HORIZON RESULTS BOOSTER

An initiative of the European Commission

Report of R&I Project Cluster Analysis

Marie Skłodowska-Curie Actions – European Green Deal Cluster; Policy Feedback

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1 Executive summary

This report presents the results of an analysis of a portfolio of projects funded by the Marie Skłodowska-Curie Actions (MSCA), focusing on six thematic areas of the European Green Deal: biodiversity, sustainable transport, eliminating pollution, clean energy, sustainable agriculture and climate action.

The project portfolio is comprised of 46 projects with a total budget of €72,9 million. The selection of projects is based on the projects presented in the thematic panels of the MSCA European Green Deal Cluster event on 6-7 July 2021. The selection of projects was further refined on the basis of information available in the CORDIS database, to ensure as comprehensive and consistent analysis as possible. The final portfolio therefore consists of a mix of projects presented in the thematic panels of the cluster event and projects presented in the virtual exhibition.

The relevance of the project portfolio was assessed against the policy priorities identified for each of the six thematic areas, based on key action plans and strategy documents. A methodological framework for analysing the projects in the portfolio was created to allow for the identification of the key objectives, outputs, tools and contributions, based on the information available in the CORDIS database.[1]

Most of the projects in the portfolio were found to be directly relevant for the priorities and aims of the strategic documents within their respective themes. As each thematic area contains fewer projects than there are priorities, it was not possible to assess the extent to which the priorities are not covered.

Within the policy portfolio, four different ways of contributing towards the policy priorities were identified. These are categorised as follows:

- **Addressing key challenges or uncertainties**: The primary contribution of these projects is to fill knowledge gaps, deepen existing knowledge or in some cases correct previously incorrect or partial understanding. The projects also have a role in mainstreaming knowledge and are of particular importance to future science, as they provide key building blocks for future research.
- **Contributing knowledge to enhance innovation capacity**: These projects provide new concepts or theoretical findings that can support the development of technology or infrastructure, or they pilot such new technologies/infrastructure.
- **Contribution towards policy/strategy/best practices**: These projects specifically aim to inform policy making, adaptation/management strategies, or to provide best practices for relevant activities.
- **Training professionals**: While the training of researchers is an overall objective of MSCA, the projects in this category provide the 'next level' of training professionals. These projects either bring together multiple early-stage researchers for a programme or a network, supporting the development of research related and transferable skills (allowing the researchers to become specialists in that niche). A second approach specifically uses the findings of a research project to train professionals within the relevant area.

[1] https://cordis.europa.eu/en

While there is some difference in frequency, all four categories were identified in all thematic groups, as displayed in the table below. It should be noted that one project can make several types of contributions.

Table 1: Types of contribution per theme

	Biodiversity (7 projects)	Sustainable transport (9 projects)	Eliminating pollution (9 projects)	Clean energy (8 projects)	Sustainable agriculture (5 projects)	Climate action (8 projects)
Addressing key challenges or uncertainties						
Contributing knowledge to enhance innovation capacity						
Contribution towards best practices/strategies/policy						
Training of professionals						

Several conclusions and policy recommendations are presented. In order to assist the MSCA projects in supporting the Green Deal, different types of projects can benefit from different types of support:

- Projects addressing key challenges or uncertainties will benefit from funding that **supports future research** – specifically to develop and build on the findings and, where appropriate, develop applied research.
- Projects contributing knowledge to enhance innovation capacity benefit from funding that supports **further conceptual development**. This can include future theoretical research, but ultimately also applied development. Many of these projects in the portfolio are still at the theoretical or conceptual level, and not yet at the stage where they can be picked up by private companies for product development. Therefore, a mix of public and private funding is required to continue the work. The exact type of funding would need to be determined for the specific research needs, aims and technology readiness level of each project.
- Projects contributing towards policy, strategies or best practices would benefit from tailored support that helps **further development of applicability** of the research findings. **New connections with the relevant authorities** would also help scale up the project contributions.
- Projects contributing trained experts would benefit from support that **enhances their training capacity** – for example, via access to forums and networking opportunities. On the other hand, the experts themselves benefit from support that allows them to **continue their professional development** and utilise their skills (employment support).

Establishing synergies between projects and relevant stakeholders - particularly EU and national policymakers, private funding providers and private companies - can further support the projects and their ability to contribute to the European Green Deal. Creating clusters and platforms can also connect the MSCA projects with other EU-funded projects, to further exchange and disseminate knowledge and establish regular communication channels with policy makers.

Even with a relatively small project portfolio, a relatively broad contribution to the European Green Deal has been identified. As the different policy areas and priorities of the Green Deal are interconnected, project contributions often transcend the borders of the thematic areas. This is relevant when disseminating results

and enhancing visibility of the MSCA projects, as the interested audience will go beyond a single thematic area.

The types of outputs, and the manner in which the projects implement their contributions towards policy priorities, are also varied and include both concrete outputs (e.g., new methods and tools as well as innovative concepts) and more theoretical outputs (e.g., new or improved knowledge and understanding of key aspects of the Green Deal and the environment). While there are minor differences in the frequency of the types of contributions between the thematic groups, the contributions and needs of the groups are not significantly different. However, within each group the needs of different projects can be very different, depending on the scale, aims and approach of the project. This needs to be taken into consideration when planning for measures to support the projects or to ensure policy benefits from the results.

2 Introduction

This report presents the preliminary results of an analysis of a portfolio of 46 projects funded by the Marie Skłodowska-Curie actions (MSCA), focusing on six thematic areas of the European Green Deal: biodiversity, sustainable transport, eliminating pollution, clean energy, sustainable agriculture and climate action. It examines the relevance and contribution of the portfolio to the policy priorities of the focus areas and identifies ways to provide support.

The report is organised as follows. Section 3 presents a brief overview of the key strategic documents and policy priorities of each thematic area. Section 4 describes the portfolio, focusing on each thematic area and also providing a summary overview. Section 5 provides conclusions on the MSCA contribution to the Green Deal based on the analysis of the portfolio and makes recommendations on how to further support the MSCA projects and to make best use of the results.

3 Policy Initiatives and challenges

This section will present an overview of the policy priorities under each thematic area.

3.1 The European Green Deal

The European Union's (EU) Green Deal is the EU's main growth strategy to transition the EU economy to a sustainable economic model. Presented in December 2019, the overarching objective of the EU Green Deal is for **the EU to become the first climate neutral continent by 2050**, resulting in a cleaner environment, more affordable energy, smarter transport, new jobs and an overall better quality of life. Complementary environmental objectives involve decoupling economic growth from resource use (by boosting the efficient use of resources by moving to a clean, circular economy), restoring biodiversity and cutting pollution. Furthermore, there is recognition in the EU Green Deal that transition can only succeed if it is conducted in a fair and inclusive way – it aims to ensure that no person and no place is left behind.

To achieve this, the EU Green Deal provides a roadmap to involve all sectors in the economy, including investing in environmentally friendly technologies, supporting industry to innovate rolling out cleaner, cheaper and healthier forms of private and public transport, decarbonising the energy sector, ensuring buildings are more energy efficient, working with international partners to improve global environmental standards. The EU Green Deal initiated a variety of Strategies and Action Plans which lay down new approaches and priorities to guide future policy development in these policy areas.

Table 2: Strategies and action plans of the EU Green Deal

Green Deal policy areas	Strategic documents per thematic area	Thematic area of the project portfolio
Biodiversity: Measures to protect our fragile ecosystem	• EU biodiversity strategy for 2030[2] (May 2020)	**Biodiversity**
Sustainable mobility: Promoting more sustainable means of transport	• EU Sustainable and Smart Mobility Strategy[3] (December 2020)	**Sustainable transport**
Eliminating pollution: Measures to cut pollution rapidly and efficiently	• Chemical strategy for sustainability[4] (March 2021) • EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil" [5] (May 2021)	**Eliminating pollution**
Clean energy: Decarbonising the EU's energy	• A hydrogen strategy for a climate-neutral Europe[6] (July 2020)	**Clean energy**

[2] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/eu-biodiversity-strategy-2030_en#the-business-case-for-biodiversity
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789
[4] https://ec.europa.eu/environment/strategy/chemicals-strategy_en
[5] https://ec.europa.eu/environment/pdf/zero-pollution-action-plan/communication_en.pdf
[6] https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

system is critical to reach climate objectives.	• Strategy for Energy System Integration[7] (July 2020) • Offshore Renewable Energy Strategy[8] (November 2020)	
Sustainable agriculture: Sustainability in EU agriculture and rural areas thanks to the common agricultural policy (CAP)	• Common Agricultural Policy[9] (reform expected in January 2023) • Farm to Fork Strategy[10] (May 2020)	**Sustainable agriculture**
From Farm to Fork: Ways to ensure more sustainable food systems		
Climate action: Making the EU climate neutral by 2050	• 2030 Climate Target Plan[11] (September 2020) • EU Strategy on Climate Adaptation[12] (February 2021)	**Climate action**
Building and renovating: The need for a cleaner construction sector	*Not relevant for the portfolio of MSCA projects*	
Sustainable industry: Ways to ensure more sustainable, more environmentally-respectful production cycles	*Not relevant for the portfolio of MSCA projects*	

The following sections in this chapter provide a description of the priorities established in these strategic documents. The remainder of this report explores how the portfolio of MSCA project contributes to these priorities.

3.2 Biodiversity

The **EU biodiversity strategy for 2030**[13] was published in May 2020. The strategy emphasises the importance of biodiversity for the European economy and for recovery from the COVID-19 crisis, as well as for job creation across different sectors. Its ambition is to deliver ecological recovery and contribute to achieving the 2030 climate change mitigation target.

[7] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2020:299:FIN
[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A741%3AFIN&qid=1605792629666
[9] https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en#proposal
[10] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590404602495&uri=CELEX%3A52020DC0381
[11] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Stepping up Europe's 2030 climate ambition. Investing in a climate-neutral future for the benefit of our people. COM(2020) 562 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0562&from=EN
[12] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change. COM(2021) 82 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN
[13] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/eu-biodiversity-strategy-2030_en#the-business-case-for-biodiversity

The strategy sets the aims of establishing protected areas for at least 30% of both land and of sea in Europe, restoring degraded ecosystems at land and sea, unlocking €20 billion annually for biodiversity through EU and national funds, and placing the EU in a leading position to address the biodiversity crisis globally.

The communication details the EU's key commitments for nature protection and restoration, including specific targets and commitments for:

- A coherent network of protected areas.
- Strengthening the EU legal framework for nature restoration.
- Bringing nature back to agricultural land.
- Addressing land take and restoring soil ecosystems.
- Increasing the quantity of forests and improving their health and resilience.
- Win-win solutions for energy generation.
- Restoring the good environmental status of marine ecosystems.
- Restoring freshwater ecosystems.
- Greening urban and peri-urban areas.
- Reducing pollution.
- Addressing invasive alien species.

It also sets the strategy for enabling transformative change, including through:

- A new governance framework.
- Stepping up implementation and enforcement of EU environmental legislation.
- Business for Biodiversity.
- Investments, pricing and taxation.
- Measuring and integrating the value of nature.
- Improving knowledge, education and skills.

Finally, the communication details the strategy for promoting the EU's biodiversity ambition through external action, including:

- International Ocean Governance.
- Trade policy.
- International cooperation, neighbourhood policy and resource mobilisation.

The strategy highlights the business case for diversity, as well as the need for all parts of economy and society, including citizens, businesses, social partners and the research and knowledge community to be part of the new approach.

3.3 Sustainable transport

The **EU Sustainable and Smart Mobility Strategy**[14] was published in December 2020. The strategy emphasises that mobility currently incurs costs alongside benefits for its users. These include air, noise and water pollution, but also accidents and road crashes, congestion, and biodiversity loss – all of which affect the health and wellbeing of society. The strategy states that digitalisation will become an indispensable driver for the modernisation of the entire mobility system, making it seamless and more efficient. It furthermore highlights that the preservation of supply chains and a coordinated European approach to connectivity and transport activity are essential to overcome any crisis and strengthen the EU's strategic autonomy and resilience.

The strategy includes several aims for 2030, including: that at least 30 million zero emission vehicles will be in operation on European roads; 100 European cities will be climate neutral; high-speed rail traffic will double; scheduled collective travel of under 500 km should be carbon neutral within the EU; automated mobility will be deployed at large scale. Related targets for 2050 include: nearly all cars, vans, buses as well as new heavy-duty vehicles will be zero-emission; rail freight traffic will double; high-speed rail traffic will triple; a more comprehensive multimodal network.[15]

To achieve this systemic change, the strategy identifies the need to: i) make all transport modes more sustainable, ii) make sustainable alternatives widely available in a multimodal transport system, and iii) put in place the right incentives to drive the transition. In line with these three pillars, the communication details the EU's key commitments through priorities for an irreversible shift to zero-emission mobility:

- To make all modes of transport more sustainable.
- To make sustainable alternatives widely available to enable better modal choices.
- To put in place the right incentives to drive the transition to zero-emission mobility.
- Smart mobility – achieving seamless, safe and efficient connectivity.
- A more resilient single European transport area - for inclusive connectivity.

The communication also details actions to establish the EU as the world's connectivity hub - by ensuring a level playing field for all transport modes with an international dimension, translating good practices in sustainable and smart mobility into the EU development cooperation, and by deepening and further develop transport relations with key strategic partners and international organisations.

A recurring theme throughout the strategy is that the sustainable European transport system that the EU strives for must be smart, flexible and adaptable. It must also be based on cutting-edge technological advancements to provide seamless, safe and secure connectivity to all European citizens.

[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789
[15] More specifically, that the Trans-European Transport Network (TEN-T) equipped for sustainable and smart transport with high-speed connectivity will be operational for the comprehensive network.

3.4 Eliminating pollution

The zero-pollution vision for 2050 is for air, water and soil pollution to be reduced to levels no longer considered harmful to health and natural ecosystems, that respect the boundaries with which our planet can cope, thereby creating a toxic-free environment. This is translated into key 2030 targets to speed up reducing pollution at source.[16] The European Green Deal announced several headline actions to cut different types of pollution rapidly and efficiently.[17]

The Chemical strategy for sustainability[18] aims to better protect citizens and the environment against hazardous chemicals and boost innovation for safe and sustainable chemicals. It sets priorities for:

- Innovating for safe and sustainable EU chemicals.
- Stronger EU legal framework to address pressing environmental and health concerns.
- Simplifying and consolidating the legal framework.
- A comprehensive knowledge base on chemicals.
- Setting the example for a global sound management of chemicals.

On 12 May 2021, the European Commission adopted the **EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil".**[19] This action plan also sets out key action for 2021-2024, involving priorities for:

- Improving our health and wellbeing.
- Living within our planetary boundaries.
- Towards zero pollution from production and consumption.
- Ensuring stricter implementation and enforcement.
- Boosting change across society for zero pollution.
- Promoting worldwide change for zero pollution.

The action plan also aims to launch a Zero Pollution Monitoring and Outlook Framework to help track progress, anticipate trends, and mainstream zero pollution.[20] The integrated monitoring of pollution should support better governance on zero pollution by offering new insights into overall pollution levels and impacts and by monitoring whether policy implementation is on track to achieve agreed objectives at EU and national level.

[16] These targets include: improving air quality to reduce the number of premature deaths caused by air pollution by 55%; improving water quality by reducing waste, plastic litter at sea (by 50%) and microplastics released into the environment (by 30%); improving soil quality by reducing nutrient losses and chemical pesticides' use by 50%; reducing by 25% the EU ecosystems where air pollution threatens biodiversity; reducing the share of people chronically disturbed by transport noise by 30%, and significantly reducing waste generation and by 50% residual municipal waste.
[17] There are several policy areas to which address different forms of pollution: Air, Chemical, Circular Economy, Industrial Emissions, Marine and Coastal Environment, Nature and Biodiversity, Noise, Plastics, Soil and Land, Water.
[18] Published by the European Commission on 14 October 2020. Available at: https://ec.europa.eu/environment/strategy/chemicals-strategy_en
[19] https://ec.europa.eu/environment/pdf/zero-pollution-action-plan/communication_en.pdf
[20] The first Zero Pollution Monitoring and Outlook Report is planned for 2022.

A separate initiative will **revise measures to address pollution from large industrial installations** to ensure that they are consistent with climate, energy and circular economy policies.[21] The upcoming initiative has not yet been adopted as the public consultation feedback period has only recently closed (on 23 March 2021).

3.5 Clean energy

Further decarbonation of the energy system is critical to reach climate objectives in 2030 and 2050. The production and use of energy across economic sectors account for more than 75% of the EU's greenhouse gas emissions and the European Green Deal Communication fully recognises the potential for decarbonisation to also contribute to a modern, resource efficient and competitive economy.

To deliver the Green Deal, action in the clean energy policy area aims to: i) interconnect energy systems and better link/integrate renewable energy sources to the grid ; ii) promote innovative technologies and modern infrastructure ; iii) boost energy efficiency and eco-design of products ; iv) decarbonise the gas sector and promote smart integration across sectors; v) empower consumers and help Member States tackle energy poverty ; vi) increase cross-border and regional cooperation to better share clean energy sources vii) promote EU energy standards and technologies at global level, and viii) develop the full potential of Europe's offshore wind energy. Accordingly, the Commission has published strategies which propose concrete policy and legislative measures at EU level to progressively shape a new energy system.

The Hydrogen Strategy for a climate-neutral Europe[22] presents measures to create the conditions for hydrogen to contribute to decarbonising the economy in a cost-effective way, addressing the whole hydrogen value chain to support economic growth and recovery. It includes priorities for:

- An investment agenda for the EU.
- Boosting demand and scaling up production.
- Designing a framework for hydrogen infrastructure and market rules.
- Promoting research and innovation in hydrogen technologies.
- The international dimension.

The Strategy for Energy System Integration[23] sets out a vision on how to enhance the coordinated planning and operation of the EU energy system 'as a whole', across multiple energy carriers, infrastructures, and consumption sectors. It includes priorities for:

- A more circular energy system, with 'energy-efficiency-first' at its core.

[21] Expected initiative, found at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12306-Industrial-emissions-EU-rules-updated_en

[22] Published by the European Commission on 8.7.2020. Available at: https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

[23] Published by the European Commission on 8.7.2020. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2020:299:FIN

- Accelerating the electrification of energy demand, building on a largely renewables-based power system.
- Promoting renewable and low-carbon fuels, including hydrogen, for hard-to-decarbonise sectors.
- Making energy markets fit for decarbonisation and distributed resources.
- A more integrated energy infrastructure.
- A digitalised energy system and a supportive innovation framework.

The Offshore Renewable Energy Strategy[24] proposes actions to make offshore renewable energy a core component of Europe's energy system by 2050. It includes priorities for:

- Maritime spatial planning for sustainable management of space and resources.
- A new approach to offshore renewable energy and grid infrastructure.
- A clearer EU regulatory framework for offshore renewable energy.
- Mobilising private-sector investment in offshore renewables: the role of EU funds.
- Focusing research and innovation on supporting offshore projects.
- A stronger supply and value chain across Europe.

This contributes to the work of the Commission in its comprehensive plan to increase the EU 2030 climate target to at least 50% and towards 55%, including the follow-up proposals that were prepared as part of the legislative reviews of July 2021.[25]

3.6 Sustainable agriculture

The primary tool for sustainable agriculture under the European Green Deal is the **Common Agricultural Policy (CAP)**. The plan for sustainable agriculture in the EU recognises the role the sector plays in ensuring environmental, economic, and social sustainability.

For this purpose, the European Commission has proposed nine key objectives to the future CAP as follows:

- To ensure a fair income to farmers.
- To increase competitiveness.
- To rebalance the power in the food chain.
- Climate change action.
- Environmental care.
- To preserve landscapes and biodiversity.
- To support generational renewal.
- Vibrant rural areas.
- To protect food and health quality.[26]

[24]Published by the European Commission on 19.11.2020. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A741%3AFIN&qid=1605792629666

[25] The revisions and initiatives linked to the European Green Deal climate actions and in particular the climate target plan's 55 % net reduction target are presented under the Fit for 55 packages. They include: Revision of the Energy Tax Directive, Amendment to the Renewable Energy Directive, Amendment of the Energy Efficiency Directive, etc.

[26] European Commission, Key policy objectives of the future CAP. Available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap/key-policy-objectives-future-cap_en

Of particular relevance to the portfolio analysed in this study are *Climate change action* and *Biodiversity and farmed landscapes.* The climate change action priority aims to contribute to climate change mitigation and adaptation, as well as sustainable energy. The *Biodiversity and farmed landscapes* priority aims to contribute to the protection of biodiversity, enhance ecosystem services and preserve habitats and landscapes.

Agriculture also plays an important role in other Green Deal policy areas, such as the biodiversity strategy (see above), climate action, the zero-pollution action plan, and the **Farm to Fork Strategy.**[27] F2F focuses on the challenges of sustainable food systems and their connection to a healthy planet and healthy societies. It details the strategy for "building the food chain that works for consumers, producers, climate and the environment" through:

- Ensuring sustainable food production.
- Ensuring food security.
- Stimulating sustainable food processing, wholesale, retail, hospitality and food services practices.
- Promoting sustainable food consumption and facilitating the shift to healthy, sustainable diets.
- Reducing food loss and waste.
- Combating food fraud along the food supply chain.

For "enabling the transition", The Farm to Fork Strategy communication identifies the following:

- Research, innovation, technology and investments.
- Advisory services, data and knowledge-sharing, and skills.

Finally, "promoting the global transition" aims to integrate sustainable agri-food systems in EU's external policy and cooperation.

The Farm to Fork strategy priorities are to a large extent interlinked. They are complementary to the priorities of the new CAP, as well as those of the Biodiversity Strategy 2030. It can therefore be anticipated that the results of the relevant projects in the portfolio will also be valuable to the priorities in multiple strategies.

3.7 Climate Action

The aim to become the world's first climate-neutral continent by 2050 is one of the key commitments of the European Green Deal. The **2030 Climate Target Plan**[28] aims to:

- Set a more ambitious and cost-effective path to achieving climate neutrality by 2050.
- Stimulate the creation of green jobs and continue the EU's track record of cutting greenhouse gas emissions whilst growing its economy.

[27] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590404602495&uri=CELEX%3A52020DC0381
[28] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Stepping up Europe's 2030 climate ambition. Investing in a climate-neutral future for the benefit of our people. COM(2020) 562 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0562&from=EN

- Encourage international partners to increase their ambition to limit the rise in global temperature to 1.5°C and avoid the most severe consequences of climate change.

The **EU Strategy on Climate Adaptation**[29] sets out the means to adapt to the impacts of climate change, and to become climate resilient by 2050. For "forging a climate-resilient Union", the strategy sets the following policy options:

- Smarter adaptation: improving knowledge and managing uncertainty. This includes the following subsections:
  - Pushing the frontiers of knowledge on adaptation.
  - More and better climate-related risk and losses data.
  - Making Climate-ADAPT the authoritative European platform for adaptation.
- More systemic adaptation: Support policy development at all levels and sectors. This includes the following subsections:
  - Improving adaptation strategies and plans.
  - Fostering local, individual, and just resilience.
  - Integrating climate resilience in national fiscal frameworks.
  - Promoting nature-based solutions for adaptation.
- Faster adaptation: Speeding up adaptation across the board. This includes the following subsections:
  - Accelerating the rollout of adaptation solutions.
  - Reducing climate-related risk.
  - Closing the climate protection gap.
  - Ensuring the availability and sustainability of freshwater.

For 'stepping up international action for climate resilience', it includes the following:

- Increasing support for international climate resilience and preparedness.
- Scaling up international finance to build climate resilience.
- Strengthen global engagement and exchanges on adaptation.

[29] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change. COM(2021) 82 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0082&from=EN

4 Analysis of the portfolio of projects

4.1 Description of the portfolio

The portfolio consists of 46 projects, each belonging to one of the six thematic areas described in Chapter 3. The selection of projects in the portfolio is based on the projects presented in the thematic panels of the MSCA European Green Deal Cluster event on 6-7 July 2021. The selection of projects was further refined on the basis of information available from the CORDIS database, to ensure as comprehensive and consistent an analysis as possible. The final portfolio therefore consists of a mix of projects presented in the thematic panels of the cluster event and projects presented in the virtual exhibition.

Figure 2: Projects per thematic group

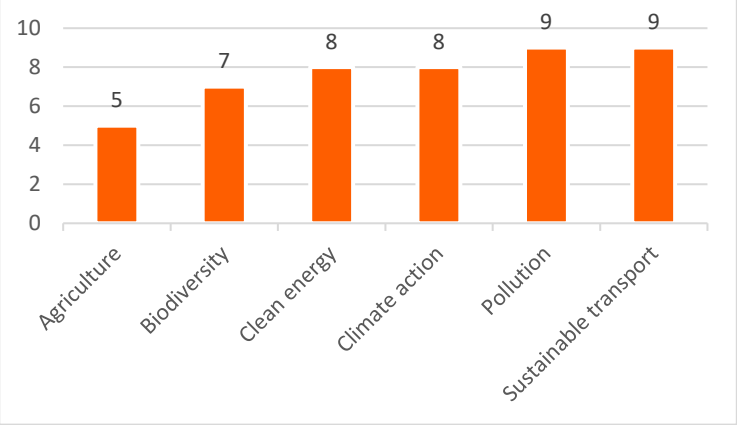
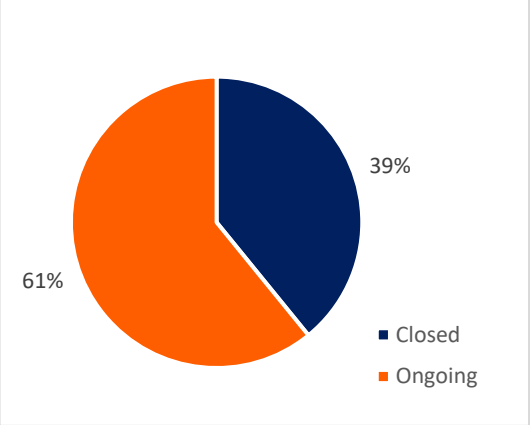


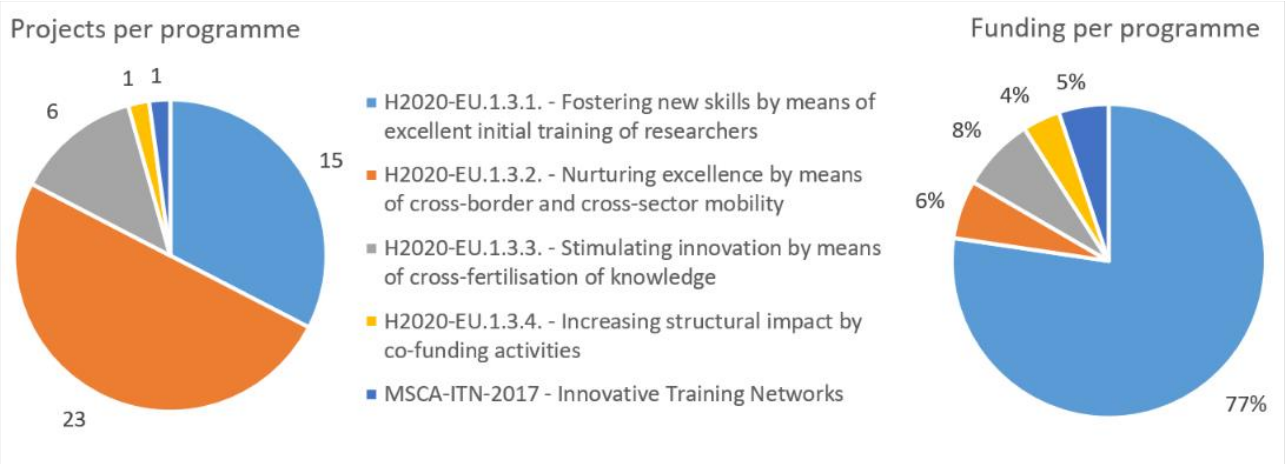
Figure 1: Project status



The projects commenced between January 2017 and March 2020, and their end dates / estimated end dates range from April 2020 to March 2024. When the portfolio was created in April 2021, 39% of the projects were finished and 61% ongoing. The total value of the portfolio is €72.857.188,72.

The projects are funded under five different programmes. *H2020-EU 1.3.1. – Fostering new skills by means of excellent initial training of researchers* funds 15 projects and provides 77% of the total funding. *H2020-EU.1.3.2. - Nurturing excellence by means of cross-border and cross-sector mobility* funds 23 projects and provides 6% of the funding. *H2020-EU.1.3.3. - Stimulating innovation by means of cross-fertilisation of knowledge* funds 6 projects with 8% of the funding, and *H2020-EU.1.3.4. - Increasing structural impact by co-funding activities* and *MSCA-ITN-2017 - Innovative Training Networks* fund one project each, with 4% and 5% of the total funding, respectively.

Figure 3: The programmes in numbers



4.2 Methodology applied

The relevance of each project to the identified policy challenges is based on its planned or implemented activities, outputs, and results. Based on the project description as available in the CORDIS database and, where applicable, the project website, every project is associated with a specific policy thematic area and sub-area. For each thematic area, we have identified policy priorities based on the relevant strategies and action plans (see Chapter 3).

Within thematic areas, projects may be associated with more than one policy priority. For example, under the theme of biodiversity, a project addressing the maritime environment can be relevant to *restoring the good environmental status of marine ecosystems*, as well as to *zero pollution* and *invasive alien species*. Where a project does not directly address a specific policy priority, it is assigned a broader theme under the relevant strategy or action plan (such as one of the more general aims of the strategy, e.g., *Protecting and restoring nature in the EU*).

To identify and assess how each project contributes to the thematic area and its priorities, we have identified the general objective of the project based on the description in the CORDIS database, and the concrete project objective(s). This allows us to identify the different approaches and focus areas from the researchers' perspectives and identify their correspondences with and contributions to the Green Deal objectives. It also allows us to identify any common features between projects in the thematic sub-areas, as well as potential future financing needs. We also identify common types of tools and methodologies used across the projects to support this assessment, such as:

- Citizen science.
- Database development.
- Knowledge sharing and creation activities.
- Modelling techniques.

- Novel tools / emerging approaches.[30]
- Sampling and monitoring.
- Simulation and experimental testing.
- Software development.
- Statistical analysis.

The project deliverables, as listed on CORDIS, are investigated and classified in several categories. The information for the deliverables per project comes from CORDIS data and the project websites, complemented by information from third-party websites and other sources where necessary. The categories are:

- Websites.
- Patent filings.
- Videos.
- Documents and reports.
- Monographic books / book chapters.
- Peer reviewed articles.
- Datasets via OpenAIRE.
- Conference proceedings.
- Open research data pilot.
- Software via OpenAIRE.
- Other (deliverables uncategorised on CORDIS such as conference posters and training events).

Additionally, we explore the (expected) final outputs of the projects as stated in the project descriptions.[31]

The analysis of deliverables and methodologies feeds into the identification of both the contribution of the projects to the Green Deal and, where appropriate and feasible, of the needs of the projects for future developments.

Limitations and assumptions

The information reported in the CORDIS database is not fully harmonised across projects, and the amount and granularity of information available is thus variable. The projects included in the portfolio are also at different stages; some are already completed with full information available, and others are still ongoing. The information and analysis provided in this report should therefore not be used to compare the different projects to each other, or to make judgements on individual projects.

For some of the projects in the portfolio, some information (particularly on deliverables) had to be acquired outside of CORDIS (either from project websites, third party websites, or in some instances directly from

[30] As identified in CORDIS (e.g., in the project descriptions or documents). Examples of the use of *Novel tools / emerging approaches* include: use of 'innovative CIV technologies and applications (COSAFE)'; 'use of a novel velocity predictor with varying-prediction-horizon calibrator' (HOEMEV); 'use of a hierarchy of innovative modelling tools to quantify emissions' (MEMO2).
[31] These are categorised as follows: New tools (models, research methods), New technology (e.g., pilot, prototypes, hardware), Skilled researchers (e.g., trained individuals, also in soft skills), Improved know-how (e.g., guidelines, recommendations, contribute to theory).

project coordinators). We do not differentiate between planned and realised results, as this differentiation is not available for all projects (as stated in Section 4.1 above, the portfolio of MSCA projects involves a mix of closed and ongoing projects).

For all collection and tabling of data, we collected information as it is provided in the CORDIS database. This means that, for example, the types of methodologies are recorded as they are expressed in CORDIS. For example, "novel tools" have been identified as such by the projects themselves.[32]

4.3 Results

4.3.1 Biodiversity

This section summarises the main findings as presented in the tables. Table 3 below presents the framework as applied to the seven projects in the biodiversity thematic area.

Within this group of projects, the following **Biodiversity Strategy 2030** policy priorities are addressed:

- Improving knowledge, education and skills.
- Restoring the good environmental status of marine ecosystems.
- International ocean governance.
- Zero pollution.
- Invasive alien species.
- International cooperation.

Two projects address the broader aim of *protecting and restoring nature in the EU*.

The priority *improving knowledge, education and skills* calls for investment in research, innovation and knowledge exchange. It also includes a Commission aim to propose a Council Recommendation on encouraging cooperation in education for environmental sustainability. Two projects under the thematic area, Inspire4Nature and IGNITE, contribute to this priority by providing training programmes for early career researchers. Inspire4Nature focuses on the science-policy interface of multilateral environmental policy agreements, and thus also contributes to EU's biodiversity ambition through external action. It also has further scientific and research goals from each individual research project within the programme.

The priority *Restoring the good environmental status of marine ecosystems* calls for restoration of marine and coastal ecosystem biodiversity and sustainable harvesting of resources. Two of the projects, TEAM-Coast, and Mesophotic, are relevant to this priority. Mesophotic examines mesophotic coral ecosystems, to set a baseline for future mesophotic research and to discover community structure dynamics over space and time for improved prediction of the Deep Reef Refugia Hypothesis (DRRH). It includes partners from Israel and Australia, and the field research is conducted outside the EU. Its results can thus also be expected to

[32] For more information on how information is uploaded in the CORDIS database, please see "CORDIS content" at: https://cordis.europa.eu/about/content/en.

contribute to *international ocean governance*. TEAM-Coast develops tools for monitoring and management of European coastal environments, through which it contributes to the *zero pollution* and *invasive alien species* priorities.

The AFRI-SKYFOR project studies African tropical montane forests, and therefore contributes to *International cooperation*, *neighbourhood policy and resource mobilisation*.

Two projects in the group, LUCCA and EcoSpy, do not directly target any of the identified policy priorities from the Biodiversity Strategy 2030. However, they fall under the broader subject of *Protecting and restoring nature in the EU* and can as such inform priorities such as *A coherent network of protected areas* and *Strengthening the EU legal framework for nature restoration*.

In terms of tools and methods, two projects within the biodiversity theme develop and/or apply emerging and novel methodologies (environmental DNA and socio-ecological ecosystem modelling). Developing and mainstreaming new tools and approaches for environmental sciences, whether for the analysis of data or for collecting field results, is a valuable MSCA contribution. Three projects utilise modelling, two projects collect data in the field, and individual projects utilise citizen science, statistical analysis, simulation and experimental testing, database development and meta-analysis.

As is common for MSCA projects, the projects in this theme are primarily focused on producing new knowledge and insight. Two projects are also providing training to early-stage researchers. This knowledge orientation is also reflected in the types of participants involved, the majority of which are higher or secondary education establishments, or research organisations. The majority of deliverables are publications, including peer-reviewed articles and books/book chapters. It can be expected that many of the key contributions to the biodiversity strategy take the form of providing new science and knowledge, including a better understanding of how different environmental and physical impacts and change drivers interact and affect species behaviour and survival. The question for this study to address will therefore be how to ensure that this new knowledge is used to inform decision making in support of the implementation of the Biodiversity Strategy.

Table 3: Analysis table – Biodiversity

	Project acronym	Inspire4Nature	AFRI-SKYFOR	TEAM-Coast	Mesophotic	IGNITE	LUCCA	EcoSpy
Project details	Status	Ongoing	Closed	Ongoing	Ongoing	Ongoing	Ongoing	Closed
	Total cost	€ 3.950.859,24	€ 251.857,80	€ 270.918,00	€ 269.634,60	€ 3.799.970,49	€ 212.194,80	€ 171.460,80
	Project coordinator	FR	UK	FR	IL	DE	DK	DE
	Partners	CH, UKx2, EL, PT	US	AU	AU	PT, DEx3, BE, NO, IE, UKx2, FR, HR, ES, BG	N/A	N/A
	Participants[33]	IT, DEx2, UK, DK, EL, PT	N/A	N/A	N/A	AU, FRx2, DE, BE	N/A	N/A
	Types of stakeholder involved	Higher or Secondary Education Establishment; Research Organisations; Other (NGO)	Higher or Secondary Education Establishments	Other; Research Organisations	Higher or Secondary Education Establishments	Higher or Secondary Education Establishments; Research Organisations; Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments); Private for-profit entities (excluding Higher or Secondary Education	Higher or Secondary Education Establishments	Higher or Secondary Education Establishments

[33] In the Inspire4Nature project, Participants are beneficiaries (universities) hosting students in the training programme, whereas partners are environmental organisations involved in the individual research projects.

	Project acronym	Inspire4Nature	AFRI-SKYFOR	TEAM-Coast	Mesophotic	IGNITE	LUCCA	EcoSpy
						Establishments); Other		
Priorities and objectives analysis	**Sub-area**	Biodiversity conservation and ecosystems management	Biodiversity conservation and ecosystems management	Biodiversity conservation and ecosystems management	Biodiversity conservation and ecosystems management	Biodiversity conservation and ecosystems management	Protection of species	Biodiversity conservation and ecosystems management
	Policy priority	Improving knowledge, education and skills	International cooperation	Restoring the good environmental status of marine ecosystems / Zero pollution / Invasive alien species	Restoring the good environmental status of marine ecosystems; International cooperation (IOG)	Improving knowledge, education and skills	Protecting and restoring nature in the EU	Protecting and restoring nature in the EU
	General project objective	Implementation of a training programme for the science-policy interface	Enhancement of EU scientific excellence, contribution to EU commitments within international treaties	Advances for monitoring and management of European coastal environments	To build a baseline for future mesophotic research and conservation decisions	To train a new generation of scientists skilled in all aspects of invertebrate genomics.	Accounting for multiple environmental change drivers and improving our predictive ability of future biodiversity changes	To use recently declassified historical, global, high-resolution spy satellite photographs from the Cold War era to extend the temporal scale of ecological and conservation remote sensing studies.
	Methodologies / tools	Knowledge sharing and creation activities (implementation of a training programme)	Modelling techniques; Novel tools / emerging approaches (socio-ecological ecosystem modelling)	Novel tools / emerging approaches (eDNA); Modelling techniques; Statistical analysis	Sampling and monitoring; Database development (Combination of geology, ecology and molecular approaches)	Knowledge sharing and creation activities; Software development; Simulation and experimental testing	Modelling techniques; Meta-analysis; Sampling and monitoring; Citizen science	Modelling techniques
	Expected final product of project	Skilled researchers; improved know-how	Improved know-how	Improved know-how; New tools	Improved know-how	Skilled researchers; New tools	Improved know-how	Improved know-how; New tools

	Project acronym	Inspire4Nature	AFRI-SKYFOR	TEAM-Coast	Mesophotic	IGNITE	LUCCA	EcoSpy
	Policy contribution	Contribution towards policy/ strategy / best practices; Trained professionals	Contribution towards policy/ strategy / best practices; Trained professionals	Addressing key challenges/uncertainties	Addressing key challenges/uncertainties	Addressing key challenges/uncertainties; Trained professionals	Addressing key challenges/uncertainties	Addressing key challenges/uncertainties
Project deliverables	Websites	2				1		
	Patent fillings							
	Videos							
	Documents, reports	2	1			2		
	Monographic books / book chapters	1			2			
	Peer reviewed articles	1	3	2	9	6	5	X
	Datasets via OpenAIRE	2				1		1
	Conference proceedings							
	Open research data pilot							
	Software via OpenAIRE	2				1		
	Other		Dissemination through teaching & student supervision	4 conference/posters		Logo, flyers; 5 non-peer reviewed articles		Conference presentations, workshop contributions; outreach talks; podcast contributions; media coverage

4.3.2 Sustainable transport

Table 4 and Table 5 below present the framework as applied to the 9 projects in the sustainable transport thematic area. This section summarises the main findings of presented in the tables.

The group of projects relate to the following priorities of the **Sustainable and Smart Mobility Strategy**:

- To make all modes of transport more sustainable:
  - Flagship 1: Boosting the uptake of zero-emission vehicles, renewable & low-carbon fuels and related infrastructure.
  - Flagship 2: Creating zero-emission airports and ports.
- To make sustainable alternatives widely available to enable better modal choices:
  - Flagship 3: Making interurban and urban mobility more sustainable and healthier.
  - Flagship 4: Greening freight transport.
- Smart mobility – achieving seamless, safe and efficient connectivity:
  - Flagship 6: Making connected and automated multimodal mobility a reality.
  - Flagship 7: Innovation, data and Artificial Intelligence for smarter mobility.
- A more resilient Single European Transport Area: for inclusive connectivity:
  - Flagship 8: Reinforcing the single market.
  - Flagship 9: Making mobility fair and just for all.
  - Flagship 10: Enhancing transport safety and security.
- The EU as the world's connectivity hub.

The projects address various Flagships of the Sustainable and Smart Mobility Strategy: Three contribute towards *Making connected and automated multimodal mobility a reality* (Flagship 6); two contribute towards *Making interurban and urban mobility more sustainable and healthy* (Flagship 3); two contribute towards *Enhancing transport safety and security* (Flagship 10); one contributes towards *Boosting the uptake of zero-emission vehicles, renewable & low-carbon fuels and related infrastructure* (Flagship 1) and; one project addresses data technology, therefore contributing towards *Innovation, data and Artificial Intelligence for smarter mobility* (Flagship 7).[34]

Flagship 6 points towards the need to take full advantage of smart digital solutions and intelligent transport systems (ITS) and to seize the opportunities presented by connected, cooperative, and automated mobility (CCAM). Projects relevant to Flagship 6 pave the way for improvements in automated or autonomous systems. SAS aims to make these systems safer in order to increase widespread acceptance, while COSAFE and ECOINTELS aim to develop predictive/communication systems to improve transportation efficiency. Two projects do not target a particular Flagship of the Sustainable and Smart Mobility Strategy – OWHEEL and FSMARTI ETN. Where OWHEEL aims to improve the comfort of automated vehicles, it focuses specifically on cars and there misses the 'multimodal' component of Flagship 6. SMARTI ETN stands out as it fosters a bottom-up approach by supporting graduates which work on different research topics within the general

[34] Flagship 7 emphasises that 'the digital transformation of the transport and mobility sector requires further efforts related to data availability, access and exchange'. The COSAFE aims to develop, among other things, data fusion with clear interface for public access.

scope of 'transport infrastructure' (roads, railways and airport). The various topics must align with the vision of four priority pillars of the project (Sustainable, Resilient, Multi-functional and Automated).

The Sustainable and Smart Mobility Strategy furthermore calls for actions towards establishing *the EU as the world's connectivity hub*. Four projects (COSAFE, OWHEEL, SMARTI ETN and SAS) include partners external to the EU (e.g., from Australia, United States, China, South Africa, Japan) and can be expected to contribute towards this priority by 'deepening transport relations, including with key strategic partners and international organisations, and will further develop links with new international partners, such as high-growth and emerging economies.

In terms of tools and methods, seven of the projects within the Sustainable Transport theme make use of modelling techniques, simulation and/or experimental testing. Three projects (SAS, COSAFE and OWHEEL) involve knowledge sharing activities, specified as partnerships or training networks with industry. Such collaboration is also hinted at when looking at the type of stakeholders involved in each project. The seven larger projects (SAS, COSAFE, OWHEEL, VisIoN, PBNv2, ECO DRIVE and SMARTI ETN), involve *Private for-profit entities*[35] to involve researchers in SMEs (and potentially their own start-ups), bring together experienced specialists from key players in academia and industry to work on common issues, or to involve producers to improve commercialisation perspectives of specific technologies. The remaining two smaller projects (ECOINTELS and HOEMEV[36]) involve only one organisation each (i.e., no participants or partners were listed on CORDIS). As can be expected from MSCA projects, all involve at least one of *higher or secondary education establishments* (8 projects) or of *research organisations* (5 projects). Finally, COSAFE stands out as the only project in the in the Sustainable Transport thematic area involving *Public Bodies* – in this case, a local city council.

The projects share some common types of (expected) final outputs which are separate to the publications and deliverables published on CORDIS. Seven projects (SAS, OWHEEL, ECOINTELS, HOEMEV, VisIoN, ECO DRIVE and SMARTI ETN) aim to improve knowledge within the field (e.g., develop practical recommendations, extend existing economic models, to validate and demonstrate the applicability of the developed approaches, draft guidelines). Five projects (SAS, VisIoN, PBNv2, ECO DRIVE and SMARTI ETN) indicated skilled researchers to be an outcome of the project – these involved specialised skills in their respective fields as well as soft/transferable skills (e.g., entrepreneurship, authoring scientific papers/patents, dissemination, communication). Most of the projects involving the latter emphasise that the main aim of this is to help the involved individuals (or 'fellows') become sought-after job market candidates. Furthermore, five projects involved outreach and dissemination activities for the results of the research. Finally, six of the projects (COSAFE, HOEMEV, PBNv2, ECOINTELS, VisIoN and SMARTI ETN) within the Sustainable Transport theme include new technologies or tools in their (expected) outputs - for example prototypes or extended economic models.

Overall, most of the sampled MSCA projects in the Sustainable Transport theme have the potential to contribute towards the overriding target in the Green Deal for the transport sector to achieve a 90%

[35] Private for-profit entities exclude Higher or Secondary Education Establishments.
[36] However, the summary of the HOEMEV project provided by Research Executive Agency provided on 24/05 (separate to the information on CORDIS) states that 'a number of industrial connections have been successfully built'.

reduction in transport emissions by 2050. This contribution from the sample projects is primarily through their potential to improve transportation efficiency - thereby reducing traffic congestion. However, one project (HOEMEV) supports this target differently by contributing to the research on electric vehicles. Separately, VisIoN could arguably contribute environmental gains through improvements in vehicle connection, even though this is not the priority of the project. Finally, only two projects were found not to be directly relevant for this target because they focused on the noise of vehicles (PBNv2 and ECO DRIVE).

While they may not be specific to enhancing the uptake of multi-model transport, projects directly contributing to Flagship 6 of the Sustainable and Smart Mobility Strategy are relevant to the specific Green Deal priority on *Automated and connected multimodal mobility.* Specifically, the research results of projects such as ECOINTELS and COSAFE, which aim to develop smart systems to improve transportation efficiency (or 'smart traffic management systems enabled by digitalisation'), can be exploited in local transport policies. The provided knowledge enhances authorities to design transport polices which utilise more efficiently the possibilities of emerging technologies such as automated demand responsive transportation and related digital information services to achieve European policy objectives for sustainability.[37]

[37] As stated in the summary of the ECOINTELS project (Ref. Ares(2021)1539224 - 28/02/2021).

Table 4: Analysis table – Sustainable transport

	Project acronym	SAS	COSAFE	OWHEEL	ECOINTELS
Project details	Status	Ongoing	Ongoing	Ongoing	Closed
	Total cost	€ 4.114.731,96	€ 1.334.000,00	€ 644.000,00	€ 17.460,80
	Project coordinator	BE	UK	DE	DE
	Partners	IR, NL, NO, FR, FR, UK, UK, DE, BE, DE	CN, CN, CN	JA, SA	N/A
	Participants	DE, NL, UK, DE, FR, UK	DE, NO, UK, UK, UK	UK, NL, IT, BE, IT, UK, LT	N/A
	Types of stakeholder involved	Higher or Secondary Education Establishments; Research Organisations, Private for-profit entities (excluding Higher or Secondary Education Establishments); Other.	Higher or Secondary Education Establishments; Private for-profit entities (excluding Higher or Secondary Education Establishments); Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments).	Higher or Secondary Education Establishments; Private for-profit entities (excluding Higher or Secondary Education Establishments).	Research Organisations.
Priorities and	Sub-area	Automated driving	Smart mobility systems	Automated driving	Smart mobility systems
	Policy priority [38]	Smart mobility/achieving seamless, safe and efficient connectivity (Flagship 6: Making connected and automated multimodal mobility a reality); A more resilient Single European Transport Area (Flagship 10: Enhancing transport safety and	Smart mobility/achieving seamless, safe and efficient connectivity (Flagship 6: Making connected and automated multimodal mobility a reality); (Flagship 7: Innovation, data and Artificial Intelligence for	The EU as the world's connectivity hub (No specific flagship).	Smart mobility/achieving seamless, safe and efficient connectivity (Flagship 6: Making connected and automated multimodal mobility a reality).

[38] According to the *Sustainable and Smart Mobility Strategy*, found at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789

	Project acronym	SAS	COSAFE	OWHEEL	ECOINTELS
		security); The EU as the world's connectivity hub.	smarter mobility); The EU as the world's connectivity hub.		
	General project objective	Improve safety and acceptance of autonomous systems through new safety designs, modelling and assurance techniques.	Develop cooperative connected intelligent vehicles (CIV) based on vehicular communication technology.	Develop and evaluate new concepts of automotive wheel corners for automated driving.	Extend existing automated demand responsive transportation models for intelligent transportation services.
	Methodologies / tools	Modelling and assurance techniques; knowledge sharing activities (training networks for 15 early-stage researchers).	Knowledge sharing activities (bringing together academics, industry and local policymaker); use of algorithms.	Knowledge sharing activities (collaborative research and training between universities and industrial organizations).	Modelling techniques (modelling services and related pricing policies, and on developing algorithms for optimal vehicle routing and demand managements).
	Expected final product of project	Improve knowhow; Skilled researchers.	New technologies (a cost effective, scalable and flexible software).	Improve knowhow.	New tools (extending economic models).
	Policy contribution	Addressing key challenges or uncertainties; Trained professionals.	Addressing key challenges or uncertainties.	Contribute knowledge to enhance innovation capacity.	Contribute knowledge to enhance innovation capacity.
Project deliverables	Websites	1		1	1 [39]
	Patent fillings				
	Videos				
	Documents, reports	4	3		
	Monographic books / book chapters				
	Peer reviewed articles		2		

[39] Website link included in publishable summary provided by the project coordinator.

	Project acronym	SAS	COSAFE	OWHEEL	ECOINTELS
	Datasets via OpenAIRE				
	Conference proceeding	1	1		
	Open Research Data Pilot	1			
	Software via OpenAIRE				
	Other	SAS Special Session/Workshop I, SAS Kick-Off Meeting, SAS Network-Wide Event I, SAS Network-Wide Event II, SAS Network-Wide Event III, Dissemination, communication and outreach strategy; training on technical skills and soft-skills.	New and sustainable collaborations will be developed; more than five high quality research papers; a standardised dataset.	Outreach and dissemination; training between universities and industrial organisations; recommendations for future vehicle architecture.	Publishable summary[40].

Table 5: Analysis table – Sustainable transport (continued)

	Project acronym	HOEMEV	VisIoN	PBNv2	ECO DRIVE	SMARTI ETN
Project details	Status	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
	Total cost	€ 224.933,76	€ 3.752.913,96	€ 3.584.644,56	€ 3.405.852,72	€ 3.990.940,92
	Project coordinator	UK	FR	BE	BE	UK
	Partners	N/A	NL, UK, CZ, SP	N/A	N/A	FR, UK, US, IT, DE, DE IT, SP, UK, US, FR, HK, AU, UK, IT, FR, UK, UK, UK

[40] As provided by the project coordinator.

	Project acronym	HOEMEV	VisIoN	PBNv2	ECO DRIVE	SMARTI ETN
	Participants	N/A	DE, UK, CZ, SP, TR, PT, DE, SP, FR, TR, DE	FR, UK, AT, AT, BE, SP, DE, LU, BE	FR, DE, DE, IT, FR, BE, DE, FR	FR, IT, SP, IT, FR, UK, IR, DE, DE
	Types of stakeholder involved	Higher or Secondary Education Establishments.	Higher or Secondary Education Establishments; Research Organisations; Private for-profit entities (excluding Higher or Secondary Education Establishments); Other.	Higher or Secondary Education Establishments; Research Organisations; Private for-profit entities (excluding Higher or Secondary Education Establishments).	Higher or Secondary Education Establishments; Research Organisations; Private for-profit entities (excluding Higher or Secondary Education Establishments).	Higher or Secondary Education Establishments; Private for-profit entities (excluding Higher or Secondary Education Establishments); Research Organisations; Other.
Priorities and objectives analysis	Sub-area	Electric vehicles	Smart mobility systems	Transportation noise	Transportation noise	Smart mobility systems
	Policy priority [41]	An irreversible shift to zero-emission mobility (Flagship 1: Boosting the uptake of zero-emission vehicles, renewable & low-carbon fuels and related infrastructure).	A more resilient Single European Transport Area (Flagship 10: Enhancing transport safety and security).	An irreversible shift to zero-emission mobility (Flagship 3: Making interurban and urban mobility more sustainable and healthier).	An irreversible shift to zero-emission mobility (Flagship 3: Making interurban and urban mobility more sustainable and healthier).	The EU as the world's connectivity hub (No specific flagship).
	General project objective	Develop an optimal control framework for the energy management of electric vehicles.	Research the use of Visible light communication (VLC) for two-way vehicle-to-vehicle and vehicle-to-roadside infrastructure communications.	Tackle the challenges of pass-by noise evaluation for the development process of safe, quiet vehicles.	Address challenges related to the noise from combustion/electric motors, transmission induced NVH (Noise, Vibration and Harshness) and driveline torsional vibrations.	Create a new generation of professionals to advance Sustainable Multifunctional Automated and Resilient Transport Infrastructures.

[41] According to the *Sustainable and Smart Mobility Strategy*, found at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789

	Project acronym	HOEMEV	VisIoN	PBNv2	ECO DRIVE	SMARTI ETN
	Methodologies / tools	Experimental testing (a hardware-in-the-loop test platform built up for real-time experiments); Novel tools / emerging approaches [42].	Simulation and experimental testing; modelling techniques (typical use cases identified and initial work has been done on channel modelling and transmission techniques).	Simulation and experimental testing; modelling techniques (related to the noise perception and detectability).	Simulation and experimental testing.	Simulation and experimental testing.
	Expected final product of project	Improve knowhow; New technologies.	Improve knowhow; Skilled researchers; new technologies.	Skilled researchers; New technologies.	Improve knowhow; Skilled researchers.	Improve knowhow; Skilled researchers; New technologies.
	Policy contribution	Contribute knowledge to enhance innovation capacity; Trained professionals.	Contribute knowledge to enhance innovation capacity; Trained professionals.	Addressing key challenges or uncertainties; Trained professionals.	Contribute knowledge to enhance innovation capacity; Trained professionals.	Contribute knowledge to enhance innovation capacity; Trained professionals.
Project deliverables	Websites		1	1		1
	Patent fillings					
	Videos					
	Documents, reports		6	1		4
	Monographic books / book chapters					
	Peer reviewed articles		7	3		3
	Datasets via OpenAIRE					
	Conference proceeding		26	15		

[42] Use of a velocity predictor with varying-prediction-horizon calibrator and an optimisation method to achieve multi-objective optimal control targets i.e., maximum fuel economy, reduction of emissions, improvement of drivability and battery life extension.

Project acronym	HOEMEV	VisIoN	PBNv2	ECO DRIVE	SMARTI ETN
Open Research Data Pilot		1			
Software via OpenAIRE					
Other	Publishable summary[43]: More than 40 high-quality journal papers have been published under the fund support, and a number of industrial connections have been successfully built.	Outreach and dissemination (in several national and international events and conferences); Supervision bylaw, appointment of ESRs, Advertisement of ESRs vacancies, Draft ESRs contracts, research vacancies; 4 Publications; training on technical skills and soft skills.	Outreach and dissemination; Public technical course; 2 Publications; training activities.	1 publication[44]; training on technical skills and soft skills.	Outreach and dissemination (2018 Dissemination Event); training on technical skills and soft skills.

[43] As provided by the project coordinator.
[44] https://app.dimensions.ai/details/grant/grant.8587189

4.3.3 Eliminating pollution

Table 6 and Table 7 below present the framework as applied to the 9 projects in the thematic area on pollution. This section summarises the main findings of presented in the tables. The group of projects relate to the following priorities of the **EU Action Plan for Zero Pollution**:

- Improving our health and wellbeing.
- Living within our planetary boundaries:
  - Flagship 3: Promoting zero pollution across regions.
- Boosting change across society for zero pollution:
  - Flagship 6: Showcasing zero pollution solutions for buildings.
  - Flagship 7: Living Labs for green digital solutions and smart zero pollution.

While three relate to the following aims of the **EU Chemical strategy for sustainability**:

- Stronger EU legal framework to address pressing environmental and health concerns.
- Simplifying and consolidating the legal framework.
- A comprehensive knowledge base on chemicals.

Few of the sampled MSCA projects in the Pollution theme address specific Flagships in the EU Action Plan for Zero Pollution. One project (E-SCENT) can be linked to living labs for green digital solutions and smart zero pollution (Flagship 7) as it aims to develop a digital solution and involves citizen engagement. While none of the remaining projects can be directly linked to the specific Flagships of the Action Plan, three projects (MEMO2, Particle-bound ROS and SMART-WORKFLOW) potentially contribute towards the initiative of *The Zero Pollution Monitoring and Outlook Framework* by fostering improvements in the monitoring of air or water pollution, which could support better governance on zero pollution by offering new insights into overall pollution levels.

However, all projects contribute to one of the priorities of the Action Plan *Living within our planetary boundaries* by contributing efforts to reduce either air, water or soil pollution. Additionally, REMIND could contribute to the more general aim of the Action Plan to *Promote worldwide change for zero pollution* as it involves knowledge transfer activities to third countries. However, it does not directly help the respective Flagship (Flagship 8: Minimise the EU's external pollution footprint), which specifically aims to restrict the export of certain products and waste that result in harmful environmental impacts in third countries.

ECORISK2050 stands out as the only project contributing towards the priorities of the EU Chemical Strategy for Sustainability. Notably, it supports *A strengthened chemical science-policy interface* which aims to foster multidisciplinary research and digital innovations for advanced tools, methods and models, and data analysis capacities as well as to provide support for EU-wide human and environmental (bio)monitoring capacities, complementing ecosystem monitoring initiatives. ECORISK2050 supports this by developing a new set of tools for use by industry and policy makers, that allow the impacts of a range of drivers on chemicals risks being assessed and managed.

The most common methodologies and tools used in each of the projects can be grouped. Four projects (MEMO2, RESOURCE, RECOPHARMA and REMIND) made use of sampling and monitoring (e.g., quantifying emissions, field sampling). Three projects (ECORISK2050, Particle-bound ROS and E-SCENT) used simulation and experimental testing. Three projects (MEMO2, P-TRAP and RESOURCE) used novel tools. In terms of types of stakeholders, all involve at least one higher or secondary education establishment (7 projects) or research organisation (5 projects). A total of four private for-profit entities (excluding higher or secondary education establishments) which were typically the larger projects in terms of total cost.

Developing novel measurement and modelling tools in an interdisciplinary and intersectoral context are some of the valuable contributions of the MSCA projects in the pollution theme. Eight projects have developed, or are expected to develop, new tools (e.g., approaches, methods or modelling frameworks) and/or new technologies (e.g., instruments, sensor protypes or pilots). Another contribution of these projects is towards enhancing the skills of researchers - five projects aimed to equip researchers with strong scientific and personal competencies through training or networking opportunities.

The research topics of three projects (MEMO2, Particle-bound ROS and E-SCENT) support the priority of *Improving our health and wellbeing*. While MEMO2 and Particle-bound ROS aim to better monitor and report airborne pollutants outside, E-SCENT aims to enable data generation that will advance (indoor) air quality research and might prove to be a key technology in informing exposure assessment. The new technologies, tools and know-how developed under these projects can pave the way for innovative strategies for air pollution mitigation and policies, as well as for public health planners. A further three projects (ECORISK2050, RESOURCE and P-TRAP) contribute towards the EU zero pollution target to reduce 'by 50% nutrient losses, the use and risk of chemical pesticides' in terms of their focus on substances from agricultural areas polluting waterbodies (e.g., groundwater, surface water).

This analysis highlights that the sampled MSCA projects in the Pollution the theme has synergies with other policy areas of the Green Deal - specifically, with Agriculture and Climate Action. These two policy areas are closely related to the Biodiversity policy area. Additionally, it is worth noting that one project (REMIND) contributes to the uptake of renewable energy and another two projects (P-TRAP, RECOPHARMA) incorporate recovery and recycling from waste - therefore contributing towards the Green Deal policy areas of clean energy and circular economy respectively (however, circular economy is not one of the thematic areas of the portfolio). This finding for projects in the theme of pollution is not surprising as it is a largely cross-cutting theme which is relevant for many sectors. As set out by the Action Plan, future efforts to mainstream pollution prevention in all relevant EU policies can be expected for different sectors.

Table 6: Analysis table – Eliminating pollution

	Project acronym	MEMO2	ECORISK2050	Particle-bound ROS	E-SCENT	P-TRAP
Project details	Status	Closed	Ongoing	Closed	Closed	Ongoing
	Total cost	€ 3.361.290,84	€ 3.596.088,24	€ 195.454,80	€ 175.866,00	€ 2.911.106,16
	Project coordinator	NL	NL	UK	IR	NL
	Partners	NL, UK, NL, PL, NL, DE, CH, UK, NL, NL, UK, SE, NL	N/A	N/A	N/A	CH, DE, DE, NL, NL, NL, SP
	Participants	NL, NL, FR, CE, UK, DE, PL, SE	SE, UK, SP, AT, NO, NL, IL	N/A	N/A	AT, DE, CH, UK, SP, BE, DE, NL
	Types of stakeholders involved	Higher or Secondary Education Establishments, Research Organisations, Private for-profit entities (excluding Higher or Secondary Education Establishments).	Higher or Secondary Education Establishments, Research Organisations.	Higher or Secondary Education Establishments.	Higher or Secondary Education Establishments.	Higher or Secondary Education Establishments, Private for-profit entities (excluding Higher or Secondary Education Establishments), Research Organisations, Other.
Priorities and objectives	Sub-area	Air pollution with more diverse projects	Water pollution, wastewater treatment	Air pollution with more diverse projects	Air pollution with more diverse projects	Water pollution, wastewater treatment
	Policy priority [45]	Improving our health and wellbeing (no specific flagship); Living within our planetary boundaries (no specific flagship); Tracking progress, anticipating	Living within our planetary boundaries (no specific flagship) (ZP); A comprehensive knowledge base on.	Improving our health and wellbeing (no specific flagship); Living within our planetary boundaries (no specific flagship); Tracking progress, anticipating trends and	Improving our health and wellbeing (no specific flagship); Living within our planetary boundaries (no specific flagship); Boosting change across society for zero pollution	Living within our planetary boundaries (no specific flagship) (ZP).

[45] According to the Priorities of the EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil" (ZP) or the Chemical strategy for sustainability (CS)

Project acronym	MEMO2	ECORISK2050	Particle-bound ROS	E-SCENT	P-TRAP
	trends and mainstreaming zero pollution (The Zero Pollution Monitoring and Outlook Framework) (ZP).	chemicals[46]; Simplifying and consolidating the legal framework; Stronger EU legal framework to address pressing environmental and health concerns (CS).	mainstreaming zero pollution (The Zero Pollution Monitoring and Outlook Framework) (ZP).	(Flagship 7: Living Labs for green digital solutions and smart zero pollution) (ZP).	
General project objective	Develop tools to enable the scientific and non-academic communities to improve the objective verification of CH4 emission reduction strategies for specific source sectors.	Risk assessment and mitigation measures for specific chemical types (pesticides, urban chemicals) in aquatic and soil systems.	Deploy a novel online instrument to improve measurements of a specific ambient particulate air pollution and to explore the impact of different sources and atmospheric conditions.	Develop low-cost sensors for measurement of indoor air pollution.	Develop new methods and approaches to prevent eutrophication in agricultural areas and surface waters.
Methodologies / tools	Novel tools / emerging approaches (used a hierarchy of innovative modelling tools to quantify emissions); Sampling and monitoring (quantify and monitor CH4 plumes); Modelling techniques (use of a fluid dynamics simulation model)	Modelling techniques (develop emission scenarios for chemicals); Simulation and experimental testing.	Simulation and experimental testing (atmospheric simulation chamber and oxidation flow reactor experiments indicate); Database development.	Experimental testing (field testing in various indoor environments); Citizen science.	Novel tools / emerging approaches (conducting innovative scientific research by using state-of-the-art methodology).

[46] Specifically contributing towards: *A strengthened chemical science-policy interface*

	Project acronym	MEMO2	ECORISK2050	Particle-bound ROS	E-SCENT	P-TRAP
	Expected final product of project	Skilled researchers; New tools; new technology.	Skilled researchers; New tools; Improved know-how.	New technology; Improved know-how.	New technology; Skilled researchers.	Skilled researchers; New tools.
	Policy contribution	Addressing key challenges or uncertainties; Trained professionals.	Addressing key challenges or uncertainties.	Addressing key challenges or uncertainties.	Addressing key challenges or uncertainties.	Addressing key challenges or uncertainties; Trained professionals.
Project deliverables	Websites	1	1		1	1
	Patent fillings					
	Documents, reports	9	9			
	Monographic books / book chapters					
	Peer reviewed articles			x	2	
	Datasets via OpenAIRE	4				
	Conference proceeding					
	Open Research Data Pilot	1				
	Software via OpenAIRE					
	Other	Mid-term review report; Outreach and dissemination; training on technical skills and soft-skills; dataset	Case-studies; Advertising vacancies for ESRs; Training course ESC1, ESC2 and ESC3; Workshop on chemical risk in the future (EWOR).	A comprehensive data set of atmospheric particle-bound ROS concentrations and temporal variability; a standard protocol to systematically evaluate and compare offline ROS	Outreach and dissemination (communication activities, workshops, demonstrations and lectures); a citizen science project; training	Publication[47]

[47] https://explore.openaire.eu/search/project?projectId=corda__h2020::037736fccb833e5efa6d1518c22f416b

	Project acronym	MEMO2	ECORISK2050	Particle-bound ROS	E-SCENT	P-TRAP
				production; Presentations at international conferences, academic seminars; scientific papers in international peer-reviewed journals; all the peer-reviewed scientific publications will be published in Open Access journals.	on technical skills and soft skills.	

Table 7: Analysis table – Eliminating pollution (continued)

	Project acronym	SMART-WORKFLOW	RESOURCE	RECOPHARMA	REMIND
Project details	Status	Closed	Closed	Ongoing	Ongoing
	Total cost	€ 158.121,60	€ 170.121,60	€ 895.500,00	€ 1.329.400,00
	Project coordinator	SP	SP	SP	IT
	Partners	N/A	N/A	CU, CU	CL, CL, EC, CL
	Participants	N/A	N/A	SE, FR, IT, SP, UK	SP, IT, IT
	Types of stakeholders involved	Research Organisations	Research Organisations	Higher or Secondary Education Establishments, Private for-profit entities (excluding Higher or Secondary Education Establishments),	Higher or Secondary Education Establishments; Private for-profit entities (excluding Higher or Secondary Education Establishments); Other
Priorities and	Sub-area	Water pollution, wastewater treatment	Water pollution, wastewater treatment	Water pollution, wastewater treatment	Water pollution, wastewater treatment

	Project acronym	SMART-WORKFLOW	RESOURCE	RECOPHARMA	REMIND
	Policy priority [48]	Living within our planetary boundaries (no specific flagship); Tracking progress, anticipating trends and mainstreaming zero pollution (The Zero Pollution Monitoring and Outlook Framework) (ZP).	Living within our planetary boundaries (no specific flagship) (ZP).	Living within our planetary boundaries (no specific flagship) (ZP).	Living within our planetary boundaries (no specific flagship) (ZP).
	General project objective	Develop and optimize a smart methodology (workflow) for the assessment of the overall quality of wastewater treatment.	Broaden the knowledge about the role of animal manure recycling as a major source of groundwater pollution.	Develop approach for the versatile, fast, highly efficient, and low-cost treatment for wastewaters.	Develop an innovative framework for the use Renewable Energy Sources (RES) in Water Treatment Technologies for mining industries.
	Methodologies / tools	Statistical analysis (statistical analysis of data to develop and optimize a smart methodology for the assessment).	Sampling and monitoring; Novel tools / emerging approaches (the combination of chemical and microbiological tools to assess groundwater quality was also a novel aspect of the project).	Sampling and monitoring; knowledge sharing and creation activities (the secondments will also enhance the exchange of knowledge).	Knowledge sharing and creation activities; sampling and monitoring.
	Expected final product of project	Improved know-how; New tools.	New tools	New technology; Skilled researchers.	Improved know-how
	Policy contribution	Contribution towards best practices	Contribution towards policy priorities	Contribute knowledge to enhance innovation capacity; Trained professionals	Contribution towards best practices; Contribute knowledge to enhance innovation capacity; Trained professionals
Project deliverabl	**Websites**			1	1
	Patent fillings				
	Documents, reports				3

[48] According to the Priorities of the *EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil"* (Z) or the *Chemical strategy for sustainability* (C)

Project acronym	SMART-WORKFLOW	RESOURCE	RECOPHARMA	REMIND
Monographic books / book chapters				
Peer reviewed articles	5		4	
Datasets via OpenAIRE				
Conference proceeding	1			
Open Research Data Pilot				
Software via OpenAIRE				
Other	Outreach and dissemination; 2 lectures.	Outreach and dissemination; the publication of open-access journal articles (two papers are under preparation and will be submitted once completed); a workshop with stakeholders, farmers and end-users; the elaboration of an open-access technical guide.	Outreach and dissemination; 41 individuals, developing 107 secondments, Organisation of 5 science cafe to reach out society; Organisation of 3 technical workshops; 4 Training courses to instruct practitioners in the use of the developed equipment and implemented research; 10 press releases, 20 radio, TV or YouTube messages or interviews. Innovation support services in terms to access to risk capital within the water treatment sector.	Outreach and dissemination; intersectoral cooperation between academia and industry by setting best practices for knowledge transfer.

4.3.4 Clean energy

Table 8 and Table 9 below present the projects in the energy theme of the portfolio. Five of the eight projects in the theme relate to the priorities of the **Strategy for Energy System Integration**:

- A more circular energy system, with 'energy-efficiency-first' at its core.
- Accelerating the electrification of energy demand, building on a largely renewables-based power system.
- Promote renewable and low-carbon fuels, including hydrogen, for hard-to-decarbonise sectors (unlocking the potential of renewable fuels produced from sustainable biomass).
- A digitalised energy system and a supportive innovation framework.

While others relate to either the **Hydrogen strategy for a climate-neutral** Europe (HS), the **Offshore Renewable Energy Strategy** (ORES), or to the energy efficiency of products (which does not address a specific strategy priority).

- Boosting demand and scaling up production (HS).
- Promoting research and innovation in hydrogen technologies (HS).
- The international dimension (HS).
- Focusing research and innovation on supporting offshore projects (ORES).

The Strategy for Energy System Integration priority of *Accelerating the electrification of energy demand, building on a largely renewables-based power system* calls for the share of renewable energy in the electricity mix [to be] double to 55-60% by 2030. Three projects contribute towards this ambition; MAESTRO by aiming to make solar power devices commercially viable, Small-scale CSP by developing a cost-effective solar energy driven cogeneration system with thermal energy storage, and MISTRAL by researching the declining social acceptance of renewable energy infrastructure. The priority however states that 'the need for increased electricity supply can, alongside other relevant onshore renewable power technologies such as solar or wind energy, partly be met by offshore renewable energy production' - therefore alluding to the importance of ambitions in the Offshore renewable energy strategy prominence. The project WAVREP contributes towards the priority focusing research and innovation on supporting offshore projects (within the Offshore renewable energy strategy) by highlighting the benefits of a wave energy converter as an approach which could lead to higher levels of renewable energy generation.

The Strategy for Energy System Integration priority of *A digitalised energy system and a supportive innovation framework* points towards the role of digitalisation as an enabler in providing 'the necessary data to match supply and demand at a more disaggregated level and close to real time'. GREENDC contributes directly to this priority by developing a tool that helps data centre managers predict energy demands better and evaluate strategies to minimise energy waste and CO_2 emissions. Similarly, the project Small-scale CSP aims to address the challenge to match the demand with the supply which is considered a key issue for renewable energy sources. By minimising energy waste through demand-side solutions, GREENDC also contributes to the priority of a more circular energy system, with 'energy-efficiency-first' at its core. The Green Deal communication states that 'energy efficiency must be

prioritised' and system integration can help the EU achieve greater energy efficiency, through a more circular use of available resources and by switching to more efficient energy technologies. Related to the topic of 'energy-efficiency-first' is the project A-WEAR. However, this project focuses on the efficiency of appliances rather than energy supply and is therefore more relevant for the clean energy priority (which is not included in a specific strategy) to boost energy efficiency and eco-design of products.

The EU has a strategic interest in placing hydrogen high on its energy policy agenda, also in relation to external policy. The Hydrogen strategy for a climate-neutral Europe has prioritises an international dimension, and states that 'bilateral dialogues promoting EU regulations, standards and technologies could be facilitated'. The project HYDRIDE4MOBILITY, with partners in South Africa, contributes towards this priority as well as priorities on promoting research and innovation in hydrogen technologies and boosting demand and scaling up production. This project also points towards synergies between the energy and transport policy areas. In this specific case, on-board hydrogen storage in vehicles is reliant on hydrogen refuelling infrastructure; these are therefore developed and tested together. A second project (DIET) alludes to a link with transport but through a different energy source. It suggests that biogas can play a significant role in future transport systems and explores the feasibility of an advanced transport biofuel for heavy goods vehicles and bus fleets. These are sectors which are considered to more difficult to decarbonise.

All sampled MSCA projects in the energy theme involve higher or secondary education establishments. In terms of the tools and methodologies used, the projects use a variety of approaches. The most common involve novel tools, simulation and experimental testing, knowledge sharing/creation activities and modelling techniques. The projects are expected to produce a variety outputs - with five projects providing new tools (e.g., machine-learning algorithms, simulation tool, modelling techniques), four developing skilled researchers, three contributing to knowhow and two establishing new technologies (e.g., prototypes). In terms of the type of stakeholders involved, five projects involve private for-profit entities. These have the potential to result in the effective transfer of research results to industries. In line with this, some projects address different ways in which to improve the route-to-market of energy technologies – either by developing cost-competitive solutions (HYDRIDE4MOBILITY), providing evidence to improve commercially viability (MAESTRO) or research the social opposition of installations (MISTRAL).

Table 8: Analysis table – Clean energy

	Project acronym	GREENDC	MAESTRO	HYDRIDE4MOBILITY	WAVREP
Project details	Status	Ongoing	Ongoing	Ongoing	Closed
	Total cost	€ 967.500,00	€ 3.829.216,53	€ 355.500,00	€ 165.598,80
	Project coordinator	UK	UK	NO	NL
	Partners	N/A	IT, UK	SAx2, ID, SA	N/A
	Participants	TR, BG, UK, TR	IT, SP, UK, GR, IT, IL, UK, DE, CH, UK, IL, UK, LI, PL	HR, NO, DE	N/A
	Types of stakeholders involved	Higher or Secondary Education Establishments, Private for-profit entities (excluding Higher or Secondary Education Establishments).	Higher or Secondary Education Establishments, Private for-profit entities (excluding Higher or Secondary Education Establishments), Research Organisations.	Research Organisations, Higher or Secondary Education Establishments, Private for-profit entities (excluding Higher or Secondary Education Establishments).	Higher or Secondary Education Establishments.
Priorities and objectives analysis	Sub-area	Energy efficiency	Renewable energy (solar)	Hydrogen	Renewable energy (wave)
	Policy priority [49]	A more circular energy system, with 'energy-efficiency-first' at its core; A digitalised energy system and a supportive innovation framework (ESI).	Building on a largely renewables-based power system (ESI).	Promoting research and innovation in hydrogen technologies; Boosting demand and scaling up production; The international dimension (HS).	Focusing research and innovation on supporting offshore projects (ORES).
	General project objective	Develop a decision support tool that helps data centre managers predict energy demands better and evaluate strategies to	Make a specific type of solar power devices commercially viable.	Address critical issues towards a commercial implementation of hydrogen powered utility vehicles.	Provide evidence that accelerating the application of wave energy converter (WEC) will lead to higher renewable energy generation.

[49] According to the Priorities of the *Hydrogen strategy for a climate-neutral Europe* (HS), the *Strategy for Energy System Integration* (ESI) or *The Offshore Renewable Energy Strategy* (ORES)

	Project acronym	GREENDC	MAESTRO	HYDRIDE4MOBILITY	WAVREP
		minimize energy waste and CO2 emissions.			
	Methodologies / tools	Modelling techniques (a non-linear energy forecasting model); Knowledge sharing and creation activities; Interviews; Simulation and experimental testing.	Modelling techniques; Knowledge sharing and creation activities.	Experimental testing (trial series of advanced MH containers).	Modelling techniques.
	Expected final product of project	New tools (provides a simulation tool); Skilled researchers.	Skilled researchers; Improve knowhow; New tools (novel multiscale modelling techniques).	New technologies (prototypes); New tools (further optimised engineering solutions).	New tool (developed a novel index for an un-biased near deterministic unbiased methodology); Improved knowhow (comprehensive roadmap of locations suitable for wave energy).
	Policy contribution	Contribution towards best practices; Training of professionals.	Contribute knowledge to enhance innovation capacity; Training of professionals.	Addressing key challenges or uncertainties.	Addressing key challenges or uncertainties; Contribution towards policy/ strategy / best practices.
Project deliverables	**Websites**	1	1	1	1
	Patent fillings				
	Videos				
	Documents, reports	3		3	
	Monographic books / book chapters				
	Peer reviewed articles		5	6	3
	Datasets via OpenAIRE		1		5
	Conference proceeding	6		3	8
	Open Research Data Pilot				

	Project acronym	GREENDC	MAESTRO	HYDRIDE4MOBILITY	WAVREP
	Software via OpenAIRE				
	Other	Outreach and dissemination; training on technical skills; Nine papers were presented in international conferences and four papers in professional events; one open day event was organised.	ISOPHOS 2019 Summer School, Training events.	Outreach and dissemination (Public dissemination workshop), 8 publications.	1 Publication; Outreach and dissemination; an open-source energy database; decision making tool.

Table 9: Analysis table – Clean energy (continued)

	Project acronym	Small-scale CSP	DIET	A-WEAR	MISTRAL
Project details	Status	Closed	Closed	Ongoing	Ongoing
	Total cost	€ 212.194,80	€ 187.866,00	€ 3.762.325,80	€ 4.210.438,32
	Project coordinator	DK	IR	FI	UK
	Partners	N/A	N/A	IT, CZ, SP, SP, FI, SP, RO, FI, FI, RO, RO, CZ,	UK, FR, IR, IR, PT, CH, DK, DE, DE, PT, IR, IR, IR, IR, BE
	Participants	N/A	N/A	SP, CZ, RO, IT	UK, CH, IR, DK, PT, DE, DK
	Types of stakeholders involved	Higher or Secondary Education Establishments	Higher or Secondary Education Establishments	Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments); Higher or Secondary Education Establishments; Private for-profit entities (excluding Higher or Secondary Education Establishments)	Higher or Secondary Education Establishments
	Sub-area	Renewable energy (solar)	Renewable energy (biogas)	Energy efficiency	Renewable energy (wind)

	Project acronym	Small-scale CSP	DIET	A-WEAR	MISTRAL
	Policy priority [50]	Building on a largely renewables-based power system (ESI)	Promote renewable and low-carbon fuels, including hydrogen, for hard-to-decarbonise sectors (Unlocking the potential of renewable fuels produced from sustainable biomass) (ESI)	Energy-efficiency-first (no specific priority within relevant strategic documents) [51]	Building on a largely renewables-based power system (ESI)
	General project objective	Develop a cost-effective concentrated solar energy driven cogeneration system with thermal energy storage.	Propose a future anaerobic digestion (AD)-based circular economy system, which produces renewable gaseous transport biofuel.	Enhance the understanding of how the superimposition of advanced technologies would improve wearable (handheld) devices' energy efficiency.	Nurture a new generation of researchers who can effectively evaluate and propose solutions for the social acceptance issues facing the deployment of renewable energy infrastructure.
	Methodologies / tools	Simulation and experimental testing; Knowledge sharing and creation activities; Modelling techniques; Novel tools / emerging approaches (the first analysis of a micro-structured polymer foil-based CSP system)	Simulation and experimental testing	Modelling techniques;	Knowledge sharing and creation activities;
	Expected final product of project	Improved knowhow	New technology (a cascading circular bioenergy system)	Skilled researchers; New tools (machine-learning algorithms); New technologies (prototypes)	Skilled researchers
	Policy contribution	Addressing key challenges or uncertainties	Contribute knowledge to enhance innovation capacity;	Contribute knowledge to enhance innovation capacity;	Addressing key challenges or uncertainties; Training of professionals

[50] According to the Priorities of the *Hydrogen strategy for a climate-neutral Europe* (HS), the *Strategy for Energy System Integration* (ESI) or *The Offshore Renewable Energy Strategy* (ORES)

[51] The project A-WEAR is not directly relevant for the priority 'energy-efficiency-first' as specified in the *Strategy for Energy System Integration* which refers to the energy system rather than specific devices. However, the project A-WEAR is relevant for the (higher-level) clean energy priority to *Boost energy efficiency and eco-design of products*.

	Project acronym	Small-scale CSP	DIET	A-WEAR	MISTRAL
Project deliverables	Websites	1	1	1	3
	Patent fillings				
	Documents, reports	3[52]		11	4
	Monographic books / book chapters				
	Peer reviewed articles		6	3	
	Datasets via OpenAIRE			4	
	Conference proceeding	2[53]		24[54]	
	Open Research Data Pilot			1	1
	Software via OpenAIRE			3	
	Other	Outreach and dissemination (Presentation of project results at international conference); Training activities on simulation tools.	Project published as success story by EC[55].	Outreach and dissemination (e.g., 25 YouTube videos, 7 press releases); 8 training events; PCDPs established and approved for each ESR, Collection of ethical clearance procedure and forms available at each participant; 8 journal papers, with a promised target of target of 90 research papers; 3 lectures and a public survey.	Knowledge exchange and publication protocol, Protocol for ensuring equality aspects are reflected in network activities and adequate monitoring is in place; Outreach and dissemination

[52] Project description states: 3 papers will be published shortly in peer-reviewed top international journals targeting researchers in the field of renewable energy.
[53] Project description states: 2 peer-reviewed conference publications.
[54] Project descriptions states 24 conference papers.
[55] https://ec.europa.eu/research-and-innovation/en/projects/success-stories/all/graphene-spiced-anaerobic-digestion-substantially-increases-biogas

4.3.5 Sustainable agriculture

Table 10 below presents the framework as applied to the projects in the agriculture thematic area. This section summarises the main findings presented in the table.

The five projects in this thematic group address the following priorities:

- Climate change action (CAP).
- Biodiversity and farmed landscapes (CAP).
- Ensuring sustainable food production (F2F).
- Research, innovation, technology and investments (F2F).

Within the future CAP, the priority of *climate change action* includes a range of adaptive measures at farm and sectorial level. Two of the projects in the portfolio contribute towards this priority, EpiDiverse through training experts in plant adaptation and ADAFARM through analysing ecosystem-based climate adaptation options and nature-based solutions for small farmers in sub-Saharan Africa.

The *biodiversity and farmed landscapes* priority promotes alternatives to chemical pesticides and fertilisers. Three projects in the portfolio, MiRa, FertiCycle and RhizoTalk, contribute to this priority through studying and developing bio-based alternatives.

The projects also contribute to Farm to Fork priorities. The reduction of fertilisers and chemical pesticides, as well as increasing climate resilience, are also parts of its *sustainable food production* priority, which also includes the Commission's aim to facilitate the placing on the market of pesticides containing biological active substances, to reinforce the environmental risk assessment of pesticides, and to work with Member States to extend the application of precise fertilisation techniques and sustainable agricultural practices, notably in hotspot areas of intensive livestock farming and of recycling of organic waste into renewable fertilisers.

Three of the projects (EpiDiverse, FertiCycle and MiRa) also contribute to their respective objectives through training programmes for early-stage researchers; thus, they can be considered to also have a specific contribution to the *Research, innovation, technology and investment* priority, which notes the role of R&I as key drivers in acceleration the transition to sustainable, healthy and inclusive food systems.

In terms of tools and methods, three projects make use of knowledge sharing and creation activities through the aforementioned training programmes. The projects in the portfolio also deploy modelling techniques and novel tools/emerging approaches. While the main expected outputs for the projects concern new knowledge, some also lay the groundwork for the future development of bio-based alternatives to pesticides and fertilisers.

The participant base is wider than in some other thematic areas, with four projects involving higher or secondary education establishments, three involving research organisations, four involving private for-profit entities (excluding higher or secondary education establishments), one involving public bodies

(excluding research organisations and secondary or higher education establishments) and three involving participants in the “other” category.

One of the projects developing alternatives to chemical pesticides is already exploring the possibilities of additional funding and material transfer agreements with agricultural companies for consolidating this research line. Overall, the projects are developing results that can be practically applied in the sector. Appropriate funding could accelerate this development.

Table 10: Analysis table – Sustainable agriculture

	Project acronym	EPIDIVERSE	ADAFARM	MIRA	FertiCycle	RhizoTalk
Project deliverables	Status	Ongoing	Closed	Ongoing	Ongoing	Closed
	Total cost	€ 3.784.150,46	€ 170.121,60	€ 3.936.52,36	€ 4.114.378,80	€ 168.277,20
	Project coordinator	NL	ES	DK	DK	Italy
	Partners	DE, DE, DE	N/A	N/A	N/A	N/A
	Participants	DE, DE, DE, DE, DE, CZ, FR, FR, ES, IT, AT, CH	N/A	ES, NL, NL, NL DE, DE, DE, UK, FR, CH	NL, PT, CH, IT, UK, BE, BE, FR, DK	N/A
	Types of stakeholders involved	Other; Higher or Secondary Education Establishments; Research Organisations; Private for-profit entities (excluding Higher or Secondary Education Establishments); Public bodies (excluding Research Organisations and Secondary or Higher Education Establishments);	Private for-profit entities (excluding Higher or Secondary Education Establishments)	Higher or Secondary Education Establishments; Research Organisations; Other; Private for-profit entities (excluding Higher or Secondary Education Establishments);	Higher or Secondary Education Establishments; Research Organisations; Other; Private for-profit entities (excluding Higher or Secondary Education Establishments); Research Organisations; Private for-profit entities (excluding Higher or Secondary Education Establishments)	Higher or Secondary Education Establishments
Priorities and objectives	Sub-area	Agriculture, crops, farmers	Agriculture, crops, farmers	Agriculture, pesticides, fertilisers	Agriculture, pesticides, fertilisers	Agriculture, pesticides, fertilisers
	Policy priority	Climate change action (adaptation) (CAP); Ensuring sustainable food production (F2F); Research, innovation, technology and investments (F2F)	Climate change action (adaptation) (CAP)	Biodiversity and farmed landscapes (natural pest control); Ensuring sustainable food production (F2F); Research, innovation, technology and investments (F2F)	Biodiversity and farmed landscapes; Ensuring sustainable food production (F2F); Research, innovation, technology and investments (F2F)	Biodiversity and farmed landscapes; Ensuring sustainable food production (F2F)

	Project acronym	EPIDIVERSE	ADAFARM	MIRA	FertiCycle	RhizoTalk
	General project objective	To train 15 early-stage researchers (ESRs) to become a first generation of expert eco-epigeneticists, equipping them with the interdisciplinary skills to successfully tackle this new research area.	Analyse ecosystem-based climate adaptation options and nature-based solutions for small farmers in sub-Saharan Africa.	To train 15 ESRs in basic and applied research on context-dependency of Microbe-induced Resistance (MiR), mechanisms, and impacts on plant performance and other biocontrol organisms.	To train 15 early-stage researchers to develop new processes for the production of bio-based fertilisers.	To improve the deployment of bacterial biocontrol agents (BCAs) as an alternative to chemical pesticides
	Methodologies / tools	Knowledge sharing and creation activities; Novel tools / emerging approaches	Modelling techniques	Knowledge sharing and creation activities;	Knowledge sharing and creation activities;	Novel tools / emerging approaches
	Expected final product of project	Improved know-how	Improved know-how	Skilled researchers; Improved know-how	Skilled researchers; Improved know-how	Improved know-how
	Policy contribution	Accessing key challenges/uncertainties; Trained professionals	Contribution towards policy / strategy / best practices;	Contributing knowledge to enhance innovation capacity; Trained professionals	Contributing knowledge to enhance innovation capacity; Trained professionals	Contributing knowledge to enhance innovation capacity
	Websites	1	1	1	1	
	Patent fillings					
	Videos	2	1			
	Documents, reports		4[56]	1	1	
	Monographic books / book chapters					1
	Peer reviewed articles	1				3
	Datasets via OpenAIRE		2			

[56] Types of publication not confirmed.

	Project acronym	EPIDIVERSE	ADAFARM	MIRA	FertiCycle	RhizoTalk
	Conference proceedings					
	Open Research Data Pilot					
	Software via OpenAIRE					
	Other	Recruitment; fact sheets and email list.	Blog posts; presentations; Master's thesis; policy briefs under development.	Data management plan ready (open access data pilot).	Supervisory Board.	1 presentation, 2 posters[57].

[57] https://www.researchgate.net/project/RhizoTalk-Decrypting-the-role-of-bacterial-signals-in-microbial-interactions-to-enhance-Lysobacter-establishment-in-the-rhizosphere

4.3.6 Climate action

Table 11 below presents the projects in the climate action theme of the portfolio. This section summarises the main findings of presented in the tables. Five of the nine projects in the theme relate to the following priorities of the **Climate Adaptation Strategy**:

- Pushing the frontiers of knowledge on adaptation.
- Promoting nature-based solutions for adaptation.
- Reducing climate-related risk.

While three relate to the following aims of the **2030 Climate Target Plan**:

- Non-CO2 emissions.
- Co-benefits for health, improved air quality and reduced environmental degradation.
- Deployment of alternative emissions-free fuel and feedstock.

The Climate Adaptation Strategy priority *pushing the frontiers of knowledge on adaptation* calls for further science-based knowledge on climate change adaptation, its costs, benefits and distributional effects, as well as anchoring decisions in science. Two projects under this theme contribute to this priority; PROTECT, through improving predictability of extreme events through increasing understanding of climate extremes from atmospheric dynamics, and NESSC, through an interdisciplinary approach to better understanding of climate change and improved future projections and predictions. The findings of these projects could support the aim to close knowledge gaps on climate impacts and resilience, and to improve the state of the art on adaptation modelling, risk assessment and management tools under this priority.

The priority *promoting nature-based solutions for adaptation* includes promoting and sustainably managing forests and farmland to help adapt to climate change in a cost-effective way, as well as the role of ecosystems in carbon removal and sequestration. In this context, the CASE-CO2 project aims to improve our knowledge on the process of carbon accumulation over forest expansion in abandoned agricultural lands. The BioVOLHum project, on the other hand, investigates the impact of increased atmospheric humidity and diffuse irradiation to carbon assimilation, allocation and consequently biogenic volatile compounds emissions from northern forests. The findings of these projects could inform the Commission aims to propose nature-based solutions for carbon removals, and to incentivise and assist Member States to rollout nature-based solutions through assessments, guidance, capacity building, and EU funding.

The *reducing climate-related risk* priority highlights the need to invest in resilient, climate-proof infrastructure, and to leverage synergies between climate adaptation and the broader work on disaster risk prevention and reduction. The DURCWAVE project seeks to understand the mechanisms that govern the interaction between overtopping waves and coastal defences in the context of changing climate conditions, to amend the current design criteria of coastal defences. Such findings could inform the Commissions aim to develop an EU-wide climate risk assessment and strengthen climate considerations in EU disaster risk prevention and management under this priority.

Of the three projects contributing to the Climate Target Plan, the AMACONOE project targets Non-CO2 emissions by developing improved strategies for N2O control in wastewater treatment plants. The Fe-RedOx-Cat project contributes to the deployment of alternative emissions-free fuel and feedstock through its aim to introduce a new family of efficient, robust and selective iron-based electro-catalysts for both CO2 reduction and H2O oxidation, which would involve a significant development in the field of solar fuel cells. The IDIOM2 project focuses on the GHG reduction co-benefits of health, improved air quality and reduced environmental degradation, through improving the understanding of the behaviour of biogenic volatile organic compounds (BVOCs), which influence levels of greenhouse gases, aerosols, and surface ozone and thus affect climate and air quality.

The projects in this thematic groups are largely knowledge generation-focused, with one of the projects also providing training to early-stage researchers, and two developing new technologies. The knowledge focus is also reflected in the types of participants, which are either research organisations or higher or secondary education establishments.

In terms of methodologies and tools, five projects utilise modelling, two novel tools / emerging approaches, and database development, algorithms and knowledge sharing, and creation activities are utilised by one project each.

The need for further science-based knowledge is acknowledged in the EU strategy for climate action, and the projects in the portfolio are doing their part in fulfilling that need. The key challenge for policymakers and financiers therefore is to provide resources to and connections to ensure that the new knowledge is integrated in decision making.

Table 11: Analysis table – Climate action

Project acronym	AMACONOE	PROTECT	*BioVOLHum*	CASE-CO2	IDIOM2	DURCWAVE	NESSC	Fe-RedOx-Cat
Status	Closed	Closed	Closed	Closed	Ongoing	Ongoing	Ongoing	Closed
Total cost	€ 200.194,80	€ 158.121,60	€ 191.325,60	€ 170.121,60	€ 180.277,20	€ 170.121,60	€ 2.820.480	€ 159.126
Project coordinator	DK	ES	FI	ES	FR	ES	NL	ES
Partners	N/A	N/A	N/A	N/A	N/A	N/A	N/A	US
Participants	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stakeholder types	Higher or Secondary Education Establishments	Research Organisations	Higher or Secondary Education Establishments	Higher or Secondary Education Establishments	Research Organisations	Higher or Secondary Education Establishments	Higher or Secondary Education Establishments	Research Organisations; Higher or Secondary Education Establishments
Policy priority	Non-CO2 emissions (Climate Target Plan)	Pushing the frontiers of knowledge on adaptation (Climate Adaptation Strategy)	Promoting nature-based solutions for adaptation (Climate Adaptation Strategy)	Promoting nature-based solutions for adaptation (Climate Adaptation Strategy)	Co-benefits for health, improved air quality and reduced environmental degradation (Climate Target Plan)	Reducing climate-related risk (Climate Adaptation Strategy)	Pushing the frontiers of knowledge on adaptation (Climate Adaptation Strategy)	Deployment of alternative emissions-free fuel and feedstock (Climate Target Plan)

Project acronym	AMACONOE	PROTECT	*BioVOLHum*	CASE-CO2	IDIOM2	DURCWAVE	NESSC	Fe-RedOx-Cat
General project objective	Development of improved strategies for N2O control in wastewater treatment plants	To harness the increased understanding of climate extremes that atmospheric dynamics can bring, to help improve the predictability of extreme events, reducing their human and societal impacts.	To clarify the impact of increased atmospheric humidity (AH) and diffuse irradiation to carbon assimilation, allocation and consequently biogenic volatile compounds (BVC) emissions from northern forests.	To improve our knowledge on the process of carbon accumulation over forest expansion in abandoned agricultural lands	To improve understanding of the behaviour of biogenic volatile organic compounds (BVOCs), particularly in critical climates	To understand the mechanisms that govern the interaction between overtopping waves and coastal defences to changing climate conditions, to amend the current design criteria of coastal defences	To bring together scientists with a background in physics, earth sciences, ecology and mathematics to better understand the processes behind climate change and improve future climate projections and predictions.	To introduce a new family of efficient, robust and selective iron-based electro-catalysts for both, CO2 reduction and H2O oxidation.
Methodologies / tools	Modelling techniques; Database development	Modelling techniques; Algorithms	Novel tools / emerging approaches	Modelling techniques;	Modelling techniques;	Modelling techniques;	Knowledge sharing and creation activities;	Novel tools / emerging technologies; Computational methods
Expected final product of project	Improved know-how	Improved know-how	Improved know-how	Improved know-how	Improved know-how	Improved know-how; new technologies	Skilled researchers; improved know-how	Improved know-how; new technologies
Policy contribution	Contribution towards policy / strategy / best practices;	Addressing key challenges / uncertainties; Contribution towards policy/ strategy / best practices	Addressing key challenges / uncertainties	Addressing key challenges/uncertainties; Contribution towards policy/ strategy / best practices;	Addressing key challenges/uncertainties	Contributing knowledge to enhance innovation capacity	Addressing key challenges/uncertainties; Trained professionals	Contributing knowledge to enhance innovation capacity
Websites							1	
Patent fillings								

Project acronym	AMACONOE	PROTECT	*BioVOLHum*	CASE-CO2	IDIOM2	DURCWAVE	NESSC	Fe-RedOx-Cat
Videos								
Documents, reports			1					
Monographic books / book chapters								
Peer reviewed articles	4	X[58]		2	1	8		
Datasets via OpenAIRE						2	1	
Conference proceedings								
Open Research Data Pilot								
Software via OpenAIRE								
Other	A database of full-scale N2O emissions from different WWTPs; Several plant designs for carbon footprint mitigation; Identified control strategies for		1 seminar talk	Exploitation and dissemination activities; Workshops; Seminars				3 posters, 1 invited talk, 2 outreach activities[59]

[58] Number not confirmed.
[59] http://mscaprojects.icig.es/projects/dr-sergio-gonell/

	Project acronym	AMACONOE	PROTECT	*BioVOLHum*	CASE-CO2	IDIOM2	DURCWAVE	NESSC	Fe-RedOx-Cat
		carbon footprint mitigation; Two conference presentations; One co-supervised Master thesis.							

4.4 Portfolio summary

This chapter presents a summary of the findings of the portfolio as a whole.

Table 12 below provides an overview of the thematic contribution of the portfolio projects to the priorities in the strategic documents within their respective themes (outline in Section 3.1). The darker colour represents a higher number of projects contributing towards a particular priority. A priority which is not shaded (or is white) indicates that there were no thematic contributions of the projects to the specific priority.

Overall, most of the projects are directly relevant for the priorities and aims of the strategic documents within their respective themes. For each theme, the group of projects also covers multiple priorities within the strategies. Notably, in sustainable transport there is a clear focus on vehicles and infrastructure, and not on other modes of transport (e.g., rail, air and shipping). The sustainable transport group also includes projects focused on noise pollution, which as such is not a Green Deal priority. As each theme contains fewer projects than there are priorities, we cannot justifiably assess the extent to which the priorities are not covered.

Knowledge creation is the primary goal of the majority of projects across the thematic groups. For these projects, the main future challenge will be to ensure that this new scientific knowledge feeds policymaking. As academic projects, much of the dissemination takes place through peer-reviewed journals and academic conferences and other events. However, the MSCA projects also frequently publish non-peer reviewed documents and engage in dissemination activities for broader audiences.

The development of new technologies and products is more common in some thematic groups (particularly sustainable transport) than others (particularly biodiversity). These projects can have a dual contribution to the European Green Deal in the future, in the shape of both knowledge created and the concrete products/approaches for greener activities. With these projects it is also important to ensure that both the findings and products are disseminated to the right actors.

Some projects, particularly those with larger scale, also contribute to the horizontal Green Deal aim of external/international collaboration, through partnerships/participants of projects and field research conducted in non-EU countries. Creating connections and cooperation between research institutions and other actors can provide practical benefits to the implementation of the aim for EU to lead the global transition by example.

Many priorities of the European Green Deal are cross-thematic. Pollution and climate action are cross-cutting, and strong interlinkages exist between biodiversity and agriculture strategies (for example). Consequently, the results of many of the projects can contribute to multiple strategies. This indicates efficient use of funding, however in order to reap the full benefits of the projects it is particularly important to support the dissemination of the results and, where appropriate, further support applied research and product development. For the projects developing early-stage researcher training programmes, interesting contributions can also be expected from the projects of the individual students.

Table 12: Thematic contribution of portfolio projects to the priorities of the strategic documents of the EU Green Deal

Biodiversity[60] (7 projects)						
A coherent network of protected areas	Strengthening the EU legal framework for nature restoration	Bringing nature back to agricultural land	Addressing land take and restoring soil ecosystems	Increasing the quantity of forests and improving their health and resilience	Win-win solutions for energy generation	Restoring the good environmental status of marine ecosystems
Restoring freshwater ecosystems	Greening urban and peri-urban areas	Reducing pollution	Addressing invasive alien species	A new governance framework	Stepping up implementation and enforcement of EU environmental legislation	Business for Biodiversity
Investments, pricing and taxation	Measuring and integrating the value of nature	Improving knowledge, education and skills	International Ocean Governance	Trade policy	International cooperation, neighbourhood policy and resource mobilisation	
Sustainable transport[61] (9 projects)						
To make all modes of transport more sustainable	To make sustainable alternatives widely available to enable better modal choices	To put in place the right incentives to drive the transition to zero-emission mobility	Smart mobility – achieving seamless, safe and efficient connectivity	Resilient mobility – A more resilient Single European Transport Area: for inclusive connectivity	The EU as the world's connectivity hub	
Eliminating pollution[62] (9 projects)						
ZP: Improving our health and wellbeing	ZP: Living within our planetary boundaries	ZP: Towards zero pollution from production and consumption	ZP: Ensuring stricter implementation and enforcement	ZP: Boosting change across society for zero pollution	ZP: Promoting worldwide change for zero pollution	ZP: Tracking progress, anticipating trends and mainstreaming zero pollution

[60] According to the Priorities of the *EU biodiversity strategy for 2030*.
[61] According to the Priorities of the *Sustainable and Smart Mobility Strategy*.
[62] According to the Priorities of the *EU Action Plan: "Towards a Zero Pollution for Air, Water and Soil"* (ZP) or the *Chemical strategy for sustainability* (CS).

CS: Innovating for safe and sustainable EU chemicals	CS: Stronger EU legal framework to address pressing environmental and health concerns	CS: Simplifying and consolidating the legal framework	CS: A comprehensive knowledge base on chemicals	CS: Setting the example for a global sound management of chemicals		
Clean energy[63](8 projects)						
ESI: A more circular energy system, with 'energy-efficiency-first' at its core	ESI: Accelerating the electrification of energy demand, building on a largely renewables-based power system	ESI: Promote renewable and low-carbon fuels, including hydrogen, for hard-to-decarbonise sectors	ESI: Making energy markets fit for decarbonisation and distributed resources	ESI: A more integrated energy infrastructure	ESI: A digitalised energy system and a supportive innovation framework	HS: An investment agenda for the EU
HS: Boosting demand and scaling up production	HS: Designing a framework for hydrogen infrastructure and market rules	HS: Promoting research and innovation in hydrogen technologies	HS: The international dimension	ORES: Maritime spatial planning for sustainable management of space and resources	ORES: A new approach to offshore renewable energy and grid infrastructure	ORES: A clearer EU regulatory framework for offshore renewable energy
ORES: Mobilising private-sector investment in offshore renewables: the role of EU funds	ORES: Focusing research and innovation on supporting offshore projects	ORES: A stronger supply and value chain across Europe				
Sustainable agriculture[64] (5 projects)						
CAP: To ensure a fair income to farmers	CAP: To increase competitiveness	CAP: To rebalance the power in the food chain	CAP: Climate change action	CAP: Environmental care	CAP: To preserve landscapes and biodiversity	CAP: To support generational renewal
CAP: Vibrant rural areas	CAP: To protect food and health quality	F2F: Ensuring sustainable food production	F2F: Ensuring food security	F2F: Stimulating sustainable food processing, wholesale, retail, hospitality and food services practices	F2F: Promoting sustainable food consumption and facilitating the shift to healthy, sustainable diets	F2F: Reducing food loss and waste

63 According to the Priorities of the *Hydrogen strategy for a climate-neutral Europe* (HS), *the Strategy for Energy System Integration* (ESI) or *The Offshore Renewable Energy Strategy* (ORES).
64 According to the Priorities of the *Common Agricultural Policy* (CAP) or the *Farm to Fork Strategy* (F2F).

F2F: Combating food fraud along the food supply chain	F2F: Research, innovation, technology and investments	F2F: Advisory services, data and knowledge-sharing, and skills				
Climate action[65] (8 projects)						
CTP: Set a more ambitious and cost-effective path to achieving climate neutrality by 2050	CTP: Stimulate the creation of green jobs and continue the EU's track record of cutting greenhouse gas emissions whilst growing its economy	CTP: Encourage international partners to increase their ambition to limit the rise in global temperature to 1.5°C and avoid the most severe consequences of climate change	SCA: Pushing the frontiers of knowledge on adaptation	SCA: More and better climate-related risk and losses data	SCA: Making Climate-ADAPT the authoritative European platform for adaptation	SCA: Improving adaptation strategies and plans
SCA: Fostering local, individual, and just resilience	SCA: Integrating climate resilience in national fiscal frameworks	SCA: Promoting nature-based solutions for adaptation	SCA: Accelerating the rollout of adaptation solutions	SCA: Reducing climate-related risk	SCA: Closing the climate protection gap	SCA: Ensuring the availability and sustainability of freshwater
SCA: Increasing support for international climate resilience and preparedness	SCA: Scaling up international finance to build climate resilience	SCA: Strengthen global engagement and exchanges on adaptation				

Key: Number of projects directly relevant for policy priority

1 – 2
3 – 4
5 +

65 According to the Priorities of the *EU Strategy on Climate Adaptation* (SCA) or the *2030 Climate Target Plan* (CTP).

5 Policy recommendations

5.1 Project support and funding

Section 4.4. provided an overview of the thematic contribution made by projects to the priorities of the EU Green Deal. To make suggestions on the potential support measures to help the future development of these projects, this section considers *how* the projects make their contributions.

The way the projects of the portfolio implement their contributions towards the policy priorities can be categorised as follows:

- **Addressing key challenges or uncertainties**: The primary contribution of these projects is to fill knowledge gaps, deepen existing knowledge or in some cases to address a previously incorrect or partial understanding. The projects also have a role in mainstreaming knowledge and are of particular importance to future science, as they provide key building blocks for future research.
- **Contributing knowledge to enhance innovation capacity**: These projects provide new concepts or theoretical findings that can support the development of technology or infrastructure, or they pilot such new technologies/infrastructure.
- **Contribution towards policy/strategy/best practices**: These projects specifically aim to inform policy making, adaptation/management strategies, or to provide best practices for relevant activities.
- **Training professionals**: While the training of researchers is an overall objective of MSCA, the projects in this category provide the 'next level' of training professionals. In the portfolio of projects, this is achieved via two separate approaches. The first involves bringing together multiple early-stage researchers (ESRs) for a programme that combines individual research projects under a specific topic. These often systematically support the development of research related and transferable skills (allowing them to become specialists in that niche). A second approach specifically uses the findings of a research project to train professionals within the relevant area.

Table 13 below illustrates the frequency of these four categories in each thematic group. It should be noted that one project can fall into multiple categories. For example, the ESR training programmes also provide contributions by facilitating the implementation of individual research projects, which can fall in any of the above categories depending on the aims of the programme.

Table 13: Types of contribution per theme

	Biodiversity (7 projects)	Sustainable transport (9 projects)	Eliminating pollution (9 projects)	Clean energy (8 projects)	Agriculture (5 projects)	Climate action (8 projects)
Addressing key challenges or uncertainties						
Contributing knowledge to enhance innovation capacity						
Contribution towards best practices/strategies/policy						
Training of professionals						

Key: Number of projects directly relevant for the category

1 - 2
3 - 4
5 +

The projects require future funding and support needs to a) ensure that they can contribute to better policy making, and b) deliver further research and development based on the project results. In practice, this means the following:

- Funding that **supports future research** can help the projects develop and build on the findings and, where appropriate, develop applied research in line with the Green Deal priorities and aims.
- **New connections with the relevant authorities** would also help scale up project contributions, and ensure that the results and recommendations emerging from the projects are implemented in policy development at all levels.
- Many of the innovative projects in the portfolio are still at theoretical or conceptual level, and are not yet at the stage where they can be picked up by enterprises for market uptake of the research outcomes. Therefore, a **mix of public and private funding** is required, to allow for continued development of the concepts and to minimise the risk and increase attractiveness for private investors. These projects, depending on their stage of development, may also benefit from support with e.g. **business plans** and **intellectual property management training**.
- Projects contributing trained experts would benefit from support that **enhances their training capacity** – for example, access to forums and networking opportunities. On the other hand, the experts themselves benefit from support that allows them to **continue their professional development** and utilise their skills (employment support).

It should however be noted that a flexible approach is necessary for providing support and funding, taking into consideration the individual needs of the projects and the development of knowledge, as well as how these evolve as the project develops. It is therefore important to ensure that the projects can proactively access the type of support they consider most appropriate for their needs.

5.2 Project synergies and clustering

Establishing synergies between projects and other stakeholders for **information exchange and interaction** can further support the projects and their ability to contribute to the European Green Deal. The four categories discussed above can act as a starting point for creating clusters of projects for mutual support and learning. **Platforms serving as "meeting places"** could allow the projects to interact with both decision makers and actors in industry in order to exchange information and discuss the needs of all parties. It is also important to involve **national authorities**, who can benefit from the best practices and strategies, as well as awareness of concepts moving towards market solutions and new knowledge that can inform policy.

The clusters can have the following specific benefits for the different types of projects (according to categories discussed above in section 5.1):

- The **"knowledge"** and **"policy"** clusters can facilitate the transfer and exchange of information by providing a common platform for projects and the decision makers at EU and national levels. These clusters can also support the exchange of information and skills between the projects, including on collaborating with stakeholders from non-EU countries where relevant, as well as common dissemination activities.
- The **"innovation"** clusters can support theoretical research where required, equally to the "knowledge" and "policy" clusters, but they can also make connections with enterprises to support further technology development of the concepts developed by the projects. Of particular importance is also the identification of the different types of funding available, depending on the stage of development and aims, and facilitating connections with private funders. Where the ambition exists to further develop the technology towards a marketable product, public funding can also help bridge the gap and minimise the risk for private investors.
- The **"training"** clusters can provide networking opportunities for the early-stage researchers and other professionals. They can support information exchange, including collaboration with non-EU partners and countries, and they can support further professional development and cross-border movement and cooperation with/between researchers. These clusters can also play a role in supporting ESRs in finding employment and funding.

These clusters and related platforms can also be utilised to connect the MSCA projects with other EU-funded projects to further exchange and disseminate knowledge and provide feedback to policy.

5.3 MSCA contribution to the European Green Deal

Even with a relatively small project portfolio (46 projects in total), the contribution covers a broad range of policy areas and priorities linked to the European Green Deal. While some policy priorities are addressed more commonly than others (as seen in Table 12), multiple priorities are addressed in each thematic group. It should also be noted that the priorities themselves have different scopes, which may explain why some of them 'fit' a larger number of projects than others.

There are some synergies between priorities of the different themes, and consequently the contributions of projects. Examples of this include:

- The Biodiversity Strategy references the priorities of the new CAP and Farm to Fork, as well as the Zero Pollution Action Plan and the decarbonisation of energy goal. Consequently, as certain policy priorities of agriculture also become priorities of biodiversity, the contributions of the relevant projects apply to both thematic areas. In the agriculture group, this applies e.g. to the projects aiming to reduce the use of chemical pesticides and fertilisers.
- Similarly, a project under the agriculture theme helps to develop climate adaptation strategies for small farmers in a non-EU country, thus also contributing to climate action. On the other hand, a project in the Climate Action theme aims to develop improved strategies for N_2O control in wastewater treatment plants, thus also contributing to the Zero Pollution Action Plan.
- One project in the pollution theme aims to improve the objective verification of Non-CO2 emissions, therefore directly contributing towards the priority in the Climate Target Plan. Three projects under the pollution theme focus on substances from agricultural areas polluting waterbodies (e.g., groundwater, surface water) which may be considered to be relevant for the priority of *environmental care* of the Common Agricultural Policy (CAP).
- All projects in the clean energy theme concern renewable energy, hydrogen or energy efficiency, therefore (by default) contributing to the aim of climate action to reduce emissions.

While these connections are largely the result of interconnectedness of the different policy areas of the Green Deal, the benefits of the synergies should be maximised when disseminating results and enhancing visibility of the MSCA projects. It is important to note that due to these synergies, the interested audience will go beyond a single thematic area.

The types of outputs, and the manner in which the projects implement their contributions towards the policy priorities, are also varied and include both concrete outputs (e.g., new methods and tools as well as innovative concepts) and more theoretical outputs (e.g. new or improved knowledge and understanding of key aspects of the Green Deal and the environment). While there are minor differences in the types of contributions the thematic groups make (such as a higher number of contributions towards innovation in sustainable transport and lower in biodiversity), the contributions and needs of the groups are not significantly different. However, within a group the needs of different projects can be very different, depending on the scale, aims and approach of the project. This needs to be taken into consideration when planning for measures to support the projects or to ensure policy benefits from the results.

As noted in section 4.4, much of the dissemination of the project results and findings takes place through peer-reviewed journals, academic conferences and other events. However, the projects also frequently publish non-peer reviewed reports and documents intended for broader audiences, and engage in a variety of dissemination activities through different media. The majority of the peer-reviewed articles in the portfolio are also publicly available, and some of the projects provide free open-source databases, making the knowledge further accessible to a wider audience, including the policy and decision makers at

national and EU levels. Further support for open access publishing can thus further improve the ability of the MSCA projects to contribute to the European Green Deal.

The Marie Skłodowska-Curie programme supports excellence in research and innovation. As demonstrated in this portfolio analysis, the projects selected through a bottom-up approach provide vast thematic contributions to the EU Green Deal. Additionally, the manner in which the projects of the portfolio implement their contributions towards the policy vary, ranging from the development of new pilot technologies, to addressing specific knowledge gaps. The programme furthermore supports researchers in different stages of their career, helping them establish new links with industry and other research institutions and helping them become specialists in their niche. As also discussed during the MSCA European Green Deal Cluster Event[66], a unique value-delivering element of the programme therefore is that it creates the opportunities which allow researchers to experiment with new and innovative ideas and solutions in controlled environments - along their specific development paths.

The participants at the roundtable of the closing plenary of the Cluster Event also highlighted that regular communication channels should be established with policy makers to make the most of scientific findings for policy development. This could be done through the knowledge and policy clusters and related platforms suggested in Section 5.2. Additionally, it was recommended that efforts should be made within the Marie Skłodowska-Curie Actions to help tailor communication stemming from projects to the policy context. This report contributes a step towards such efforts by mapping some of the thematic priorities of the EU Green Deal and by providing insight on how a sample of projects within the programme contribute to these. This can be used as a basis to further translate scientific findings and establish a feedback loop to better enable the joint design of solutions to contribute towards the objectives of the EU Green Deal.

[66] The MSCA European Green Deal event took place between 6 -7 July 2021.

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