



The Marie Skłodowska-Curie Actions Green Charter Survey

Greening practices in MSCA projects

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EUROPEAN COMMISSION

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Contents

1.	Introduction.....	4
2.	Policy background	4
3.	Marie Skłodowska-Curie actions survey and main findings	6
	Methodological considerations	6
	State of play – awareness of policy measures.....	7
	Green considerations for research practices	7
	Funding, support measures and challenges	10
4.	Reflections for future action	13
	Annex – Marie Skłodowska-Curie actions green success stories	16

1. Introduction

The Marie Skłodowska-Curie actions (MSCAs) are the EU's flagship programme for the international mobility and training of researchers and the development of excellent doctoral programmes. As part of the EU's research and innovation framework programme (currently Horizon Europe, covering 2021–2027), the MSCAs have been well known and appreciated for their bottom-up nature – their openness to any research topic or discipline, with excellence as the main selection criterion. While maintaining its thematic openness, the programme is strongly committed to EU priorities and values, including in relation to the climate and environmental challenges addressed by the [European Green Deal](#) (EGD).

The MSCAs' contributions to the EGD can be presented in two ways: **content-wise**, through MSCA-funded projects contributing to the objectives of the EGD (research on relevant topics); and **process-wise**, by encouraging the take-up of green and sustainable practices in the implementation of MSCA projects, in line with the principles of the green transition.

Content-wise, the first policy initiative focusing specifically on the MSCAs' contribution to the EGD was the [2021 MSCA Cluster event on the European Green Deal](#). The event featured more than 80 MSCAs and other EU-funded projects in areas relevant to the objectives of the EGD. The [event report](#) provides a helpful overview of the topic and inspirational examples of research and practices in MSCAs and other EU-funded projects (Erasmus+, the European Institute for Innovation and Technology, Creative Europe). In the same vein, in 2022, an [MSCA Cluster event on Mission Oceans and Waters](#) was held, touching on topics with strong links to the EGD. Building on these initiatives, the European Commission is now designing new formats to streamline the contribution of MSCA-funded projects in fulfilling the EU's green objectives.

Process-wise, the Commission has developed the [MSCA Green Charter](#) as a measure to raise awareness and provide guidance to MSCA beneficiaries to adopt sustainable project activities. Developed in consultation with experts on the subject and published in 2021, the MSCA Green Charter is a code of good practice for individuals and institutions in receipt of MSCA funding, regardless of the topic of their project. Accompanied by guidance material, it lays down a set of general principles and objectives that promote sustainable practices in line with the EGD and the United Nations' 2030 Agenda for Sustainable Development. All MSCA participants are expected to adhere to the Green Charter on a 'best effort' basis and to commit to as many of its provisions as possible when implementing their projects. While the MSCA Green Charter is not binding, candidates for funding under Doctoral Networks (DNs), Postdoctoral Fellowships (PFs), Staff Exchanges (SEs) and COFUND have been requested, since 2023, to explain in their application forms how the proposed project would adhere to the MSCA Green Charter during its implementation. As of 2024, environmental considerations in line with the MSCA Green Charter will constitute an additional potential criterion to help decide between equally excellent and impactful proposals.

2. Policy background

Several legal and policy documents affirm commitments to ensuring the uptake of sustainable practices in relation to research, innovation and education.

The **regulation** establishing the Horizon Europe programme ⁽¹⁾ states the following among the programme objectives under Article 3(2)(b) (emphasis added):

*to generate knowledge, strengthen the impact of R&I in developing, supporting and implementing Union policies and support the access to and uptake of innovative solutions in European industry, in particular SMEs, and in society to **address global challenges, including climate change and the SDGs**[.]*

Respect for sustainable practices is also referenced in the **Horizon Europe programme guide** ⁽²⁾, specifically in relation to the 'do no (significant) harm' principle. This principle aims to ensure that activities funded under the EU budget do not cause significant damage to any of the objectives of the EGD. It was mentioned, in relation to economic activities, in the EU regulation establishing a framework to facilitate sustainable investments ⁽³⁾, commonly known as the EU taxonomy regulation. Article 9 of this regulation lists **six environmental objectives**, while Article 17 specifies what can constitute 'significant harm' in relation to these objectives, as follows.

1. An economic activity is considered to do significant harm to **climate change mitigation** if it 'leads to significant greenhouse gas emissions'.
2. An economic activity is considered to do significant harm to **climate change adaptation** if it 'leads to an increased adverse impact of the current climate and the expected future climate, on the activity itself or on people, nature or assets'.
3. An economic activity is considered to do significant harm to the **sustainable use and protection of water and marine resources** if it is detrimental 'to the good status or the good ecological potential of bodies of water, including surface water and groundwater' or 'to the good environmental status of marine waters'.
4. An economic activity is considered to do significant harm to the **circular economy**, including waste prevention and recycling, if it 'leads to significant inefficiencies in the use of materials or in the direct or indirect use of natural resources', if it significantly increases 'the generation, incineration or disposal of waste' or if 'the long-term disposal of waste may cause significant and long-term harm to the environment'.
5. An economic activity is considered to do significant harm to **pollution prevention and control** if it 'leads to a significant increase in the emissions of pollutants into air, water or land'.
6. An economic activity is considered to do significant harm to the **protection and restoration of biodiversity and ecosystems** if it is 'significantly detrimental to the good condition and resilience of ecosystems' or 'detrimental to the conservation status of habitats and species, including those of Union interest'.

The same article further specifies that **both the activity and its products and services** should be taken into account when assessing the environmental impact against the six objectives.

⁽¹⁾ Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the framework programme for research and innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013 (OJ L 170, 12.5.2021, p. 1, ELI: <http://data.europa.eu/eli/reg/2021/695/oj>).

⁽²⁾ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf.

⁽³⁾ Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (OJ L 198, 22.6.2020, p. 13, ELI: <http://data.europa.eu/eli/reg/2020/852/oj>).

The MSCA Green Charter can be seen as a pioneering document adapting the ‘do no significant harm’ principle, as well as the broader objectives of the EGD, to activities funded by the MSCA ⁽⁴⁾. The charter itself was acknowledged and obtained high-level support in the Commission communication on a **European strategy for universities** ⁽⁵⁾. In addition, the **work programme for the MSCAs** clearly states the commitment to promoting sustainable research and measures to minimise environmental footprint, in line with the EGD ⁽⁶⁾.

*The MSCA support bottom-up and frontier/applied research contributing directly to the European Commission’s commitment to tackling climate and environmental-related challenges. Under Horizon Europe, the MSCA will significantly contribute to promote sustainable research in line with the European Green Deal, the United Nations’ 2030 Agenda and the Sustainable Development Goals. All MSCA-funded projects are encouraged to address the principles of the **MSCA Green Charter** and implement measures to minimise the environmental footprint of their activities.*

3. Marie Skłodowska-Curie actions survey and main findings

To assess the initial uptake of the MSCA Green Charter and define future policy orientations, the Commission carried out a survey in 2023 of all MSCA projects selected under the 2021 calls for proposals for DNs, PFs, SEs and COFUND. The aims of the survey were to inform the Commission of the general developments in greening strategies among MSCA participants, to learn whether the Green Charter can and does help in furthering sustainability considerations and measures and to understand what kind of support is needed at the EU and institutional levels to advance green and sustainable research practices in MSCA projects. This report provides an overview of the main findings, along with reflections on future action by the Commission and the MSCA project community.

Methodological considerations

The survey was initially sent to the coordinators of the 1 385 MSCA projects selected for funding under the 2021 calls, of whom 262 replied, which represents a response rate of 18.9 % at the project level. Coordinators were also asked to forward the survey to their project partners and individual researchers (in the case of PFs), leading to a total of 529 responses. Of these responses, the largest share come from DNs (MSCA-DN, 45 %), followed by PFs (MSCA-PF, 42 %), SEs (MSCA-SE, 11 %) and COFUND – (2 %). With regard to the MSCA-PF action, 46 % of replies came from individual researchers and 54 % from host institutions. Except for the COFUND action, where the response rate is much lower, the share of responses is a good representation of the distribution of participation in the respective MSCAs (Figure 1).

⁽⁴⁾ In related areas, see the Council recommendation on learning for environmental sustainability, <https://www.consilium.europa.eu/en/press/press-releases/2022/06/16/council-adopts-recommendation-to-stimulate-learning-for-the-green-transition/>; the Education for Climate community, <https://education-for-climate.ec.europa.eu/community/>; the Erasmus+ Charter for Higher Education, <https://erasmus-plus.ec.europa.eu/resources-and-tools/erasmus-charter-for-higher-education>; and the European Climate Pact, https://climate-pact.europa.eu/index_en. See also recently the Commission Proposal for a Council recommendation “Europe on the move – a proposal on the future of learning mobility”.

⁽⁵⁾ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0016>.

⁽⁶⁾ https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-2-msca-actions_horizon-2023-2024_en.pdf

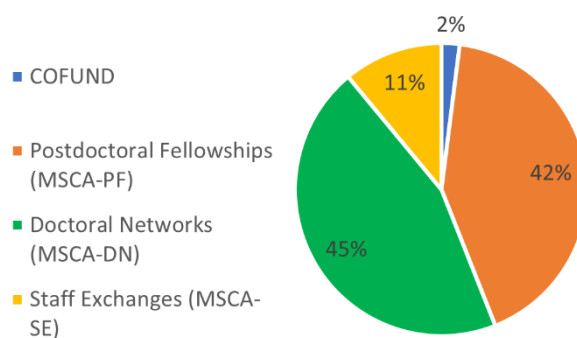


Figure 1. Distribution of responses according to MSCA type

A large majority (88 %) of respondents represent the academic sector (e.g. universities, public research institutes), followed by small and medium-sized enterprises and large enterprises, and private non-profit organisations (around 3 % each). Knowing that the share of academic organisations in the programme is around 75 %, this is a clear over-representation of the academic sector.

State of play – awareness of policy measures

The results show that 45 % of respondents were already aware of the EGD and its objectives, 35 % were vaguely familiar with the EGD and 20 % were not at all familiar with it. Looking at each action, 38.5 % respondents (individual and institutional) involved in PFs were familiar with the EGD and its objectives, 35 % were vaguely familiar and 26 % were not at all aware. On the other hand, 50 % of DN coordinators and partners were aware of the EGD, along with slightly more than half of SE respondents (52 %) (with respectively around 16 % and 14 % not being familiar at all).

Similarly, 44 % of respondents were already aware of the MSCA Green Charter, consisting of 34.5 % of all PF respondents, 50 % of SE respondents and 53 % of DN respondents.

At the same time, 61 % of respondents stated that their institutions already have a strategy in place to promote sustainable research and the adoption of green practices in research activities; the replies here were very similar for both the MSCA-PF action (61 %) and the MSCA-DN action (63 %), and slightly lower for SEs (52 %). Only 7 % stated that their institutions do not have such strategies in place, while as many as 32 % did not know whether their institutions had such strategies in place or not.

Of the 61 % of respondents whose institution has a strategy in place to promote sustainable research and green practices, almost half (48 %) were already aware of the MSCA Green Charter. Of these, 17 % considered that the MSCA Green Charter promotes to a large extent the integration of environmental considerations that are not provided for by the institutional strategy, while around 34 % saw its added contribution to existing strategies as being moderate in extent.

Green considerations for research practices

As already noted, the good practices in the MSCA Green Charter are intended as guidance to all recipients of MSCA funding, be they individuals, institutions or consortia. They also address various aspects of project implementation in the promotion of mainstreaming environmental considerations. The measures described in the MSCA

Green Charter should serve as guiding principles for individual researchers, institutions and consortia, bearing in mind that the list of measures is not exhaustive and can be complemented by other initiatives, whether they are outlined in the institutional strategies or not.

When asked about 'green' considerations in their MSCA project, 71 % of respondents stated that they will, over the lifetime of their MSCA project, take measures to integrate environmental considerations in line with the MSCA Green Charter. Only 3 % reported that they have no plans to do so. The vast majority of DN and SE respondents (76 % and 74 % respectively) reported plans to integrate environmental considerations into their MSCA project; the rate was lower for PF respondents (65 %). The share of positive answers is not surprising, knowing that more than 60 % of respondents already work with institutional strategies that incorporate many of the Green Charter principles.

The respondents were further asked to specify the greening measures by choosing from a list of proposed options or by naming other planned activities not listed in the questionnaire. They were asked to reply from different positions: on behalf of the institution they represent, on behalf of the consortium/project they represent and as an individual. Regardless of the type of role the respondents had (individual, institutional, project representative), the most frequently mentioned greening measure pertains to **online conferencing and limiting physical meetings to the necessary minimum**. Other measures vary depending on the role the respondents assumed in their replies, but when responding both on behalf of the individual institutions and as consortia representatives they state the intention to support and **engage MSCA fellows** in minimising the environmental impact of their research and aligning it with the Green Charter. The top five responses according to the role assumed in responding are listed below.

The top five measures that respondents plan to undertake **on behalf of their institutions** to incorporate green practices in line with the charter are:

- **encouraging teleconferencing and hybrid conferencing** in those cases where physical presence is not strictly necessary, and providing training to researchers in the efficient use of such tools (59 %);
- **supporting MSCA researchers** in developing greater awareness of environmental sustainability (54 %);
- **providing support and guidance to MSCA fellows** in monitoring and minimising the environmental impact of their research activities (53 %);
- supporting the use of the **most sustainable and low-carbon forms of transportation** possible, even where other more economical or faster travel options exist (49 %);
- promoting the use of **sustainable, renewable forms of energy** and monitoring and seeking to reduce energy and water consumption in the context of the project (46 %).

In terms of the MSCA **consortia's** plans to incorporate green practices, the top five replies involved:

- promoting the use of **teleconferencing and online tools**, including for training and project meetings, as a complement to physical mobility (58 %);

- actively **minimising the environmental impact** of the project and promoting the sharing of best practices within the consortium (49 %);
- **organising project-related events as sustainably as possible** (number and duration of events, location, travel arrangements, accommodation, catering, handouts, etc.) (47 %);
- **actively involving and engaging MSCA fellows** in all aspects of the consortium's efforts at implementing the provisions of the charter (43 %);
- **promoting green purchasing** for project-related materials and sustainable alternatives to single-use plastics and consumable items (38 %).

When it comes to **individual ways** to incorporate green practices, the five most frequent replies are as follows:

- employing **teleconferencing tools** as a complement to physical attendance at events where such attendance is not strictly necessary nor advantageous (72 %);
- **preventing or minimising the production of waste and harmful substances** and – where possible – sorting, reusing and recycling any waste by-products that are unavoidably produced (64 %);
- prioritising **low-carbon forms of transportation** for project-related travel, including commuting (61 %);
- minimising the **use of energy, water and other scarce resources** (59 %);
- **mainstream sustainability and environmental considerations** in the project's implementation, including teaching and learning (55 %).

Several additional points were raised by the respondents in terms of possible measures to incorporate green practices.

For example, 'environmental aspects should be mainstreamed throughout the implementation of the work plan' (see also the table below).

Example: one project's list of commitments for sustainability

- Ensuring the sustainability of events by directing hosting organisations to choose local organic catering, favour paperless formats and, when possible, secure local 'green event' labels.
- Using forms of transport with the lowest possible emissions by mandating train travel when the journey time would be under 5 hours.
- Compensating for travel-related carbon by way of a participatory carbon-offset budget managed by the researchers.
- Using sustainable and renewable forms of energy by making sure that all servers used by the project are based in the EU and that their energy consumption has been certified as sustainable.
- Developing awareness and best practices by encouraging partner organisations to present their green practices while having the researchers directly involved in managing the carbon-offset budget.

The same project highlights an active effort to **measure the carbon impact of project activities** by assessing all mobility funded by the project (e.g. for training

events, project meetings and participation in international conferences) on at least an annual basis and reporting to the board. The goal of this implementation plan is twofold: on the one hand, to track the project's real-world footprint to monitor whether it remains within the projected amount; on the other, to invest the necessary carbon mitigation funds in line with the real-world carbon footprint of the project. Accordingly, a **provisional carbon budget** was set aside as part of the project's management costs. Similar measures and budgetary solutions were raised by other respondents, such as combining network meetings with other activities where most participants are already present, for example in conjunction with a major conference, in order to minimise travel.

Some examples point to the **existing institutional policies** that support greening practices in projects, such as using renewable energy sources, using certified green power only, having an energy monitoring system and mandatory train travel when the journey time is under a certain number of hours, even if flying is a cheaper option.

Other respondents suggested that, for lab-based projects, it would be good to get involved in **Green Lab** or **Sustainable Lab**, which are international initiatives and programmes that advocate for and support green and sustainable laboratory practices.

Very few respondents reported the existence of a **specific team or department** in their institution/organisation dedicated to raising awareness of or spreading good practices in relation to green and sustainable action.

As mentioned above, most remarks pertain to green travel or reducing travel, followed by the use of recyclable materials. On the former, the feedback is mixed: while the respondents agree on the need to reduce the related carbon footprint, some also point to the relevance of physical meetings or the fact that green travel is not readily available to everyone (in terms of either funding or logistics). When it comes to the use of recyclable materials, a few respondents remarked that the purchase of materials is frequently regulated at a central level in the institution. As noted by the respondents, both practices – green travel and green purchasing – would require more funding in cases where they would be more costly options.

Funding, support measures and challenges

Very few respondents stated that they are receiving financial support (from the institution or external sources) for the integration of environmental considerations into the MSCAs project. However, only around 15 % stated that the lack of financial support is an important factor limiting what could be achieved in terms of incorporating environmental considerations into the projects. When asked about the **financial resources** necessary to comply with the MSCA Green Charter and the **areas** in which these would be particularly useful, the respondents mainly mentioned the following (Figure 2):

- more funding for switching to green alternatives where these would be more expensive;
- higher travel budget (as trains can be more expensive than planes);
- more funding for projects that involve greener methodologies;
- financial support to replace single-use items with high-quality, reusable items.

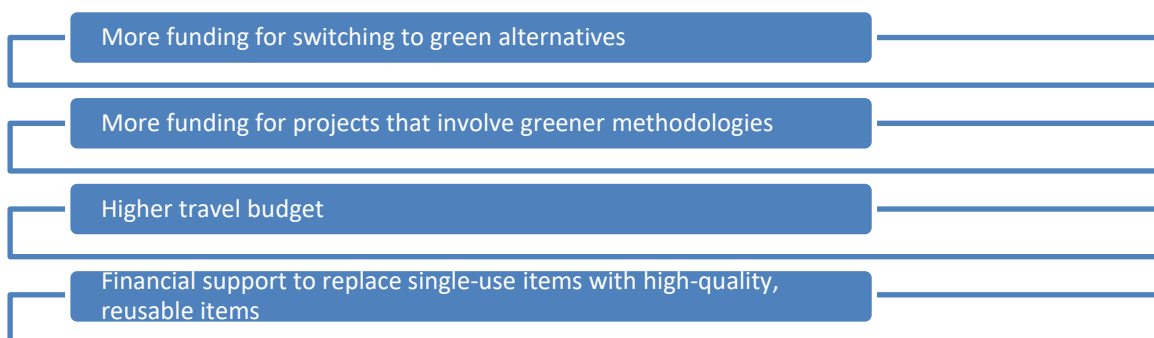


Figure 2. Financial resources necessary to comply with the Green Charter

More than 75 % of respondents stated that they did/do not expect **challenges** in the integration of environmental considerations into their MSCA projects. The main challenges identified among the 21 % of the respondents who expect to encounter difficulties could be summarised as follows.

1. **Lack of or inadequate policies or funding** to purchase green alternatives or use sustainable energy sources and **lack of financial resources** to use alternative means of transport (as it was underlined several times that can be more expensive than planes).
2. Difficulties in changing people’s **habits/mindset** and lack of incentive to change on the part of the institutions. For example, the perceived value of in-person meetings outweighing the virtual set-up.
3. Difficulties in using **carbon offsetting** at the local level.
4. Being overambitious – the need to set **reasonable and not overambitious targets**.

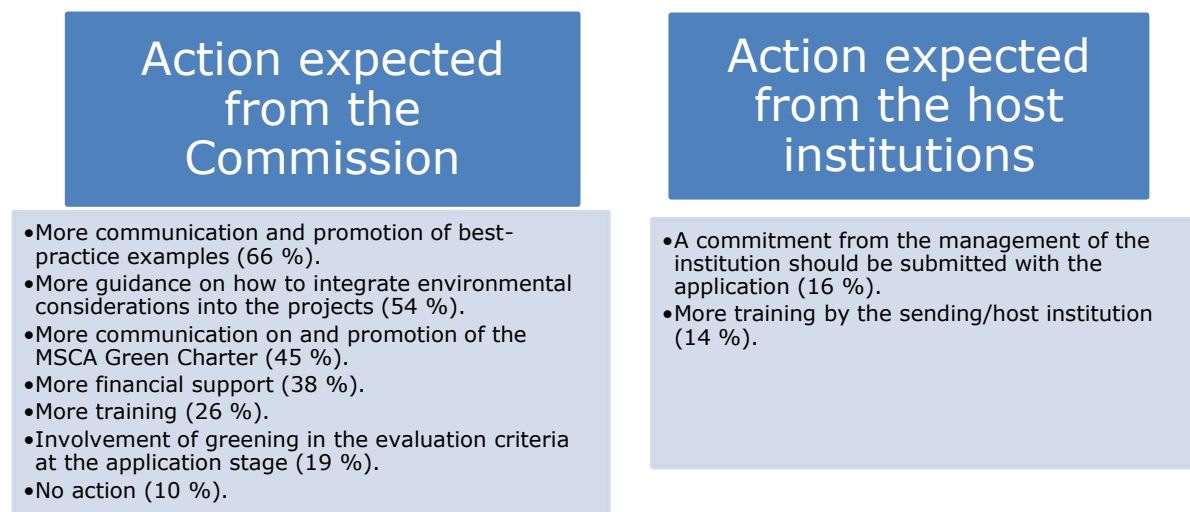
Respondents were asked about the **type of support** that would be needed to align more and better with the Green Charter – the survey provided a number of possibilities and left space for respondents to add new proposals. The respondents mainly called for the **sharing of best-practice examples** (how to implement the Green Charter), **training** to promote and familiarise project staff with the MSCA Green Charter, training on carbon offsetting and training on green purchasing and waste management (Figure 3).



Figure 3. Type of training support indicated by respondents

Similarly, the respondents were asked about the **type of support expected from the Commission** in order to make the MSCAs greener in the future (multiple choices offered and space to propose additional measures). Two thirds of respondents suggested that the Commission should **communicate more** and promote best-practice examples. More than half want **more guidance** on how to integrate environmental considerations into projects and 45 % suggested **more communication on and promotion of the MSCA Green Charter**. Around 40 % of respondents think that the Commission should provide **financial support** and 26 % would like the Commission to provide **more training**. Around 15 % suggested more training by the sending/host institution. Around a fifth of respondents propose that the Commission should include greening in the evaluation criteria at the application stage and 16 % would like an expression of commitment by the management of the institution to be submitted with the application. Only 10 % stated that the current approach is sufficient and that the Commission does not have to do anything further.

In terms of training and guidance more specifically, respondents asked for **short, simple, practical examples and guidance on implementing green considerations in everyday work**, implementing the Green Charter and explaining the Green Deal and the charter in more detail.



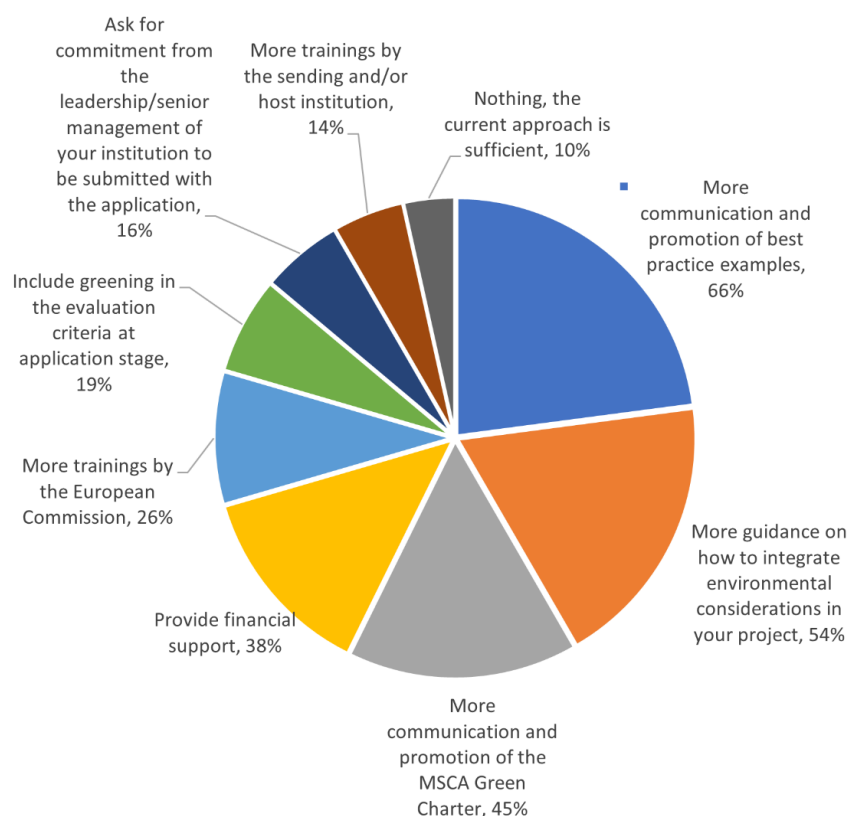


Figure 4. Type of support expected from the European Commission

4. Reflections for future action

The results of the survey show that both the organisations and the individual researchers involved in MSCA projects need to be made **more aware** about the EGD and the MSCA Green Charter. As confirmed by the respondents' feedback, the **Commission should communicate more about the Green Charter** and should provide **guidance** on its implementation and the greening practices it encourages. In this regard, the Green Charter seems complementary to existing institutional strategies, which are not an exception, according to the findings.

The results also point to varying levels of awareness depending on the MSCA. While each MSCA has its own specificities in terms of the numbers of beneficiaries of the project, the profile and experience of the researchers and the objectives of the actions, the findings can help to reflect on the ways in which the Green Charter is promoted to applicants and beneficiaries across the actions and at the level of the programme at large. Consequently, information about the Green Charter could be added to the **information sessions** organised for potential applicants and for the coordinators of projects that are selected. This would ensure that all MSCA-funded projects receive relevant information materials at the start of the project and that the people involved are aware of the charter and the guidance materials.

It is clear from the respondents' feedback there is a strong need for short, simple, practical **training**, and that the Commission could provide such an opportunity. Given

the bottom-up nature of the MSCAs and the variety of requirements that would have to be covered by highly customised training, the Commission could aim to bring MSCA participants and researchers together for targeted exchanges and the promotion of good practices. In addition, such exchanges would lead to community building and enable a follow-up for more concrete exchange among projects, depending on the topic, scientific panel and specific research needs.

While very few respondents report receiving additional **funding** for their MSCA project, only 15 % consider a lack of financial support to be an important limitation to incorporating more environmental considerations into MSCA projects. Furthermore, 75 % of respondents were confident about the implementation of their project in relation to green and sustainable principles and practices, meaning that they did not expect major challenges in project implementation. Funding comes only fourth in the types of support expected from the Commission, and it is raised less often by the respondents than specific suggestions on training and guidance they would like to receive. When funding is mentioned, however, it is mainly in the context of **green travel** (more funding for greener options) and **green purchases**, which can be more costly. The training needs expressed by the respondents relate to more systemic measures (green purchases, management of waste, material, resources or carbon offsetting in general).

Notably, the existence of **peer and training networks at the national or international level** can be of strategic value (e.g. Green Labs Austria, sustainable laboratories in Germany through federally funded projects). The MSCA project networks are also an excellent international community for peer learning and exchange, which could be further exploited through meetings, training courses and information sessions to share good practices and updates. Such opportunities for exchange could potentially lead to further initiatives by decision-makers at those institutions that do not have relevant strategies in place.

Not surprisingly, **institutional approaches** appear at the same time to be both enablers and inhibitors of greening practices, depending on the mindset and uptake of decision-makers, procurement practices (in terms of equipment and material standards or the level of centralisation) and the commitment of resources – not only financial but also human (dedicated staff working on the topic).

Despite some respondents promoting mandatory adherence to the charter in MSCAs, softer approaches may be preferred for the time being, noting that institutional strategies exist in more than half of the responding institutions and that the Green Charter covers considerations similar to these strategies. Where this is not the case, MSCA participants – particularly from higher education institutions – could consider using the Green Charter as a tool to advocate for greener and more sustainable institutional practices. As noted by some respondents, making adherence to the charter a requirement in MSCAs might bring with it more of an administrative burden than it would add value. Instead, different forms of recognition can be developed to reward the efforts made in greening project practices.

Finally, this is the first exercise of its kind in MSCAs, and similar policy feedback activities are envisaged in the future to monitor the uptake of the Green Charter and respond to

needs in the MSCA community in relation to sustainable and green research practices. In addition, the MSCAs have a strong support network of researchers and experts who can gather feedback for both national decision-makers and the Commission: MSCA national contact points ⁽⁷⁾, the MSCA Alumni Association ⁽⁸⁾ and the project officers in the European Research Executive Agency managing individual MSCA projects ⁽⁹⁾.

⁽⁷⁾ <https://msca-net.eu/contact-points/>.

⁽⁸⁾ <https://www.mariecuriealumni.eu/>.

⁽⁹⁾ https://rea.ec.europa.eu/funding-and-grants/horizon-europe-marie-sklodowska-curie-actions_en.

Annex – Marie Skłodowska-Curie actions green success stories

Through the work of the MSCA Alumni Association and project officers from the European Research Executive Agency, some projects have already been identified for their good practice in environmental and greening practices. The list is not exhaustive, and the Commission will be working regularly on the uptake of the Green Charter and good practices among MSCA projects.

Volcanoes: eruptive style, pre-eruptive evolution and risk (Vesper)

MSCA Individual Fellowship, 2018–2020

Europe is home to more than 60 active volcanoes, including two of the most active in the world. The main objective of this project was to understand the periodicity and style of volcanic eruptions to mitigate hazards and risks to communities living near volcanoes. Reducing these risks requires knowing when, why and how volcanoes erupt.

Dr Jane H. Scarrow, the lead researcher in the Vesper project, successfully contributed to the more sustainable implementation of the project's research activities in several ways, such as using only the quantities of laboratory acids strictly necessary for the processing of samples and requiring the use of low-carbon forms of transportation, such as trains and bicycles. Additionally, she reduced travel where possible, substituting it with teleconferencing tools even before the COVID-19 pandemic made this a regular practice.

Taking into consideration the [UN sustainable development goals](#) (SDGs), the project also made a concentrated effort to implement SDG 4, 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all', in particular by reaching out to the public through events and publications. For instance, Dr Scarrow was active in the preparation of a Marie Skłodowska-Curie ambassador outreach pack for primary school children and in European Researchers' Night activities at the Natural History Museums in London and in Brussels. By participating in such outreach activities, the project aimed at contributing to the wider development of a sustainable society.

Project website: <https://volcanoutreach.uea.ac.uk/>.



Image 1:
Presentation of the project at Science is Wonderful! 2019, Brussels

Inflaming the microenvironment of glioblastoma tumors by ADAR1 inhibition: a two-hit approach for the treatment of brain cancer – GlioTarget

MSCA Individual Fellowship, 2021–2023

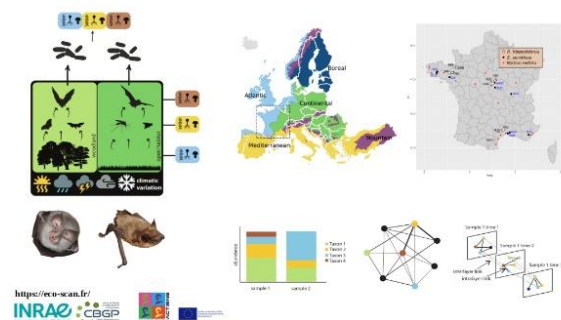
The brain is our most precious organ. Not only does it orchestrate vital body functions, it also stores memories and experiences, ultimately defining the core of our human nature. Brain malignancies are particularly disheartening because they disrupt our ability to perform as individuals and hinder our social interactions. Glioblastomas are the most frequent and lethal form of primary brain tumour, with a median survival time of 14.6 months and 15 000 newly diagnosed patients per year in Europe and the United States. Current therapies invariably fail, likely due to the extreme genetic heterogeneity of glioblastomas and the presence of a highly immunosuppressive tumour microenvironment. The GlioTarget project aimed to exploit an innate immunity checkpoint to target both cancer cells and their tumour microenvironment.

In line with the MSCA Green Charter, this individual fellowship project implemented several initiatives in order to minimise its environmental impact. A more careful approach was applied in relation to disposable materials, such as minimising their use as much as possible. Examples included reusing flasks when passaging cells in culture, changing pipette tips only when strictly necessary, using the same pair of gloves for several experiments and employing the same set of disposable surgical tools when working with several subjects. Using ethanol to clean disposable materials (gloves, surgical tools, etc.) is a great way to extend their lifetime.

A great deal of attention was also paid to monitoring the equipment in the laboratory, making sure that everything was switched off when not in use (cell culture cabinets, centrifuges, microscopes, room lights, computer screens, etc.). Additionally, an automated system was in place that turned off the laboratory lights after a certain amount of time. Personal cups and reusable water bottles were available in the common areas.

Finally, in order to avoid unnecessary emissions, low-carbon forms of commuting such as on foot or by bike were favoured where possible. Similarly, online meetings and courses were preferred over in-person meetings, particularly when the latter would involve travelling to other countries.

Guano-based monitoring of ecosystems – a novel approach to capture ecological processes underlying ecosystem health (Ecoscan)



MSCA Individual Fellowship, 2020–2022

Image 2: Ecoscan project

Climate change is arguably the most pressing challenge facing all life on earth, threatening human health, ecosystem integrity and the survival of vulnerable

species and habitats. Monitoring ecosystem health is critical for the early detection of imbalances, but current approaches measure the end state, not the mechanisms driving patterns of change. The Ecoscan project introduced a new method of monitoring by observing more closely the mechanisms that transform the environments.

This individual fellowship successfully implemented the guidelines of the MSCA Green Charter to minimise its environmental impact. For the purposes of the research, fieldwork took place once per month, from May to September, at 19 sites across France. In order to minimise travel to any of these sites, partnerships were established with local volunteers, who collected samples using metal forceps. These samples were then posted in envelopes padded with paper instead of plastic. After receiving the samples, the envelopes were also reused. The process of sampling involved visiting the site in the evening and again the following morning. Some of these sites were located in remote areas and, to avoid unnecessary commuting, researchers camped there overnight.

To lessen the environmental footprint of the research activities, the waste produced in the laboratory was recycled where possible. On an individual level, researchers favoured low-carbon modes of transportation, used non-disposable cups and took care not to waste food or electricity. Even though the project had already planned to minimise travel to conferences, the COVID-19 pandemic made virtual meetings a necessity. Any future project-related travel emissions were compensated for through carbon offsetting.

Project website: <https://eco-scan.fr>.

Investigation of plant biostimulating properties of feather protein hydrolyzate and the effects on symbiotic microorganisms (Biostisym)

MSCA Individual Fellowship, 2017–2019

One of the greatest challenges in the EU and worldwide is reducing the negative environmental impact of modern agriculture. The use of environmentally friendly products, such as plant biostimulants generated from waste products, may hold the key to new sustainable crop production systems. The aim of this project was to develop a new biostimulant based on feather protein hydrolysate, a waste product that would otherwise be disposed of with a negative impact on the environment, which can enhance plant growth and/or stress resistance and can act in synergy with symbiotic microbes to promote their growth/functioning.

The Biostisym project successfully increased public awareness of the necessity to develop eco-friendly agricultural products sustainable agricultural products. In this regard, lectures and internships were organised under the initiative of the Czech Academy of Sciences' 'Do not be afraid of science' programme to promote science among secondary school students. Students therefore participated regularly throughout the year in the establishment, measurement and evaluation of experiments with plant biostimulants and beneficial microorganisms, and finally presented their stage of the project at the dedicated national event.

Project website: <https://www.ibot.cas.cz/en/plant-biostimulants-and-their-effects-on-symbiotic-microorganisms/>.

Resilient energy systems for climate change and sustainable development (Interaction)

MSCA Individual Fellowship, 2019–2021

The [UN SDGs](#) recognise the interconnectedness of climate change, energy access and development. The Interaction project acknowledged that climate-change mitigation and adaptation require a rapid transition to sustainable, renewable energy sources and that stakeholder engagement is key to ensuring the success of energy transformations. It therefore aimed to develop energy-transition pathways, translate model results into realistic implementation strategies in least-developed partner countries through stakeholder workshops and provide regionally specific feedback to the modelling community. In particular, the project illustrated possible forms of energy transition for West Africa by optimising the use of local solar, wind and water resources while keeping an eye on sustainability criteria.

The Interaction project has contributed to the redesigning of energy systems in order to reduce carbon dioxide emissions. In addition to this important aspect of the project, additional attention was paid to reducing the environmental footprint of the research. To begin with, a large proportion of the work with stakeholders was conducted remotely, and the in-country workshops were carefully planned. This arrangement, partially due to COVID-19 restrictions, ultimately benefited the project, as it allowed both the local partners in Africa and the collaborators in Europe to gather data and 'do homework' between the workshops.

Project Cordis page: [Resilient energy systems for climate change and sustainable development \(Interaction\) – Climate Analytics](#).

Residues as feedstock for value-added products – application to the case of the Irish dairy industry (Refeed)

MSCA COFUND, 2017–2022

The COFUND Refeed project aimed to valorise dairy-processing waste water to obtain added-value products, in particular chemicals such as volatile fatty acids and biomaterials such as polyhydroxyalkanoates. This project managed to reduce its environmental impact in a number of ways. To begin with, the best method for polyhydroxyalkanoate extraction was thermochemical digestion with chloroform, and one of the aims of the project was to look for a new solvent – reusable if possible – that would allow for an efficient and green extraction method.

The sustainability of the project was further enhanced by the University of Galway, which promotes the use of public transport and bikes for commuting through a sustainable transport and travel policy. This involves a park-and-ride scheme, travel passes and even revenue benefits for cyclists. Additionally, the university has a dedicated policy and was

recently certified under ISO 50001:2018; an annual energy review is carried out in compliance with clause 6.3 of that standard. The institution also has commitments regarding waste and water management.

Additionally, the research group was involved in the green labs initiative, which helps to identify critical points in the laboratory and in everyday habits to reduce the impact on energy/water/resource consumption. The restrictions imposed due to the COVID-19 pandemic showed how the networking aspects of the work could be managed more consciously and effectively.

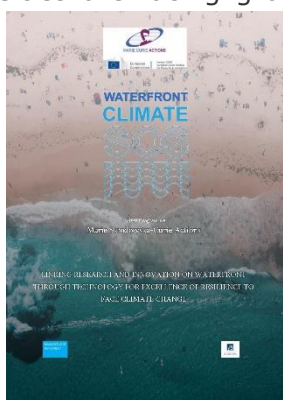
Refeed is part of the COFUND project Career-FIT, which comprises a number of postdoctoral positions.

Project Cordis page: [Career development fellowships in the national technology centre programme](#).

Linking research and innovation on waterfront through technology for excellence of resilience to face climate change (SOS climate waterfront)

MSCA Research and Innovation Staff Exchange (RISE), 2019–2023

Cities are facing growing costs relating to handling extreme climate events. The SOS climate waterfront project proposed solutions for cities facing these challenges. One such solution is the further development of the concept of the sponge city, which would allow waterfronts to absorb floods and tides and guarantee lower energy consumption.



Besides the object of the research, the project put in place several measures to be more sustainable and reduce its carbon footprint, from selecting working spaces based on their accessibility by foot and public transport to encouraging the use of recycled materials such as cups and paper.

Image 3: Project brochure cover page

In order to raise awareness of the vulnerable state of waterfronts in the context of extreme climate events, the project recognised the need to disseminate its results to a broader audience. It employed a variety of means to reach this audience, such as conferences, webinars, interviews, publications (books) and videos. The researchers themselves had an important role in the various means of dissemination used for this project. The contributors to the project came from an interdisciplinary background, consisting of both local and international experts, stakeholders and policy professionals. Having such diverse backgrounds, they were encouraged to think outside of the box and come up with their own initiatives regarding the field of study, along with ways to improve and green research practices.

Project website: <http://sosclimatewaterfront.eu/>.

Directed protein evolution for synthetic biology and biocatalysis (ES-Cat)

competitiveness and laying the foundation for environmental employment, circular-economy policies are designed to increase resource efficiency and decrease carbon dependency. However, the many different fields of activity involved in the circular economy (e.g. reuse, recovery, recycling, eco-design) operate with varying degrees of effectiveness in different places and for different materials. Moreover, these fields of activity have not been critically analysed as an interrelated social, technical, environmental and spatial phenomenon. The consequences of the radical changes implied by a truly circular economy are unknown. Increasing contextual understanding of the implementation of the circular economy is therefore a research priority.

The Cresting (circular economy: sustainability implications and guiding progress) project advanced a critical analysis of the concept of circular economy and its implications by recruiting 15 early-stage researchers. The aim of the project was to train these researchers in cutting-edge systematic analysis of circular-economy-related initiatives in a range of geographic and economic settings, with the purpose of transforming critical assessment into lessons for managing the transition to circular economy.

In addition to the many work packages, Cresting also developed a side project aimed at raising awareness of the role of research travel in increasing carbon emissions. Footprint aimed to guide Cresting members in their decision-making, encouraging a reduction in the amount of travel and providing guidance in selecting low-carbon travel options. In addition to the travel policy, the project decided to record and measure all project-related travel. Information on the barriers faced by individual early-stage researchers in selecting the desired low-carbon travel option were recorded and used to inform recommendations for future EU-funded research projects.

Project website: [Cresting](#).

Footprint (side project): [Project Footprint](#).

[International training at the science–policy interface for researchers in Europe, for nature \(Inspire4nature\)](#)

MSCA Innovative Training Network (ITN), 2018–2022

The growing recognition that biological diversity is a global asset of tremendous value to present and future generations has underpinned a number of multilateral environmental policy agreements, including the EU biodiversity strategy for 2020. Implementing these agreements requires global-scale cooperation among conservation scientists in the collection, mobilisation and synthesis of biodiversity data and ecological knowledge, and their translation directly into recommendations for conservation action and indicators of progress towards meeting internationally agreed goals and targets.

Inspire4nature's purpose was to contribute to the formation of a new generation of creative, entrepreneurial and innovative early-stage researchers by providing them with both research-related and transferable skills that would enable them to work at this science–policy interface, converting their knowledge and ideas into tools for tackling complex global environmental problems. To do so, the project proposed an ambitious training programme combining individual research projects (leading to doctoral degrees) of a high scientific standard, strategically positioned at the science–policy interface in

biodiversity conservation, with a rich network-wide training programme including training events and joint projects that would provide the early-stage researchers with a wide range of scientific, communication and project-management skills.

The project incorporated awareness raising and the promotion of best practices into the training. As part of a joint project, fellows were responsible for the accounting of the project's carbon emissions, and then chose a carbon-offsetting project that could verifiably offset these emissions. For example, see the blog post [here](#).

The project also strived to reduce the impact of catering at all project meetings (no single-use plastic, focus on local fresh products).

At the Centre d'Écologie Fonctionnelle et Evolutive (Montpellier), the Lab Council unanimously approved two new environmental responsibility charters: a charter setting out collective principles and commitments; and an individual charter of good environmental behaviour. More information about the charters and signatories can be found [here](#).

Globalisation, Europe and multilateralism: democratic institutions, the rise of alternative models and mounting normative dissensus (GEM-Diamond)

MSCA Doctoral Network (DN), 2022–2026

The EU's political priorities for 2019–2024 include a push for European democracy. Funded by the Marie Skłodowska-Curie Actions programme, the GEM-DIAMOND project will explore the impact of EU instruments on democratic institutions, the rise of alternative models and the existing rising dissensus driven by internal contestation and external competition. The project is part of an ongoing research programme on globalisation, Europe and multilateralism. GEM-DIAMOND will conduct research and deliver training to 15 early career researchers (ECRs) on improved citizens' knowledge and democratic practices. The ECRs will produce innovations entrenched in an original conceptual understanding of 'dissensus,' a unique form of interdisciplinary and methodological coherence, and new empirical findings to assess the shifting efficiency and legitimacy of EU instruments.

In line with the MSCA Green Charter, environmental aspects will be mainstreamed throughout the implementation of the work plan. As one of its key transversal concerns, environmental sustainability in GEM-Diamond means an active effort to limit the environmental impact of the research. In principle, GEM-Diamond commits to the following measures.

- Ensuring the sustainability of events by directing hosting organisations to choose local organic catering, favour paperless formats and, where possible, to secure local 'green event' labels.
- Using forms of transport with the lowest possible emissions by mandating train travel when journey times are under 5 hours.
- Compensating for travel-related carbon emissions by way of a participatory carbon-offset budget managed by the researchers.

- Promoting teleconferencing whenever possible. For example, the work plan envisaged that close to 100 % of the continuous monitoring of the IRPs would be online.
- Using sustainable and renewable forms of energy by making sure that all servers used by the project are based in the EU and that their energy consumption has been certified as sustainable.
- Developing awareness and best practices by encouraging partner organisations to present their green practices while having the researchers directly involved in managing the carbon-offset budget.

A key tool in mitigating the environmental impact of GEM-Diamond is the classification of its initiatives according to their carbon impact. All mobility funded by the project (e.g. for training events, meetings, participation in international conferences, ST meetings, evaluation board meetings) will be labelled in one of three ways: low-carbon events, which are online with no travel required; medium-carbon events, which are in hybrid format with no need for plane travel; or high-carbon gatherings, which involve multiple travel obligations, including air travel.

Project Cordis page: [Globalisation, Europe and Multilateralism : Democratic Institutions, the rise of Alternative MOdels and mounting Normative Dissensus | GEM-DIAMOND | Project | Fact sheet | HORIZON | CORDIS | European Commission \(europa.eu\)](#)



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