerable groups such as high-risk patients and the elderly; multiomics; exposome	
101154453 **MARHEALTH** *Assessing human health impacts of maritime air pollution* 24 months (2025-2026) MSCA Postdoctoral Fellowships 2023, € 210 911 Fellow: Dr Nicole Wägner, Norwegian School of Economics, Bergen, NO	Quantify health effects of maritime air pollution; shipping sector; combine administrative health and socio-economic data on individuals with highly granular geo-referenced data on shipping routes of all container and passenger vessels; estimate causal impacts of pollution from ports; benefits of green transition policies in the maritime sector	EU Zero Pollution Action Plan Integrated maritime policy
101096133 **PAREMPI** *Particle emission prevention and impact: from real-world emissions of traffic to secondary PM of urban air* 36 months (2023-2025) Research and innovation action Cluster 5: Climate, Energy and Mobility: € 2 996 544 Coordinator: Dr Päivi Aakko-Saksa, VTT Technology Centre, FI Additional information in CORDIS	Transport sector; air pollution; particulate matter (PM2.5) emissions; contribution of secondary aerosols from transport sources to ambient PM2.5 levels; toxicity and health impact assessments	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101064284 **SENSEWELLBEING** *The well-being of the sensitive: indoor environment and well-being of people with autism*	Autism; indoor comfort and well-being; environmental stimuli;	EU Zero Pollution Action Plan EU Global Health Strategy: Better

24 months (2022-2024) MSCA Postdoctoral Fellowships 2021, € 230 774 Fellow: Prof Jørn Toftum, Technical University of Denmark	environmental parameters; behavioural monitoring; subjective questionnaire surveys; adaptive strategies	Health for All in a Changing World
101130814 **SO-TOX** *Source and toxicological profile of airborne particles in African megacity* 24 months (2024-2026) ERA fellowship Widening participation and spreading excellence; € 172 618 Fellow: Dr Himanshi Rohra, University of Aveiro, PT	Air quality in Luanda (Angola); exposure-health; particulate matter (PM) profiling; source identification; *in-vitro* assessment of cytotoxic and genotoxic properties of the PM to link physicochemical characteristics of air pollution to health risks	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101057271 **SYNAIR-G** *Disrupting noxious synergies of indoor air pollutants and their impact in childhood health and wellbeing, using advanced intelligent multisensing and green interventions* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 6 662 223 Coordinator: Dr Nikos Papadopoulos, National and Kapodistrian University of Athens, EL Additional information in CORDIS Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	Identify and quantify synergistic interactions between different air pollutants affecting health; mechanisms; schools; multipollutant monitoring system; interventions; sensors of chemical and biological (allergens, microbes) pollutants; health outcome data from children using a gamified app and prospective monitoring; cell and mouse models	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101057779 **TWINAIR** *Digital twins enabled indoor air quality management for healthy living* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 6 925 582 Coordinator: Dr Stelios Karatzas, University of Patras, EL Additional information in CORDIS	Indoor air quality; innovative tools for identifying and tracing pollutants and pathogens; impact on health; demonstration in residential and public buildings, hospitals, vehicles and schools; six pilot sites in	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World

Belongs to the European Cluster on Indoor Air Quality and Health (IDEAL)	Europe; chemical and environmental sensors; smart buildings; behaviour	
101156622 **UPRISE** *Unravelling ultrafine particulate matter and micro nano plastic's mechanisms of impact on fetal health* 60 months (2025-2029) Cluster 1: Health, € 7 991 696 Coordinator: Prof Ricard Martinez, La Fe Health Research Institute, Valencia, ES Additional information in CORDIS Belongs to the EXPOHEALTHNET cluster (under development)	Air pollution; particular ultrafine particles (UFPs) and micro-nanoplastics (MNPs); disruption of normal foetal development; risk of adverse birth outcomes (ABOs such as preterm birth, risk of non-communicable diseases in adulthood; exposure databases; understanding of sources, concentrations and dispersion patterns; clinical study with pregnant participants exposed to different levels of UFPs and MNPs pollution; causal models	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101060170 **WEBASOOP** *Research reinforcing in the Western Balkans in offline and online monitoring and source identification of atmospheric particles* 36 months (2022-2025) Coordination and support action Widening Participation and Spreading Excellence, Twinning, € 1 492 000 Coordinator: Prof. Milena Jovasevic-Stojanovic, University of Belgrad, RS Additional information in CORDIS	Atmospheric particles; particulate matter (PM); monitoring; physical, chemical and biological properties of PM determining toxicity and bioavailability; research hub of knowledge and skills related to PM monitoring and assessment; oxidative potential as proxy for health effects	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World

4. Horizon Europe projects on urban health

According to WHO, urbanization is one of the leading global trends of the 21st century that has a significant impact on health. Over 55% of the world's population live in urban areas, a proportion that is expected to increase to 68% by 2050. While cities can bring many challenges, they can also provide opportunities for better health, cleaner environment and climate action.

Health aspects will also be covered by the EU Climate-neutral and Smart Cities mission launched in 2021. EU missions are a novelty in Horizon Europe and are a new way to bring concrete solutions to some of our greatest challenges. They have ambitious goals and will deliver tangible results by 2030.

Table 4 lists the seven projects, with an EU commitment of around €33 million, addressing various aspects of urban health, funded outside the calls launched by the Mission. One of the projects listed here – GO GREEN NEXT – is part of the Planetary Health Cluster, described under the chapter on biological safety.

Table 4. Projects on urban health

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
101082551 **100KTREES** *Decision toolbox for cities to improve air quality, biodiversity, human wellbeing and reduce climate risks by planting more trees in our cities* 36 months (2022-2025) Innovation action Cluster 4: Digital, Industry and Space, € 1 891 300 Coordinator: Dr Brigitte Holt Andersen, DHI A/S, Hørsholm, DK Additional information in CORDIS	Green areas; urban; planting trees; mapping and modelling toolbox to optimise the planting of trees; pollution absorption; cooling effect; noise abatement; flood risk reduction; life quality; mental health impacts	EU Mission: Climate-Neutral and Smart Cities Urban agenda for the EU

 101137209 **GO GREEN NEXT** *GoGreenNext promoting future health in cities* 48 months (2024-2028) Research and innovation action Cluster 1: Health, € 6 000 216 Coordinator: Dr. Tadhg MacIntyre, National University of Ireland Maynooth, IE Additional information in CORDIS Belongs to the Planetary Health Cluster	Climate change and biodiversity; urban health; nature-based solutions (NBS); cities; biodiversity-climate-planetary health nexus; city/region pilots	EU Mission: Climate-Neutral and Smart Cities Urban agenda for the EU
 101073437 **GREENEXUS** *Green-health-safety nexus for new urban spaces* 48 months (2023-2026) MSCA doctoral network; € 2 633 666 Coordinator: Dr. Cesare Sangiorgi, University of Bologna, IT Additional information in CORDIS	Characteristics of urban green contexts and people's health and safety; air pollution and urban climate; reduced contact with nature; limited access to quality green spaces; urban fabrics and infrastructure; mental and physical well-being; Training-through-Research programme	EU Mission: Climate-Neutral and Smart Cities Urban agenda for the EU
 101086521 **ONEAQUAHEALTH** *Protecting urban aquatic ecosystems to promote One Health* 48 months (2023-2026) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 4 939 558 Research and innovation action Coordinator: Dr Maria J Feio, University of Coimbra, PT Additional information in CORDIS	Aquatic urban ecosystems; degradation; people, animals and plants; health and environmental observations; health and wellbeing impacts in wildlife and humans; environmental monitoring of early warning indicators; AI-based environmental surveillance system	EU Mission: Climate-Neutral and Smart Cities Urban agenda for the EU Global Earth Observation System of Systems (GEOSS)
101130855 **STREAMSCAPE** *Building knowledge and tools to advance on promoting of freshwater urban ecosystems as nature based-solution for health and wellbeing in a changing word* 24 months (2024-2026)	Social and environmental impacts of urban streams as essential nature-based solutions; mitigate natural hazards;	EU Mission: Climate-Neutral and Smart Cities Urban agenda for the EU

ERA fellowship Widening participation and spreading excellence; €172 618 Coordinator: Dr Aurea Lemes Da Silva, University of Aveiro, PT	preserve biodiversity; enhance the well-being of city dwellers; case studies in Aveiro and Coimbra	
101188131 **URBANAIR** *Urban simulation for air quality and heat resilience strategies* 48 months (2025-2028) Research and innovation action Research Infrastructures; € 14 266 198 Coordinator: Assoc. Prof. Femke Vossepoel, Delft University of Technology, NL Additional information in CORDIS	Urban air quality; climate change; heat; health and socio-economic well-being of citizens; digital twin platforms; co-creation; user-friendly infrastructure integrated into the Destination Earth infrastructure; quantification of risks and uncertainties for the UrbanAIR scenarios; behavioural models to simulate the human response to changes in climate and associated hazards	EU Mission: Climate-Neutral and Smart Cities Urban agenda for the EU
101095423 **YOPAAPE** *A youth-centred preventive action approach towards co-created implementation of socially and physically activating environmental interventions* 60 months (2023-2027) Research and innovation action Cluster 1: Health, € 3 281 100 Coordinator: Prof. Mai Chin A Paw, VU University Medical Center Amsterdam, NL Additional information in CORDIS	Healthy movement behaviours; risks for non-communicable diseases (NCDs); implementation of lifestyle interventions focused on teenagers; social and physical environmental interventions; urban environments; co-creation	EU Global Health Strategy: Better Health for All in a Changing World

5. Horizon Europe projects on climate change and health

According to WHO, between 2030 and 2050, climate change is expected to cause approximately 250 000 additional deaths per year in the world from malnutrition, malaria, diarrhoea and heat stress. The direct damage costs to health (i.e. excluding costs in health-determining sectors such as agriculture and water and sanitation), is estimated to be between USD 2-4 billion/year by 2030. According to the Lancet Countdown report (2021), global excess mortality attributable to heat exposure in people over 65 is estimated to have increased by more than 50% during the period

2000-2018. Climate change affects many of the social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter.

In recent years, the European Union has responded to this challenge by adopting initiatives such as the new EU strategy on adaptation to climate change in 2021, which acknowledges that climate change impacts the health and well-being of Europeans, who increasingly suffer from heat waves. Furthermore, it calls for the need of a deeper understanding of the climate-related risks for health. Within this context, a new European Climate and Health Observatory has been established under Climate-ADAPT. On the research front, Horizon Europe supports the EU Mission: Adaptation to Climate Change since 2021. Addressing health-related issues is one of the components of this new Mission.

Outside the Mission, funding for climate change and health research received a significant boost in the first two years of Horizon Europe. 25 projects have been funded, with an EU commitment of around €146 million (Table 5). One of the projects listed here – MOSAIC – is part of the Planetary Health Cluster, described under the chapter on biological safety.

Noteworthy initiative:

- **European Cluster on Climate Change and Health**: This cluster of six projects (**BLUEADAPT**, **CATALYSE**, **CLIMOS**, **HIGH HORIZONS**, **IDALERT**, **TRIGGER**) resulted from a call launched by the Health cluster of Horizon Europe. Taken together, the project addresses the dual call requirement, namely research on the relationships between changes in environmental hazards caused by climate change, the impacts on interrelated ecosystems and their influence on human health, and climate induced emergence and transmission of pathogens and spread of zoonotic pathogens using Eco-health and One-Health approaches. As the call for proposal stated that 'All projects funded under this topic are strongly encouraged to participate in networking and joint activities, as appropriate', the six projects selected for funding have formed a cluster, to optimize synergies, avoid overlaps and increase the impact of the projects at the level of dissemination and outreach to policy-makers and other stakeholders. The cluster has formed working groups on issues of common interest and is organising workshops and training activities, among other things.

Table 5. Projects on climate change and health

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions

101181300 **AMBROSIA** *Bridging knowledge, communication, and action for food safety in a changing climate* 36 months (2024-2027) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment; € 3 972 738 Coordinator: Prof. Christopher Brewster, Maastricht University, NL Additional information in CORDIS	Impacts of climate change on food safety; food safety risk assessment across the supply chain; novel sources of risk and hazards across key food groups consumed by EU citizens; artificial intelligence (AI) techniques; Fusarium mycotoxins and enteric pathogens in fresh produce	European Climate Law EU Adaptation Strategy European Climate and Health Observatory General Food Law
101137895 **ALBATROSS** *Advancing knowldge for long-term benefits and climate adaptation through holistic climate services and nature-based solutions* 36 months (2024-2027) Cluster 5: Climate, Energy and Mobility: € 4 999 646 Coordinator: Dr Laura Sandra Leo, University of Bologna, IT Additional information in CORDIS	Current and future climate related threats and opportunities in sub-Saharan Africa; socio-demographic developments; political/economic risks; food security; urbanisation patterns; key adaptation challenges; nature-based solutions; socio-economic determinants and benefits	European Climate Law EU Adaptation Strategy European Climate and Health Observatory
101065960 **ARCEPH** *Tracking impacts of climate change in the Arctic marine ecosystems through cephalopod diversity and life histories* 24 months (2022-2024) MSCA Postdoctoral Fellowships 2021, €173 847 Fellow: Dr Henk-Jan Hoving, GEOMAR Helmholtz Centre for Ocean Research, Kiel, DE	Climate change impact; predictions; ecosystems; Arctic; Cephalopoda (Phylum Mollusca); marine food webs; modelling; biodiversity; populations shifts	EU Strategy for Managing the Arctic
101135051 **ARCSOLUTION** *Arctic pollution in a one health perspective - from complex challenges to sustainable solutions* 48 months (2024-2028) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment; € 5 998 880 Coordinator: Dr Jon Øyvind Odland, Nord University, Bodø, NO Additional information in CORDIS	Climate change and pollution in the Arctic; holistic OneHealth approach to analyses and assessments of pollution; priority pollutants (e.g. per-/polyfluorinated alkylated substances, mercury, (micro)plastics and their additives, and key pathogens); citizen science projects; human health, wildlife and ecosystems effects	EU climate action EU Arctic Policy

101157643 **AURORA** *Demonstrating transformative solutions to empower climate resilience towards improved public health status in the EU boreal region* 48 months (2024-2028) Innovation action Cluster 5: Climate, Energy and Mobility, € 6 099 870 Coordinator: Dr Dimitris Kanakidis, Exus Software Monoprosopi Etairia Periorismenis Evthinis, Athens, EL Additional information in CORDIS	Enhance resilience against health risks stemming from climate change; monitoring climate stressors; creating climate and epidemiological models; generating forecasts via simulated scenarios; identifying climate change risks and vulnerabilities in the Boreal region; AI-driven technology	EU climate action EU Arctic Policy
101057764 **BLUEADAPT** *Reducing climate based health risks in blue environments: Adapting to the climate change impacts on coastal pathogens* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 6 678 353 Coordinator: Prof. Marc Neumann, BC3 Basque Centre for Climate Change, ES Additional information in CORDIS Belongs to the European Cluster on Climate Change and Health	Investigation and quantification of the future health risks associated with selected coastal pathogens; tools to assess the impacts of policy responses and communicate the results; One Health and Ecological Public Health; simulations of how changes in climate variables, interacting with other environmental change, may influence the state of selected microbial pathogens of public health concern in coastal waters	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101057131 **CATALYSE** *Climate action to advance healthy societies in Europe* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 8 377 188 Coordinator: Prof. Cathryn Tonne, Barcelona Institute for Global Health - ISGlobal, ES Additional information in CORDIS Belongs to the European Cluster on Climate Change and Health	Environmental hazards caused by climate change, ecosystems and human health; health evidence in decision making; integrated indicator framework and repository to track the status of health-relevant outcomes of climate actions; health co-benefits and social and environmental costs and benefits resulting from mitigation measures outside of the health sector; surveillance and forecasting tools; interventions; evidence and training on the most	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World

	effective strategies for climate change adaptation and mitigation for health systems	
101156799 **CLIMAIR** *Climate change and air contamination: Artificial Intelligence applied on the correlation between air pollutants and non-communicable respiratory diseases in Europe* 48 months (2025-2028) Research and innovation action Cluster 1: Health, € 7 961 521 Coordinator: Dr Carlos Sanchez Garcia, Idener Research & Development, Sevilla, ES Additional information in CORDIS Belongs to the EXPOHEALTHNET cluster (under development)	Climate change; air pollution; non-communicable respiratory diseases; Artificial Intelligence (AI) tools; greenhouse gases levels and disaster risks; information on serious air pollutants and respiratory diseases' prevalence; intervention methods; ClimAIr tool; case studies in cities	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101057690 **CLIMOS** *Climate monitoring and decision support framework for sand fly-borne diseases detection and mitigation with cost-benefit and climate-policy measures* 36 months (2022-2025) Research and innovation action Cluster 1: Health, € 9 038 530 Coordinator: Dr Carla Maia, Nova University of Lisbon, PT Additional information in CORDIS Belongs to the European Cluster on Climate Change and Health	Mitigation of climate- and climate change-induced emergence, transmission and spread of vector-borne and zoonotic pathogens; Eco-health and One Health; climate and environmental-related drivers of sandfly vector populations and the sand fly-borne diseases; Early Warning System (EWS) and decision support frameworks for climate and health modelling; big data time series (on vectors, disease, micro- and macroclimate, environment and health, infection risk)	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101062347 **FASCIOCLIME** *Impact of climate change on zoonotic vector-borne diseases and their potential transmission increase and introduction risk: An innovative approach with a selected disease model* 24 months (2022-2024) MSCA Postdoctoral Fellowships 2021, €181 152	Vector-borne diseases (VBDs); snails; climate change; response of zoonotic VBDs to climate change; fascioliasis as a model; integrative modelling framework for fascioliasis transmission	HERA European Climate and Health Observatory

Fellow: Prof. Santiago Mas-Coma, University of Valencia, ES		
101056783 **FOCI** *Non-CO2 forcers and their climate, weather, air quality and health impacts* 48 months (2022-2026) Research and innovation action Cluster 5: Climate, Energy and Mobility: € 6 470 974 Coordinator: Dr Tomáš Halenka, Charles University, CZ Additional information in CORDIS	Individual and cumulative contribution of short- and long-lived radiative forcers, including greenhouse gases, their precursors, aerosols, refrigerants and other climate forcers, to climate change; impact on atmospheric and ocean circulation; air pollution; application in relevant sectors (transport, industry, agriculture and health) with a view to better understand co-benefits and trade-offs of mitigation policies with other societal benefits, including human health	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101157458 **HEALTHRISKADAPT** *User-driven health risk assessment services and innovative adaptation options against threats from heatwaves, air pollution, wildfire emission and pollen* 48 months (2024-2028) Innovation action Cluster 5: Climate, Energy and Mobility: € 5 633 151 Coordinator: Dr Tuan-Vu Cao, Norwegian Institute for Air Research (NILU), Oslo, NO Additional information in CORDIS	Transformative adaptation strategies to climate change in the Mediterranean, alpine, and continental regions; climate-related health risks in indoor and outdoor environments; technical, nature-based, and social solutions; vulnerability assessments, health indicators, and risk indices related to climate change impact on health	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101057843 **HIGH HORIZONS** *Heat indicators for global health (High Horizons): monitoring, early warning systems and health facility interventions for pregnant and postpartum women, infants and young children and health workers* 48 months (2022-2026) Research and innovation action	Climate change; health and well-being impact on pregnant and postpartum women, infants, health workers; health impacts of extreme heat; personalised Early Warning System (EWS); adaptation-mitigation actions in health facilities; data from Europe and	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health

Cluster 1: Health, € 8 759 066 Coordinator: Prof. Stanley Luchters, University of Ghent, BE Additional information in CORDIS climate-health Belongs to the European Cluster on Climate Change and Health	Africa; cost/benefit analyses	for All in a Changing World
101057554 **IDALERT** *Infectious disease decision-support tools and alert systems to build climate resilience to emerging health threats* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 9 188 294 Coordinator: Prof. Joacim Rocklöv, Umeå University, SE Additional information in CORDIS climate-health Belongs to the European Cluster on Climate Change and Health	Climate change; zoonotic infectious diseases; pan-European indicators tracking past, present, and future climate-induced disease risk across hazard, exposure, and vulnerability domains at the animal, human and environment interface; cost-benefits of climate change adaptation and mitigation measures across sectors and scales; surveillance, early warning and response systems; health system resilience	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101133587 **ILLUQ** *Permafrost – Pollution - Health* 48 months (2024-2027) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, €6 000 000 Coordinator: Mrs Leena-Kaisa Viitanen, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, DE Additional information in CORDIS	Climate change; permafrost thaw; organic matter and contaminants, including heavy metals, persistent organic pollutants and microbiological agents locked in permafrost; risk for human and animal health; infrastructure impacts in local communities; One Health and well-being in the Arctic	EU climate action EU Arctic Policy
101124719 **IMBRACE** *Embracing immigrant knowledges for just climate health adaptation* 60 months (2024-2029) European Research Council (ERC) consolidator grant; € 1 985 268 Fellow: Dr Panagiota Kotsila, Autonomous University of Barcelona, ES	Climate change, human health and immigration; climate and health injustice; increased and prolonged heat; intense rainfall and flooding; 6 case-study cities in Europe	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health

		for All in a Changing World
101131261 **IRISCC** *Integrated research infrastructure services for climate change risks* 54 months (2024-2028) Research Infrastructures; € 14 499 857 Coordinator: Dr Sanna Sorvari Sundet, Natural Resources Institute (LUKE), Finland Additional information in CORDIS	Research infrastructures (RIs); adaptation to climate change; climate change-driven risks; determinants (hazards, exposure and vulnerabilities), impacts to human, production and natural systems; research and evidence-based policymaking; catalogue of services; risk management platforms; open data	European Climate Law EU Adaptation Strategy European Climate and Health Observatory
101156653 **ISMED-CLIM** *Innovative solutions across the mediterranean for mitigation of climate change-related health risks and enhancing health system resilience* 48 months (2024-2028) Innovation action Cluster 5: Climate, Energy and Mobility: € 5 999 552 Coordinator: Prof. Panayiotis Yiallouros, University of Cyprus, Nicosia, EL Additional information in CORDIS	Novel solutions for mitigating the health risks associated with climate change; Mediterranean; impact of climate change on non-communicable diseases and vector-borne infections; prediction tools; quantification of how state-of-the-art public health interventions can reduce personal exposures to heat and air pollution and related health effects; preparedness and ability of health systems to deliver care	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101124572 **LACRIMA** *Lagrangian climate risk and impact attribution* 60 months (2024-2029) European Research Council (ERC) consolidator grant; € 1 999 590 Fellow: Dr Wim Thiery, Free University of Brussels, BE	Novel concepts and methodologies to express climate change impacts and risk from a cohort perspective; reconstruct two iconic climate change impacts on people around the world using machine learning (heat-related mortality and burned area); age-specific vulnerability to climate extremes	European Climate Law EU Adaptation Strategy EU climate action

101124827 **MIMERE** *The role of the gut microbiome in host responses to environmental variation: within and across generations and species* 60 months (2024-2029) European Research Council (ERC) consolidator grant; € 1 999 943 Fellow: Dr Suvi Ruuskanen, University of Jyväskylä, FI	Adaptation to climate change; influence of gut microbiome on the host's response to temperature fluctuations; underlying epigenetic modifications; molecular mechanisms of host-microbiome interactions; birds	EU Adaptation Strategy
101137398 **MOSAIC** *Multi-site application of open science in the creation of healthy environments involving local communities* 48 months (2024-2027) Research and innovation action Cluster 1: Health, € 5 993 603 Coordinator: Mr François Tremege, Institut de Recherche pour le Développement (IRD), FR Additional information in CORDIS Belongs to the planetary health cluster	Planetary health; negative effects and co-benefits between environmental changes, degradations and human health; locally feasible, acceptable, and sustainable adaptation and mitigation solutions; health-promoting environment; two bio-regions particularly affected by climate change, extreme climatic events and land cover degradation: East Africa and the Amazon	European Climate Law EU Adaptation Strategy EU climate action
101155958 **MOUNTADAPT** *Adaptation solutions to reduce climate change impact on health in the mountain area* 36 months (2024-2027) Cluster 5: Climate, Energy and Mobility: € 5 851 010 Coordinator: Mr Barthélémy Maillard , Euroquality SAS, FR Additional information in CORDIS	Climate adaptation solutions in mountainous regions (Austria, Slovenia, France, Romania); co-design; health sector; models to better understand the impact of climate change on health; monitoring tools; short term forecasts to communicate warnings; emergency management tool; guidance for transforming the health systems	European Climate Law EU Adaptation Strategy EU climate action
101123538 **MULTICLIMACT** *Multi-faceted climate adaptation actions to improve resilience, preparedness and responsiveness of the built environment against multiple hazards at multiple scales* 48 months (2023-2027) Research and innovation action	Retrofitting the built environment to adapt it to present and future climate-related risks; framework and a tool to assess the resilience of the built environment and its people at multiple scales (buildings, urban areas, territories) against locally relevant natural	European Climate Law EU Adaptation Strategy

Cluster 5: Climate, Energy and Mobility: € 7 499 166 Coordinator: Mrs Giorgia Spigliantini , Rina Consulting Spa, Genoa, IT Additional information in CORDIS	and climatic hazards; human well-being, health, and quality of life	
 101057739 **TRIGGER** *Solutions for mitigating climate-induced health treaths* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 9 996 777 Coordinator: Prof. Silvana Di Sabatino, University of Bologna, IT Additional information in CORDIS  Belongs to the European Cluster on Climate Change and Health	Understanding of linkage between climate, health and ecosystems; tools to monitor, predict and mitigate risks for human health connected to climate change; Climate-Health Connection Labs in Europe; increased heat waves, air pollution, droughts, UV exposure; cardio-vascular and respiratory diseases	European Climate Law EU Adaptation Strategy HERA The Lancet Countdown: Health and Climate Change in Europe European Climate and Health Observatory WHO's work on climate change and health EU Global Health Strategy: Better Health for All in a Changing World
101064940 **TRUEHEAT** *Best-estimate projections of future compound extreme heat, its impacts and driving mechanisms* 36 months (2022-2025) MSCA Postdoctoral Fellowships 2021, €308 746 Fellow: Prof. Robert Vautard, National Centre for Scientific Research (CNRS), FR	Extreme heat; can current climate models sufficiently capture the risk and intensity of extremes under present and future climate conditions	European Climate Law EU Adaptation Strategy Actions of Health Emergency Preparedness and Response Authority (HERA) European Climate and Health Observatory

6. Horizon Europe projects on biological safety

Biological hazards include bacteria, viruses, parasites, biotoxins etc. Some of these hazards can pose serious risks to public health and can be influenced by environmental factors and conditions. The increasing importance of this area has become more evident due to the recent Covid pandemic and changing transmission patterns of pathogens due to climate change.

12 projects have been funded from calls launched during the first two years, with an EU commitment of around €44 million (Table 6).

Noteworthy initiative:

- **The Planetary Health Cluster**: According to the Planetary Health Alliance, Planetary Health is "a solutions-oriented, transdisciplinary field and social movement focused on analyzing and addressing the impacts of human

disruptions to Earth's natural systems on human health and all life on Earth". The concept is focused on the interdependencies between human health and the state of earth's complex natural systems. A key focus is on understanding how the current trend of human-related environmental degradation can affect the health and well-being of current and future generations. A call for proposals was launched in 2023 to, among others, provide (i) strengthened evidence for health and wellbeing impacts of planetary changes; (ii) improved understanding and modelling of human–ecological systems interactions and ecosystem-mediated effects on human health and well-being; a methodology to identify and prioritise threats for public health caused by environmental degradation; and (iv) investigate how infections agents that might have the capacity to adapt to other host species can spread via the environment. Five projects [**GOGREENNEXT**, **MOSAIC** (described in a previous chapter), **PLANET4HEALTH**, **SPRINGS**, **TULIP**] were selected for funding for the period 2024-2027/2028, forming a cluster to promote cooperation and to avoid duplicate work.

Table 6. Projects on biological safety and health

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
101052876 **APROSUS** *Microbiome-derived asthma and allergy protective substances for prevention* 60 months (2023-2027) European Research Council (ERC) advanced grants; €2 500 000 Principal investigator: Prof. Erika Von Mutius, Helmholtz Environmental Health Centre, Munich, DE	Asthma and allergies; exposures to the environmental microbiome; risk and protection from onset of illness; in depth characterization of microbe-derived metabolite complexes to better understand their associated asthma- and allergy protective properties; population-based farm studies	EU Global Health Strategy: Better Health for All in a Changing World
BCOMING 101059483 **BCOMING** *Biodiversity conservation to mitigate the risks of emerging infectious diseases* 48 months (2022-2026) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, €4 949 614 Coordinator: Dr Julien Cappelle, International Centre of Cooperation in	Biodiversity loss and hotspots; disease surveillance; Europe and three tropical biodiversity hotspots in Southeast Asia, West Africa and the Caribbean; mechanisms underlying the impact of biodiversity on the risk of infectious	EU Biodiversity Strategy for 2030 European Health Union EU Adaptation Strategy

Agronomic Research for Development (CIRAD), Marcy l'Etoile, FR Additional information in CORDIS	disease emergence; tools to facilitate the design of context-adapted biodiversity conservation and restoration strategies that reduce zoonotic risk	
 101060568 **BEPREP** *Identification of best practices for biodiversity recovery and public health interventions to prevent future epidemics and pandemics* 60 months (2022-2027) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 5 424 904 Coordinator: Prof. Frauke Ecke, University of Helsinki, FI Additional information in CORDIS	Nature restoration targeting biodiversity recovery; public health interventions; mitigation of disease risk; case studies in Europe and the tropics; causal mechanisms of infection dynamics and drivers; epidemics and pandemics	EU Biodiversity Strategy for 2030 EU Global Health Strategy: Better Health for All in a Changing World
 101057036 **DESIGN OH AMR** *Designing the European partnership on one health AMR* 24 months (2022-2024) Coordination and support action Cluster 1: Health, € 990 432 Coordinator: Dr Laura Plant, Swedish Research Council, SE Additional information in CORDIS	Antimicrobial resistance (AMR); one health approach; threat to human, animal, plant and environmental health; preparatory groundwork of the candidate European co-funded One Health antimicrobial resistance (OH AMR)	Farm to Fork strategy One Health Antimicrobial Resistance partnership European One Health Action Plan against AMR WHO Global Action Plan on AMR EU Global Health Strategy: Better Health for All in a Changing World
 101086640 **E4WARNING** *Eco-epidemiological intelligence for early warning and response to mosquito-borne disease risk in endemic and emergence settings* 48 months (2023-2026) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 4 082 528	Mosquito-borne diseases; anticipating and identifying eco-epidemiological risks leading to epidemics and emergence in previously unaffected areas; understanding of factors that drive disease circulation, emergence and spread; changing environment; One	EU Global Health Strategy: Better Health for All in a Changing World WHO work on One health

Coordinator: Dr Frederic Bartumeus, Spanish National Research Council (CSIC), Blanes, ES Additional information in CORDIS	Health; zoonotic pathogens	
 101073982 **MOBILISE** *MOBILISE: A novel and green mobile One Health laboratory for (re-) emerging infectious disease outbreaks* 36 months (2022-2025) Innovation action Cluster 3 - Civil security for society: € 3 999 891 Coordinator: Dr Florian Gehre, Bernhard Nocht Institute for Tropical Medicine, Hamburg, DE Additional information in CORDIS	Climate change; emergence of arboviruses; mosquitoes and ticks (arthropod vectors); mobile One Health laboratory; pathogen discovery and epidemiological analysis; rapid diagnostic tests for BSL-3/4 pathogens	EU Civil Protection and Health policy framework EU Global Health Strategy: Better Health for All in a Changing World WHO work on One health
101181208 **MYMATCH** *Mycotoxin management (AI)platform to face CC impact on food safety and human health* 48 months (2024-2028) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 3 991 210 Coordinator: Prof. Paola Battilani, Catholic University of Milan, IT Additional information in CORDIS	Risks due to pathogens and contaminants in the food supply chain; mycotoxins (fungi belonging to Aspergillus, Fusarium, Alternaria) occurring in maize, wheat, tomato, nuts; assessment of mycotoxin exposure in humans and animals; fungi and mycotoxin predictive models based on accurate climate change scenarios; MYMATCH AI mycotoxin management platform	EU legislation on mycotoxins
 101136652 **PLANET4HEALTH** *Translating science into policy: a multisectoral approach to adaptation and mitigation of adverse effects of vector-borne diseases, environmental pollution and climate change on planetary health* 48 months (2024-2027) Research and innovation action Cluster 1: Health, € 5 925 130 Coordinator: Dr Stefano Campostrini, University of Florence, IT	New knowledge and tools on environmental degradation and its impact on human animal and ecosystems health; One Health effects of vector-borne diseases; air pollution; food contamination arising from soil and water contamination; mental wellbeing; data on climate and	EU Global Health Strategy: Better Health for All in a Changing World EU Adaptation Strategy EU One Health

Additional information in CORDIS Belongs to the planetary health cluster	environmental indicators linked to One Health	
101109642 **REGIME** *REGIME: Transmission regimes of climate-sensitive infectious diseases in Latin America* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2022, € 165 312 Fellow: Dr Raquel Martins Lana, Barcelona Supercomputing Centre, ES	Risk of mosquito-borne disease (MBD) epidemics in Brazil; extreme climatic events, environmental degradation and socio-economic inequalities; modelling tool (REGIME); transmission regime classification (e.g. endemic, epidemic, episodic); temporal changes; disentangle the role of different disease drivers	EU Global Health Strategy: Better Health for All in a Changing World EU Adaptation Strategy
SPRINGS 101137255 **SPRINGS** *Supporting policy regulations and interventions to negate aggravated global diarrheal disease due to future climate shocks* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 5 920 338 Coordinator: Dr Vanessa Harris, VU University Medical Center Amsterdam, NL Additional information in CORDIS Belongs to the planetary health cluster	Global warming and climate extremes; risks for waterborne diarrheal disease; climate, environmental and health adaptation policies; modelling the impact of future climate shocks on the burden of water-borne diarrheal diseases; case studies in Africa and EU; planetary health interventions; integrated climate and health surveillance, climate-resilient water supply systems	EU Global Health Strategy: Better Health for All in a Changing World EU Adaptation Strategy
TULIP planetary health 101136659 **TULIP** *Community-based engagement and interventions to stem the spread of antimicrobial resistance in the aquatic environments catalysed by climate change and plastic pollution interactions* 48 months (2024-2028)	Impacts of climate change, environmental plastic pollution and proliferation of antimicrobial resistance (AMR) on health of people, animals and ecosystems on planetary scale; transdisciplinary socio-	EU Global Health Strategy: Better Health for All in a Changing World EU Adaptation Strategy

Research and innovation action Cluster 1: Health, € 6 283 534 Coordinator: Dr Joacim Rockloev, University Hospital Heidelberg, DE Additional information in CORDIS Belongs to the planetary health cluster	ecological systems thinking; spatio-temporal dynamics and patterns of plastic-associated AMR under a changing climate; community-based interventions and nature-based solutions; decision-supporting tools approximating co-benefits to human and ecosystem health	
101154781 **ZUMBBA** *Studying urban movements of an avian model species to understand the role of biodiversity for the spread of zoonoses. (Zoonoses and Urban Movement Bird Biodiversity Assessment)* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023, € 181 152 Fellow: Prof. Emilio Barba, University of Valencia, ES	Spread of tick-borne zoonotic diseases; bird movements; natural environments in cities; impact of higher biodiversity on the risk of spreading of zoonosis	EU Biodiversity Strategy for 2030 WHO work on One health

7. Projects on non-ionizing and ionizing radiation and health

Non-ionizing radiation: While the adoption of digital technologies presents new opportunities, e.g., distance monitoring of air and water pollution and health outcomes, it also presents potential health risks. There has been an exponential increase in the use of wireless personal communication devices (mobile phones, Wi-Fi or Bluetooth-enabled devices etc.) by almost all citizens in private and professional settings and in the supporting infrastructures. The number of other applications using electromagnetic fields (EMF) has also increased such as security scanners, smart meters and medical equipment. This has resulted in an increase in man-made electromagnetic radiation (non-ionizing) in our surroundings. Therefore, as there is some concern over the possible impact on health and safety from potentially higher exposure to EMF, e.g., arising from the deployment of 5G technology, a dedicated call for proposals was launched in 2021 to provide forward-looking information on potential hazards and risks of existing and emerging EMF exposures through innovative monitoring techniques, experimental evidence and modelling.

Four projects were funded from calls launched during the first four years on non-ionizing radiation, with an EU commitment of around €29 million (Table 7).

A noteworthy initiative:

- **European Research Cluster on EMF and Health (CLUE-H):** This cluster of four projects (**ETAIN**, **GOLIAT**, **NEXTGEM**, **SEAWAVE**) resulted from a call launched by the Health cluster of Horizon Europe. This represents a significant investment in this area of research that received little funding from the previous Framework Programme Horizon 2020. As the call for proposal stated that 'All projects funded under this topic are strongly encouraged to participate in networking and joint activities, as appropriate', the four projects selected for funding have formed a cluster, to optimize synergies, avoid overlaps and increase the impact of the projects at the level of dissemination and outreach to policy-makers and other stakeholders. The cluster formed working groups on issues of common interest (Working Groups | EMF Health Cluster (emf-health-cluster.eu)) and will organise workshops and training activities, among other things.

Ionizing radiation: This type of radiation is capable of stripping electrons from atoms and breaking chemical bonds, creating highly reactive ions. Radioactive materials occur naturally and emit ionising radiation in a process known as radioactive decay. Man-made devices such as x-ray machines produce ionising radiation. It is acknowledged that this type of physical environmental stressor has the capacity to produce adverse health effects. Three projects were funded for €34 million, including a Programme Co-fund Action (**PIANOFORTE**) on health impacts of ionizing radiation supported by the Euratom research and training programme.

Table 7. Projects on ionizing and non-ionizing radiation and health

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
ETAIN 101057216 **ETAIN** *Exposure to electromagnetic fields and planetary health* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 6 635 053 Coordinator: Dr Anke Huss, Utrecht University, NL Additional information in CORDIS CLUE-H Belongs to the European Research Cluster on EMF and Health (CLUE-H)	5G; electromagnetic fields (EMF); planetary health; insect biodiversity and fitness; insect pollinators; personal absorbed radiofrequency (RF)-EMF; mechanisms of biological effects in humans and the environment; skin and eyes	Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) SCHEER opinions on EMF and health

		The International EMF Project ICNIRP guidance
101057262 **GOLIAT** *5G exposure, causal effects, and risk perception through citizen engagement* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 7 036 677 Coordinator: Dr Mònica Guxens, Barcelona Institute for Global Health - ISGlobal, ES Additional information in CORDIS Belongs to the European Research Cluster on EMF and Health (CLUE-H)	5G; radiofrequency (RF) electromagnetic radiation (EMF); child and occupational health; neuropsychological effects; brain function; thermoregulation; radical stress; health impact assessment; risk perception and communication; citizen engagement	Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) SCHEER opinions on EMF and health The International EMF Project ICNIRP guidance
101057527 **NEXTGEM** *Next generation integrated sensing and analytical system for monitoring and assessing radiofrequency electromagnetic field exposure and health* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 7 559 039 Coordinator: Dr Nikolaos Petroulakis, Fundation for Research and Technology – Hellas (FORTH), Heraklion, EL Additional information in CORDIS Belongs to the European Research Cluster on EMF and Health (CLUE-H)	EMF-based telecommunication technologies; EMF exposure in residential, public and occupational settings; knowledge and data on new scenarios of exposure to EMF in multiple frequency bands; NextGEM Innovation and Knowledge Hub (NIKH); health effects and mechanisms; causal links; human and experimental studies; real-life case studies	Council Recommendation on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) SCHEER opinions on EMF and health The International EMF Project ICNIRP guidance

101061037 **PIANOFORTE** *The European Partnership for Radiation Protection Research* 60 months (2022-2027) Programme Co-fund Action Euratom; € 29 414 410 Coordinator: Dr Jean-Christophe Gariel, French Institute for Radiation Protection and Nuclear Safety (IRSN), Fontenay Aux Roses, FR Additional information in CORDIS	Radiation protection in relation to the use of ionizing radiation in the medical field; variability of individual response to exposure to ionizing radiation; mechanisms involved in chronic exposure to low doses of ionizing radiation; improvement of anticipation capacities and resilience in nuclear or radiological crisis situations and post-accident management; sustainable capacity of expertise in radiation protection in Europe	Europe's Beating Cancer Plan Sendai Framework for Disaster Risk Reduction
101158832 **RADEXIORS** *Boost Twinning to skyrocket scientific excellence towards individual radiosensitivity prediction by raising the bar in knowledge transfer, networking, and technological innovation in radiobiology* 36 months (2024-2027) Widening participation and spreading excellence; € 1 223 641 Coordinator: Dr Ivana Matic, Institute for Oncology and Radiology of Serbia, Belgrade, RS Additional information in CORDIS	Prostate cancer patients receiving radiotherapy; normal tissue radiosensitivity; knowledge transfer networking with leading European institutions; scientific strategy on radiobiology; omics, artificial intelligence; biomarkers predicting radiotoxicity	Europe's Beating Cancer Plan Sendai Framework for Disaster Risk Reduction
101057622 **SEAWAVE** *Scientific-based exposure and risk assessment of radiofrequency and mm-wave*	Monitoring of electromagnetic fields (EMF); 5G networks; millimetre waves; base stations;	Council Recommendation on the limitation of exposure of the general public to

systems from children to elderly (5G and beyond) 36 months (2022-2025) Research and innovation action Cluster 1: Health, € 7 317 777 Coordinator: Dr Theodoros Samaras, Aristotle University of Thessaloniki, EL Additional information in CORDIS  Belongs to the European Research Cluster on EMF and Health (CLUE-H)	wireless devices; standardisation; children and elderly; skin cancer; epigenetics; risk assessment and communication; *in vitro* and *in vivo*	electromagnetic fields (0 Hz to 300 GHz) Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) SCHEER opinions on EMF and health The International EMF Project ICNIRP guidance
101166699 **TETRIS** *Risk assessment tools for severe side effects after breast radiotherapy: radiation safety through biological extended models and digital twins* 36 months (2024-2027) Innovation action Euratom; € 3 493 218 Coordinator: Dr Paolo Verderi, IRCCS Foundation National Cancer Institute, Milan, IT Additional information in CORDIS	Radiation protection and safety; breast cancer; quantitative personalised risk scores for late severe cardiac/pulmonary disease/second cancers following radiotherapy; dose-response relationships; digital twins in radiotherapy safety	Europe's Beating Cancer Plan Sendai Framework for Disaster Risk Reduction

8. Horizon Europe projects focused on support for environment and health action

Table 8 represents a collection of 14 projects (EU contribution: €42 million) that have in common the fact that they support general environment and health action (not focusing on specific types of environmental exposures or a narrow policy sector). Thus, the list includes a cluster that will underpin regular use of integrated economic and health modelling in impact assessments and socio-economic analysis by public authorities and improve the estimation of health impacts and socio-economic costs and/or benefits of environmental stressors.

Noteworthy initiative:

- **Methods for Assessing Health-Related Costs of Environmental Stressors Cluster (METEOR):** This cluster of five projects, receiving €17.5 million for the

next four years, represents the first significant investment ever in supporting research through the Framework Programme on advancing the methodologies and approaches to estimate health impacts and costs and/or benefits of environmental stressors. The cluster is the result of a dedicated call for proposals on '*Methods for assessing health-related costs of environmental stressors*'. It is known that policy-makers face challenges when devising pollution mitigation measures and having to assess the health costs emerging from life-long exposures to environmental stressors or the benefits from clean environments. Deaths and disabilities resulting from pollution carry a quantifiable economic cost to society, but there are significant uncertainties in the cost estimates methodologies. There is also paucity of data to evaluate the economic benefits of clean environments.

The call for proposal encouraged the funded projects to participate in networking and joint activities to optimize synergies, avoid overlaps and increase the impact of the projects at the level of dissemination and outreach to policy-makers and other stakeholders. The four-year cluster has formed working groups on issues of common interest, organised workshops and training activities, among other things.

Table 8. Projects focused on support for environment and health action

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
101095408 **BEST-COST** *Burden of disease based methods for estimating the socio-economic cost of environmental stressors* 48 months (2023-2026) Research and innovation action Cluster 1: Health, € 4 185 218 Coordinator: Dr Brecht Devleesschauwer, Sciensano, BE Additional information in CORDIS Belongs to the Methods for Assessing Health-Related Costs of Environmental Stressors Cluster (METEOR)	Improved and consensual burden of disease (BoD) framework for estimating the health impact of environmental stressors, with a focus on air pollution and noise; improved and consensual methodology for monetization of BoD estimates of environmental stressors; coherent methodological framework for assessing social inequalities in the socio-economic cost of environmental stressors	EU Zero Pollution Action Plan

101131141 **ENVRI-Hub NEXT** *Environmental research infrastructures delivering an open access hub and next-level interdisciplinary research framework providing services for advancing science and society* 36 months (2024-2026) Research Infrastructures; € 5 000 000 Coordinator: Dr Marta Gutierrez, EGI Foundation, Amsterdam, NL Additional information in CORDIS	Development and implementation of open access hub to data and services provision framework of the Cluster of Environmental Research Infrastructures (ENVRI); climate change research; mitigation and adaptation measures and strategies; assessment of the climate change risks; integration of the environmental sciences community into EOSC (European Open Science Cloud)	European Research Area
101120502 **ERA_SHUTTLE** *Accelerating ERA by sharing unique talents for healthy life and environment* 48 months (2023-2027) Coordination ans support action Widening participation and spreading excellence; € 3 093 030 Coordinator: Mrs Bruna Pausic, University of Split, University of Split, HR Additional information in CORDIS	Cross-sectoral framework for collaboration to address contemporary health and environmental challenges; foster R&I capacity in the European Research Area (ERA) to benefit the participating widening countries Poland, Croatia, and Malta; capacity building; mobility; career improvement	European Industrial Strategy European Skills Agenda European Research Area
101131588 **FHERITALE** *Food, health and environment research infrastructures to tackle emerging priorities* 36 months (2024-2026) Coordination and support action Research Infrastructures; € 2 002 189 Coordinator: Dr Antonio Rosato, Interuniversitary consortium of research on magnetic resonance of	Development, provision and integration of services across the European Research Infrastructures (RIs) landscape; research on the effects on health and the environment of artificial materials (including plastics, micro-, nano-, and biotechnological materials); overview of state-of-the-art; common strategies for	European Research Area

metalloproteins (CIRMMP), Florence, IT Additional information in CORDIS	coordination and optimisation of services at different RIs	
101188351 **HDHL F4H** *HDHL Food4Health* 48 months (2025-2028) Coordination and support action Reforming and enhancing the EU R&I system, € 2 414 977 Coordinator: Dr Jessie Doppler, ZonMw, The Hague, NL Additional information in CORDIS	Interconnected challenges of diet-related non-cummunicable diseases (NCDs) and climate change; food and environment; align research and innovation priorities among research funding programmes by identifying research and policy needs	European Research Area
101137317 **IHEN PROJECT** *International Human Exposome Network Project* 36 months (2023-2026) Coordination and support action Cluster 1: Health, € 2 999 957 Coordinator: Prof Martine Vrijheid, Barcelona Institute for Global Health (ISGlobal), ES Additional information in CORDIS	Cooperation between exposome initiatives at EU and global level; longer-term IHEN; organisational structure; identification and making available exposome tools, metadata and resources at the global scale in a FAIR toolbox, demonstrator projects; roadmap for future exposome research and innovation	EU Zero Pollution Action Plan EU Global Health Strategy: Better Health for All in a Changing World
101095430 **MARCHES** *Methodologies for assessing the real costs to health of environmental stressors* 48 months (2023-2026) Research and innovation action Cluster 1: Health, € 3 999 281 Coordinator: Prof. Mikael Skou Andersen, University of Aarhus, DK Additional information in CORDIS	Integrated economic and health modelling in impact assessments and socio-economic analysis; advancing methodological rigor and consistency in accounting for the welfare economic health costs of air pollution and drinking water nitrate; systematic reviews; consensus on approaches on premature mortality	EU Zero Pollution Action Plan

Belongs to the Methods for Assessing Health-Related Costs of Environmental Stressors Cluster (METEOR) 	with disability-adjustment of the associated morbidity burdens	
 101095119 **MISTRAL** *A toolkit for dynamic health impact analysis to predict disability-related costs in the aging population based on three case studies of steel-industry exposed areas in Europe* 48 months (2023-2026) Research and innovation action Cluster 1: Health, € 3 619 635 Coordinator: Dr Mauro Grigioni, Istituto Superiore di Sanità, Rome, IT Additional information in CORDIS Belongs to the Methods for Assessing Health-Related Costs of Environmental Stressors Cluster (METEOR)	Socio-environmental risk factors and sub-clinical conditions and the consequent increase of primary non-communicable diseases; Health Impact Assessment (HIA); artificial Intelligence algorithms; prediction of health impact of health-related features, forecasting the trajectories of disability and quality of life reduction; Model validation on three different exposures in steel plants in Italy, Belgium and Poland	EU Zero Pollution Action Plan
 101059534 **PFASTWIN** *Twinning to address the PFAS challenge in Serbia* 36 months (2022-2025) Coordination and support action Widening Participation and Spreading Excellence, Twinning, € 1 182 431 Coordinator: Dr. Vladimir Beškoski, University of Belgrade, RS Additional information in CORDIS	Per- and polyfluoroalkyl substances (PFAS); networking activities between University of Belgrade and institutions in the EU with expertise in PFAS analysis and innovative (bio)remediation of emerging pollutants; scientific strategy for dealing with PFAS; knowledge transfer in	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan

	the field of analysis and (bio)remediation of emerging pollutants; capacity building	
101132497 **R-MAP** *Mapping, understanding, assessing and predicting the effects of remote working arrangements in urban and rural areas* 36 months (2024-2027) Research and innovation action Cluster 2: Culture, creativity and inclusive society, € 2 798 323 Coordinator: Dr Efstratios Stylianidis, Aristotle University of Thessaloniki, EL Additional information in CORDIS	Impact of remote working arrangements (RWAs) on the disparities between urban and rural regions in Europe; monitoring and assessment of how remote work arrangements affect individuals and communities as well as spatial, economic and environmental aspects in urban-rural areas; Integrated Impact Assessment Framework allowing the assessment of individual, social, economic, environmental and spatial impacts	EU Strategic Framework on Health and Safety at Work 2021-2027
101094639 **UBDPOLICY** *The urban burden of disease estimation for policy making* 48 months (2023-2026) Research and innovation action Cluster 1: Health, € 2 765 718 Coordinator: Dr Mark Nieuwenhuijsen, Barcelona Institute for Global Health - ISGlobal, ES Additional information in CORDIS Belongs to the Methods for Assessing Health-Related Costs of Environmental Stressors Cluster (METEOR)	Improve estimation of health impacts and socio-economic costs and/or benefits of environmental stressors (air pollution, noise, temperature/heat and lack of green space); advance methodological approaches; 1000 cities; physical activity; gender and inequality	EU Zero Pollution Action Plan
101132580 **WINWIN4WORKLIFE** *Healthy, inclusive and sustainable remote work futures as a*	Healthy, inclusive and sustainable remote working arrangements; living	EU Strategic Framework on Health and Safety at Work 2021-2027

Win-Win for employees and employers in urban, rural and cross-border areas 36 months (2024-2027) Research and innovation action Cluster 2: Culture, creativity and inclusive society, € 3 618 782 Coordinator: Dr Veronique Van Acker, LISER - Luxembourg Institute of Socio-Economic Research, Esch-sur-Alzette, LX Additional information in CORDIS	and working conditions ensure a healthy work-life balance in urban, rural, and cross-border areas; forecasting models of the impacts of different scenarios of RWA on mobility, land use, air quality, noise, and health; culture, regional context and welfare systems; evidence-based spatial policies for a sustainable implementation of sustainable remote working arrangements	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101117370 **UHEALTH** *Trade unions and workers' health* 60 months (2024-2028) European Research Council (ERC) starting grant, € 1 498 694 Fellow: Dr Amandine Faucon Alonso, Free University of Brussels, BE	Occupational health determinants; trade unions; birth cohorts; life course assessment of health outcomes; health and safety committees	EU Strategic Framework on Health and Safety at Work 2021-2027
VALESOR 101095611 **VALESOR** *Valuation of environmental stressors* 36 months (2023-2025) Research and innovation action Cluster 1: Health, € 2 913 886 Coordinator: Prof. Gildas Appéré, University of Angers, FR Additional information in CORDIS meteor Belongs to the Methods for Assessing Health-Related Costs of Environmental Stressors Cluster (METEOR)	Economic values of environmental stressors in policy making; chemical stressors and air pollutants transmitted via air, water, and soil vectors; website tool for stakeholders to assess health and economic consequences of planned variations in chemical stressors; economic welfare assessments of chemical and air pollution	Chemicals strategy for sustainability towards a toxic-free environment EU Zero Pollution Action Plan

9. Horizon Europe projects on the exposome: environmental risk factors of health and disease

Table 9 presents 34 projects with an EU commitment of around €188 million. A significant portion of the funding was funded by the Cluster 1 (Health) of Horizon Europe. As compared to previous Framework programmes, there

is an increase in funding of research focused on environmental causes of mental health issues and cancer; the latter being a reflection of the significance of cancer as a policy and scientific issue at the EU level, as manifested by the adoption in 2021 of the Europe's Beating Cancer Plan and the EU Mission in Cancer.

Noteworthy initiative:

- **Workplace Innovation for Sustainable Wellbeing Cluster** (**WISEWORK-C**): The five projects (**EU-COWORK**, **INTERCAMBIO**, **PROSPERH**, **SONATA**, **WAGE**), belonging to this cluster were selected for funding from a call focused on proposing evidence-based interventions for promotion of mental and physical health in changing working environments (post-pandemic workplaces). The 5-year cluster aims, among others, to address common areas of practice and collectively influence policy and decision makers with project findings.

Table 9. Projects addressing environmental determinants and risk factors of health and disease; the exposome

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
101080323 **ADVANCE** *Addressing mental health vulnerabilities from adolescence to older age: innovating prevention science for times of change* 60 months (2023-2028) Research and innovation action Cluster 1: Health, €6 999 987 Coordinator: Prof. Wietse Antol Tol, University of Copenhagen, DK Additional information in CORDIS	Vulnerable populations in times of change; mental health promotion and prevention; social justice; intervention studies; youth affected by climate change in Germany, socio-economically disadvantaged young adults in Lithuania, working adults in highly digitalized work environments in the Netherlands, migrants in Italy and Denmark; older adults in Switzerland	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101137144 **APOLLO2028** *Improving mental health, wellbeing, and resilience of*	Occupational health and safety; mental health and well-being; resilience to changing environments (especially daily	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World

healthcare workers in changing environments 48 months (2024-2027) Research and innovation action Cluster 1: Health, € 5 626 338 Coordinator: Dr Irene Georgescu, University of Montpellier, FR Additional information in CORDIS	pressures and extreme events) at the workplace; health and care workers, managers, health systems funders; AI-based system to support in the identification of stress factors	EU Strategic Framework on Health and Safety at Work 2021-2027
101150312 **BESPACE** *Boosting the exposome space coverage in the aquatic environment by multidimensional integrated analytical platforms* 24 months (2024-2026) Grant agreement ID: 101150312 MSCA Postdoctoral Fellowships 2023, € 187 624 Fellow: Dr Renai Lapo, University of Amsterdam, NL	Profiling of chemicals of environmental concern in relevant exposome matrices such as environmental and treated water samples; risk assessment	EU Water Framework Directive
101086188 **BRAINSCAPE** *How the physical environment shapes the human brain* 60 months (2023-2028) European Research Council (ERC) consolidator grant; €1 999 600 Fellow: Dr Imke Kruse, Max Planck Institute, Berlin, DE	Brain function; impact physical and biological environments; environmental neuroscience; healthy living environments, urbanisation and climate change; pathways and mechanisms by which environment affects the brain and mental health; neuroimaging data; discordant monozygotic twin study	EU Global Health Strategy: Better Health for All in a Changing World
101180607 **DEMANS24-26** *Dementia in Ankara and the nature of Surroundings: The effects of everyday home and family environments on the health, well-being and identity of aging women* 24 months (2024-2026) ERA fellowship Widening participation and spreading excellence; € 132 638 Fellow: Dr Ward Meghánn, Bilkent University, TR	Relationship between physical (natural, built, material, biophilic) and social (spousal, familial, communal) features of home environments, and dementia, place-based experiences, daily living, and well-being	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World

101096888 **DISCERN** *Discovering the causes of three poorly understood cancers in Europe* Research and innovation action 60 months (2023-2027) Cluster 1: Health, € 8 857 813 Coordinator: Dr Marc Gunter, International Agency for Research on Cancer (IARC), Lyon, FR Additional information in CORDIS Belongs to the 'Understanding' cluster to work on Objective 1 of the Cancer Mission programme	Causes of three poorly understood cancers in Europe (renal, pancreatic and colorectal cancer); large-scale European biorepositories comprising population-based cohorts and tumour case-series; novel exposomics and proteomics scans, geospatial and environmental exposure information from 16 large-scale epidemiological cohorts including almost 900,000 individuals; biological mechanisms	Europe's Beating Cancer Plan EU mission on cancer
101095392 **EARLY** *Evaluating, identifying and reducing determinants of MHCs in youth* 48 months (2023-2027) Research and innovation action Cluster 1: Health, € 3 014 766 EU contribution Coordinator: Prof Jutta Lindert, University of Applied Sciences Emden/Leer, DE Additional information in CORDIS	Mental health conditions (depression, anxiety, stress and substance use disorders); identification and reduction of risky modifiable exposures in youth; comprehensive exposure matrix; multicomponent intervention in five selected countries	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101097094 **ELMUMY** *Elucidation of risk factors and health determinants associated with progression of monoclonal gammopathies to multiple myeloma* 48 months (2023-2026) Research and innovation action Cluster 1: Health, € 9 951 078 Coordinator: Dr Ieronymos Zoidakis, National and Kapodistrian University of Athens Additional information in CORDIS Belongs to the 'Understanding' cluster to work on Objective 1 of the Cancer Mission programme	Multiple myeloma; omics and bioinformatics; biological pathways and molecules responsible for the onset, progression and resistance to therapy; health determinants and risk factors associated with progression; demographic, lifestyle and exposure datasets	Europe's Beating Cancer Plan EU mission on cancer

101157151 **ENACT** *Environmental effect on health care and wellbeing and active interventions* 48 months (2025-2028) Research and innovation action Cluster 1: Health, € 7 997 612 Coordinator: Dr Damir Filipovic, Alliance for AI, IoT and Edge Continuum Innovation AIOTI, Brussels, BE Additional information in CORDIS Belongs to the **EXPOHEALTHNET** cluster (under development)	Develop a state-of-the-art environmental risk score and analyser driven framework and platform to predict, monitor and prevent the exposomic risk of acute and chronic health conditions of chronic vascular and non-vascular NCDs; combined exposures; exposomic risk score and analyser; individual vulnerability; clinical and a policy implementation	EU Global Health Strategy: Better Health for All in a Changing World
101157269 **ENVESOME** *The environmental exposome and health* 48 months (2024-2028) Research and innovation action Cluster 1: Health, € 7 999 798 Coordinator: Prof. Dimosthenis Sarigiannis, National Hellenic Research Foundation, Athens, EL Additional information in CORDIS Belongs to the **EXPOHEALTHNET** cluster (under development)	Role of air, noise, light, and hazardous waste pollution in non-communicable disease development (cardiorespiratory disease, metabolic syndrome, neurotoxicity, immunotoxicity, mental health disorders); exposome and citizen-science-based framework for assessing the risks of emerging environmental health stressors; environmental and human biomonitoring and personal exposure data and models; AI tools; adverse outcome pathways; decision support tools	EU Global Health Strategy: Better Health for All in a Changing World EU (mental) health policies
101105240 **ENVIBRAIN** *Characterization of diffuse glioma tumors' chemical exposome and potential positive associations with environmental pollution through air particulate matter analysis and wastewater based epidemiology* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2022, € 181 152	Brain tumour; diffuse glioma; chemical exposures and exposome; cohort of diffuse gliomas patients; exposure of Barcelona citizens to a mixture of contaminants	Chemicals strategy for sustainability towards a toxic-free environment Europe's Beating Cancer Plan EU mission on cancer

Fellow: Dr Maria-Christina Nika, Spanish National Research Council (CSIC), ES		
101057429 **ENVIRONMENTAL** *Reducing the impact of major environmental challenges on mental health* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 9 045 288 Coordinator: Prof. Gunter Schumann, Charité Medical Center, Berlin, DE Additional information in CORDIS	Global environmental challenges; climate change; urbanisation; psychosocial stress caused by the COVID-19-pandemic; mental health over the lifespan; deep phenotyping; environmental adversity; molecular characterisation; virtual reality; biomarkers; prevention	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101137223 **EU-COWORK** *Developing compassionate workplaces in Europe for the digital and green work environment to protect employees' mental and physical health and wellbeing* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 3 871 498 Coordinator: Dr Deborah de Moortel, Free University of Brussels, BE Additional information in CORDIS Belongs to the Workplace Innovation for Sustainable Wellbeing Cluster (WISEWORK-C)	Twin transitions on well-being, performance, job quality and work culture; employees confronted with serious illness, family caregiving, death, dying and loss; Compassionate Workplaces Programmes (CWPs) as health promotion strategies to maintain and support employee health and wellbeing in the work environment; intervention study; mental and physical health and wellbeing	EU Strategic Framework on Health and Safety at Work 2021-2027 EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101043321 **EXPOMET** *Deciphering the exposome by metabolomic technology in breast cancer* 60 months (2022-2027) European Research Council (ERC) consolidator grant; €2 937 489 Principal investigator: Dr Benedikt Warth, University of Vienna, AT	Mass spectrometry-based platform for omic-scale assessment of chemical exposures; environmental contaminants and breast cancer; comprehensive sequencing of the exposome and aetiology of breast cancer; exposome-	Europe's Beating Cancer Plan EU mission on cancer

	wide association (ExWAS) study	
101156311 **EXPOSIM** *Environmental stressors as causal determinants for immune-mediated diseases – mapping and prioritising evidence for knowledge-based policy making* 60 months (2025-2029) Research and innovation action Cluster 1: Health, € 7 998 991 Coordinator: Prof. Peter Hoet, Catholic University of Leuven, BE Additional information in CORDIS Belongs to the **EXPOHEALTHNET** cluster (under development)	Immune-mediated diseases (IMDs); exposome; impact of combined environmental exposures on IMDs and immune health at different stages in life (pregnancy, childhood and adulthood); biological pathways and molecular mechanisms; effectiveness of exposure-reducing and health-promoting interventions; decision-support tools; user-friendly toolbox	EU Global Health Strategy: Better Health for All in a Changing World
101096312 **GENIAL** *Understanding gene environment interaction in alcohol-related hepatocellular carcinoma* 60 months (2023-2027) Research and innovation action Cluster 1: Health, € 11 996 753 Coordinator: Prof. Eric Trepo, Free University of Brussels, BE Additional information in CORDIS Belongs to the 'Understanding' cluster to work on Objective 1 of the Cancer Mission programme	Alcohol-related hepatocellular carcinoma; characterisation of environmental factors (e.g. diet, lifestyle; genetic and environmental determinants promoting ALD-HCC; assess how these determinants modulate the ALD-HCC risk in prospective cohorts of patients included in HCC surveillance programmes	Europe's Beating Cancer Plan EU mission on cancer
101137149 **INTERCAMBIO** *Interventions to promote mental and physical health in changing working environments due to climate change, sustainable work practices, and in green jobs* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 5 728 110 Coordinator: Dr Michelle Turner, Barcelona Institute for Global Health - ISGlobal, ES Additional information in CORDIS	Changing work environment; mental and physical health of workers; climate change; novel workplace exposures; green jobs interventions in strategic industries; longitudinal cohorts	EU Strategic Framework on Health and Safety at Work 2021-2027 EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World

Belongs to the Workplace Innovation for Sustainable Wellbeing Cluster (WISEWORK-C)		
101103230 **HEALTHDETERMINANTS** *Investigating the impact of risk of automation on health outcomes of employees: Evidence from Germany* 24 months (2023-2025) MSCA Postdoctoral Fellowships 2022, € 173 847 Fellow: Dr Mariia Vasiakina, Max Planck Institute, Rostock, DE	Effects of automation on employees' well-being; survey data from the German Socio-Economic Panel and expert data, subjective and objective measures of health	EU Strategic Framework on Health and Safety at Work 2021-2027
101096473 **LUCIA** *Understanding lung cancer related risk factors and their impact* 48 months (2023-2026) Cluster 1: Health, 13 516 869 Research and innovation action Coordinator: Prof. Hossam Haick, Technion - Israel Institute Of Technology, Haifa, Israel Additional information in CORDIS Belongs to the 'Understanding' cluster to work on Objective 1 of the Cancer Mission programme	Lung cancer; toolbox for discovering and understanding new risk factors; personal exposure to chemical pollutants and behavioural and lifestyle factors; external risk factors, such as urban, built and transport environments, social aspects and climate; biological responses to the personal and external risk factors, retrospective and prospective cohorts	Europe's Beating Cancer Plan EU mission on cancer
101086988 **MAMELI** *Mapping the methylation of repetitive elements to track the exposome effects on health: the city of legnano as a living lab* 60 months (2023-2028) European Research Council (ERC) consolidator grant; € 2 993 251 Fellow: Dr Valentina Bollati, University of Milano, IT Additional information in CORDIS	Exposome; epigenetic modifications; repetitive elements (REs); enrolment of 6200 subjects in the city of Legnano (Italy); prediction of the relationship between exposome and RE methylation status	EU Global Health Strategy: Better Health for All in a Changing World
101096667 **MELCAYA** *Novel health care strategies for*	Risk factors and determinants of melanoma in childhood, adolescence	Europe's Beating Cancer Plan EU mission on cancer

melanoma in children, adolescents and young adults 48 months (2022-2026) Research and innovation action Cluster 1: Health, 8 013 218 Coordinator: Dr Susana Puig, Clínic Foundation for Biomedical Research, Barcelona, ES Additional information in CORDIS Belongs to the 'Understanding' cluster to work on Objective 1 of the Cancer Mission programme	and young adults; European cohorts and registries; genetic and environmental risk factors and progression of melanoma; omics; machine learning tools; non-invasive disruptive tools based on artificial intelligence and volatilomics detection from exhaled breath and skin for earlier detection; public health	
101086247 **PSYCHOMED** *Psychiatric disorders and comorbidities caused by pollution in the Mediterranean area* 48 months (2023-2026) MSCA Staff Exchanges 2021, €1 159 200 Coordinator: Prof. Marc Landry, University of Bordeaux, FR Additional information in CORDIS	Staff exchange programme; role of anthropogenic pollutants in the Mediterranean area as a risk factor of neuro-psychiatric disorders and associated pathologies; neuroinflammatory responses; psychiatric patients; *in vitro* and in *in vivo* preclinical models	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World EU Zero Pollution Action Plan
101044387 **PREDICTCOPD** *Understanding the host-environmental interactions across the lifespan determining lung function trajectories and COPD* 60 months (2022-2027) European Research Council (ERC) consolidator grant; €1 998 319 Principal investigator: Dr Maria Rosa Faner, University of Barcelona, ES	Chronic Obstructive Pulmonary Disease (COPD); gene and environment interactions occurring early in life; alteration of the normal lung developmental programme; trajectome	EU Global Health Strategy: Better Health for All in a Changing World
101104618 **PREVENT** *Improving and upscaling primary prevention of cancer by addressing childhood obesity through implementation research - the PREVENT approach* 48 months (2023-2027) Research and innovation action Cluster 1: Health, € 7 469 250 Coordinator: Prof. Vana Papaevangelou, National and	Obesity; future cancer risk; implementation research; pilots; barriers to current interventions and policies preventing them from upscaling to different geographical, socio-economic, and cultural settings; social environment; schools; outreach to more than 3.3 million students; active behavioural	Europe's Beating Cancer Plan EU mission on cancer

Kapodistrian University of Athens, EL Additional information in CORDIS Belongs to Cancer Mission cluster of projects on 'Prevention and Early Detection'	change, social innovation	
101137256 **PROSPERH** *Promoting positive mental and physical health at work in a changing environment: a multi-level approach* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 5 796 408 Coordinator: Prof. Ella Arensman, University College Cork - National University of Ireland, IE Additional information in CORDIS Belongs to the Workplace Innovation for Sustainable Wellbeing Cluster (WISEWORK-C)	Changes in the workplace; twin transition; physical and mental health of workers; interventions; health promotion; monitoring; cluster-randomised controlled trial to determine effectiveness and cost-effectiveness; guidelines and recommendations	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101156916 **PUREMIND** *Personal natural environment-gene-gut-brain interactions based ecosystem for prevention of mental illness in children, adolescents and young adults (PUREMIND)* 48 months (2024-2028) Research and innovation action Cluster 1: Health, € 9 845 662 Coordinator: Dr Elena Tamburini, MEDEA SRL Massa-Carrara, IT Additional information in CORDIS	Integrated Mental Healthcare Ecosystem (IMHE); personalised interventions to prevent mental health disorders (MHD) and thereby improving wellbeing in children, adolescents and young adults (0–25 years); inequality; digital addiction resulting in sedentary, socially isolated lifestyle; personal natural environment-gene-gut-brain-MHD interactions; artificial intelligence; environment and lifestyle	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101147877 **SOCIAL** *Towards an understanding of social media: The effects on health, well-being, and genetic susceptibilities* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023, € 156 778	Social media's impact on health and well-being; social media research; genetic factors influencing social media usage patterns; genetic	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World

Fellow: Dr Rita Dias Pereira, University of Lisbon, PT	susceptibilities to mental disorders contribute to social media use patterns	
101041087 **SOCIALCRAVING** *Towards a social neuroscience of health-related decision-making* 60 months (2023-2027) European Research Council (ERC) starting grant, € 1 491 166 Principal investigator: Dr Leonie Koban, National Centre for Scientific Research (CNRS), Lyon, FR	Psychosocial risk factors; social determinants of health; brain signature of social craving; mental and physical health	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
SONATA 101137507 **SONATA** *Situation-aware orchestration of adaptive architecture* 48 months (2024-2027) Research and innovation action Cluster 1: Health, € 5 680 125 Coordinator: Prof. Andrew Vande Moere, Catholic University of Leuven, BE Additional information in CORDIS Belongs to the Workplace Innovation for Sustainable Wellbeing Cluster (WISEWORK-C)	Occupational health and safety; shared workplace design; health, wellbeing, productivity, social relations; impact of adaptive architectural technologies on health and wellbeing; evidence-based recommendations	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World EU Strategic Framework on Health and Safety at Work 2021-2027
Support 4 Resilience 101136291 **SUPPORT4RESILIENCE** *Strengthening resilience and mental wellbeing through the Support4Resilience toolbox for leaders in elderly care* 60 months (2024-2028) Research and innovation action Cluster 1: Health, € 5 999 561 Coordinator: Prof Siri Wiig, University of Stavanger, NO Additional information in CORDIS	Occupational health; working environment; stress, burnout, and reduced mental wellbeing among healthcare workers and informal caregivers; research-based toolbox to support healthcare leaders in improving healthcare workers' and informal caregivers' resilience and mental wellbeing in elderly care; resilience and mental wellbeing factors among healthcare workers and informal caregivers	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World EU Strategic Framework on Health and Safety at Work 2021-2027

101057182 **YOUTH-GEMS** *Gene environment interactions in mental health trajectories of youth* 60 months (2022-2027) Research and innovation action Cluster 1: Health, € 8 107 980 Coordinator: Dr Sinan Gülöksüz, Maastricht University, NL Additional information in CORDIS	Youth mental health; gene environment interactions; epigenetics; development; child and adolescent psychiatry; complex genetics; machine learning; brain; biomarker discovery; predictive models; cohorts	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World
101137207 **WAGE** *Healthy working environments for all ages: an evidence-driven framework* 48 months (2023-2027) Research and innovation action Cluster 1: Health, € 5 442 312 Coordinator: Dr Victor Gonzalez, Sintef AF, NO Additional information in CORDIS Belongs to the Workplace Innovation for Sustainable Wellbeing Cluster (WISEWORK-C)	Occupational health and well-being; comprehensive framework for assessing roles and interactions between physical and psychosocial risk factors; modelling; policy-relevant evidence; multi-level intervention strategies and policy changes for workers; adverse physical and psychosocial work environments	EU Strategic Framework on Health and Safety at Work 2021-2027 EU Global Health Strategy: Better Health for All in a Changing World
101137468 **WELL CARE** *Investing in the mental wellbeing and resilience of long-term care workers and informal carers through the identification, evaluation and promotion of good practices across Europe* 48 months (2024-2027) Research and innovation action Cluster 1: Health, € 5 999 895 Coordinator: Prof Elizabeth Hanson, Linnaeus University, SE Additional information in CORDIS	Mental health and well-being; occupational health; psychosocial risks; good practices and case studies; evidence-based and action-oriented recommendations for policy makers and stakeholders; long-term care (LTC) workers and informal carers' mental health and productivity	EU Strategic Framework on Health and Safety at Work 2021-2027 EU Global Health Strategy: Better Health for All in a Changing World
101155977 **YEAH** *Youth health from a holistic perspective* 60 months (2025-2029) Research and innovation action Cluster 1: Health, € 9 992 936 Coordinator: Prof Aïna Chalabaev, Grenoble Alpes University, FR Additional information in CORDIS	Healthy lifestyles in children; health inequalities; social environment and interactions; personalised person-centred digital intervention; health behaviours (physical	EU (mental) health policies EU Global Health Strategy: Better Health for All in a Changing World

	activity, sedentary behaviours, diet, sleep); concepts from, inter alia, psychology (health, social, developmental), public health, and environmental epidemiology	

10. Horizon Europe projects focused on pollution monitoring and mitigation

Table 10 represents a collection of small-scale projects focused on developing technological means to detect environmental pollution in different media and finding ways for remediation and mitigation, the final aim being to protect environmental and human health. 29 projects were funded, with a commitment of €86 million from Horizon Europe. The projects in this chapter are funded from outside the Cluster 1 (Health), Cluster 6 (Food, Bioeconomy, Natural Resources, Agriculture and Environment) being a significant contributor.

Table 10. Projects addressing monitoring and mitigation of pollution

Project ID nb, acronym, title, duration, funding area, EU contribution, project type, coordinator, logo	Key words	Potential contribution to EU and/or global policy and actions
AquaBioSens 101135432 **AQUABIOSENS** *On-site biological sensing for aquatic pollutants and biohazards* 36 months (2024-2026) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 2 470 992 Coordinator: Dr Electra Gizeli, Foundation for Research and Technology – Hellas (FORTH), EL Additional information in CORDIS	Tools for the measurement of aquatic hazards and pollution; handheld devices to measure contaminants of emerging concern, microbial biohazards and heavy metals; monitoring; bioassays; toxicity; sensors	EU Zero Pollution Action Plan EU Water Framework Directive Drinking water directive
BIOSYSMO 101060211 **BIOSYSMO** *Bioremediation systems exploiting synergies for improved removal of mixed pollutants* 48 months (2022-2026) Research and innovation action	Computationally-assisted framework; synergistic biosystems; degradation and sequestration of pollutant mixtures; bacteria, fungi and	EU Zero Pollution Action Plan

Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 4 873 331 Coordinator: Dr. Lila Otero-Gonzalez, Sevilla, ES Additional information in CORDIS	plants (poplar tree); engineering bacteria for improved degradation and bioaugmentation	
101131382 **CLEANWATER** *Multifunctional sustainable adsorbents for water treatment assisted with plasma technologies and for health protection from xenobiotics* 48 months (2024-2027) MSCA Staff Exchanges 2022, € 979 800 Coordinator: Dr Joaquín Silvestre Albero, University of Alicante, ES Additional information in CORDIS	Contamination of drinking water; decrease levels of pathogens, chemical and radiological hazards to tolerable levels in a single and simple pot; multicomponent sorbents	EU Water Framework Directive Drinking water directive
101060638 **D4RUNOFF** *Data driven implementation of hybrid nature based solutions for preventing and managing diffuse pollution from urban water runoff* 48 months (2022-2026) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 3 332 948 Research and innovation action Coordinator: Mr. Uffe Linneberg Gangelhof, Vandcenter Syd AS, DK Additional information in CORDIS	Urban runoff pollution sources and the impacts; high-resolution suspect and screening & non-target screening NTS methods for Contaminants of Emerging Concern (CECs) detection and identification; online sensors for targeted CECs, metals and microplastics	EU Zero Pollution Action Plan
101151986 **3DMEMBIO** *3D Printed membrane and bioremediation for the reduction of per- and poly-fluoroalkyl substances pollution in aquatic ecosystems* 24 months (2025-2026) MSCA Postdoctoral Fellowships 2023; € 156 778 Fellow: Dr Pedro Martins, University of Minho, PT	Per- and polyfluoroalkyl substances (PFAS) in water bodies; prevent adverse impacts on human health and ecosystems; alternative technologies; photocatalysis using nanoparticles; 3D printing technology to produce novel and reusable multilayered polymer membranes incorporating photocatalysts	EU Zero Pollution Action Plan EU Water Framework Directive

101054300 **EMBODIED ECOLOGIES** *Embodied Ecologies: A collaborative inquiry into how people sense, know, and act to reduce chemical exposures in everyday urban life* 60 months (2022-2027) European Research Council (ERC) advanced grants; 2 499 117 Principal investigator: Dr Anita Hardon, Wageningen University, NL	Chemical exposures; harm reduction strategies; two Western European and two Southeast Asian cities having adopted green policies but differing starkly in their regulatory environments; multi-modal ethnography; multi-layered cartography to study the accumulation of toxic chemicals in human bodies; impact of political, economic, social, and regulatory forces shaping uneven exposure	Chemicals strategy for sustainability towards a toxic-free environment
101039270 **ERA-ARE** *A new ERA for Environmental Risk Assessment: Chirality as a tool towards environmentally safe pharmaceuticals* 60 months (2023-2028) European Research Council (ERC) starting grant, € 1 499 950 Principal investigator: Dr Ana Ribeiro, University of Porto, PT	Pharmaceuticals, metabolites and transformation products; emerging contamination of aquatic environments; prevention; exploitation of the chirality of fluoro-quinolones as a piloting tool to reduce antibiotic resistance and create innovative guidelines for developing safer drugs; avoidance of ecotoxicological effects and bioaccumulation	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe EU Zero Pollution Action Plan
101091980 **GREENER** *Single photon source and detector based on novel materials for the detection of endocrine disruptors* 36 months (2023-2025) Cluster 4: Digital, Industry and Space, € 3 759 104 Research and innovation action Coordinator: Dr Martin Moebius, Technical University of Chemnitz, DE	Water safety; drinking water contaminants; endocrine disruptors; spectrometer capable of measuring extremely low concentrations; biosensor	EU Water Framework Directive Drinking water directive

Additional information in CORDIS		
 101081963 **H2OFORALL** *Innovative integrated tools and technologies to protect and treat drinking water from disinfection byproducts (DBPs)* 36 months (2022-2025) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 3 452 700 Coordinator: Dr. Luisa Durães, University of Coimbra, PT Additional information in CORDIS	Safe water; water purification and disinfection; disinfection by-products (DBPs); sensor monitoring devices; modelling of spread through drinking water distribution systems; toxicity and environmental impact; water treatments to remove DBPs	EU Water Framework Directive
 101041255 **HELIOS** *The new generation of scalable urban heat island mitigation by means of adaptive photoluminescent radiative cooling skins* 60 months (2022-2027) European Research Council (ERC) starting grant, € 1 498 125 Principal investigator: Dr Anna Laura Pisello, University of Perugia, IT Additional information in CORDIS	Urban heat island; resilient urban skin of the future; radiative cooling structures; into temperature responsive performance for indoor-outdoor human comfort and energy-efficiency	European Climate Law
101154622 **HYCEM** *Boosting water depollution: development of a novel hybrid photocatalytic membrane for removal of contaminants of emerging concern* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023; € 191 760 Fellow: Dr Najmeh Askari, KU Leuven, BE	Emerging pollutants in water; pharmaceuticals and endocrine-disrupting compounds; development of a Z-scheme photo-catalytic membrane optimized for the degradation of contaminants of emerging concern in water	EU Water Framework Directive

101057286 **IMPACTIVE** *Innovative mechanochemical processes to synthesize green active pharmaceutical ingredients* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 7 438 705 Coordinator: Dr Evelina Colacino, University of Montpellier, FR Additional information in CORDIS	Green chemistry; green pharma; green methods to produce active pharmaceutical ingredients (APIs) mitigation of environmental impact of drug manufacturing; environmental, health and societal impacts of IMPACTIVE processes	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe EU Zero Pollution Action Plan European Green Deal
101081728 **INTODBP** *Innovative tools to control organic matter and disinfection byproducts in drinking water* 48 months (2022-2026) Innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 3 994 707 Coordinator: Dr Maria José Farré, Catalan Institute for Water Research, Girona, ES Additional information in CORDIS	Water quality management for safe human use and a healthy environment; drinking water treatment and real-time monitoring; pollution and risks related to disinfection by-products (DBPs); sensors and analytical methods; human exposure	EU Water Framework Directive
101135402 **MOBILES** *Monitoring and detection of biotic and abiotic pollutants by electronic, plants and microorganisms based sensors* 48 months (2024-2028) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 4 644 952 Coordinator: Prof. Evangelos Hristoforou, National Technical University of Athens Additional information in CORDIS	Chemicals of Emerging Concern (CECs) and Persistent Mobile Chemicals (PMCs); tools for monitoring, detection, and consequently mitigation of pollution from pathogens, CECs and PMCs; electronic biosensors for monitoring organic chemicals (pesticides, hormones) and antimicrobial resistance bacteria and pathogens in water, soil and air	EU Water Framework Directive
101072559 **MODELAIR** *Groundbreaking*	Artificial Intelligence (AI) - based tool; control air pollution	EU Mission: Climate-neutral and smart cities

tools and models to reduce air pollution in urban areas 48 months (2023-2026) MSCA Postdoctoral Fellowships 2021, € 2 688 624 Fellow: Dr Soledad Le Clainche Martinez, Technical university of Madrid, ES Additional information in CORDIS	in urban areas; Bristol, Brussels and Madrid; flow and dispersion of air pollution; sensor network to provide a high-quality air pollution monitoring service; influence of the pollutant emission source	
101108881 **MS4PFAS** *Application of gas-phase atmospheric pressure ionization sources to assess the wide-scope determination of PFAS in environmental and biological samples* 24 months (2024-2026) MSCA Postdoctoral Fellowships 2022; €165 312 Fellow: Dr Juan Francisco Ayala Cabrera, University of the Basque Country, Leioa/Bizkaia, ES	Per- and polyfluoroalkyl substances (PFAS); high-throughput methodologies based on mass spectrometry (MS); determination of ionic and neutral PFAS in biological and environmental matrices; monitoring of PFAS in drinking water and in human biofluids (breast milk, plasma, urine)	EU Water Framework Directive Drinking water directive EU Zero Pollution Action Plan
101056777 **LENS** *L-vehicles emissions and noise mitigation solutions* 36 months (2022-2025) Research and innovation action Cluster 5: Climate, Energy and Mobility, € 4 995 098 Coordinator: Prof. Leonidas Ntziachristos, Environmental and Energy Studies and Software Development,Thessaloniki, EL Additional information in CORDIS	Noise and air pollution from motorcycles and mopeds (L-category vehicles - LVs); techniques to monitor LVs' noise and emissions; emissions and noise performance under real driving conditions; detailed pollutant and noise characterization of more than 150 vehicles in the lab and on the road; portable sensor-based and mini-analyser measurement systems; nanoparticles	Environmental noise directive
101151717 **NANOTROJANS** *Development of mass spectrometry*	Nanoplastics (nPLs) behaviour in the environment;	EU Strategy for Plastics in a Circular Economy

based analytical methods for high-throughput nanoplastic screening in environmental and biological systems 24 months (2024-2026) MSCA Postdoctoral Fellowships 2023; € 169 326 Fellow: NN, University of Crete, EL	toxicity; Trojan horse-like transport of toxic chemicals into cells; development, validation and application of novel analytical methods to detect and quantify of nPLs in environmental, food and biological systems	
NET4Air 101079455 **NET4AIR** *Networking center for excellence in nanoelectronic devices for air monitoring* 36 months (2023-2025) Coordination and support action Widening Participation and Spreading Excellence, Twinning, € 1 423 825 Coordinator: Dr Carmen Moldovan, National Institute for Research and Development in Microtechnologies, RO Additional information in CORDIS	Collaborative programme; air quality monitoring; engagement of Romanian citizens in a participatory approach to air quality science; health and wellbeing; Networking Centre for Excellence in environmental monitoring and remediation; low-cost wearable/portable nanoelectronic-based platform for air monitoring	EU Zero Pollution Action Plan European Green Deal
NINFA 101081865 **NINFA** *Taking action to prevent and mitigate pollution of groundwater bodies* 48 months (2022-2026) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, €3 996 824 Coordinator: Dr Amro Satti, LEITAT Technological Centre, Terrassa, ES Additional information in CORDIS	Groundwater pollution; pesticides, nutrients, pharmaceuticals, antibiotic resistance genes, hydrocarbons, heavy metals, microplastics; monitoring and protection; synergistic effects and risks of multiple stressors and pollutants, early-warning decision support system	EU Water Framework Directive
101063386 **REMIPLASWAS** *Removal of microplastics from the environment using autochthonous wastewater-derived microbial consortia* 24 months (2023-2025)	Microplastics (MPs) pollution; cost-effective biobased MPs (Polyethylene terephthalate-PET) removal strategies;	EU Zero Pollution Action Plan EU Strategy for Plastics in a Circular Economy

MSCA Postdoctoral Fellowships 2021, € 181 152 Fellow: Prof. Elisabet Aranda Ballesteros, Univeristy of Granada, ES	eco-friendly remediation techniques; wastewater; microbial communities; toxicity of the resulting effluent after MPs process	
101188929 **REPROTOX** *Developing a human-based stem cell model for reproductive toxicity* 24 months (2024-2026) European Research Council (ERC) proof of concept grant, € 150 000 Fellow: Dr Myra Behendt, Leiden University Hospital, NL	Optimise a human-based high-throughput screening assay for male reproductive toxicity	Directive on the protection of animals used for scientific purposes REACH regulation
101119769 **SEASOUNDS** *Innovative marine soundscape characterization to effectively mitigate ocean and sea noise pollution* 48 months (2024-2027) MSCA doctoral network; €2 790 583 Coordinator: Dr Nathalie Favretto-Cristini, Laboratoire de Mécanique et d'Acoustique, National Centre for Scientific Research (CNRS), Marseille, FR Additional information in CORDIS	Marine soundscapes, recommendations for underwater noise mitigation solutions; develop solutions based on Distributed Acoustic Sensing technology to monitor marine mammals; impact of noise and vibrations on marine invertebrates and plants; links between exposures of individual animals and the overall quality of the habitat that the animals live in	EU Zero Pollution Action Plan Environmental noise directive
101131379 **SELFAQUASENS** *Advanced manufacturing of self-sensing bio-based membranes for environmental detoxification and revalorization* 48 months (2024-2027) MSCA Staff Exchanges 2022, € 795 800 Coordinator: Dr Roberto Fernández De Luis, Basque Centre for Materials, Applications and Nanostructures, ES Additional information in CORDIS	Heavy metals derived from mining; polluted water; remediation; exchange and training programme; improving the health and life quality of the EU citizens	EU Zero Pollution Action Plan EU Water Framework Directive

 101136056 **SHEREC** *Safe, healthy and environmental ship recycling* 48 months (2024-2027) Innovation action Cluster 4: Digital, Industry and Space, € 7 954 760 Coordinator: Mr Tolga Cankurt, HKTM, Kocaeli, TR Additional information in CORDIS	Ship recycling; toxic waste disposal; exposure of workers to hazardous substances; occupational safety and health; innovative robotics, data and AI systems; automation; prevention of contamination of hazardous materials at occupational and environmental levels	European Circular Economy Action Plan EU Strategic Framework on Health and Safety at Work 2021-2027
 101086109 **SYLVA** *A System for real-time observation of aeroallergens* 48 months (2023-2026) Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, € 2 998 677 Innovation action Coordinator: Prof. Mikhail Sofiev, Finnish Meteorological Institute, Helsinki, FI Additional information in CORDIS	Bioaerosols (mainly pollen and fungal spores, but also bacteria and viruses); allergens; improved monitoring and temporal resolution, timeliness, coverage and availability of information about aeroallergens and other bioaerosols; bioaerosol monitoring ICT infrastructure; demonstrating SYLVA innovations including health	Global Earth Observation System of Systems (GEOSS)
 101135523 **SYMPHONY** *Smart systems for environmental pollution detection and biogas production based on cloud-connected silicon photonic and microelectronic hyperspectral sensors* 36 months (2024-2027) Research and innovation action Cluster 4: Digital, Industry and Space, € 4 982 272 Coordinator: Dr Carlos Alonso Ramos, National Centre for Scientific Research (CNRS), FR Additional information in CORDIS	Air pollution; smart sensors; validation in different scenarios: city pollution monitoring in Cyprus, process control and leakage detection in biogas micro-plants in multiple locations in Europe	EU Zero Pollution Action Plan

101057816 **TRANSPHARM** *Transforming into a sustainable European pharmaceutical sector* 48 months (2022-2026) Research and innovation action Cluster 1: Health, € 8 039 600 Coordinator: Dr Chris Stevens, University of Ghent, BE Additional information in CORDIS	New methods to produce greener pharmaceuticals; reduce the environmental footprint; in silico toolbox for benign-by-design for environmental biodegradability	European Union Strategic Approach to Pharmaceuticals in the Environment Pharmaceutical Strategy for Europe EU Zero Pollution Action Plan European Green Deal
101081807 **UPWATER** *Understanding groundwater pollution to protect and enhance water quality* 48 months (2022-2026) Research and innovation action Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment, €3 993 637 Coordinator: Dr Enric Vazquez, Spanish National Research Council (CSIC), ES Additional information in CORDIS	Groundwater chemical and microbial pollution; identification, occurrence and fate of pollutants; cost-efficient sampling methods; identify and quantify the pollution sources; bio-based engineered natural treatment systems designed as mitigation solutions	EU Water Framework Directive

CONCLUSIONS

Total EU funding

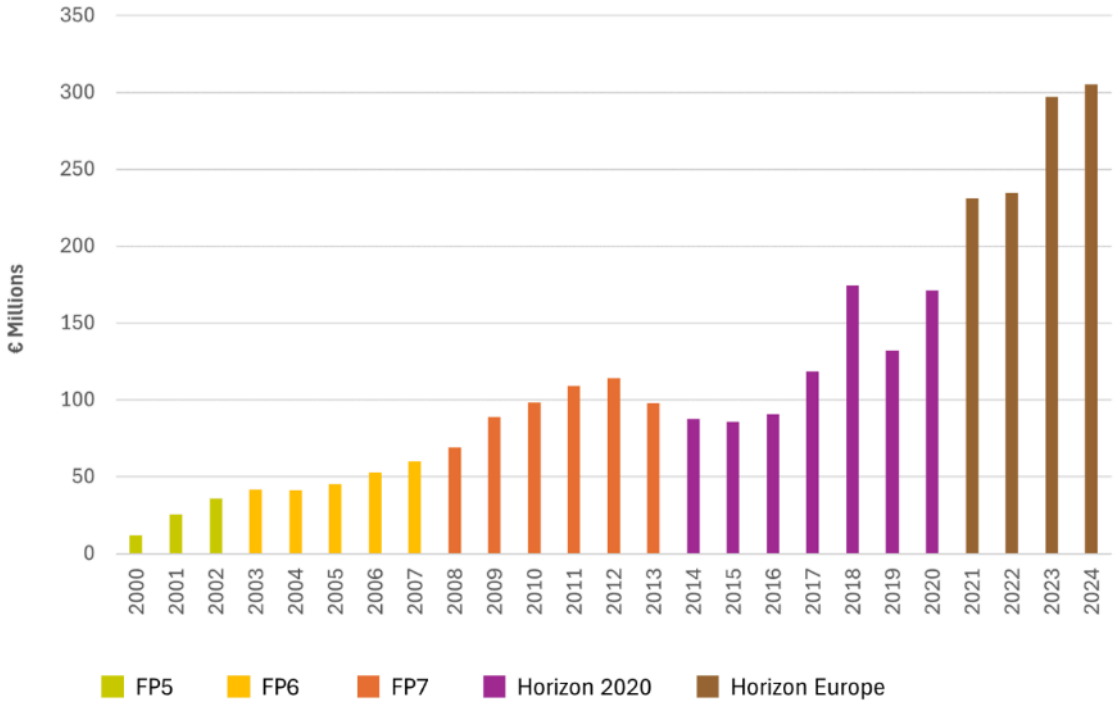
Taken together, the first four years of Horizon Europe have seen an increase in the EU allocation to support environment and health projects on an annual basis (Fig.1a) as compared to previous Framework Programmes. The increase is especially related to the launch of the large-scale PARC initiative. Overall, the funding levels have seen a sustained increase since the beginning of FP5, resulting from numerous policy initiatives such as the European Environment and Health Strategy adopted in 2003 or the European Green Deal adopted in 2020.

Fig.1a: EU allocation to EU environment and health projects in various Framework Programmes[1]

Framework	Nb projects	EU contribution (€M)	Funding per annum (€M)
Fifth Framework of Research (FP5, 1998-2002)	90	160	40
Sixth Framework of Research (FP6, 2003-2006)	66	283	71
Seventh Framework of Research (FP7, 2007-2012)	147	550	79
Horizon 2020 (2013-2020)	351	1381	197
Horizon Europe (2021-2024)	203	1042	261

[1] From 2014-2024

Fig.1b: EU allocation to EU environment and health research projects



Funding from various Horizon Europe programmes

Environment and health research has a very wide scope and is of multidisciplinary nature, which therefore spans across several thematic areas, programmes and Directorates in DG Research and Innovation, the entity in the European Commission in charge of the research and innovation framework programmes. As seen from Table 11, a large majority of funding for the first four years has come from the Health cluster (72%), followed by Cluster 6 and other programmes. The health cluster being in the lead is logical as this Theme had a dedicated environment and health research area (referred to as Destination 2. Living and working in a health-promoting environment').

Clusters 5 and 6 are a significant funding source for projects with focus on environmental aspects (with relevance to health), be it research and innovation or innovation actions on remediating pollution problems or providing support for healthier urban environments. The Cluster 4 has supported research on nanosafety. The Excellent Science pillar of Horizon Europe covers European Research Council (ERC) actions, and Marie Skłodowska-Curie (MSCA) actions, which support both research teams and individual fellows. Some of the latter representmulti-partner efforts (e.g., MSCA Doctoral Networks).

Table 11. Origin of environment and health research funding

	Nb projects	EU contribution (€ M)
CLUSTERS OF HORIZON EUROPE		
Cluster 1: Health	72	687
Cluster 2: Culture, Creativity and Inclusive Society	2	6,42
Cluster 3 - Civil Security for Society	1	4,0
Cluster 4: Digital, Industry and Space	11	52,2
Cluster 5: Climate, Energy and Mobility	9	47,6
Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment	20	87,9
WIDENING PARTICIPATION AND SPREADING EXCELLENCE		
ERA Fellowships	6	1,08
ERA Talents	1	3,09
Twinning	4	5,31
REFORMING AND ENHANCING THE EUROPEAN R&I SYSTEM		
Coordination and support action	1	2,41
ENHANCED EUROPEAN INNOVATION COUNCIL (EIC)		
EIC Pathfinder Open	1	1,99
EIC Transition	1	2,50
SCIENTIFIC EXCELLENCE		
European Research Council (ERC) actions	18	33,2
Marie Skłodowska-Curie actions (MSCA)	49	24,3
RESEARCH INFRASTRUCTURES		
Research and Innovation Actions	4	48,1

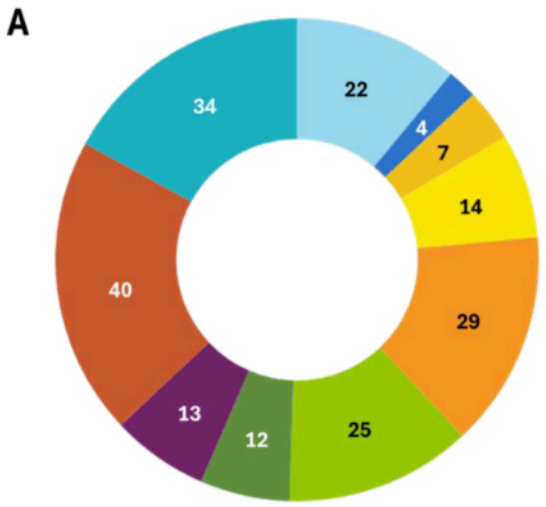
Coordination and Support Action	1	2,0
EURATOM		
Euratom Innovation Action	1	3,49
Euratom Co-fund Action	1	29,4
TOTAL	203	1042

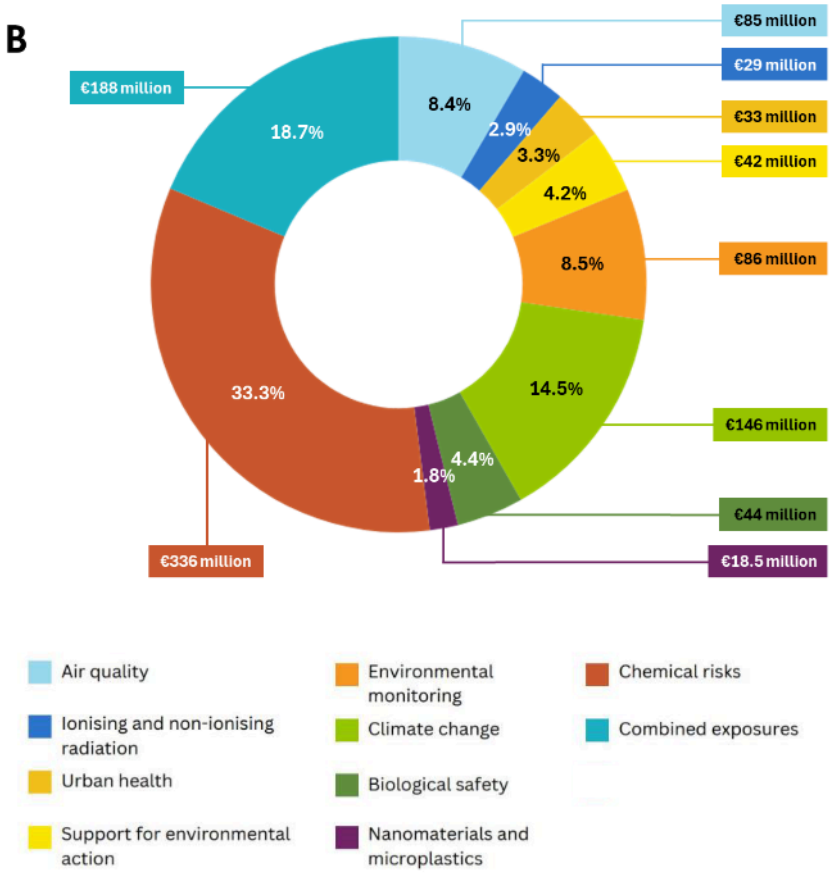
Thematic coverage

As regards thematic coverage of the projects, the projects can roughly be divided into 10 main groups, although there are numerous overlaps between some of the categories. For example, many of the projects on air quality also address climate change-related issues; the urban health projects can also include climate change, chemical and air quality aspects; and chemical pollution is a small or large part in many of the groups.

Fig.2 shows that the largest allocation of funds during the first four years of Horizon Europe were to projects dealing with issues related to understanding exposure to as well as biological and health impacts of chemicals (33.3% of funding; €336 million), followed by those investigating environmental determinants (including the exposome) of human health and well-being (18.7% of EU funding; €188 million) and climate change research (14.5%; €146 million).

Fig.2. Number of projects funded (A) and EU contribution (B) in different areas of environment and health research.





As shown in Fig. 3, the main differences during the first four years of Horizon Europe, as compared to Horizon 2020, are the increasing funding allocated to four research areas (on an annual basis): Research on the impact of chemicals on health (related to the funding of PARC); climate change research, air quality research; and research on non-ionizing and ionizing radiation and health. All three areas have had research clusters established. In contrast, research on nanosafety and urban health issues saw getting a smaller share of the cake.

Fig. 3. Funding of environment and health research per thematic sub-areas

Main area of E&H (% of total in HE vs H2020)	Horizon Europe 2021-2024		Horizon 2020	
	Nb projects	EU funding (€ M)	Nb projects	EU funding (€ M)
Chemical safety (32% vs 25%)	40	336	66	327
Risk factors for health (18% vs 19%)	34	188	71	259
Air quality (8% vs 6%)	22	85	31	75
Climate change (14% vs 4%)	25	146	13	53
Radiation (6% vs 2%)	7	63	4	31
Pollution monitoring (8% vs 10%)	29	86	54	132
Biosafety (4% vs 6%)	12	44	12	74
Support for E&H action (4% vs 3%)	14	42	18	40
Nanomaterials & microplastics (2% vs 12%)	13	19	41	162
Urban health (3% vs 13%)	7	33	32	180

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The first four years of Horizon Europe, the ongoing EU Framework of Research and Innovation running from 2021-2027, have seen a substantial increase in the EU allocation to support environment and health projects on an annual basis. At the time of publication, 203 projects have been funded, with an overall EU contribution of around € 1 042 million. The increase is especially related to the launch of the largescale PARC initiative (The European Partnership for the Assessment of Risks from Chemicals). The sustained support for this area is the result of numerous policy initiatives emanating from the European Green Deal. The impact has been increased by the establishment of a number of clusters working together on a common theme such as the European Cluster on Indoor Air Quality and Health [IDEAL], the European Cluster on Climate Change and Health, the European Research Cluster on EMF and Health [CLUE-H], and the Methods for Assessing Health-Related Costs of Environmental Stressors Cluster [METEOR]..

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