



D8.7

Report on the synergies with other projects and on the exploitation of the results

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WHO WE ARE

The ECF consortium consists of ten partners. The project is coordinated by Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas-CIEMAT.

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ABOUT THE PROJECT

Through a multidisciplinary, transdisciplinary and participatory process, ECF4CLIM develops, tests and validates a European Competence Framework (ECF) for transformational change, which will empower the educational community to take action against climate change and towards sustainable development.

Applying a novel hybrid participatory approach, rooted in participatory action research and citizen science, ECF4CLIM co-designs the ECF in selected schools and universities, by: 1) elaborating an initial ECF, supported by crowdsourcing of ideas and analysis of existing ECFs; 2) establishing the baseline of individual and collective competences, as well as environmental performance indicators; 3) implementing practical, replicable and context adapted technical, behavioural, and organisational interventions that foster the acquisition of competences; 4) evaluating the ability of the interventions to strengthen sustainability competences and environmental performance; and 5) validating the ECF. The proposed ECF is unique in that it encompasses the interacting STEM (Science, Technology, Engineering, and Mathematics) --related, digital and social competences, and systematically explores individual, organisational and institutional factors that enable or constrain the desired change. The novel hybrid participatory approach provides the broad educational community with: an ECF adaptable to a range of settings; new ways of collaboration between public, private and third-sector bodies; and innovative organisational models of engagement and action for sustainability (Sustainability Competence Teams and Committees).

To encourage learning-by-doing, several novel tools will be co-designed with and made available to citizens, including a digital platform for crowdsourcing, IoT solutions for real-time monitoring of selected parameters, and a digital learning space. Participation of various SMEs in the consortium maximises the broad adoption and applicability of the ECF for the required transformational change towards sustainability.

Project information

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1 EXECUTIVE SUMMARY

The report “D8.7 Report on the Synergies with Other Projects and on the Exploitation of the Results” presents the achievements of the ECF4CLIM project in transforming its research outputs into sustainable and impactful outcomes within the fields of education, climate action, and sustainability. Funded under the EU Horizon 2020 Green Deal Programme, ECF4CLIM (European Competence Framework for a Low-Carbon Economy and Sustainability through Education) developed, tested, and validated a ECF4CLIM Roadmap for Sustainability Competences designed to empower educational communities to drive climate action and systemic transformation toward sustainability and to operationalize the ECF developed by GreenComp.

The report documents how the consortium has structured exploitation as a continuous, participatory process extending beyond the project’s duration, ensuring that results evolve into lasting assets that contribute to the European Green Deal and the Education for Climate Coalition objectives.

From its inception, ECF4CLIM adopted a hybrid participatory approach that placed schools and universities at the heart of co-design, testing, and validation. Through Sustainable Competence Teams (SCTs) and Sustainable Competence Committees (SCCs), educational communities actively engaged in developing the ECF Roadmap, piloting interventions, and providing feedback loops that strengthened usability, scalability, and contextual adaptation. These interactions were complemented by workshops, webinars, and General Assemblies, which facilitated dialogue across disciplines and countries, generating an active network of practitioners and researchers committed to sustainability education.

The exploitation framework was guided by the Plan for Exploitation of Results and for Stimulating Synergies (PERSS), first defined in Month 6 and updated periodically. The plan ensured the systematic identification, validation, and valorisation of exploitable results across four categories: methods (participatory, auditing, and co-design approaches), tools (digital and analytical instruments such as the Environmental Footprint Calculator and Retrofitting Toolkit), knowledge (evidence-based interventions and the ECF4CLIM Roadmap for Sustainability Competences), and data (baseline competences and environmental performance metrics). Each result was assigned to responsible partners and linked to specific exploitation pathways—educational, societal, and policy-oriented—ensuring accountability and coherence.

A central milestone was the Horizon Results Booster (HRB) exercise focused on the ECF4CLIM Roadmap for Sustainability Competences, which provided methodological guidance to refine exploitation pathways, identify barriers and opportunities, and develop an actionable post-project plan. The exercise confirmed that ECF4CLIM’s



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exploitation is primarily non-commercial, emphasizing educational and policy value through integration into curricula, training programs, and institutional sustainability strategies. Key pathways include embedding the ECF in national education policies, supporting teacher training, informing local climate strategies, and fostering cross-project synergies with initiatives such as GreenComp, Education for Climate, and the sister project GreenSCENT.

Governance structures—including the Exploitation Group (EG), Exploitable Results Managers (ERMs), and an expanded Advisory Board—ensured that exploitation was strategically managed, evidence-based, and policy-relevant. The Advisory Board, which brought together education and environmental authorities, NGOs, and academic experts from several EU countries, played a crucial role in validating the usability of project outputs and promoting their transferability to new contexts.

The report also highlights the establishment of synergies and clustering activities, which have amplified ECF4CLIM's reach and policy relevance. Joint actions with other EU-funded projects have led to knowledge exchange, coordinated dissemination, and the creation of shared narratives around sustainability competences and education transformation. These partnerships not only expanded ECF4CLIM's audience but also positioned its results within the broader European ecosystem of climate and education innovation.

Monitoring and evaluation mechanisms, based on qualitative and quantitative KPIs, confirmed significant progress in the uptake and visibility of project results. Educational communities reported improved sustainability competences and environmental awareness, while policymakers and stakeholders recognized ECF4CLIM's contribution to operationalizing GreenComp in practical, context-specific settings. The project also received positive feedback from Horizon Europe reviewers, who provided constructive advice for enhancing the usability of tools, digital games, and educational flipbooks.

In conclusion, the ECF4CLIM project has shown that participatory, evidence-based frameworks hold strong potential to support long-term transformation in education for sustainability. The exploitation process established during the project lays a solid foundation for continued collaboration, knowledge exchange, and gradual institutional integration beyond 2025. While the consortium remains committed to further advancing the use and dissemination of the project's results, the continuation of these efforts will depend on the availability of resources and the engagement capacity of the partners after the project's completion. Nonetheless, the shared determination within the consortium to sustain the ECF4CLIM legacy—through research, educational practice, and policy dialogue—reflects a strong collective will to ensure that the project's results continue contributing to Europe's ongoing transition toward a more sustainable and climate-resilient future.



2 INTRODUCTION

2.1 Purpose and scope of the deliverable

The purpose of this deliverable is to provide a comprehensive overview of the **exploitation strategy and activities carried out within the ECF4CLIM project**, with a focus on ensuring that the results generated are not only disseminated but also **translated into concrete and sustainable impacts**. Exploitation, in this context, goes beyond the promotion of outcomes: it is about creating value from the project's knowledge, methods, tools, data, and the European Competence Framework (ECF) itself by embedding them into **educational practices, institutional strategies, and policy processes** at local, national, and European levels.

The scope of the deliverable encompasses the full cycle of exploitation, starting with the **identification of exploitable results** and potential beneficiaries, continuing with the **structures and processes established to support exploitation** (e.g., the Exploitation Group, Advisory Board, co-design with demonstration sites), and culminating in **actions and pathways that prepare for the sustainable uptake of results** after the project's conclusion. This includes both **short-term achievements**, such as the integration of tools and methods in demonstration sites (DSs) (pilot schools and universities), and **long-term perspectives**, such as the institutional adoption of the ECF4CLIM Roadmap for Sustainability Competences and synergies with European initiatives like GreenComp and Education for Climate.

By clearly defining its purpose and scope, this deliverable serves as both a **record of the project's exploitation efforts** and a **practical guide for partners, stakeholders, and policymakers** on how to continue leveraging ECF4CLIM results to strengthen sustainability competences and advance the transition toward a low-carbon society through education.

2.2 Importance of exploitation in Horizon 2020 projects

In Horizon 2020, **exploitation of results** is a central requirement that ensures the investments made in research and innovation are effectively translated into **tangible benefits for society, the economy, and policy development**. While dissemination and communication aim to transfer knowledge and raise awareness, exploitation focuses on the **practical use and uptake of project outputs**, thereby maximizing the return on public funding [1].

For projects like ECF4CLIM, which address the urgent challenges of **climate change, sustainability, and education**, exploitation is particularly important. It ensures that



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developed frameworks, methods, tools, and knowledge are not only validated within the project's lifetime but also **adopted, adapted, and embedded by relevant stakeholders**—including educational communities, policymakers, and local authorities. This process transforms research results into **real-world applications**, such as curriculum development, policy guidance, training programs, and community engagement initiatives.

Exploitation within Horizon 2020 is also linked to the creation of **synergies with other projects and European initiatives**, fostering collaboration and avoiding duplication of efforts. By aligning results with broader strategies such as **GreenComp, Education for Climate, and the European Green Deal**, exploitation activities reinforce the long-term sustainability, scalability, and policy relevance of project outputs.

Ultimately, exploitation is not a one-off action but a **continuous process** that extends beyond the project's duration. It safeguards the durability of results, enhances their accessibility to new users, and strengthens the impact of European research in shaping the transition toward a low-carbon and sustainable society.

2.3 Linkages to other project activities and deliverables

The exploitation of results in ECF4CLIM is **closely interwoven with other project activities and deliverables**, forming a coherent strategy [2] that connects research, testing, dissemination, and long-term uptake. Rather than standing as an isolated effort, exploitation builds upon and reinforces the project's broader objectives, ensuring that outputs are fully leveraged to achieve maximum impact.

An important enabler of this process is **clustering**, which fosters synergies between related projects and initiatives [3]. Through clustering activities, partners can exchange best practices, align complementary outcomes, and strengthen the visibility and adoption of project results across sectors and communities. In this way, exploitation is not only about turning research outputs into tangible benefits—such as products, services, standards, or policy contributions—but also about building collective momentum that reinforces Europe's capacity for innovation, sustainability, and long-term growth.

Strong linkages exist with the **co-design, co-implementation and participatory evaluation of demonstration activities** [4] carried out in the DSs. The commitment of Sustainable Competence Teams (SCTs), Sustainable Competence Committees (SCCs) in our educational communities has provided a practical testing ground where methods, tools, and knowledge were validated, adapted, and refined. These activities not only improved the quality and usability of the results but also laid the foundation for their immediate exploitation at the school, university, and community levels. The hybrid participatory process, achieved through the active involvement of beneficiaries,



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represents a fundamental element for ensuring the long-term exploitability of the project's results. By integrating end-users' perspectives and practical needs throughout the design, development and validation phases, the project has been able to produce outputs that are not only scientifically sound but also directly relevant and applicable in real contexts of the society. This participatory approach enhances acceptance, facilitates smoother transfer of results to practice, and fosters a sense of ownership among stakeholders, thereby increasing the likelihood of sustainable use and impact beyond the project's formal duration.

The exploitation strategy [2] also interacts with **dissemination and communication** activities [5], as awareness-raising and targeted outreach are prerequisites for the effective uptake of results. Dissemination efforts identified and reached potential beneficiaries, while exploitation activities focus on embedding the results in their operational contexts. Similarly, communication activities contribute by demonstrating the societal value of the project, which reinforces stakeholder engagement and supports long-term sustainability.

Moreover, this deliverable links directly with **outputs such as the ECF4CLIM Roadmap for Sustainability Competences** [6], which was selected as the flagship result for the Horizon Results Booster exploitation exercise. Insights gained from HRB support have been integrated into the exploitation plan, ensuring alignment between identified opportunities and practical pathways for implementation.

Finally, exploitation activities contribute to the **overall project impact assessment** by providing evidence of uptake, embedding, and scalability of results. This not only strengthens the project's capacity to report on impact but also creates synergies with policy recommendations, clustering activities, and future funding opportunities. In this way, the deliverable acts as a bridge between knowledge creation, stakeholder engagement, and long-term sustainability of results.

3 FRAMEWORK FOR EXPLOITATION IN ECF4CLIM

At the beginning of ECF4CLIM project (M6), a **Plan for Exploitation of Results and for Stimulating Synergies** (PERSS) was developed [2] to guide the structured use and valorization of project outcomes. This plan was subsequently **updated after 18 months** to reflect progress, align with emerging opportunities, and ensure that the exploitation strategy remained effective and relevant.

The primary objective of the PERSS was to maximize the project's influence and impact by preparing and organizing the exploitation activities, including the identification of suitable routes for transferring results. Central to this process was the effective use of



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research outputs by transforming them into **concrete values—such as societal, scientific, and policy contributions**. In parallel, dissemination activities focused on transferring knowledge and results to enable uptake, while communication activities highlighted the broader impact and benefits of the project for society and stakeholders. Secondary objectives of the PERSS included the identification of target audiences, the selection of optimal tools and approaches for accelerating exploitation and fostering synergies, the definition of implementation strategies and indicative timelines, partner support for exploitation actions, the establishment of KPIs to monitor effectiveness, transparent management of IPRs, and the facilitation of collaboration among partners to ensure the sustainable use of results beyond the project's lifetime.

Exploitation within the project has been conceived as a **continuous process**, beginning in the early stages of project evolution and extending well beyond the formal end of its duration. During implementation, exploitation activities ensured that intermediate results were systematically assessed, aligned with stakeholder needs, and prepared for practical uptake.

This proactive approach not only enhanced the visibility and readiness of outputs but also facilitated the creation of synergies with ongoing initiatives and external actors. After the official completion of the project, exploitation continues through the sustained use, transfer, and further development of results by partners and stakeholders. In this way, the project's outcomes remain dynamic assets that generate lasting impact—scientific, societal, and economic—by supporting innovation, informing policy, and strengthening collaboration across Europe.

3.1 Definition of exploitable results in the project context

In the context of ECF4CLIM, **exploitable results** are defined as tangible outputs of the project that can be adopted, adapted, or transferred by stakeholders to generate value beyond the project's lifetime. Unlike general dissemination outputs, which primarily raise awareness or share knowledge, exploitable results are practical results with direct applicability in educational, policy, and societal contexts.

Exploitable results in ECF4CLIM focus primarily on **societal, educational, and policy impacts** rather than commercial opportunities. They are designed to be integrated into curricula, institutional strategies, policy frameworks, and capacity-building initiatives.

The project adopts a broad and inclusive concept of exploitation, aiming to **transform research and innovation outputs into lasting improvements in sustainability education and practice**, supporting the development of competences necessary for a low-carbon, sustainable future.



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The ECF4CLIM exploitable results encompass a diverse and carefully structured set of outputs that reflect the **multidisciplinary nature of the project**. A set of deliverables with potential exploitable results was identified in [2] and it is presented in Annex 1. A selection of the key exploitable results was done after the 1st reporting period (2023) in order to accommodate the existing resources with the identified priorities. These outputs are organized into four main categories:

- (1) **Methods**, which consist of innovative approaches for assessing, developing, and embedding sustainability competences within educational communities,
- (2) **Tools**, including both digital and practical instruments designed to support the implementation of the European Competence Framework (ECF) in schools, universities, and local communities,
- (3) **Knowledge**, comprising evidence-based insights, conceptual frameworks, guidelines, and demonstration interventions that inform decision-making and educational practice in sustainability,
- (4) **Data**, representing structured datasets collected and analyzed throughout the project to monitor, evaluate, and compare collective and individual competences as well as environmental performance.

Together, these categories provide a comprehensive, practical, and transferable set of resources aimed at fostering long-term educational, societal, and policy impact. A description of the key exploitable results is presented in Section 7 (Identified exploitable results).

3.2 Overall exploitation strategy

The overall exploitation strategy of ECF4CLIM is designed to ensure that the project's results are **systematically transformed into concrete and sustainable impacts** at the educational, societal, and policy levels. This strategy is built on the principle that exploitation is not a final step, but rather a **continuous and iterative process** that begins during the project's lifetime and extends well beyond its formal conclusion.

Through this multi-level strategy, represented in Fig. 3.2.1, ECF4CLIM project ensures that its methods, tools, knowledge, data, and the **ECF4CLIM Roadmap for Sustainability Competences** will not only achieve **short-term uptake** during the project but will also generate **long-lasting impact** by shaping educational practices, policy development, and societal awareness of sustainability challenges.

The strategy is structured around several key pillars:

- **Early co-design and co-implementation in DSs:** by involving educational communities—teachers, students, administrators, and local stakeholders—in the co-design of methods and tools, the project ensures that results are relevant,

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practical, and user-oriented. This approach creates immediate opportunities for exploitation within schools and universities, while also serving as proof of concept for broader adoption.

- **Clear assignment of responsibilities:** each exploitable result has a designated responsible partner, coordinated through the Exploitation Group (EG) and supported by the Exploitable Results Managers. This ensures accountability, monitoring, and progress toward effective use of results.

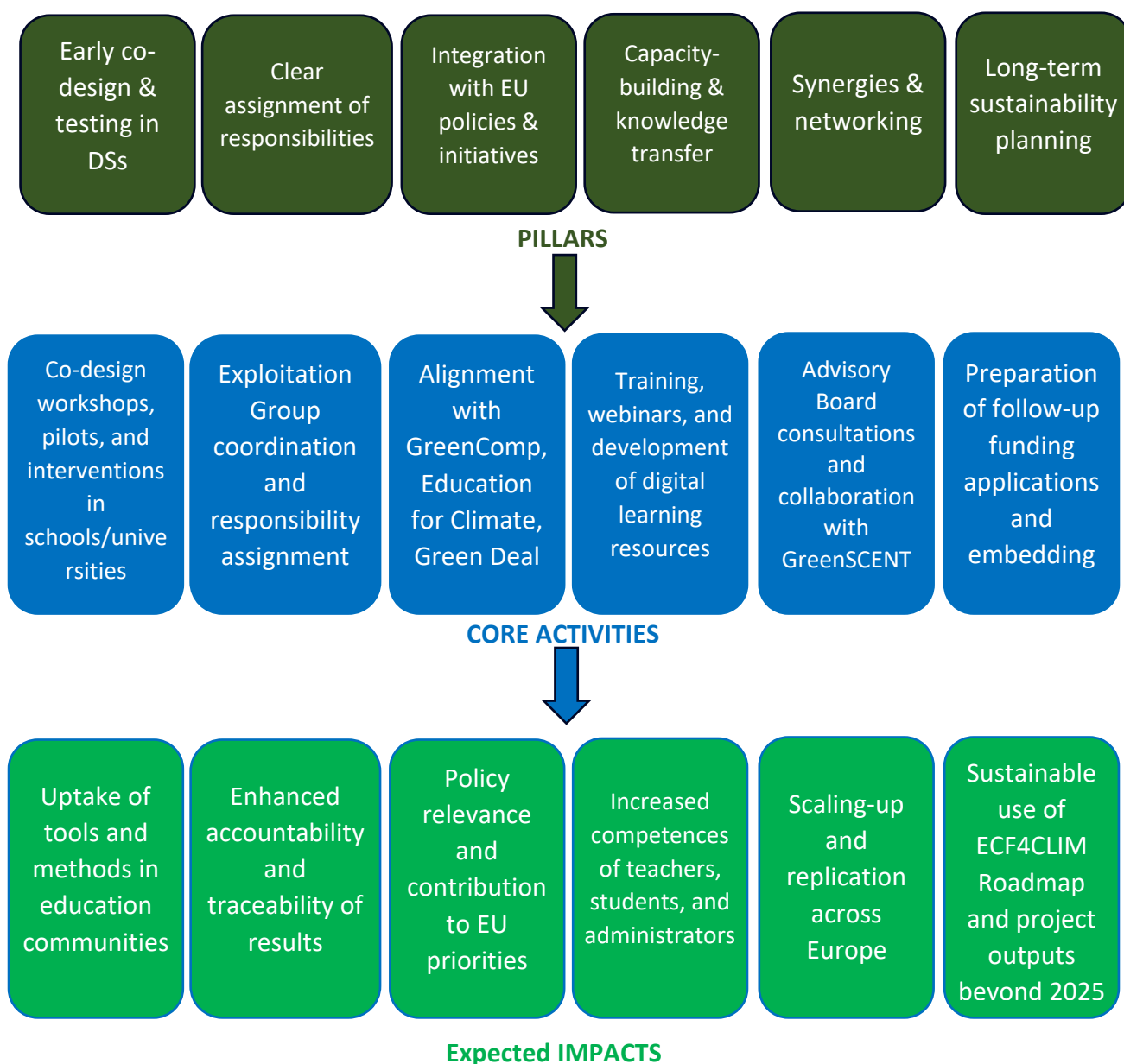


Figure 3.2.1 The multi-pillar exploitation strategy of ECF4CLIM



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- **Integration with policy and European initiatives:** the project aligns its exploitation efforts with broader frameworks such as **GreenComp, Education for Climate, and the European Green Deal**, ensuring that results contribute to EU-wide priorities and increase their visibility and relevance for policymakers.
- **Capacity-building and knowledge transfer:** exploitation is supported by targeted training, workshops, and digital resources to equip educators, administrators, and policymakers with the competences and tools needed to adopt and embed the project outputs.
- **Synergies and networking:** collaboration with external stakeholders, including the **Advisory Board, NGOs, local authorities**, and the sister project **GreenSCENT**, strengthens exploitation by creating opportunities for scaling up, replication, and transferability.
- **Long-term sustainability planning:** beyond the project's duration, exploitation focuses on embedding results into institutional strategies, curricula, and policy frameworks, supported by follow-up funding applications and partnerships.

Due to the specific nature of the project—the development of the European Competence Framework (ECF)—special attention was given to the **diversity of potential users**, denoted above by educational communities, local communities, and other stakeholders involved in education. In the context of education for sustainability, these users encompass **teachers, school administrators, curriculum developers, students, higher education institutions, educational policymakers, non-formal educational organizations, local communities, researchers, and society at large**.

Most of these stakeholders can actively **adopt and adapt the methods, tools, knowledge, and data** produced by the project to enhance sustainability competences, deepen understanding of sustainability as a multifaceted phenomenon within educational contexts and integrate low-carbon practices into educational settings. Others, while primarily final beneficiaries, can influence the uptake and integration of results in educational processes due to their interests and roles.

Exploitation of the results in this context focuses on **embedding project outputs into educational practices, curricula, training programs, and institutional strategies, as well as presenting results in academic settings**. This is achieved through targeted training workshops, digital learning platforms, co-design sessions with schools, collaboration with policy bodies to inform guidelines and frameworks, and presenting the results in conferences and academic papers. By engaging these users early and fostering their active involvement, the project ensures that its outcomes are not only widely disseminated but also sustainably applied, generating **long-term impact on both educational practices and societal awareness of sustainability challenges**.



3.3 Stakeholders and beneficiaries: mapping and prioritization

The success of the exploitation process in ECF4CLIM projects depends on a clear understanding of **who the stakeholders and beneficiaries are**, what their needs and expectations entail, and how the project's results can generate value for them. Stakeholders and beneficiaries were considered not only as **end-users of the project outputs**, but also as **active contributors** who can influence, adapt, and help disseminate the results.

The main stakeholder categories were identified at the beginning of project and updated accordingly with the existing evolutions. The current structure is:

- **Educational communities:** teachers, students, school administrators, and higher education institutions, who directly use the methods, tools, and knowledge in learning and institutional practices. The list of the schools and universities is presented at <https://ecf4clim.eu/consortium/> in the tab Demonstration sites.
- **Educational authorities and policymakers:** These include national, regional, and local bodies with responsibilities in the field of education, who play a central role in embedding the ECF and related outputs into curricula, institutional strategies, and official policy frameworks. Their involvement has been fostered through multiple channels: some were formally integrated into the enlarged Advisory Board (AB) of the project, while others were engaged via dedicated workshops, webinars, and targeted outreach activities. This ensured that key decision-makers were both informed about and actively connected to the exploitation of project results.

The spectrum of the educational authorities and policymakers engaged with ECF4CLIM activities is exemplified in the following list: Spanish Service for the Internationalisation of Education (under Ministry of Universities), GD of Innovation and Training Programs, General Directorate of Bilingualism and Quality of Teaching Education, Universities, Sciences and Spokesperson Office, National Centre for Environmental Education (CENEAM), Programme for the Recovery and Educational Use of Abandoned Villages (PRUEPA), Higher Institute for Educational Innovation in Madrid, Territorial Center for Innovation and Training Madrid East (Educa Madrid), Territorial Center for Innovation and Training Madrid South (Educa Madrid), Ministry of Education (Romania), Higher Institute for Educational Innovation (Madrid), Comillas Pontifical University (Spain), Centro de Educación Ambiental Ciudad Escolar (Spain).

- **Environmental authorities:** institutions at national and regional levels with responsibilities in environmental policy and sustainability, ensuring the



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alignment of the project results with broader environmental and climate goals. Some were formally integrated into the enlarged Advisory Board (AB) of the project, while others were engaged via dedicated workshops, webinars, and targeted outreach activities. Below the main environmental authorities engaged with ECF4CLIM project: National Parks Autonomous Agency (OAPN), Central Finland Centre for Economic Development, Transport and the Environment (ELY-Centre, Finland), ADENE (Agência para a Energia, Portugal), National Agency for Environmental Protection (Romania), Agency for Environmental Protection Arges County (Romania), Sociedade Ponto Verde (Portugal), Spanish Office for Climate Change (OECC).

- **NGOs and civil society organizations:** particularly those active in environmental education and sustainability, who serve as multipliers of results within and beyond formal education systems. The main organisations engaged in ECF4CLIM process are: Spanish organization responsible of recycling and eco-design of packaging (Ecoembes), ODS Certificates CIFAL Málaga Association/ UNITAR-ONU, Biodiversity Foundation, Finnish Association of Nature and Environment Schools, Prepare for Education (Romania), ARIN (Romania), Fundación Vida Sostenible (Spain), World Vision (Romania), Impreuna pentru educatie (Romania), Grupul pentru dezvoltare locala Mioveni (Romania), Fundacion Descubre (Spain), Sociedad Andaluza para la Divulgación de la Ciencia (Spain), L'Ortiga (civil entity specialized in agroecology and environmental education) (Spain), El Pa Sencer (civil entity specialized in the food field) (Spain), Espai Ambiental (entity specialized in promoting environmental awareness) (Spain), Restarters BCN (entity specialized in the reuse and repair of electronic devices) (Spain), Observatori del Deute en la Globalització (civil entity specializing in environmental conflicts and international cooperation) (Spain), Comissió Catalana d'Acció pel Refugi (civil entity specialized in care of migrants and refugees) (Spain).
- **Experts and research institutions:** specialists in sustainability, competence frameworks, and pedagogy, who validate and refine project outcomes and support their academic and policy relevance. Main research institutions engaged in the process are exemplified below: Institute of Government and Public Policy (IGOP), Central Finland Centre for Economic Development, University from Galati (Romania), Higher Institute for Educational Innovation in Madrid, Territorial Center for Innovation and Training Madrid East (Educa Madrid), Territorial Center for Innovation and Training Madrid South (Educa Madrid), Comillas Pontifical University (Spain).
- **Local communities and society at large:** indirect beneficiaries of the integration of sustainability competences in education, contributing to long-term cultural



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and behavioral change. Some of the local communities and organizations are presented below: Unidad Programas Educativos (Comunidad Madrid), Sercaia municipality (Romania), Dragasani municipality (Romania), Mioveni municipality (Romania), Pitesti municipality (Romania), Local Council Sercaia (Romania), Municipality of Kauniainen (Finland), Câmara Municipal de Loures (Portugal, involved in the pilot schools' activities), Junta de Freguesia de Camarate (Portugal).

A prioritization exercise was carried out to align the project's exploitation strategy with the stakeholders who hold the greatest potential to ensure **immediate uptake and long-term sustainability** of results:

- **Primary beneficiaries** – Educational communities (teachers, students, administrators) and educational policymakers. These groups are the main drivers of adoption, as they can integrate project outputs into everyday teaching practices, institutional strategies, and curricula.
- **Secondary beneficiaries** – Environmental authorities, NGOs, and research institutions. Their role is to **reinforce, validate, and scale** the exploitation by embedding project results into policies, networks, and scientific evidence.
- **Tertiary beneficiaries** – local communities and society. Though not directly responsible for adoption, their engagement creates a **favorable ecosystem** for sustainability competences to thrive and supports the diffusion of results into broader societal practices.

By mapping and prioritizing these stakeholder groups, ECF4CLIM ensured that exploitation efforts are **targeted, efficient, and aligned with real needs**. This approach also facilitates the identification of appropriate tools, formats, and channels for engagement, while enabling synergies across categories.

The engagement of educational communities (DSs) in the exploitation process has included:

- **active participation in the co-design** of most of the methods and tools, as well as in the selection, planning, implementation and participatory evaluation of a set of interventions aimed at improving sustainability performance and advancing education for sustainability [7].
- **discussion of potential exploitation pathways**, including extending the reach of the project's outputs to other educational communities through the dissemination of knowledge, methods, tools, and other key results.



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- **provision of feedback** on the developed tools and materials (to be used in the exploitation process) to ensure their relevance, usability, and effectiveness for broader educational communities.

The key elements for engaging the educational communities from the Demonstration Schools (DSs) included:

1. **Innovative organizational models** established in each participating school and university, namely the **Sustainable Competence Teams (SCTs)**—three per DS, comprising one for students, one for teachers, and one for administrative personnel—and the **Sustainable Competence Committees (SCCs)**, one per DS, bringing together representatives from all SCTs. Young people, teachers and administrators engaged in joint deliberation on how to promote sustainable individual and collective competences, co-design specific measures and jointly evaluate the outcomes of the learning experience.
2. **Webinars, workshops, and presentations** [5] involving educational experts from project partners and members of the DSs, facilitating knowledge exchange, capacity building, and collaborative development. By crowdsourcing ideas, relevant knowledge and practical insights are generated, which can inform policy and pave the way towards an integrated approach to sustainable solutions across diverse European contexts.
3. **Creative activities organized within General Assemblies (GA)** (both in-person and online) [8], providing a platform for coordination, discussion, and dissemination of project outcomes.
4. **Stimulation of the transdisciplinary** activities at the level of the DSs [9] to identify the needs for collaboration among different disciplines and how to integrate them in the curricula.

The engagement of educational policymakers was fostered through their active participation in the SC), as well as in the GA and AB meetings. Their involvement provided valuable feedback on the ECF4CLIM Roadmap, methods, and tools, contributing to their refinement and contextual relevance. At the same time, policymakers played a key role in promoting ECF4CLIM outcomes for wider adoption beyond the demonstration sites. Within the SCCs, they brought forward policy perspectives that enriched the co-design of interventions and informed the development of project tools and methodologies, strengthening the link between educational practice and policy frameworks.

The engagement of environmental authorities, NGOs, and research institutions in the exploitation process was stimulated through the participation in the GA activities, and Advisory Board (AB) activities. In case of some DSs, NGOs were involved in the design of



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some interventions. For example, in Spain, for the implementation of the interventions at the UAB, the following NGOs were involved in the collaboration: L'Ortiga (civil entity specialized in agroecology and environmental education), El Pa Sencer (civil entity specialized in the food field), Espai Ambiental (entity specialized in promoting environmental awareness), Restarters BCN (entity specialized in the reuse and repair of electronic devices), Observatori del Deute en la Globalització (civil entity specializing in environmental conflicts and international cooperation), Comissió Catalana d'Acció pel Refugi (civil entity specialized in care of migrants and refugees).

The engagement of environmental authorities, NGOs, and research institutions in the exploitation process was strengthened through their active participation in GA sessions and AB activities, where they provided expertise, feedback, and networking support. At the level of several DSs, NGOs played a hands-on role in designing and implementing sustainability interventions. For example, in Portugal, at Bobadela school, Sociedade Ponto Verde collaborated to introduce selective waste collection systems and promote recycling awareness campaigns, while in Romania, local NGOs supported environmental education workshops and tree-planting initiatives. These partnerships not only enriched the interventions with practical knowledge and community outreach but also enhanced the visibility and transferability of ECF4CLIM's outcomes beyond the project's direct participants.

It should be noted the AB has a large composition, not limited to the scientific representatives as in most of projects. The **ECF4CLIM AB** [10] is composed of external experts and representatives from key stakeholder groups who are potential users of the project's results. Its membership includes national and regional authorities in education and environment, NGOs, institutions active in environmental education, sustainability experts, companies working in sustainability, and higher education representatives. The **International Advisory Board** includes representatives from Spain (SEPIE; ADEAC), Portugal (Sustainable Campus Network), Romania (National and regional Environmental Protection Agencies; Universities of Galati and Pitesti), and Finland (Finnish Association of Nature and Environment Schools; Central Finland Centre for Economic Development, Transport and the Environment, National Agency for Education, Municipality of Kauniainen). The **Local Advisory Board** is composed of national authorities, regional authorities, universities, NGOs, and industry partners, mainly from Spain, with additional representatives from Portugal, Romania, and Finland. These members provided feedback, guidance, and validation of the project's methods, tools, and educational resources, ensuring that outputs are aligned with user needs and are readily adoptable in diverse educational and societal contexts.

Through this multi-level involvement, the Advisory Board played a central role in **supporting exploitation**, by facilitating stakeholder engagement, guiding adaptation of results to local contexts, fostering knowledge transfer, and promoting sustainable



adoption of the project's outputs across schools, universities, and broader communities. AB members have provided detailed feedback on the project activities at the biannual GA meetings. Contributions related to exploitation and synergies are presented in section 4.3.

4 GOVERNANCE AND STRUCTURES SUPPORTING EXPLOITATION

4.1 The Exploitation Group

The **Exploitation Group (EG)** was established to coordinate and guide the exploitation process throughout the project's lifetime, ensuring that all partners contribute to the transformation of project results into tangible and sustainable impacts. The EG is composed of **one representative from each partner institution**, working in close collaboration with the **Exploitable Results Managers**.

The EG operated as the **central coordination body** for exploitation and is tasked with:

- **Identifying and validating exploitable results**, in collaboration with work packages and DSs.
- **Assigning responsibilities** by designating a lead partner for each exploitable result, ensuring accountability for its refinement, testing, and preparation for uptake.
- **Defining exploitation pathways**, including possible integration into educational curricula, institutional practices, policy frameworks, and non-formal educational initiatives.
- **Supporting partners** in adapting methods, tools, and knowledge to the needs of their respective user communities.
- **Monitoring progress** against exploitation-related KPIs and ensuring alignment with the overall exploitation strategy.
- **Facilitating synergies** with dissemination, communication, and clustering activities to strengthen impact.

Beginning in 2023, the EG established a practice of holding **regular meetings** providing a platform for:

- Reviewing the status of exploitable results and discussing feedback from demonstration sites and stakeholders.



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- Sharing good practices, lessons learned, and challenges in advancing exploitation.
- Coordinating with the AB to incorporate external expertise into exploitation planning.
- Preparing updates for project reporting and aligning with Horizon Results Booster recommendations.

The EG ensured that exploitation is a **collective and structured effort**, rather than an ad-hoc or individual responsibility of partners.

4.2 Role of Exploitable Results Managers

To complement the collective work of the Exploitation Group (EG), the project appointed two **Exploitable Results Managers (ERMs)**, Yolanda Lechón and Ana Prades, who oversee and support the overall exploitation strategy. Their role is central to ensuring that all exploitable results are **systematically identified and tracked**, in line with Horizon Europe requirements and best practices.

The ERMs carry out several essential functions, including:

- **Coordination and oversight:** guiding the EG in structuring the exploitation process and ensuring coherence across partners and work packages.
- **Identification and validation of results:** working with research teams and DSs to determine which outputs qualify as exploitable results and how they can be best positioned for impact.
- **Strategic advice:** recommending exploitation pathways tailored to specific categories of users (e.g., educational communities, policymakers, NGOs, authorities).
- **Support to partners:** assisting consortium members in refining outputs, preparing exploitation materials, and addressing barriers to uptake.
- **Monitoring and reporting:** maintaining a consolidated overview of the status of all exploitable results, ensuring proper documentation, and contributing to periodic reports and deliverables.

Beyond internal coordination, the ERMs acted as **interfaces between the consortium and external stakeholders**, including the AB and the Horizon Results Booster (HRB). By doing so, they facilitated the integration of external expertise and ensure that exploitation strategies are aligned with EU-level priorities and funding opportunities.



4.3 The Advisory Board and its role in exploitation

The **Advisory Board (AB)** was established as a key governance body to provide **external expertise, including guidance, and validation** for the exploitation of ECF4CLIM results. A List of the key stakeholders is presented in Annex 2.

Its composition reflects a deliberate balance between international and local representation, ensuring that both **European-level perspectives** and **country context-specific (for DSs)** are incorporated.

The ECF4CLIM Advisory Board (AB) has played a key strategic role in supporting the exploitation of project results by providing external expertise, critical insights, and policy-relevant perspectives. Composed of recognized experts in education, sustainability, energy systems, environmental governance, and social sciences from across Europe, the Advisory Board ensured that the project's **outcomes remained aligned with real-world needs and had strong potential for transferability and long-term impact**.

Throughout the project, AB members contributed to refining the exploitation strategy by offering recommendations on **how to enhance the practical relevance, scalability, and integration of the ECF4CLIM results into educational and policy frameworks**. Their guidance was particularly valuable in identifying pathways for embedding the European Competence Framework (ECF) for sustainability into institutional practices and curricula, as well as in strengthening the links between education, research, and policymaking.

During plenary sessions and targeted consultations, the Advisory Board emphasized the importance of **creating open-access resources and maintaining digital tools**—such as the ECF4CLIM Roadmap and Digital Platform—as key mechanisms for ensuring continuity and replication. They also encouraged the consortium to **expand collaboration with other European initiatives, leverage synergies through clustering**, and promote the framework as a reference model for future educational policies at both national and EU levels.

In the final phase of the project, the AB provided specific recommendations to sustain exploitation beyond the project's lifetime. These included:

- Establishing partnerships with ministries of education and local authorities to integrate ECF4CLIM tools into professional development and school management practices;
- Engaging teacher training institutions and networks to ensure the ECF Roadmap informs ongoing competence-building in sustainability;



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- Strengthening links with European education and climate policy agendas (e.g., the European Green Deal, Education for Climate Coalition);
- Exploring opportunities for additional funding to maintain and update the digital resources created by the project.

Through this sustained engagement, the Advisory Board has acted not only as a source of scientific and professional validation but also as a catalyst for ensuring that ECF4CLIM's results are effectively used, adapted, and scaled beyond the project's duration.

4.4 Collaboration with sister project

Collaboration with sister projects is an essential dimension of the ECF4CLIM exploitation strategy, ensuring that synergies are maximized and results are positioned within a broader European framework of sustainability-related initiatives. In this regard, [GreenSCENT](#) [11]—a Horizon Europe project with complementary objectives in education for sustainability and competence development—represents a key partner for knowledge exchange and mutual reinforcement of exploitation efforts.

To facilitate structured cooperation, ECF4CLIM and GreenSCENT agreed to establish **reciprocal participation in ABs**. Specifically, one or two “project ambassadors” from each project were nominated to take part in the other project's AB. This arrangement ensured **continuous dialogue, alignment of strategies, and sharing of lessons learned**, while also strengthening the impact and outreach of both initiatives.

The collaboration between the two projects made it possible to exchange information about the methods and tools used to develop competences in sustainability education. It also facilitated the sharing of insights regarding dissemination and exploitation activities, helping to ensure complementarity and mutual awareness while avoiding overlaps in approach.

The collaboration also aimed to engage broader stakeholder groups by leveraging each project's networks to maximize the uptake of results within educational and policy-making communities. In addition, it helped stimulate joint opportunities for dialogue and workshops, fostering the exchange of ideas and the promotion of sustainable education practices.



5 CO-DESIGN AND ENGAGEMENT OF DSs

5.1 Role of educational communities in co-design and testing

Educational communities have been at the core of the ECF4CLIM project, both as end-users and as active contributors to the co-design, co-implementation and participatory evaluation of methods, tools, knowledge, and data. Their engagement ensures that project outcomes are not only theoretically sound but also practical, relevant, and adaptable to real educational contexts.

The project adopted **an innovative hybrid participatory approach whereby teachers, students, administrators, and other community members participated directly in the creation and refinement of the most outcomes of the project**. By involving beneficiaries from the early stages, the consortium was able to:

- Capture diverse perspectives and needs from real educational environments.
- Ensure that outputs are user-friendly, context-sensitive, and adaptable to different educational systems.
- Build a sense of ownership and commitment among stakeholders, thereby laying the groundwork for long-term adoption and exploitation of results.
- Testing and capturing feedback.

Beyond co-design, educational communities in the DSs played a central role in testing and validating project results. This process involved:

- Piloting methods and tools in classrooms and educational groups.
- Assessing their effectiveness in improving sustainability competences and supporting low-carbon practices.
- Providing structured feedback to refine outputs before wider dissemination.

By combining co-design with systematic testing, **educational communities became early adopters of project results**. This not only accelerated exploitation at the local level but also provided valuable evidence of impact, which strengthens the case for wider uptake at national and European scales. The active participation of educational communities thus ensured that the project's outputs are not only exploitable in principle but already embedded in practice, significantly increasing their replicability and sustainability.



5.2 Sustainable Competence Teams and Sustainable Competence Committees

To ensure structured engagement of educational communities in the co-design, testing, and exploitation of project outputs, ECF4CLIM established **Sustainable Competence Teams (SCTs)** and **Sustainable Competence Committees (SCCs)** at each DS. These bodies played a pivotal role in facilitating collaboration between students, teachers, administrative staff, and other stakeholders, enabling effective integration of project results into educational practices.

Each DS formed **three SCTs** representing different groups within the educational community:

- **Student SCT:** Engaging students directly in defining and implement demonstrative interventions, testing methods, tools, and activities, ensuring that outputs are relevant, practical, and aligned with learners' needs.
- **Teacher SCT:** Focusing on pedagogical integration, this team evaluated usability, adaptation of methods, tools, interventions, and teaching materials, and their alignment with curricula.
- **Administrative SCT:** Involving school or university administrative staff, this team assessed the feasibility of embedding project outputs into institutional practices and policies.

It should be noted that in a few Demonstration Sites (DSs), the teacher SCT was merged with the administrative SCT to better align with local contexts. In these cases, the approach was complemented by targeted interviews to ensure the collection of comprehensive and relevant information.

SCTs served as **the primary interface for co-design, co-implementation and participatory evaluation**, providing continuous feedback to project partners and guiding iterative improvements of methods, tools, and resources. They also contributed to the early adoption of results, effectively **initiating exploitation at the local level**.

Complementing the SCTs, each DS established a **SCC**, which included representatives from all three SCTs, and representatives from the wider educational stakeholders: policy-makers, NGOs, parents, local authorities, etc. The Committees were responsible for:

- **Coordinating activities** across SCTs to ensure coherent vision on the demonstrative interventions, testing activities, and feedback processes.
- **Synthesizing results and insights** from different perspectives within the educational community.



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- **Planning and prioritizing interventions** aimed at demonstrating improvements in sustainability competences and integrating low-carbon practices.
- **Advising on broader exploitation pathways**, including dissemination to other schools, universities, and relevant stakeholders.

The SCTs and SCCs created a **structured and participatory framework** for embedding the project outputs into educational practice. By actively involving all relevant stakeholders in co-design, testing, and decision-making, these bodies ensured that project results were: **contextually adapted** to the needs of educational communities, **validated and refined** through iterative feedback loops, **ready for immediate uptake** and prepared for broader exploitation at national and European levels.

Through this approach, ECF4CLIM strengthened both the **practical applicability** of its outputs and the **sustainability of their impact**, establishing a model of participatory engagement that can be replicated in other educational and community contexts.

5.3 Webinars, workshops, and General Assembly contributions

In addition to the structured engagement through SCTs and SCCs, ECF4CLIM leveraged **webinars, workshops, and General Assembly (GA) activities** to support co-design, testing, and exploitation of project outputs. These interactive formats provided platforms for knowledge exchange, capacity-building, and collaborative decision-making among project partners, educational communities, and external stakeholders.

The webinars and workshops were organized to:

- **Introduce methods, tools, and resources** developed by the project to teachers, students, and administrators.
- **Facilitate co-design sessions**, allowing participants to provide feedback on prototypes, propose improvements, and share experiences from local contexts.
- **Strengthen skills and competences** in sustainability education, low-carbon practices, and the application of the European Competence Framework (ECF).
- **Promote cross-site learning**, enabling DSs to exchange insights, identify common challenges, and disseminate best practices.

These activities also served as **direct exploitation channels**, ensuring that outputs were tested, adapted, and adopted in real educational settings, while simultaneously building capacity for long-term implementation.



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As part of the development of the **ECF4CLIM Roadmap for Sustainability Competences**, a series of **nine workshops and webinars** were organised with the active participation of educational communities in support of the construction of the Roadmap. In addition, two dedicated webinars were held to present the progress of the Roadmap. The first progress webinar (December 2022) explored the concepts of sustainability in general and **sustainability competences** in particular, with reflections on the concepts and definitions proposed in **GreenComp**. The second progress webinar (November 2024) focused on translating these concepts into practice, addressing drivers and barriers to transdisciplinarity and identifying resources to support implementation. A final discussion on the completed ECF4CLIM Roadmap for Sustainability Competences, engaging beneficiaries and stakeholders, is scheduled to take place during the **Final Conference in Madrid (December 2025)**.

In parallel, two additional webinars were organised to examine the **interdisciplinary and transdisciplinary dimensions** of operationalising the ECF4CLIM Roadmap and strengthening education for sustainability in schools and universities. These sessions engaged Demonstration Sites (DSs) as well as other practitioners and end-users from diverse backgrounds, with the aim of identifying needs for cross-disciplinary collaboration and potential synergies between different fields of expertise.

Another series of workshops and webinars was dedicated to the **development and testing of the project's tools (T1–T6)**. These sessions provided opportunities to present different versions of the tools to end-users, collect structured feedback, and introduce improvements based on the input of teachers, students, and administrators. This iterative process ensured that the tools were not only scientifically robust but also practical and user-friendly in real educational contexts.

The project's **General Assemblies (GAs)**—held both in-person and online—offered additional opportunities to:

- **Review progress** on co-design and testing activities across all demonstration sites.
- **Engage stakeholders and AB members** in discussions on exploitation strategies and sustainability pathways.
- **Align exploitation activities** with project milestones, deliverables, and Horizon Europe requirements.
- **Document lessons learned and feedback**, which informed refinement of outputs and the planning of targeted exploitation measures.

By combining webinars, workshops, and GA sessions, ECF4CLIM ensured that educational communities remained **actively involved in co-design and testing**, providing timely feedback on project outputs, exploitation efforts were **well-**



coordinated across sites and stakeholders, promoting consistency and alignment with project objectives, and the project created a **dynamic, participatory environment** where knowledge transfer, capacity-building, and practical implementation reinforced each other.

5.4 Feedback loops and their impact on exploitability

A central element of the ECF4CLIM exploitation strategy has been the establishment of **continuous feedback loops** between project partners, DSs, educational communities, and external stakeholders. These loops ensured that methods, tools, knowledge, and data were **iteratively refined and adapted** to meet the real needs of users, thereby increasing their practical relevance and long-term exploitability.

Feedback was collected through multiple channels:

- **SCTs and SCCs:** providing structured, ongoing input on usability, applicability, and adaptation of project outputs in classrooms, university courses, and institutional processes.
- **Webinars and Workshops:** enabling real-time discussion, testing, and collaborative refinement of tools and methods with a broader group of participants.
- **GA and AB Meetings:** integrating expert insights and strategic guidance to ensure alignment with policy frameworks, European competence initiatives, and stakeholder expectations.
- **Surveys and assessments:** collecting quantitative and qualitative data on the effectiveness of methods and tools, informing iterative improvements.

The continuous feedback loops had a **direct and measurable impact on the exploitability** of ECF4CLIM outputs:

- **Enhanced usability:** adjustments based on user input improved accessibility, clarity, and integration potential of tools and methods.
- **Increased adoption potential:** iterative testing in real educational settings provided evidence of effectiveness, making outputs more attractive and credible to other schools, universities, and policymakers.
- **Contextual adaptation:** feedback allowed outputs to be tailored to diverse educational systems and stakeholder needs, supporting scalability across different regions and institutions.
- **Strengthened stakeholder engagement:** involving end-users in continuous improvement fostered ownership and commitment, which is critical for sustained uptake and replication.



By systematically embedding feedback mechanisms into the project's workflow, ECF4CLIM ensured that exploitation was **not a one-time activity but a dynamic, reflective and iterative process**. This approach increased confidence in the results among both direct and secondary beneficiaries and prepared the ground for **sustainable, long-term implementation** of the European Competence Framework (ECF), methods, tools, and the ECF4CLIM Roadmap for Sustainability Competences in educational and policy contexts.

6 SUPPORT FROM HORIZON RESULTS BOOSTER (HRB)

6.1 Objectives of HRB involvement

Support from Horizon Results Booster (HRB) was requested by ECF4CLIM to **enhance the strategic planning, clarity, and effectiveness of the exploitation process**. Recognizing that successful exploitation requires structured guidance and expert insight, the project sought HRB support to ensure that key results, particularly the ECF4CLIM Roadmap for Sustainability Competences, could achieve **maximum societal, educational, and policy impact**.

The main objectives of HRB involvement were:

(O1) Improving understanding of exploitation pathways: HRB provided methodological support and structured exercises to help project partners fully understand the potential avenues for exploitation, including non-commercial, educational, and policy-oriented applications.

(O2) Defining an optimal exploitation strategy: HRB assisted in identifying realistic and high-impact exploitation options for the project's primary results, including methods, tools, knowledge, and data. This included assessing the **feasibility, relevance, and potential uptake** of each result by target stakeholders.

(O3) Supporting prioritization of key exploitable results: By analyzing the project's outputs, HRB helped the consortium focus on results with the **greatest potential for impact**, ensuring resources and efforts were efficiently allocated.

(O4) Enhancing practical implementation: HRB guided the development of concrete plans to operationalize exploitation, including steps for embedding results into educational curricula, training programs, policy frameworks, and institutional strategies.

(O5) Providing external validation and feedback: As an independent entity with expertise in Horizon Europe exploitation practices, HRB offered an **objective**



assessment of the project's exploitation approach, helping to refine and strengthen the plan for long-term sustainability.

Through these objectives, HRB involvement **reinforced the capacity of ECF4CLIM partners** to transform research outputs into actionable results, ensuring that the European Competence Framework (ECF) and associated project outputs would be **effectively adopted, applied, and sustained** beyond the formal project duration.

6.2 The exploitation exercise on the ECF4CLIM Roadmap for Sustainability Competences

A fruitful activity in the ECF4CLIM exploitation process was the **dedicated exploitation exercise on the European Competence Framework (ECF) Roadmap**, (PDES – Module C for ECF4CLIM), conducted with the support of the Horizon Results Booster (HRB). The ECF4CLIM Roadmap for Sustainability Competences, identified by the Expert Group (EG) as the **project's primary exploitable output**, served as the focus for a structured process aimed at defining realistic and high-impact exploitation pathways.

The exercise was designed to:

- **Clarify potential uses** of the ECF4CLIM Roadmap for Sustainability Competences by different stakeholder groups, including educational communities, policymakers, and non-formal education organizations.
- **Identify and evaluate exploitation pathways**, encompassing educational implementation, policy integration, training programs, and other societal applications.
- **Develop a practical, actionable exploitation plan** for the ECF4CLIM Roadmap for Sustainability Competences that could be implemented after the project's formal conclusion.

The exercise, initiated in December 2023 and completed in June 2024, followed a structured methodology guided by HRB, including:

- **Stakeholder analysis:** mapping primary and secondary users of the ECF4CLIM Roadmap for Sustainability Competences and assessing their capacity and willingness to adopt the framework.
- **Exploitation pathway design:** exploring potential applications of the ECF4CLIM Roadmap for Sustainability Competences in curricula, institutional strategies, new training modules, and policy frameworks.
- **Feasibility assessment:** evaluating the likelihood of successful adoption, potential barriers, and required resources.



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- **Action planning:** developing a step-by-step approach for post-project exploitation, including timelines, responsibilities, and expected outcomes.

The exploitation exercise produced a **realistic and structured approach** for leveraging the ECF4CLIM Roadmap for Sustainability Competences after its finalization in autumn 2025. Key outcomes include:

- Identification of the **main areas for exploitation**, including new funding applications, development of training courses or learning modules, and informing educational and policy strategies.
- Definition of **responsibilities and timelines** for partners to ensure coordinated implementation.
- Clarification that **commercial exploitation was not foreseen**, with the primary focus on educational, societal, and policy-oriented impact.
- Enhanced confidence among project partners regarding the **feasibility and sustainability** of long-term exploitation activities.

By systematically analyzing potential users, pathways, and implementation strategies, the HRB-supported exercise ensured that the ECF4CLIM Roadmap for Sustainability Competences is **ready for broad adoption and practical application**, significantly increasing its long-term impact across educational and policy contexts.

6.3 Outcomes: exploitation pathways, barriers, and opportunities

Following the HRB-supported exploitation exercise and the continuous engagement of educational communities, DSs, and AB members, ECF4CLIM identified a series of **practical exploitation pathways** for its primary outputs, including the European Competence Framework (ECF) Roadmap, methods, tools, knowledge, and data. Alongside these pathways, potential **barriers and opportunities** were analyzed to inform strategic planning and maximize impact.

The main pathways for exploitation were structured around three complementary dimensions:

- **Educational Implementation:** (1) Integration of the ECF, methods, and tools into formal and non-formal curricula across schools and universities, (2) Development of new courses, learning modules, and training programs for students, teachers, and administrators, (3) Embedding sustainability competences into institutional practices and pedagogical strategies.



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- **Policy and Institutional Uptake:** (1) Use of project outputs to inform policy guidelines, frameworks, and strategies at local, regional, and national levels, (2) Advocacy for adoption of low-carbon practices in educational institutions, leveraging evidence from demonstration sites.
- **Knowledge Sharing and Networking:** (1) Dissemination of results through webinars, workshops, publications, and collaboration with sister projects such as GreenSCENT, (2) Participation of the AB and project ambassadors to extend the reach of project outputs across Europe.

Several **potential barriers** to exploitation were recognized: (1) **Variability in educational contexts** across countries, which may require adaptation of methods and tools, (2) **Limited capacity or resources** at some institutions to implement new curricula or integrate additional training modules, (3) **Policy or regulatory constraints**, which may slow institutional uptake or alignment with national frameworks, (4) **Sustainability of engagement**, as continued support and motivation are needed to maintain adoption after project completion.

The exercise also highlighted **multiple opportunities** to enhance the uptake of project results: (1) **Early engagement and co-design**, ensuring outputs are user-centered and directly applicable in educational settings, (2) **Evidence-based validation** from demonstration sites, which strengthens credibility and encourages adoption by other institutions, (3) **Cross-project synergies** with initiatives like GreenSCENT, Education for Climate, and GreenComp to leverage networks and align with European sustainability objectives, (4) **Digital platforms and open-access resources** for wide dissemination, enabling replication and adaptation in diverse contexts.

By identifying these pathways, barriers, and opportunities, ECF4CLIM has laid a **clear, structured foundation for exploitation**. The project outputs are positioned to achieve **maximum educational, societal, and policy impact**, with strategies in place to overcome potential obstacles and capitalize on opportunities for scaling, replication, and sustainable adoption.

7 IDENTIFIED EXPLOITABLE RESULTS

ECF4CLIM is not a technical project generating tangible outputs such as prototypes, tools, or technological innovations that can be directly commercialized or standardized. Our project generates results that are primarily knowledge-based, such as frameworks, models, policy recommendations, educational materials, or methodologies. The exploitation of such results therefore requires different strategies, focusing less on

market uptake and more on **integration into societal practices, policy frameworks, and institutional processes.**

Successful exploitation in this context involves ensuring that the findings inform decision-making, support capacity building, shape public debate, and contribute to long-term cultural or behavioral change. This can be achieved by engaging policymakers, practitioners, educators, and civil society from the outset, tailoring dissemination tools to non-technical audiences, and embedding the results in training programs, guidelines, and institutional and governance structures to secure their lasting impact.

A deep reflective and iterative process among the partners and involving the associated demonstration sites (DSs) was devoted to identify the exploitable results and to engage as much as possible some of the potential beneficiaries in the co-design process.

The list of exploitable results resulted after the revising of PERSS, together with the potential beneficiaries, is presented in Table 7.1.

Table 7.1 List of potential exploitable results [2]

Code	Potential exploitable results	Type of results	Potential beneficiaries
m1	ECF4CLIM Crowdsourcing (participatory will formation)	Method	Scientific community Educational communities from DSs Local communities Other educational communities Policy makers NGOs and other organizations
m2	Environmental audits	Method	Scientific community Educational communities from DSs Local communities Other educational communities General public
m3	Hybrid participatory approach for the co-design, co- implementation and co- evaluation of interventions to	Method	Scientific community Educational communities from DSs NGOs and other organisations



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	promote sustainability competences		
T1	Environmental footprint calculator	Tool	Educational communities from DSs Local communities Scientific community Other educational communities Policy makers NGOs and other organizations General public
T2	Retrofitting tool kit	Tool	Educational communities from DSs Local communities Other educational communities Scientific communities NGOs and other organizations General public
T3	Tools to evaluate the sustainability of interventions	Tool	Educational communities from DSs Local communities Other educational communities Scientific communities NGOs and other organizations General public
T4	Learning space and its educational resources (Digital Learning Contents, games, narratives, storytelling, and creative writing tasks integrated in the games)	Tool	Educational communities from DSs Other educational communities General public
T5	Crowdsourcing collaborative space	Tool	Educational communities from DSs

			Other educational communities
T6	IoT Ecosystem for Multipurpose Monitoring	Tool	Educational communities from DSs Other educational communities Policy makers
K1	Small-scale demonstrative interventions to improve sustainability jointly with the educational community	Knowledge	Educational communities from DSs Other educational communities
K2	ECF4CLIM Roadmap	Knowledge	Educational communities from DSs Other educational communities Scientific communities
D1	Baseline of collective and individual competences and environmental performance	Data	Local communities Scientific communities Policy makers

The development of the exploitable methods (M1, M2, M3), tools (T1–T6), knowledge outputs (K1, K2), and data sets (D1) involved all partners or subsets thereof. In most cases, educational communities from the demonstration schools (DSs) actively participated as co-designers, or at a minimum, the methods and tools were tested within these communities. This approach not only ensured that exploitation was effectively prepared for success but also initiated the exploitation process directly at the level of the educational communities, fostering early engagement and practical adoption of the project results.

7.1 Methods (M1–M3)

The ECF4CLIM project developed **three core methodological approaches (M1–M3)** to foster sustainability competences and low-carbon practices within educational and local communities. These methods were designed to be **participatory, adaptable, and directly applicable**, ensuring they could be effectively exploited by schools, universities, and other stakeholders.



7.1.1 M1, ECF4CLIM Crowdsourcing method (Participatory Will Formation)

Within ECF4CLIM, the crowdsourcing method—referred to as **Participatory Will-Formation by Crowdsourcing (M1)** [12]—serves as a foundational tool for engaging diverse educational communities in the co-creation of sustainability priorities, intervention ideas, and commitments. Its objective is to elicit, collect, and reflect the “will” of students, teachers, administrators, and other stakeholders toward sustainability actions, thereby helping ensure that later methods, tools, and interventions are grounded in actual needs and aspirations.

The key features and design of M1 may be summarized as:

- **Participatory and Inclusive:** The crowdsourcing method invites input from a broad cross-section of the educational community (students, teachers, administrators, etc.), often through digital collaborative spaces. Participation is designed to be easy, accessible, and representative, enabling voices from different roles, levels, and contexts to be heard.
- **Structured Will-Formation:** Rather than simply gathering suggestions, the method includes structured phases. First, eliciting ideas and proposals for sustainability actions; second, enabling discussion, ranking or selection of these among participants; and third, synthesizing joint priorities or commitments. This sequence helps the method move from raw input to agreed directions for interventions.
- **Digital Support Tools:** The crowdsourcing process is supported by online platforms/tools that allow for submission of ideas, commenting, voting or ranking, and collaborative deliberation. The digital space (tool T5) plays a critical role in gathering input, facilitating communication, and making the process scalable and traceable.
- **Co-Design Integration:** The crowdsourcing method isn’t standalone; it is integrated with other co-design and test phases in the project. Outputs from crowdsourcing feed directly into the development of the ECF4CLIM Roadmap, ensuring alignment between what stakeholders express as their priorities and what is actually implemented.

The **implementation steps and the process** is described below:

1. **Initial Call for Participation:** Educational communities are invited to contribute via online platforms to suggest areas of sustainability they consider most urgent or impactful, often guided by prompts or thematic areas (e.g. energy, waste, resource use, behavior change).



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2. **Idea Aggregation & Screening:** Submitted ideas are collected, grouped, possibly de-duplicated, and screened (with partner oversight) to ensure clarity, relevance, and feasibility.
3. **Deliberation & Voting/Ranking:** Participants review the collected proposals, discussing merits, identifying trade-offs, and ranking or voting for preferred actions. This may happen in workshops, webinars, or online.
4. **Synthesis of Outcomes:** The results of ranking or voting are synthesized into a set of agreed priorities or “will” statements which then guide downstream intervention design and implementation. These become input for intervention planning under M3 and selection of which tools or methods to deploy in Demonstration Sites.
5. **Feedback Loop:** Participants are informed of how their contributions are used, what interventions follow from the crowdsourcing exercise, and how priorities map into demonstrable actions. This transparency strengthens engagement and trust, and helps with ongoing refinement.

The **main strengths and benefits** of M1 consist of:

- **Alignment with Real Needs:** By anchoring the choice of interventions, methods, and tools in what stakeholders themselves express, the crowdsourcing method enhances relevance, increases acceptance, and reduces risks of misalignment.
- **Ownership and Commitment:** Stakeholders are more likely to invest effort and support interventions when they have taken part in setting their direction.
- **Scalability & Traceability:** Digital tools allow collecting, managing, and analyzing large volumes of input efficiently, making replication and extension to other sites easier.
- **Cross-cutting input:** Because the method gathers ideas from diverse roles within educational communities, viewpoints such as pedagogical, infrastructural, behavioral, and administrative concerns are all surfaced.

The following **challenges** were identified during the testing and implementation process together with **recommendations** for the mitigation process:

- **Participation Bias:** Some stakeholders may be more likely to participate than others (e.g. teachers over students, or more engaged schools over less resourced ones). Mitigation includes active outreach, support, and making submissions accessible.



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- **Feasibility Filtering:** Not all suggested actions may be realistic or resourced. The filtering and screening phase is important to manage expectations and ensure that selected interventions are viable.
- **Digital Access & Literacy:** Use of digital platforms assumes availability of devices and digital skills. The method includes measures for training, alternate formats, or in-person sessions for those with limited access.
- **Sustained Engagement:** Ensuring that the crowdsourced “will” is translated into concrete implementation is critical; otherwise, participants may become disengaged. Feedback loops and visible follow-through are therefore central.

7.1.2 M2, Environmental audits

The Environmental Audits method (M2) [13], developed within ECF4CLIM, provides a structured approach for establishing a baseline of environmental performance in educational institutions and guiding continuous improvement toward sustainability and low-carbon operations. It offers a practical framework for systematically assessing key dimensions of environmental performance—such as energy consumption, waste management, water use, heating and insulation, and overall resource efficiency.

By highlighting strengths and pinpointing areas for improvement, M2 enables schools and universities to design and prioritize evidence-based interventions. Its participatory nature allows teachers, administrative staff, and students to actively engage in the monitoring of institutional practices, fostering awareness and shared responsibility for sustainable action.

The audits are applicable across diverse educational contexts in EU countries, making them a versatile tool for integrating low-carbon measures into daily operations. Beyond measuring performance, M2 also serves as a learning and capacity-building process, helping institutions embed sustainability competences into governance, infrastructure management, and educational practice.

The key components and the process is described as following:

1. **Baseline Assessment:** (1) The method begins with a **baseline audit**, collecting quantitative data from participating institutions on current environmental performance. This includes measuring electricity and gas usage, water consumption, waste generation and separation rates, usage of materials, and other resource inputs, (2) It also involves **observational and qualitative assessments of infrastructure** (e.g. building envelopes, insulation, heating systems), practices (e.g. recycling, energy conservation measures), and **behaviors** among the school or university community.
2. **Indicators & Metrics:** (1) Specific indicators are used to enable comparison over time and between sites. These may include kWh/student, liters of water per unit



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institution size, waste per student, and proportion of renewable energy or energy-saving installations, (2) Both individual and collective environmental performance are assessed, enabling institutions to see where potential improvements lie at both operational and community behavior levels.

3. **Data Collection Tools:** (1) Audits employ both existing institutional records (utility bills, maintenance logs, waste management records) and direct measurements, (2) Where possible, observational checklists, surveys of practices, and interviews with administrative or facility staff and students provide additional insights into non-quantified environmental aspects (behavioral, procedural, etc.).
4. **Analysis & Reporting:** (1) Collected data is processed to quantify environmental baselines and identify benchmarks, (2) Comparative analyses are done across demonstration sites to highlight variation, best practices, and priority areas for improvement, (3) Gap analyses are used: comparing current performance to ideal benchmarks or targets, and creating actionable recommendations.
5. **Intervention Planning:** (1) Based on audit findings, educational institutions work with co-design teams (including SCTs) to select feasible interventions. These might include retrofitting (insulation, lighting upgrades), behaviour change campaigns, waste reduction measures, water-saving devices, etc, (2) The Environmental Audit provides a roadmap of where action can have the greatest environmental impact and/or deliver cost savings.
6. **Monitoring and Iteration:** (1) After interventions are implemented, follow-up audits or measurements are planned to assess improvements, (2) This establishes an ongoing feedback loop: audits → interventions → monitoring → refinement. This iterative model supports sustained environmental performance improvement.

While the Environmental Audits method (M2) proved to be an effective and adaptable tool across diverse educational settings, its implementation was not without challenges. One of the main difficulties encountered related to **data availability and quality**. Many educational institutions lacked centralized systems for tracking energy, water, and waste data, which complicated baseline assessments. In some cases, some data were incomplete, inconsistent, or only available at the municipal level rather than for individual schools or campuses. This required additional coordination with local authorities and facility managers, as well as the development of estimation and extrapolation techniques to ensure comparability across sites.

Another challenge concerned **human and time resources**. Conducting thorough environmental audits requires the active involvement of teachers, administrative staff, and technical personnel—groups that already operate under demanding workloads.



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Mobilizing participation and maintaining motivation throughout the process demanded careful planning, internal coordination, and ongoing communication. Training and guidance materials provided by the ECF4CLIM team helped mitigate these issues, but long-term institutional commitment remains essential for maintaining regular audits and integrating them into annual planning cycles.

Additionally, **contextual and infrastructural differences between schools** and universities influenced the feasibility and relevance of certain indicators. For example, while some institutions could directly measure electricity consumption or implement smart metering solutions, others relied on shared utilities or outdated systems. Climate, building age, and funding availability also affected the capacity to introduce recommended interventions.

To address these challenges, several recommendations emerged from the implementation experience. First, institutions are encouraged **to integrate environmental audits into existing administrative and pedagogical routines**, such as annual school reports or sustainability curricula, to reduce the burden of separate reporting. Second, **capacity-building activities**—including workshops and online tutorials—**should be continued to strengthen technical understanding of sustainability metrics among educators and students**. Third, **establishing local partnerships with municipalities, energy agencies, or environmental NGOs** can enhance access to expertise and resources, facilitating data collection and the implementation of technical improvements.

Finally, a key lesson learned is the importance of **embedding audits within a participatory culture**. When students and staff understand the purpose and value of monitoring environmental performance, **audits evolve from a compliance exercise into a transformative learning process**. This approach not only improves data quality and follow-up but also strengthens the overall sustainability culture within educational institutions, ensuring that environmental awareness translates into long-term behavioral and organizational change.

7.1.3 M3, Hybrid Participatory Approach

The Hybrid Participatory Approach (M3) [14, 15], developed in ECF4CLIM, is a **structured method that integrates co-design, co-implementation, and co-evaluation processes to foster sustainability competences within educational communities**. By actively involving students, educators, administrators, and other stakeholders, M3 ensures that interventions are practical, context-sensitive, and aligned with the real needs of institutions.

M3 follows a multi-stage process: first, **interventions are co-designed** with educational communities to capture their priorities and contextual realities; second, these **interventions are collaboratively implemented**, ensuring ownership and commitment;



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and finally, outcomes are co-evaluated through participatory mechanisms that highlight both successes and areas for improvement. This iterative cycle allows for adaptation and refinement, ensuring that interventions remain usable, relevant, and responsive to evolving contexts.

Beyond its role as a methodological framework, **M3 functions as a capacity-building tool**. It empowers educational communities to become active co-creators of sustainability solutions, embeds continuous feedback loops into institutional practice, and enhances the long-term exploitability of project outputs by aligning them with everyday realities of schools and universities.

In the following the components and process are presented:

1. **Co-Design Phase:** (1) Educational stakeholders (students, teachers, administrative staff) participate in workshops and sessions to identify local sustainability challenges and opportunities, (2) Participants select, adapt, and customize those measures that are feasible in their school/university/local community contexts. This co-design includes decisions on which tools and methods (from M1 and M2) to use, what scale interventions will take
2. **Preparation & Implementation Phase:** (1) Once interventions are co-designed, participating communities prepare action plans, assign roles, schedule tasks, and begin implementation. Tools such as T1-T6, presented in the next section, are used as relevant, (2) Implementation is hybrid in nature: combining onsite, hands-on activities in schools/universities with digital collaboration, remote monitoring/data collection, and shared learning across demonstration sites.
3. **Co-Evaluation & Feedback Phase:** In this phase, interventions were assessed through a twofold approach addressing both sustainability competences and environmental performance. In line with reviewers' recommendations, the evaluation of individual competences did not rely on baseline data. Instead, it aimed to (1) explore the current status of individual sustainability competences among participants, (2) generate empirical evidence to validate and refine the initial ECF4CLIM Roadmap by examining how specific competences functioned as enablers or constraints, and (3) foster self-reflection and dialogue on the role of these competences in driving transformative change [15].

For environmental performance, the evaluation followed a sector-based approach, differing from the uniform baseline assessment conducted earlier in the project. Each demonstration site was analysed according to the types and scope of interventions implemented, with evaluations conducted only for relevant sectors such as energy, waste, water, green spaces, green procurement, transport, and indoor air quality. Short-term impacts were measured using predefined Key Performance Indicators (KPIs) derived from the baseline phase, wherever



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comparable data were available, capturing measurable improvements in resource efficiency and environmental practices. Complementing this quantitative assessment, a qualitative analysis explored long-term impacts and behavioural transformations within the educational communities [16].

Feedback loops remained integral to this process, enabling stakeholders to share experiences, reflect on achievements and challenges, and adapt interventions accordingly. Documentation of outcomes and cross-site comparisons provided valuable insights for refining the ECF4CLIM Roadmap and supporting future exploitation and scalability efforts.

The main strengths of M3 are:

- **Context Sensitivity & Relevance:** Because local stakeholders are involved at all stages, interventions are more pertinent to the specific constraints and opportunities of each community.
- **Ownership & Capacity Building:** Co-design and co-evaluation foster stakeholder ownership, enhancing likelihood of uptake and long-term sustainability. Students, teachers, and administrators learn not just from the outcomes but from the process.
- **Empirical Evidence for Scaling:** The hybrid participatory interventions generate evidence on what works, in which contexts, and under which conditions, which is invaluable for policy uptake, replication, and scaling.
- **Adaptive Flexibility:** The method accommodates different combinations of tools, methods, and scales of intervention, making it transferable to diverse schools, universities, and communities.

M3 serves as a core method for moving from idea to action, ensuring that project outputs are not only developed but lived, tested, refined, and embedded—making them strong candidates for sustainable exploitation across and beyond ECF4CLIM’s lifetime.

The implementation of the **M3** revealed both its transformative potential and the practical challenges that accompany participatory, multi-stakeholder processes in diverse educational contexts. While M3 successfully fostered collaboration and ownership across demonstration sites, several factors influenced its effectiveness and replicability.

One of the main challenges concerned **balancing inclusiveness with efficiency**. Bringing together teachers, students, administrative staff, and local stakeholders in the co-design and co-evaluation phases often required extensive coordination, scheduling flexibility, and facilitation skills. In some cases, schools and universities faced difficulties in allocating sufficient time and human resources for participatory sessions alongside their regular academic obligations. Moreover, the varying levels of familiarity with



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participatory methodologies among participants occasionally led to uneven engagement, requiring additional training and capacity-building efforts.

Another challenge was **maintaining consistency and comparability** across different national and institutional contexts. DSs operated under diverse educational systems, governance models, and cultural approaches to collaboration, which affected the depth and speed of implementation. While this diversity enriched the learning process, it also complicated cross-site analysis and the development of standardized indicators. Additionally, the hybrid nature of the method—combining face-to-face activities with digital collaboration—sometimes faced technical barriers, such as limited access to digital tools, connectivity issues, or varying digital literacy levels among participants.

From a sustainability standpoint, **ensuring long-term engagement beyond the project's timeline** emerged as a crucial issue. The success of participatory approaches depends heavily **on institutional continuity, stable leadership, and ongoing motivation of teachers and students**. However, schools and universities are dynamic environments, often facing staff turnover, shifting priorities, and limited funding for extracurricular initiatives. Without embedding M3 processes into institutional governance or curriculum structures, there is a risk of discontinuity once external project support ends.

To address these challenges, several recommendations were formulated based on the lessons learned during ECF4CLIM implementation. First, it is essential to **institutionalize participatory structures**—such as SCTs and Committees SCCs—so that the co-design, co-implementation, and co-evaluation processes become integral to the governance of schools and universities rather than temporary project mechanisms. Second, **dedicated training and facilitation support** should be offered to educators and administrators to strengthen their participatory and communication skills, enabling them to sustain stakeholder engagement independently. Third, **simplified tools and templates** should be developed to reduce the workload associated with reporting and monitoring, ensuring that the process remains accessible and scalable.

Finally, a key recommendation concerns **creating cross-institutional learning communities**—both at national and European levels—to ensure continued exchange of experiences and peer learning beyond the project's end. Such networks would not only enhance the exploitation potential of M3 but also contribute to its evolution as a flexible, evidence-based model adaptable to future educational priorities and emerging sustainability challenges.

In summary, while M3 proved to be **a robust and adaptable participatory model**, its full potential depends on continued institutional commitment, adequate resourcing, and the cultivation of a collaborative culture that values shared learning and co-creation. These elements are essential for ensuring that the approach remains a cornerstone of education for sustainability beyond the ECF4CLIM project's lifetime.



7.2 Tools (T1–T6)

The ECF4CLIM project developed a set of practical tools designed to operationalize the three core methods (M1–M3) and to support the development of sustainability competences in educational and local communities. **Six of them (T1–T6)** were selected as exploitable results based on their potential to transform theoretical frameworks into actionable, user-friendly resources to be applied across schools, universities, and other stakeholder settings.

The tools T1–T6 were **co-designed and tested** in collaboration with DSs, ensuring usability, relevance, and adaptability to different educational contexts. By providing **interactive, data-driven, and participatory tools**, T1–T6 ensure that ECF4CLIM outputs are **immediately applicable and ready for long-term integration**, supporting both local implementation and broader exploitation at regional, national, and European levels.

7.2.1 T1, Environmental Footprint Calculator

T1 is a tool [17] designed to enable educational institutions to measure and monitor their environmental footprint. The tool is embedded in the Simulators Space of the ECF4CLIM's digital platform (<https://ecf4clim.eu/digital-platform/>). Its goal is to provide a practical, user-friendly means of quantifying resource usage, emissions, and other environmental impacts, thereby helping these institutions understand baseline sustainability performance and identify high-priority areas for improvement.

The main key features of T1 are:

1. **Indicator-Based Assessment:** The Calculator tracks multiple environmental impact indicators, including climate change, water resource depletion, human toxicity, or acidification. associated with building operations and personal and institutional activities.
2. **Baseline Benchmarking:** Institutions can use T1 to establish a baseline of their environmental performance, which can then serve as a reference point against which interventions (e.g. retrofits, behavior changes) are compared. This enables monitoring of progress over time.
3. **User Participation:** Teachers, administrators, students, and facility managers are intended users of T1. The Calculator is designed to involve these stakeholders in data collection (e.g. providing utility bills, waste data), interpretation, and decision-making processes, increasing ownership of environmental action.
4. **Comparability & Reporting:** The tool supports comparison across different time periods and potentially between different institutions. It may also have functionalities for reporting or visualizing the footprints so that information can



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be communicated to the educational community, local authorities, or other stakeholders.

5. **Guidance for Improvement:** Based on the results of the footprint calculation, T1 highlights areas for improvement.

T1 aligns with project baseline assessments of environmental performance (using of M1), helping to operationalize the reference data and track progress post interventions, with M2 (Environmental Audits) by providing quantitative, continuously updated metric tracking, and with other tools used to conduct retrofitting (T2), evaluation of interventions (T3), and IoT monitoring (T6).

The main benefits of T1 are:

- **Practical Decision Support:** By translating environmental operations into measurable metrics, T1 supports evidence-based decision-making within institutions.
- **Motivation & Engagement:** Stakeholders (students, staff) can see concrete data, which encourages behavioral change and investment in sustainability.
- **Scalability & Transferability:** Because it relies largely on accessible data (electricity bills, water meters, waste metrics), the tool is replicable across institutions of widely differing sizes, types, and locations.
- **Policy & Institutional Strategy Alignment:** T1 outputs can feed into institutional sustainability plans, curriculum content, and policy discussions—serving as evidence when seeking funding or administrative support for environmental improvements.

Some challenges and recommendations resulted from the use of T1 in the context of the DSs:

- **Data Availability and Quality:** Some institutions may lack detailed or reliable records for utilities, waste, etc., which can affect accuracy.
- **Access to Technical Support:** Users may need training or assistance to use the calculator effectively, especially regarding interpreting results and deriving action plans.
- **Maintaining Use Over Time:** To ensure the tool continues to drive impact, institutions must commit to periodic updates and follow-through on improvement actions informed by the outputs.



7.2.2 T2, Retrofitting Toolkit

The Retrofitting Toolkit [18] is a digital toolset developed to help educational communities (schools, universities) to assess and plan building energy efficiency improvements. It is embedded in the Simulators Space of the ECF4CLIM's digital platform (<https://ecf4clim.eu/digital-platform/>) and is designed both as an educational tool (raising awareness, building competence) and as a decision-support tool for institutions seeking to reduce energy demand, improve indoor comfort, and align with sustainability goals.

The toolkit is composed of two main tools:

Tool 1, Maps for Building Energy Retrofitting Proposals: (1) Creates maps and visualizations based on the climatology of a school's location, showing environmental variables such as temperature, solar radiation, relative humidity, and wind, using Typical Meteorological Year (TMY) files and other climate datasets, (2) Generates bioclimatic strategy maps that suggest passive and active design measures—like shading, improved insulation, ventilation strategies—tailored to the local climate and building type, (3) Provides heat/cooling estimation, showing dynamic heating and cooling demand for buildings under different configurations. Users can explore how thermal comfort responds to proposed environmental and retrofitting changes.

Tool 2: Dynamic Building Energy Performance: (1) Enables users to select a representative classroom or building component and model it dynamically, taking into account building geometry, construction materials, use patterns, orientation, and operational variables (ventilation, lighting, etc.), (2) Offers a suite of predefined retrofitting measures: window improvements, wall insulation, shading, lighting upgrades, ventilation enhancements, etc. Users can test and compare energy savings in heating and cooling demands arising from each measure, (3) Uses a parametric simulation environment (including external simulation engines) to generate a database of performance outcomes, which enables benchmarking of retrofitting savings under different scenarios.

The toolkit differentiates according to educational level: primary, secondary, university. Outputs, visualizations, and explanations are adapted to suit the comprehension level of different user groups (students, teachers, facility managers) to ensure clarity and educational value. Users can set or modify parameters such as classroom orientation, insulation level, lighting type, shading, or ventilation, to see how modifications affect indoor thermal comfort and energy demand. This supports both institution-level planning and student/educator learning.

The key strengths and the exploitation values are:



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- Educational utility: By visualizing climate data, showing thermal comfort charts, and simulating retrofitting effects, the tool helps build sustainability competences—raising awareness of how built environments contribute to energy demand and how retrofitting can address this.
- Decision support: Helps administrators and facility managers make informed choices about retrofitting measures, based on quantifiable savings in heating/cooling demand, trade-offs, and local climatic and building conditions.
- Scalable and transferable: Because input data (climate, building type, orientation, etc.) can be adapted for different institutions and geographical contexts, the toolkit is suitable for replication beyond initial demonstration sites.

In the following, some considerations resulted from the use of T2 in the real context of DSs:

- Data availability: Accuracy depends on availability of climate files, building specifications (geometry, materials), and operational data (lighting, usage, ventilation). Some institutions may lack these.
- User proficiency: Effective use requires some familiarity with climate/environmental concepts and comfort interpreting thermal comfort graphs, degree-day metrics, etc. Educational support, explanatory materials, and training may be needed.

7.2.3 T3, Tools to Evaluate the Sustainability of Interventions

T3 [19] is an evaluation toolset developed in ECF4CLIM to assist school educational community in assessing sustainability audits in seven environmental areas. Moreover, it could be used to detect those areas with more improvement potential and preparing scenarios before interventions design and execution. The tool allows the analysis and understanding of the state of educational centers about seven different areas of sustainability, within which Key Performance Indicators (KPIs) are determined. Using the tool will help evaluate technical-material sustainability competencies and define strategies for their improvement. The areas of sustainability covered within the tool are: green procurement, transports, water, waste, green areas, indoor air quality, energy.

These tools help ensure that interventions are not only implemented, but also tracked, refined, and validated with respect to their environmental performance. The evaluation tools support decision-making, accountability, and refinement, forming a critical link between intervention design (M3), baseline data (D1), and long-term exploitability.

T3 includes the following components and capabilities:

- **Evaluation Indicators:** T3 provides a set of indicators aligned with environmental performance, technical-material sustainability competences, behavioral change,

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and institutional resource efficiency. These indicators allow measurement of how interventions are progressing against established benchmarks (e.g., from baseline data in D1).

- **Comparative & Temporal Analysis:** The tools allow for comparison of results over time (pre- vs post- intervention) and across different demonstration sites. This helps detect which interventions are more effective, under what conditions, and where improvements are needed.
- **Feedback Mechanism:** T3 is designed to be part of iterative feedback loops: results from evaluation feed back into co-design and implementation phases (M3), ensuring continuous improvement of the interventions and adaptation to real conditions.
- **Reporting & Visualization:** Tools include means to present evaluation results via dashboards or reports. These visual reports help communicate impact internally (within educational institutions) and externally (to policymakers, advisory boards, etc.).

The main strengths of T3 are the followings:

- **Supports Evidence-Based Decision-Making:** T3 provides quantitative and qualitative evidence of what works, which is crucial for convincing institutional leadership, funding bodies, or policy makers to scale or replicate interventions.
- **Improves Intervention Quality:** Through systematic evaluation and feedback, the tools help refine and improve interventions both during and after implementation, increasing their effectiveness, relevance, and acceptability.
- **Facilitates Transparency & Accountability:** Having standardized evaluation tools enables consistent reporting and comparison across sites and over time, improving accountability to stakeholders and grantors.
- **Transferability & Scalability:** Because the tools are designed to work in different educational settings and with common indicators, they can be adopted by other schools, universities, and networks beyond the demonstration sites.

The main considerations resulted from the testing and use in the real context of DSs:

- **Data Collection Challenges:** Reliable evaluation requires consistent, quality data before and after interventions. Some institutions may lack infrastructure or capacity for baseline data, or struggle with follow-up measurement.
- **Resource & Time Demands:** Proper evaluation takes time, effort from multiple actors (teachers, students, administrators) and may require training in use of the tools and interpretation of results.



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- Context Dependence: What constitutes "success" or improvement may vary greatly between contexts (geographical, institutional, resource availability), so tools must remain flexible enough to adapt thresholds or indicators and comparison among schools should be done with caution.

7.2.4 T4, Learning Space and Educational Resources

T4 [20, 21] is a "Learning Space" module within the ECF4CLIM digital platform (<https://ecf4clim.eu/digital-platform/>) designed to provide a rich collection of educational resources to foster sustainability competences, climate awareness, and responsible citizenship. It serves as a pedagogical hub for teachers, students, and other users (including perhaps informal learners), offering varied learning materials, interactive learning formats, and engaging content aligned with the project's competence roadmap.

The Learning Space is organized into three main sub-spaces, each targeting different user groups and learning modes:

- **Teachers' Space:** (1) Curated resources including lesson plans, interactive activities, serious games, infographics, video content, and presentation materials. These are categorized by age group (6-9, 10-15, 16-25), by theme/topic (e.g. Action; Circular Economy; Energy Choices; Environmental Awareness; Waste & Circular Economy; Engagement; Visions; etc.), and by resource type (flipbooks, games, visuals, etc.). L0 PDF shows the resource types, (2) Links to the ECF4CLIM Roadmap and other guiding documents so that teachers can align their planning and classroom work with the project's long-term competence goals.
- **Students' Space:** (1) Interactive flipbooks (e.g. 5 flipbooks developed by ISQ) organized in modules that correspond to thematic areas in the ECF4CLIM Roadmap for Sustainability Competences (Awareness, Engagement, Vision, Action, etc.), (2) Content is adapted for different age ranges, making sure younger students see simpler narratives while older students can engage with more complex concepts.
- **Game Sub-Space:** (1) A serious game integrated in the Learning Space, structured around the thematic modules of the ECF4CLIM Roadmap for Sustainability Competences. Users can access it via both the Learning Space and platform main menu, (2) Mini-games within the serious game: quizzes, decision trees, true/false questions, memory cards, etc. Elements of narratives, storytelling, and creative writing tasks are incorporated to enhance engagement.

T4 is designed to be interactive, visually rich, and engaging, which increases its appeal for both teaching and learning. Key exploitability aspects include:



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- Ease of access: Materials can be accessed via the digital platform, making it available to remote or blended learning contexts.
- Variety of formats: The use of flipbooks, games, storytelling, creative writing, quizzes etc., means different learning preferences are addressed, enhancing adoption.
- Customization / alignment: Teachers can choose themes, age groups, and types of resource that match their curricula, thus facilitating integration into existing teaching plans.
- Engagement and motivation: The inclusion of games and interactive resources boosts learner engagement, which tends to improve retention, participation, and behavior change.

Some considerations resulted from the testing and use of T4 in the DSs:

- Content refresh and maintenance: To remain relevant and engaging, resources need updating, especially as scientific knowledge, policy contexts, or technological affordances change.
- Localization/adaptation: Some content may need translation, adaptation to local curricula, or cultural adjustment to optimize relevance in different countries.
- Digital access: Reliable digital infrastructure (internet, devices) is necessary to use many of the interactive features.
- Support for teachers: Some resources may need accompanying guidance, training, or teacher facilitation to be effectively used, particularly for interactive game-based or narrative tasks.

T4 – Learning Space and Educational Resources is a central component in ECF4CLIM’s exploitation strategy, providing a diverse, well-structured, and engaging set of educational materials aligned with the project’s Roadmap and competence framework. By offering content tailored to teachers and students across age groups, thematic areas, and learning formats, it supports curriculum integration, promotes sustainability education in an engaging way, and aids in building competences and awareness. Its interactive design and adaptability make it well suited for replication, institutional embedding, and longer-term exploitation across educational communities.

7.2.5 T5, Crowdsourcing Collaborative Space

T5 [22] is a digital collaborative environment within the ECF4CLIM Digital Platform (<https://ecf4clim.eu/digital-platform/>) that supports the project’s crowdsourcing and participatory “will-formation” processes. It is designed to collect input, feedback, and ideas from diverse educational communities—including students, teachers, administrators, and other stakeholders—thus amplifying voices and ensuring that



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interventions, tools, and educational methods are informed by real needs, barriers, and opportunities.

The key features and functionality are described below:

- **Online Discussions & Idea Collection:** Users can contribute suggestions about challenges, opportunities, and needs in sustainability education via structured prompts or thematic areas. This supports the initial co-design and crowdsourcing phases (M1). The tool allows submission of open-text contributions, allowing participants to share perceptions, experiences, suggestions, and concerns regarding sustainability competence development and environmental performance in educational settings.
- **Stakeholder Engagement & Dialogue:** The collaborative space is meant to be safe and inclusive, enabling participation from various roles within educational communities. It encourages dialogue among users—replying to, voting on, or commenting on proposals—to refine and build consensus on what actions would be most valuable.
- **Mapping Barriers and Opportunities:** Information collected via the crowdsourcing collaborative space is used to identify common barriers to effective sustainability education as well as potential enablers. Stakeholders can help outline which tools or methods they believe would support their contexts, contributing to design decisions in later phases (e.g. which interventions to pilot under M3).
- **Linkage to Other Tools and Platform Areas:** T5 is tightly integrated with other parts of the ECF4CLIM Digital Platform: suggestions made through the collaborative space feed into planning and evaluation tools, and into the Learning Space resources. Crowd input may guide which topics receive priority in the educational resources, which tools are adapted or emphasized, and which measures are piloted.
- **Transparency and Feedback:** Users are informed of how their contributions are being used—for example, which ideas are selected for further development, or which actions are prioritized. This feedback loop helps maintain engagement and trust in the process.

Some considerations resulted from the testing and use of T5 in the DSs:

- **Digital Access & Literacy:** Some users may have limited access to technology, or be less comfortable contributing via digital means. Support, guidance, or alternate participation options may be needed.



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- Participation Bias: Those who participate may not represent all stakeholder groups equally; active outreach is necessary to ensure inclusiveness.
- Expectations Management: Managing participant expectations is crucial; not every idea can be implemented. Clear communication of what can be done helps maintain trust.
- Sustainability of Platform Use: After formal conclusion of project phases, keeping the collaborative space active (moderated, maintained, updated) is necessary to avoid stagnation.

By providing a platform for inclusive participation and idea generation, it supports the early identification of stakeholder needs, influences co-design and intervention planning, and helps ensure that project outputs are usable, relevant, and accepted by the communities they aim to serve. Its integration into the digital platform and its connections with other tools make it a strong enabler of sustainable uptake, policy alignment, and transferability beyond the initial project sites.

7.2.6 T6, Ecosystem for Multipurpose Monitoring

T6 [23] is designed to allow educational institutions (schools, universities) to collect, monitor, and analyze real-time environmental and operational data through an Internet of Things (IoT) ecosystem. Its purpose is to support evidence-based decision-making, track environmental performance, and complement other tools (e.g. footprint calculators, audits) by providing continuous, fine-grained data. This helps institutions both monitor baseline performance (as in D1) and evaluate improvements following interventions.

The key features and functionalities are:

Sensors & Data Collection: (1) Deployment of IoT sensors in educational facilities to collect environmental metrics such as temperature, humidity, air quality (CO₂, VOCs), and energy usage (lighting, heating), (2) Monitoring resource usage in real time to capture fluctuations and to understand patterns of energy consumption tied to behaviors and institutional operations.

Multipurpose Monitoring: (1) Because it is “multipurpose”, the system is meant not only for environmental monitoring but also for educational purposes: helping students and staff observe how changes in behavior or interventions (e.g. closing windows, adjusting heating, turning off lights) reflect immediately in environmental parameters, (2) Provides data that can feed into other tools (e.g., environmental footprint, audits, or evaluation tools) to build a more complete picture of performance over time.

Dashboard & Visualization: (1) A digital web-interface was developed to visualize the collected IoT data: charts, time series graphs, comparisons with baseline or benchmarks, (2) Enables administrators, teachers, and possibly students to access readings, track



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trends, and see effects of interventions or retrofitting efforts. A mobile app was deployed to showcase in an intuitive way the energy consumption and indoor air quality metrics to the students and the teachers to identify the energy waste and to improve the air quality in the classrooms.

Integration & Context Adaptability: (1) Designed to work with the digital platform of ECF4CLIM, making it interoperable with other modules, tools, and data sources, (2) Adaptable to different environments and hardware availability; likely allows modular sensor deployment so that institutions can start small and scale up.

Support for Feedback and Intervention Evaluation: (1) Data collected through T6 can serve as part of the evaluation of interventions under M3: comparing pre- and post-intervention environmental metrics, (2) Enables more immediate feedback to users (students, teachers, administrators) so that behavior changes can be reinforced when positive effects are observed.

Some considerations resulted from the testing and use of T6 in the DSs:

- **Technical & Infrastructure Requirements:** Reliable hardware, maintenance, internet connectivity, power supply, and sensor accuracy are required; not all institutions may have these resources.
- **Data Privacy and Ethical Use:** Care must be taken to ensure data collected does not breach privacy norms (especially if occupancy, CO₂ levels are tied to rooms/users).
- **Cost & Maintenance:** Installing, calibrating, maintaining sensors, ensuring data continuity, and software upkeep requires resources and technical capacity.
- **User Training & Interpretation:** Workshops and training material was provided to the installers for the proper installation and configuration of the IoT devices to the IoT ecosystem framework. Also, teachers, administrators, and students need guidance to interpret data correctly and draw meaningful conclusions.

T6 provides continuous, granular, real-world environmental data that support monitoring, evaluation, awareness-building, and ultimately more informed action. Its integration into the digital platform and alignment with other project methods and tools makes it a powerful asset for educational institutions aiming to embed sustainable practices and low-carbon behaviors into their daily operations.

7.3 Knowledge (K1–K2)

The ECF4CLIM project generated **two key knowledge outputs (K1–K2)**, which constitute essential resources for the exploitation of the project's methods and tools. These



knowledge outputs capture theoretical background, practical experiences, validated approaches, and strategic guidance that can be applied in educational and community contexts to enhance sustainability competences.

7.3.1 K1, Small-Scale Demonstration Interventions to Improve Sustainability

K1 [24, 25, 26, 27] represents a core “knowledge” output of the ECF4CLIM project. It comprises a range of **small-scale, illustrative interventions** carried out in educational communities (schools, universities) in order to improve sustainability practices, environmental performance, and sustainability competences (knowledge, attitudes, behaviour). These interventions serve both as practical learning experiments and as proofs-of-concept for what works in different institutional, infrastructural, and cultural contexts.

The interventions serve as a **reference for replication and adaptation**, allowing other schools, universities, and community organizations to implement similar initiatives effectively.

K1 captures a portfolio of locally-rooted, co-designed pilots that test, refine, and validate sustainability interventions in educational institutions. It bridges theory and practice, generating actionable insights, evidence, and ownership, and thus plays a crucial role in the exploitation of ECF4CLIM outputs. These interventions form the backbone of the project’s knowledge base, supporting both immediate adopters and informing broader policy, scaling, and institutional embedding.

The key features and functionalities are:

- **Co-Design with Educational Communities:** (1) These interventions are not “top-down” but are co-designed with input from students, teachers, administrators, and other staff via mechanisms such as the SCTs/Committees and via the hybrid participatory approach (M3), (2) Local priorities are identified (e.g. waste management, energy use, behaviour change, resource efficiency) and context-appropriate measures chosen.
- **Intervention Types & Measures:** (1) The interventions include technical, behavioural, and organisational actions to address individual, collective and technical-material competences. For example, retrofitting or energy-efficiency upgrades, setting up or improving monitoring or measurement (often via IoT or footprint tools), promoting sustainable behaviour, awareness campaigns, etc. (2) Some interventions may involve applying tools (e.g. environmental audits, footprint calculators) to drive change.
- **Pilot Nature and Scale:** (1) They are small-scale by design, implemented in one or more classrooms, building wings, or individual buildings rather than across



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entire institutions at first. This allows testing, iteration, and refinement. (2) Duration is often limited and designed to produce observable effects within a manageable timeframe, while collecting data for evaluation.

- **Monitoring & Evaluation:** (1) Interventions are monitored using baseline data (D1) and evaluated using tools such as T3, IoT monitoring (T6), and other environmental performance or behavioural indicators (such as transport habits), (2) Feedback collected from participants is used to adjust the intervention in progress, ensuring greater relevance and acceptability.

Some considerations resulted from the testing and use of K1 in the DSs:

- Some interventions led to improvements in environmental indicators (energy, waste, water, etc.) and in sustainability awareness among students and staff.
- Challenges include variability in infrastructure quality, access to technical / monitoring resources, limited time or staff capacity, difficulty maintaining behaviour change, and ensuring follow-through of planned actions.

7.3.2 K2, ECF4CLIM Roadmap

K2 – ECF4CLIM Roadmap [28, 29, 30] is a practical framework developed to guide educational institutions, policymakers, and other stakeholders in promoting sustainability competences and embedding climate action into educational practices.

K2 integrates findings from co-design activities, demonstration interventions, and stakeholder engagement to outline pathways for scaling and embedding project outputs, and functions as a **central guidance tool** for policymakers, educational authorities, and institutions seeking to align curricula, training programs, and sustainability strategies with European competence frameworks. Additionally, it, along with academic papers that will be written based on this development work, will contribute to scholarly discussions on sustainability competences and thereby advance research in this field. These provide possibilities for **long-term development, adoption, and exploitation** of the ECF4CLIM Roadmap for Sustainability Competences across educational institutions.

The key features and components of the ECF4CLIM Roadmap for Sustainability Competences are:

- **Vision for promoting sustainability – Four areas of sustainability competences in educational practice:** The ECF4CLIM Roadmap outlines four crucial factors for promoting sustainability competences in educational practice: promoting engagement, understanding



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connections, supporting change, and realising action. It also provides examples from demonstration sites.

- **Objectives for promoting sustainability – Three levels of sustainability competences:** The Roadmap expands the concept of sustainability competences from individual competences to include collective and technical-material competences, which are deeply intertwined. It presents the focal competences at each level and area that educational institutions should consider.
- **Implementation pathways – Enablers and constraints in educational practice:** The Roadmap analyses the enablers of sustainability in educational settings and offers examples of opportunities and strategies to overcome constraints, based on experiences from ECF4CLIM demonstration sites.
- **Policy and institutional alignment – GreenComp as a springboard:** The ECF4CLIM Roadmap puts the European Sustainability Competence Framework, GreenComp, into practice by broadening its focus to include collective and technical-material competences. In doing so, it supports administrations and educational institutions in embedding GreenComp into their practices and learning content. GreenComp is a key policy initiative for sustainability in education, and EU countries, administrations, and schools are committed to its implementation.
- **Capacity building and support – Materials, tools and platforms:** The Roadmap describes the approaches developed during the ECF4CLIM project. They are available on the ECF4CLIM project site <https://ecf4clim.eu/> and on the MAPPA.fi platform, on pages dedicated to the Roadmap for Sustainability Competences <https://mappa.fi/en/greencomp-roadmap/>. Some tools include mechanisms for monitoring and evaluating the implementation of sustainability initiatives, enabling institutions to assess effectiveness and make data-informed decisions.

7.4 Data (D1)

The ECF4CLIM project generated a key data output, **D1 – Baseline of Collective Competences** [31] and **Environmental Performance** [32], which forms the empirical



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foundation for assessing, monitoring, and enhancing sustainability competences within educational communities. This dataset is essential for both the **implementation of project methods and tools** and the planning of future exploitation activities.

D1 provides a comprehensive baseline of sustainability competences at the collective level, including students, teachers, and administrative staff, as well as an assessment of environmental performance across demonstration sites. The data encompass regulatory and normative data related with sustainability at our DS, as well as quantitative measures of institutional environmental performance such as energy consumption, waste management, and resource efficiency. D1 serves as a **reference point for evaluating the effectiveness of project interventions**, supporting continuous monitoring and iterative improvement of methods and tools.

By establishing a **reliable baseline**, D1 enables the measurement of impact from co-designed interventions, validates the effectiveness of methods (M1–M3) and tools (T1–T6), and supports strategic planning for broader exploitation. It ensures that project outcomes are **evidence-driven, transparent, and replicable**, reinforcing the long-term usability and sustainability of ECF4CLIM outputs.

Data (D1) encompasses two foundational baseline assessments conducted within the ECF4CLIM project:

1. **D4.1 – Baseline Assessment of Collective Competences:** This identifies the set of enabling and constraining features that condition the capacity of a community or an organisation to function in a manner that fosters sustainable development and to prepare younger generations for behaviours that advance such an objective. It includes regulatory and normative competences.
2. **D4.3 – Baseline Assessment of Environmental Performance:** This assessment measures the current environmental impact of the institutions, focusing on areas such as energy consumption, waste management, water usage, transportation, green spaces, and procurement practices.

Both assessments were carried out using a hybrid participatory methodology, involving students, educators, and staff in the data collection and analysis processes. This approach ensures that the assessments are contextually relevant and that the stakeholders are actively engaged in the sustainability journey.

The assessments utilized a combination of quantitative metrics (e.g., energy consumption per student, waste produced) and qualitative insights to provide a holistic view of the current state.

The main findings are presented below:

- **Collective competences** [31]: The baseline analysis of collective competences for sustainability in education revealed both enabling and constraining institutional

factors influencing sustainability efforts across the twelve demonstration sites. A key finding was the tension between regulatory and normative competences—anchored in institutional rules—and cultural-cognitive competences, rooted in shared values and beliefs. Across all countries, teachers had autonomy to include sustainability topics, but systemic and structural barriers—such as dependence on municipal authorities or outsourced services—restricted broader institutional action. The economic dimension of sustainability was found to be underrepresented in curricula, highlighting the need for more integrated approaches. A consistent observation across all sites was the gap between ambitious policy frameworks and actual implementation. Leadership commitment emerged as a decisive factor for success, while students pointed to prevailing societal values like individualism and consumerism as key obstacles. Strengthening collective competences thus requires aligning governance, culture, and leadership to embed sustainability into the core of educational practice.

- **Environmental Performance** [32]: The environmental performance assessment highlighted significant disparities among institutions in areas such as waste management, energy efficiency, and green procurement. For instance, some schools exhibited high levels of recyclable waste, while others had limited infrastructure for sustainable transportation options.

The baseline data allows for the design of customized interventions that address the specific needs and challenges of each institution, thereby enhancing the likelihood of successful outcomes.

The baseline assessments provide a benchmark against which the impact of interventions can be measured, facilitating ongoing monitoring and evaluation throughout the project.

By involving the educational community in the assessment process, Data (D1) fosters a sense of ownership and commitment to sustainability goals, which is crucial for the long-term success of the project.

7.5 The ECF4CLIM Roadmap for Sustainability Competences as the flagship result

The **ECF4CLIM Roadmap** represents the flagship result of the project, serving as the **strategic cornerstone** for the exploitation of all project outputs, including methods (M1–M3), tools (T1–T6), knowledge (K1–K2), and data (D1). The ECF4CLIM Roadmap for Sustainability Competences consolidates lessons learned, best practices, and co-designed interventions into a **comprehensive Roadmap** that guides the adoption,



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scaling, and long-term integration of sustainability competences across educational and institutional contexts.

The ECF4CLIM Roadmap for Sustainability Competences provides pathways for embedding sustainability competences in schools, universities, and local communities, supporting alignment with the European Competence Framework for a Low Carbon Economy and Sustainability, GreenComp.

It synthesises methods, tools, demonstration interventions, and baseline data into a structured plan, ensuring coherence between different components of the project.

Developed through collaboration with educational communities, Advisory Board members, and demonstration sites, the ECF4CLIM Roadmap for Sustainability Competences is tailored to the needs of multiple stakeholders, including educators, administrators, policymakers, and civil society.

As the flagship result, the ECF4CLIM Roadmap for Sustainability Competences serves multiple exploitation purposes:

- **Educational impact:** Schools and universities can use it as a blueprint for curriculum design, training programs, and institutional strategies to enhance sustainability competences.
- **Policy and strategic planning:** Authorities and educational policymakers can adopt the Roadmap to inform national and regional guidelines, frameworks, and sustainability initiatives.
- **Cross-project and European-level applications:** The Roadmap can be leveraged in sister projects, networks, and European programs to harmonize approaches, share best practices, and foster synergies.
- **Evidence-based validation:** Built on demonstration interventions (K1) and baseline data (D1), the Roadmap provides a credible, tested framework for replicable and scalable implementation.

The ECF4CLIM Roadmap for Sustainability Competences acts as the **primary vehicle for the sustainable exploitation** of ECF4CLIM results, ensuring that the project's outputs are not only **adopted locally** but also **replicable, scalable, and adaptable** to diverse educational and institutional contexts across Europe. By consolidating the project's knowledge, methods, tools, and empirical insights into a single strategic framework, the Roadmap maximises the impact, visibility, and long-term sustainability of the project's contributions.



8 RECOMMENDATIONS FROM THE REVIEWERS

The external evaluation of the ECF4CLIM project was carried out by a panel of independent reviewers with complementary expertise in sustainability education, climate policy, innovation management, and European research project evaluation. Their multidisciplinary perspectives ensured a comprehensive assessment of the project's scientific, technical, and societal dimensions. The reviewers followed the standard two-period review process, corresponding to the project's mid-term and advanced implementation stages.

During the first reporting period, the reviewers focused on evaluating the project's conceptual foundations, methodological coherence, and the initial progress in developing the European Competence Framework (ECF) and the hybrid participatory approach, including the creation of innovative organizational models in the Demonstration Sites.

In the second reporting period, their attention shifted to assessing the maturity of results, the effectiveness of the dissemination and exploitation strategies, and the impact of the demonstrative interventions carried out in schools and universities.

This two-step review provided a balanced and constructive feedback loop, enabling the consortium to refine its activities, strengthen the exploitation pathways, and enhance synergies with European education and sustainability initiatives.

8.1 Recommendations from reviewers on exploitation and synergies

The two review reports of the ECF4CLIM project, covering the first and second reporting periods, provided several valuable recommendations for strengthening the exploitation of results and for enhancing synergies with other projects and initiatives.

During the first reporting period, reviewers highlighted the strong potential impact of the project and recommended reinforcing the communication, dissemination, and exploitation strategies to ensure the reach and usability of results for different target groups. They encouraged a clearer connection between exploitable outputs and target audiences, proposing more tailored strategies and simplified tools for end users (teachers, students, and school managers).

Reviewers also advised strengthening the mechanisms for quality assurance and the role of the Advisory Board in supporting exploitation and clustering efforts. Furthermore, they emphasized the importance of clarifying pathways for policy engagement and integrating project outputs within educational and institutional frameworks.

For the second reporting period, the reviewers acknowledged significant progress in addressing earlier recommendations. The updated dissemination and exploitation plans



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were praised for their more qualitative orientation and better targeting of user groups. The consortium's use of the Horizon Booster service for exploitation was positively noted, as was the prioritization of key exploitable results with clear end-user mapping. However, reviewers encouraged further attention to ensuring that the flipbooks and minigames within the digital learning space become more transformative and age-appropriate, and that teachers' feedback be integrated through participatory workshops.

Reviewers also highlighted the need to continue building synergies with related EU initiatives—in particular, through clustering activities, coordinated events, and improved presence in European education and sustainability networks. They recommended strengthening links with DG EAC, JRC, and the Education for Climate Coalition, and enhancing social media collaboration across similar EU projects.

Overall, the feedback from both reviews supports the project's strong exploitation potential while advising continued efforts to (i) simplify and adapt tools for broader use, (ii) sustain engagement with educational authorities and networks, (iii) maintain an active dissemination presence, and (iv) secure long-term accessibility and reuse of materials through open platforms such as ZENODO and MAPPA.

8.2 Implementation of the Reviewers' Recommendations

Following the feedback received during the second review period, the ECF4CLIM consortium undertook a series of targeted actions to strengthen the exploitation, communication, and synergy-building dimensions of the project. The reviewers emphasized the importance of ensuring that the project's outcomes — particularly the ECF4CLIM Roadmap for Sustainability Education — achieve visibility and practical usability beyond the academic context.

In response, the consortium intensified its strategic dissemination efforts, developing clearer pathways for the uptake of project results by educational institutions, policymakers, and civil society. This included the preparation of user-friendly materials such as the ECF4CLIM Roadmap short version, national-language video, and video explainers, as well as more systematic use of the digital platform and social media channels to reach non-academic audiences. The Best Intervention Award was also aligned with the reviewers' recommendation to highlight success stories and practical examples of impact. Twenty-two demonstrative interventions were identified as representative success stories and published on the project website, each accompanied by illustrative posters that highlight their objectives, implementation process, and key messages.

Another key recommendation concerned the need to reinforce the exploitation strategy by identifying concrete follow-up actions and potential continuation opportunities after



the project's conclusion. To address this, partners integrated exploitation-oriented discussions into consortium and GA meetings, clarifying roles and responsibilities for maintaining and expanding project outputs. The consortium also initiated contacts with related EU-funded projects and Green Deal clusters to exchange relevant information about their practices for the exploitation of results, in line with the reviewers' call for enhanced synergy-building.

The reviewers further encouraged the project to ensure the sustainability of the digital platform and data repositories. In response, the consortium committed to maintaining the project's website and platform for at least five years after completion and to storing key outputs on Zenodo, ensuring long-term open access to the project's knowledge base.

Overall, the consortium has treated the reviewers' recommendations as a constructive roadmap for reinforcing the project's legacy. The actions taken have contributed to a more robust exploitation framework, stronger cross-sectoral partnerships, and improved capacity for long-term sustainability of ECF4CLIM's results at both national and European levels.

9 EXPLOITATION PATHWAYS AND ACHIEVED ACTIONS FOR EXPLOITATION

9.1 Confirming the exploitation potential during testing and piloting

The ECF4CLIM project embedded **exploitation activities directly into the project workflow** from the outset, ensuring that outputs were tested, validated, and refined in real-world educational contexts. Exploitation during the project lifetime was primarily achieved through **testing of the methods and tools, a set of small-scale interventions, and demonstration activities** carried out across the demonstration sites (DSs).

An important output resulted from these testing activities was the evaluation of the exploitation potential for the developed methods, tools, knowledge, and set of data. The evaluation is presented in Table 8.1.1 for those results considered exploitable based on the previous analysis.

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Table 8.1.1 Evaluation of the exploitation potential by testing in DSs

Result	Testing in DSs	Observed Value	Exploitation Potential
M1 – Crowdsourcing (participatory will formation)	Applied in schools/universities to gather ideas, priorities, and concerns from students, teachers, and staff.	Enabled inclusive decision-making, strengthened ownership, and revealed local sustainability priorities.	High – scalable to multiple education systems and adaptable for community-level participatory processes, and for data collection, including scientific community's actions.
M2 – Environmental Audits	Conducted baseline assessments of energy, waste, water, and resource efficiency in DSs.	Provided quantitative evidence of environmental performance; raised awareness among staff and students.	Very High – ready-to-use method that can be integrated into institutional sustainability monitoring and policy frameworks.
M3 – Hybrid Participatory Approach	Used to co-design, co-implement, and co-evaluate sustainability interventions	Increased engagement, reflection and deliberation; the resulting interventions were context-specific and widely accepted.	Medium to High – transferable method to other schools/universities and scientific community; applicable beyond education (e.g., municipalities, NGOs); however, its proper implementation requires familiarity with and/or training on participatory action research and institutional commitment with the process.
T1 – Environmental	Tested with students and staff	Improved awareness,	High – easily transferable digital



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Footprint Calculator	to measure ecological impact of institutional and individual actions.	enabled comparison, and supported informed decision-making.	tool with potential for broad uptake in schools.
T2 – Retrofitting Toolkit	Used in DSs to assess and plan building efficiency improvements.	Practical resource for identifying low-cost and scalable interventions.	High – applicable across European educational infrastructures and relevant to policy/municipal frameworks.
T3 – Tools to Evaluate Sustainability Interventions	Piloted to establish scenarios before intervention implementation and assist the codesign phase of interventions	Enabled data - based evaluation of interventions' impact.	High – versatile evaluation framework that ensures scalability and comparability across contexts.
T4 – Learning Space & Educational Resources	Integrated into teaching activities in DSs (games, narratives, digital learning content).	Enhanced student engagement; improved competences through experiential learning.	Very High – strong potential for integration into curricula, online platforms, and lifelong learning programs.
T5 – Crowdsourcing Collaborative Space	Tested as a digital platform for collaboration and knowledge exchange.	Facilitated interaction among schools, stakeholders, and external experts.	High – strong exploitation potential as an EU-wide hub for sustainability learning and practice-sharing.
T6 – IoT Ecosystem for Multipurpose Monitoring	Installed in DSs to track real-time energy, environmental, and behavioral indicators.	Provided reliable data, raised awareness, and enabled dynamic monitoring.	Very High – high transferability to smart campuses and educational infrastructures across Europe.
K1 – Small-Scale Demonstration Interventions	Co-developed and implemented with DS communities.	Served as living labs, validating project methods and tools.	High – replicable interventions offering concrete examples for policy

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			and institutional adoption.
K2 – ECF4CLIM Roadmap for Sustainability Competences	Tested through workshops, expert validation, and Advisory Board feedback in DSs.	Offered a structural model for understanding the complexity of sustainability competences in educational practice, along with guidance for embedding these sustainability competences in education.	Very High – central exploitation asset, already recognized by Horizon Results Booster, with high policy relevance.
D1 – Baseline Data (Collective competences & Environmental Performance)	Collected systematically in DSs to measure the reference level.	Provided essential evidence base for interventions, monitoring, and evaluation.	Very High – transferable methodology and datasets can guide policymaking, benchmarking, and further research.

9.2 Exploitation activities during project lifetime

Exploitation of ECF4CLIM results started promptly after their validation by the Exploitation Group as exploitable outputs, with several methods, tools, knowledge resources, and datasets already being tested, applied in practice, and in some cases transferred to other European projects and initiatives. This proactive approach ensured that outputs were not only developed but also validated in real contexts, providing early evidence of usability, transferability, and long-term value.

The exploitation activities performed during the project execution are presented in Table 8.2.1.

Table 8.2.1 Exploitation activities during the project execution

Result	Test and use by DSs	Enlarged exploitation by networking	Other exploitation activities
M1 – Crowdsourcing (participatory will formation)	All 13 DSs	Planned	New projects: Dialoguing Arts, INTRACOMP, CREA+BIRD

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M2 – Environmental Audits	All 13 DSs	In progress, by DSs local and national networking	Environmental audits applied across pilot schools for data collection and benchmarking; results discussed and disseminated within DSs through SCT/SCC
M3 – Hybrid Participatory Approach	All 13 DSs	Planned	User-friendly version of the hybrid participatory approach available on-line
T1 – Environmental Footprint Calculator	All 13 DSs	In progress, by DSs local and national networking	Digital platform hosts all the tools together with the guidelines
T2 – Retrofitting Toolkit	All 13 DSs	In progress, by DSs local and national networking	Digital platform hosts all the tools together with the guidelines
T3 – Tools to Evaluate Sustainability Interventions	All 13 DSs	In progress, by DSs local and national networking	Sustainability intervention tool will be offer to be used by Andalusian schools
T4 – Learning Space & Educational Resources	All 13 DSs	In progress, by DSs local and national networking	
T5 – Crowdsourcing Collaborative Space	All 13 DSs	In progress, by DSs local and national networking	
T6 – IoT Ecosystem for Multipurpose Monitoring	All 13 DSs	Planned	A smart-phone application for IoT installed in DSs is available to be used by potential beneficiaries
K1 – Small-Scale Demonstration Interventions	All 13 DSs	Planned	Document describing the most relevant interventions to support future replication in preparation. The public repository of the



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			University of Seville, IDUS, is available to upload the documents.
K2 – ECF4CLIM Roadmap for Sustainability Competences	All 13 DSs	In progress, by MAPPA.fi network	The MAPPA.fi website prepared to host on long-term the final ECF4CLIM Roadmap for Sustainability Competences and all associated documents
D1 – Baseline Data (Collective competences & Environmental Performance)	All 13 DSs	Planned	The data are available at request. (Anonymized) data will be up-loaded to ZENODO

In alignment with the project's exploitation strategy and its objective to ensure long-term uptake of the developed methodologies, a series of teacher training courses were organised in collaboration with **CTIF**, the **Territorial Centre for Innovation and Training** under the Regional Government of Madrid. The courses, conducted in **February 2024**, focused on the implementation and pedagogical integration of key ECF4CLIM methodologies and tools, specifically the **Hybrid Participatory Approach (M3)**, the **Tool for Environmental Footprint Calculator (T1)**, and the **ECF4CLIM Roadmap (K2)**.

These activities contributed to the professional development of educators and facilitated the institutional embedding of ECF4CLIM concepts within regional education systems. Based on their relevance and positive reception, the **Regional Government has formally committed to the continuation of these training courses in 2026**, ensuring the sustained application, dissemination, and exploitation of project results beyond its official duration.

Methods (M1–M3)

The **Crowdsourcing Method (M1)**, combining deliberative workshops with an eDelphi process, has already been exploited beyond ECF4CLIM. Partner JYU successfully applied it in the Horizon Europe project *d@rts* (Dialoguing Arts) (<https://dialoguingarts.eu>), adapting workshop guidance and eDelphi questions to the project's specific context. Similarly, the Horizon Europe project *INTRACOMP* (started 2025, <https://intracomp.info/>) is implementing M1, further demonstrating its transferability across topics and domains. JYU is conducting a crowdsourcing in INTRACOMP that was



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inspired by the ECF4CLIM, but ended up using a different online platform for data collection (peda.net) and did not use Flinga for the workshops.

While the method does not hold direct commercial potential—since it relies on existing online tools (Flinga and eDelphi)—its strength lies in its adaptability and replicability in diverse research and educational contexts.

The **Environmental Audits (M2)** equipped schools and universities with a structured framework for establishing a baseline of their environmental performance, addressing critical areas such as energy use, waste management, water consumption, and infrastructure efficiency. Applied in the Demonstration Sites (DSs), the audits not only supported evidence-based interventions and enabled monitoring of progress but also facilitated the integration of low-carbon practices into everyday institutional operations. By sharing findings through the networks of DSs, these audits extended their impact beyond individual institutions, reaching local, regional, and national networks where schools regularly engage in joint activities, thus enlarging the group of beneficiaries. The enlargement of the use of M2 is expected through the existing networking involving the DSs, based on the good practices exchange and prepared guidelines.

The **Hybrid Participatory Approach (M3)** for co-design, co-implementation, and co-evaluation of interventions was validated in DSs as a highly effective means of engaging students, educators, and administrators in the design and testing of sustainability measures. Its participatory nature ensures adaptability across contexts and broadens exploitation potential by fostering collaboration across institutional and regional networks. To further strengthen uptake and replication, guidance was created to describe the methods, helping schools, universities, and policy actors to apply them effectively. To support the exploitation of the “Hybrid Participatory Method” a user-friendly version is on-going. It will be uploaded to both the project website and Zenodo.

Together, **M1–M3** form a robust methodological foundation for embedding sustainability competences in education, enabling local implementation, supporting institutional strategies, and informing educational policies, while also **expanding their reach through networking and dissemination activities**.

Tools (T1-T6)

The exploitation activities for T1-T6 included: (1) **Educational adoption:** Schools and universities are progressing in integrating tools into curricula, projects, and institutional practices to enhance sustainability competences, (2) **Policy and institutional uptake:** Tools provided practical frameworks and evidence for curriculum development, strategic planning, and sustainability policies, (3) **Cross-project application and scaling:** Tools were shared with sister project and other European projects and initiatives to promote wider impact.



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The six digital and practical tools developed within ECF4CLIM (T1–T6) are made accessible through the **ECF4CLIM Digital Platform** (<https://ecf4clim.eu/digital-platform/>), which serves as a central hub for schools, universities, and stakeholders interested in implementing sustainability competences. Each tool is accompanied by **guidelines, explanatory materials, and step-by-step instructions**, ensuring that users can easily understand their functionality and integrate them into everyday practices. These resources cover not only the technical aspects of the tools but also their pedagogical and institutional applications, supporting smooth adoption and transferability across contexts.

During testing in **Demonstration Sites (DSs)**, schools and universities confirmed that the platform-based accessibility of the tools significantly enhanced usability. However, they also emphasized the importance of **networking opportunities** to enlarge the group of beneficiaries. Through DS networks at local, regional, and national levels, the tools can be introduced to a wider audience of educational institutions (on-going continuous process), enabling knowledge-sharing and fostering communities of practice. This peer-to-peer exchange contributes to facilitate replication and scaling, while also ensuring that the tools are adapted to diverse institutional and cultural contexts.

Feedback from DSs also highlighted the need for **targeted training** to support new users, particularly teachers and administrative staff unfamiliar with digital sustainability tools. While the provided guidelines offer a strong foundation, hands-on workshops, webinars, and peer-learning activities were identified as necessary for building confidence and ensuring effective use of the tools. Such training will also enable schools to make the most of the synergies between tools—for example, linking data from the Environmental Footprint Calculator (T1) with outcomes from Environmental Audits (M2) or demonstrating impacts through the IoT Ecosystem for Multipurpose Monitoring (T6).

In this way, the accessibility of tools via the Digital Platform, combined with guidelines, networking, and training, ensures that **T1–T6 are not isolated products but part of a dynamic ecosystem** that empowers educational communities to embed sustainability competences in both learning and institutional practices.

A special note for T5 (ECF4CLIM crowdsourcing collaborative space). T5 does not hold commercial exploitation potential because it relied on already pre-existing tool on the market eDelphi and merely contained a link to the eDelphi page that was used (through buying a license) in the online crowdsourcing activity. The ECF4CLIM crowdsourcing collaborative space was created so that the participants of the crowdsourcing activity could easily find the correct eDelphi page. The IPR of the eDelphi platform belong to another party. It is, however, worth noting that there are also open and free-of-charge functionalities in Flinga and eDelphi. The JYU team conducted a rigorous comparison of the available tools in the beginning of ECF4CLIM project and discovered these



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functionalities, thus making it easier for the project partners to utilize these tools also in other projects.

Knowledge (K1-K2)

K1 – Small-scale demonstration interventions are central to the exploitation process, as they provide tangible “real stories” of application. These interventions generated evidence, user feedback, lessons learned, and measurable success indicators, making them essential for validating and scaling ECF4CLIM outputs.

A dedicated deliverable, *Report of Execution and Monitoring of Interventions and Actions* [25], documents the full range of interventions implemented across the Demonstration Sites. From this spectrum, a **selected subset was identified as showcases**—the main interventions recommended for replication in other educational communities beyond the current DSs. In parallel, the deliverable *Report on the Identified Interventions and Actions* [26] provides a detailed description of 22 interventions. It is available at the project website.

The selection of these showcase interventions was guided by four key criteria:

1. **Impact on the educational community** – the extent to which the intervention influenced individual, collective and technical-material competences.
2. **Replicability** – the potential for adaptation and adoption in different educational contexts.
3. **Coverage of the four dimensions of the ECF4CLIM Roadmap** – Engagement, Connections, Change, and Action.
4. **Coverage of the three spheres of the ECF4CLIM Analytical Framework** – individual competences, collective competences, and technical-material competences.

Through these carefully selected interventions, K1 ensures that the project results are not only tested and validated but also positioned for **transfer, replication, and long-term exploitation**.

All the interventions implemented in ECF4CLIM project has important features for the exploitation process: (1) **Evidence of feasibility** - They show that certain sustainability measures are achievable in educational settings, under constraints of budget, infrastructure, or institutional capacity, (2) **Proof of impact** - Measurable environmental improvements or behavioral changes bolster the case for scaling and institutional embedding, (3) **User engagement and ownership** - Because communities are involved in co-design, interventions often have higher acceptance and higher likelihood of being sustained, (4) **Transferability** - Lessons learned (what works, what doesn't, conditions needed) help other schools/universities replicate or adapt similar interventions elsewhere.



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On the other hand, these interventions implemented methods (M1–M3) and tools (T1–T6) in collaboration with students, teachers, and administrative staff to assess their usability, effectiveness, and adaptability. Selected schools and universities applied the methods and tools in classroom settings, projects, and institutional practices, allowing for **iterative testing and co-design adjustments** based on feedback from participants. Institutional-level activities highlighted the feasibility of low-carbon interventions and provided tangible examples of sustainability improvements.

By integrating **practical, context-specific testing** into the project timeline, ECF4CLIM ensured that exploitation was **initiated during the project lifetime**, creating a foundation for broader adoption and long-term sustainability. These pilots, interventions, and demonstrations not only validated the project outputs but also **fostered ownership among end-users**, preparing the ground for post-project exploitation at local, regional, and European levels.

To stimulate replication, a **dedicated promotion campaign** for K1 interventions was launched in August 2025 across the project's social media channels. All **22 selected interventions** were highlighted, showcasing their objectives, implementation processes, and outcomes. By presenting these interventions in accessible formats, the campaign aimed to raise awareness, inspire other educational communities, and encourage adoption and adaptation beyond the Demonstration Site.

K2 (ECF4CLIM Roadmap for Sustainability Competences) played a crucial role in the already done exploitation activities of ECF4CLIM by: (1) **Ensuring Sustainability** - By embedding sustainability into institutional policies and practices, the roadmap helps ensure that the project's impacts are long-lasting, (2) **Providing a Scalable Framework** - The roadmap offers a replicable model that can be adapted to various educational contexts, facilitating the widespread adoption of sustainability practices, (3) **Guiding Future Initiatives** - It serves as a reference for future projects and initiatives, offering insights and lessons learned to inform ongoing and upcoming efforts.

As part of the **Horizon Results Booster (HRB) exercise**, the main exploitation pathways for the **ECF4CLIM Roadmap** were identified as: (i) integration into new funding applications, (ii) development of new training courses and learning modules, and (iii) contribution to policy development. No commercial exploitation potential was foreseen.

So far, the ECF4CLIM Roadmap has already been successfully referenced in several European funding applications. For example, partner **JYU** integrated it into the successful **ERASMUS+ project CREA+BIRD** (running from December 2024 to November 2027), where the ECF4CLIM Roadmap serves both as a conceptual framework and as a practical guide to strengthening individual and collective sustainability competences. Similarly, the **ERASMUS+ project Greenversity**, where JYU is also a partner, uses learnings from the ECF4CLIM Roadmap for Sustainability Competences to further



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develop a green competence framework, standardize protocols for institutions and educational programs, and embed sustainability competences across university curricula. Both projects leverage experiences from ECF4CLIM to empower students and communities as active promoters of sustainable practices. The results of the ECF4CLIM project will also be utilised in Finnish national projects assessing sustainability education: **KESTOT** project, run by The Finnish Education Evaluation Centre (FINEEC), and **YKAPO** project assessing sustainability projects that were funded by the Finnish National Agency for Education. The ECF4CLIM Roadmap was also cited in a Horizon Europe application, **CROSSROADS**, which was not selected for funding but still demonstrated the growing recognition of its relevance. Additionally, the DS from Madrid expressed interest in collaborating with Romania and/or Finland in a future ERASMUS+ proposal. A dedicated session was included in the Agenda of GA and Final Conference in Madrid to discuss such opportunities.

In addition to funding applications, the ECF4CLIM Roadmap for Sustainability Competences has been exploited in the development of new educational offerings. At JYU, it was used in the development work of the **multidisciplinary module “Sustainability Transitions”**, where researchers, teachers, and students from all faculties collaborate to explore new pathways for the green transition. Beyond the Demonstration Sites, the Roadmap has also supported curriculum development in other institutions. For instance, **SYKLI Environmental College** (operating across Finland) has incorporated the ECF4CLIM Roadmap into its professional development training courses in environmental and sustainability education. The work of the ECF4CLIM project has also strongly supported the launch of a national doctoral program in sustainability sciences in Finland: Finnish researchers involved in the project have been working as designers and supervisors in the national Sustainability Transformations (SusTra) doctoral school, to which the project's results have contributed significantly.

The ECF4CLIM project has also influenced the launch of the UNESCO Chair on Teacher Education for Sustainable Development at the University of Ljubljana in Slovenia. In its launchin seminar in September 25th 2024 in Ljubljana, Professor Hannu Heikkinen contributed by presenting ideas from the ECF4CLIM research for developing sustainability education.

Furthermore, in September 26th 2025, the ECF4CLIM team, in collaboration with the UNESCO Chair on Teacher Education for Sustainable Development and the Faculty of Education at the University of Ljubljana, organized an international seminar, one of the key elements of which was the ECF4CLIM research. Similarly, the work of the ECF4CLIM project was prominently featured at the CREA+BIRD seminar held in Koper, Slovenia, in September 23rd -25th , 2025.



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In **Romania**, the **ECF4CLIM Roadmap** provided guidance for the development of a new university course titled “*Sustainable Development in a Technological Society*”, designed for students enrolled in technical faculties. The course is structured in 8 modules: (M1) Introduction to Sustainable Development, (M2) Technical Aspects of Sustainable Development, (M3) Sustainable resource management, (M4) Responsible technological development, (M5) Green and Renewable Technologies, (M6) Climate Change and Technical Adaptation, (M7) Global Collaboration and the Future of Technical Sustainability, (M8) Practical Sustainable Development Projects.

The course was developed through a **co-design process**, actively involving members of the **Sustainability Competence Teams (SCTs)** and **Committees (SCCs)** to ensure alignment with both educational and professional needs. It will be finalized and validated through a **pilot phase**, allowing for testing and refinement.

The intervention is aimed at equipping future graduates of technical faculties with the competences necessary to integrate rapidly and effectively into sustainability-oriented professional environments. This includes the ability to **develop and implement sustainability policies at the organizational level** and to **adapt to emerging requirements from national and EU strategies and regulations**.

By embedding sustainability competences into technical higher education, this initiative demonstrates how the ECF Roadmap can support curricular innovation and enhance graduates’ readiness for the green transition.

Through these applications, the ECF4CLIM Roadmap for Sustainability Competences is proving its value as a **scalable and transferable framework**, linking project results to real-world practices, curricula, and policy initiatives across Europe.

A set of video materials were developed and published on ECF4CLIM YouTube channel (https://www.youtube.com/channel/UCYCEl1uPSPKZvBmGX_tBvcg) with a focus on the Roadmap outcomes, accumulating more than 250 watching visitors.

Data (D1)

The D1 dataset offered multiple avenues for exploitation: (1) **Assessment and benchmarking** - Educational institutions used the baseline to **measure progress over time**, comparing collective and technical-material competences before and after interventions, (2) **Evidence-based decision-making** - Administrators and educators leveraged the data to identify priority areas for action, plan sustainability initiatives, and allocate resources efficiently, (3) **Supporting research and policy** - Aggregated insights from D1 informed policy recommendations, curriculum development, and the design of future sustainability programs, (4) **Cross-project and European-level applications** - The dataset provided a model for similar assessments in other contexts, enabling replication, harmonization, and benchmarking across schools, universities, and European initiatives.



9.3 Targeted dissemination and clustering activities

A key component of ECF4CLIM's exploitation strategy is **targeted dissemination and clustering**, designed to ensure that project results reach relevant stakeholders and are integrated into broader educational and sustainability initiatives. These activities complement the direct exploitation efforts conducted during the project lifetime by **extending the reach and impact of methods, tools, knowledge, and data**.

Specific groups were prioritized, including teachers, school administrators, curriculum developers, students, higher education institutions, policymakers, NGOs, and local communities. Dissemination was tailored to each audience using workshops, webinars, newsletters, publications, social media, and project websites, ensuring accessibility and engagement.

Beyond raising awareness, dissemination activities focused on enabling stakeholders to **adopt, adapt, and integrate** project outputs into educational and institutional practices.

ECF4CLIM engaged in strategic clustering with projects such as GreenSCENT, Education for Climate, GreenComp, and other Green Deal Call projects to exchange best practices, align methodologies, and create synergies that enhance exploitation potential. Clustering fostered connections among European stakeholders, promoting cross-project learning and coordinated approaches to sustainability education.

Participation in multi-project webinars, conferences, and thematic workshops enabled the demonstration of ECF4CLIM outputs to broader networks and facilitated the **scaling and replication** of project interventions. For example, in Finland, the results of ECF4CLIM project have been presented in multiple national academic conferences (e.g. FERA conferences on education, NYRIS conference, CHER conference, NESS conference); in multiple further training sessions and presentations for teachers, environmental educators, administration, and researcher communities; in ULOS-UT-OUT Outdoor learning conference, but also in some international seminars like in two Erasmus + TCA thematic seminars, in a seminar of Forthem Alliance, and Explore Nordics -seminar.

9.4 Capacity-building and training activities for users

To ensure effective exploitation of ECF4CLIM results, the project placed strong emphasis on **capacity-building and targeted training activities** aimed at equipping users with the knowledge, skills, and confidence to adopt and integrate project outputs into their educational and institutional practices. These activities complemented the co-design, piloting, and demonstration processes, ensuring **long-term usability and sustainability**.

Teachers, administrators, and students participated in structured workshops to familiarize themselves with the methods (M1–M3) and tools (T1–T6), including practical exercises and scenario-based learning.



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DSs provided opportunities for users to implement environmental audits, crowdsourcing exercises, and hybrid participatory interventions, reinforcing practical skills.

Online resources, interactive content, and learning platforms (T4, T5) were used to deliver flexible training that could be accessed asynchronously, expanding reach beyond the demonstration sites.

Targeted guidance supported administrators, curriculum developers, and policymakers in adapting the ECF4CLIM methods and tools to their specific contexts. Sessions focused on embedding sustainability competences into curricula, institutional strategies, and policy frameworks, promoting scalable and systemic adoption.

Participants gained practical expertise in sustainability education, low-carbon interventions, and participatory co-design approaches. Training activities increased confidence among users, facilitating the integration of methods and tools into educational practices and institutional policies. By building capacity at multiple levels, ECF4CLIM ensured that exploitation was not limited to the project lifetime but could continue autonomously, generating long-term educational, societal, and policy impact.

9.5 Role of Advisory Board members in exploitation and synergies with other projects

The Advisory Board (AB) of ECF4CLIM has played a **strategic role in supporting and guiding the exploitation of project results**, leveraging the expertise and networks of its members to enhance the impact, visibility, and sustainability of outputs. Composed of representatives from national and regional authorities, NGOs, universities, and industry, the AB ensured that project outputs aligned with stakeholder needs and were positioned for broad adoption.

The AB consistently emphasized the importance of **sustaining ECF4CLIM's outcomes beyond the project's lifetime**. Members highlighted that successful exploitation requires both institutional and personal commitment from educational leaders, teachers, and researchers. They advised that headmasters, motivated teachers, and local champions act as **"internal driving forces"** to maintain project momentum after funding ends.

Several members recommended the **institutionalization of interventions**, transforming pilot activities into regular educational and administrative practices. To this end, schools should integrate sustainability initiatives into their curricula, governance structures, and professional development schemes. The Board also stressed the need to connect **structural interventions (e.g., infrastructure improvements)** with **educational and behavioural dimensions**, ensuring that learning remains central to sustainability transitions.



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AB members further suggested that project outputs—such as the ECF4CLIM Roadmap, learning materials, and digital tools—be kept **accessible and regularly updated** on open platforms (e.g., the project website, Zenodo, or EU educational portals). They encouraged simplifying complex methodologies to create **practical resources for teachers**, particularly at primary and secondary levels, emphasizing that concise, adaptable toolkits would foster wider adoption. The idea of **mentorship between schools**—where experienced demonstration sites could guide newcomers—was proposed as an effective exploitation pathway.

At the same time, reviewers underlined the importance of **monitoring resource requirements** (time, funding, expertise) for interventions and classifying them by ambition level (low, medium, high) to support future replication. Recognizing the diversity of educational systems and contexts, the Board recommended maintaining flexibility and avoiding overly rigid frameworks that could hinder local adaptation.

In their strategic and operational role, AB members contributed to exploitation in several key areas:

- **Strategic guidance** – advising on potential exploitation pathways for methods, tools, and knowledge outputs, and identifying priority areas for impact.
- **Validation and quality assurance** – reviewing interventions and project outputs to ensure usability, scalability, and sustainability.
- **Policy alignment** – ensuring coherence with educational and sustainability policies at local, national, and EU levels, facilitating potential integration into formal frameworks.
- **Networking and outreach** – promoting project visibility through professional networks and acting as ambassadors to support adoption and replication across Europe.

The Advisory Board's active involvement ensured that ECF4CLIM outputs were **strategically positioned, validated, and communicated** to relevant stakeholders. By combining strategic advice, network facilitation, and validation of project interventions, AB members significantly **enhanced the likelihood of adoption, replication, and long-term sustainability**, reinforcing the overall exploitation strategy of the project.

In terms of the synergies creation, the AB encouraged **building stronger links between ECF4CLIM and external networks**, including other EU-funded projects, municipal initiatives, and policy bodies. Collaboration with entities such as the **European School Education Platform (ESEP)** was recommended to ensure long-term dissemination and shared learning across European educational institutions.

Members also promoted the establishment of **partnerships with municipalities and regional authorities**, citing examples where local governments (e.g., Loures Municipality



in Portugal) co-funded interventions and supported broader replication within their territories. They viewed municipalities as **key facilitators** of sustainability transitions in education.

The AB called for **cross-disciplinary and cross-sector synergies**, integrating technical, pedagogical, and policy dimensions. Recommendations included maintaining dialogue with other Horizon Europe and Green Deal projects to exchange information about tools, data structures, and participatory methodologies. Developing **joint events, workshops, or dialogues** with these initiatives would strengthen the European community of practice on education for sustainability.

Moreover, the AB advised leveraging the project's participatory networks to connect **bottom-up initiatives** (schools and teachers) with **top-down processes** (policy formulation and regulation). This dual approach would empower educational actors to influence future sustainability strategies and ensure that project tools inform national and EU policy frameworks.

10 POST-PROJECT EXPLOITATION

10.1 Ensuring exploitation's continuity after project completion

A core objective of the ECF4CLIM exploitation strategy is to ensure that the **project's results continue to be used, adapted, and scaled beyond the formal project duration**. Continuity is critical to maintain the impact of methods (M1–M3), tools (T1–T6), knowledge (K1–K2), data (D1), and the flagship ECF4CLIM Roadmap for Sustainability Competences, guaranteeing that the investment in co-design, piloting, and demonstration interventions translates into **long-term educational, societal, and policy benefits**.

The strategy for continuity is based on:

- **Institutional integration:** (1) Schools, universities, and local authorities are encouraged to embed ECF4CLIM methods, tools, and interventions into curricula, training programs, and operational practices. Some schools (e.g. Mozart school in Madrid, Sercaia school) have expressed a willingness to make some of the interventions a permanent feature. (2) Demonstration sites act as role models, offering proven examples that can be replicated and adapted in new contexts.
- **Knowledge sharing and open access:** (1) Project outputs, including manuals, digital learning resources, and the ECF4CLIM Roadmap for Sustainability



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Competences, were prepared and stored broadly accessible, supporting uptake by new schools, universities, and community groups, (2) Open access to baseline data (D1) and case studies (K1) will facilitate replication, evaluation, and adaptation across diverse settings.

- **Sustained stakeholder engagement:** While formal project activities will conclude with the end of ECF4CLIM, partners intend to **maintain dialogue and informal collaboration** with policymakers to help ensure that project outcomes remain visible and compatible with evolving educational and sustainability policies. The **Exploitation Group (EG)** may explore opportunities to adapt and share exploitation results when resources or institutional mandates allow. Likewise, **AB members, project ambassadors, and partner networks** are expected to remain points of reference for guidance and advocacy, contributing voluntarily or through future initiatives to the continued exploitations and dissemination of ECF4CLIM outcomes.
- **Continuation of school networking:** EG will invest efforts to stimulate and maintain the networking activities of the Demonstration Schools (DSs). Some of our schools expressed their interest in jointly applying to ERASMUS+
- **European frameworks and networks:** The project's alignment with key European initiatives—such as **GreenComp, Education for Climate**, and other EU frameworks—provides a solid foundation for continued relevance of its results. After the project's conclusion, partners aim to **maintain awareness of future developments** within these frameworks and to explore possibilities for adaptation or integration of ECF4CLIM outcomes **as institutional priorities and resources permit**. This approach will help ensure that the project's results remain **visible, compatible, and transferable** across evolving European educational and sustainability initiatives, even if direct engagement depends on future funding opportunities.

10.2 Long-term storage and access

An essential component of the long-term exploitation strategy is the secure and sustainable storage of project outputs, including documentation and guidelines for methods (M1–M3), tools (T1–T6), knowledge resources (K1–K2), and datasets (D1). Considering the specificity of these outputs and the diversity of target beneficiaries, long-term preservation and accessibility will be ensured through three dedicated platforms: (1) **MAPPA.fi** (with a primary focus on the ECF4CLIM Roadmap for Sustainability Competences), (2) **ecf4clim.eu** (serving as the reference repository for core project results and their exploitation pathways), and (3) **ecf4clim.smartwatt.net** (the Digital Platform supporting interactive use and adaptation of results).



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- **MAPPA.fi** (<https://mappa.fi/en/greencomp-roadmap/>)
 - The *Roadmap for Sustainability Competences* will remain accessible to teachers and educators via the MAPPA.fi platform after the conclusion of the ECF4CLIM project. MAPPA.fi, maintained by the Finnish Association of Nature and Environment Schools (an ECF4CLIM partner), is a digital resource bank compiling learning materials from diverse producers in environmental education, sustainability, and outdoor learning.
 - Its strength in storing and sharing educational resources lies in three key aspects: (1) MAPPA provides a centralized and reliable platform that ensures long-term accessibility and usability of materials; (2) its advanced search functions, thematic collections, and curriculum-linked tools facilitate effective organization and pedagogical integration; (3) MAPPA promotes collaboration by serving as a publishing platform for multiple contributors and enabling resource sharing among teachers.
 - Through these features, MAPPA.fi functions both as a durable repository of educational materials and as a hub for teacher collaboration. The Roadmap is linked to GreenComp competences, allowing content creators and users to connect teaching and learning resources aligned with both frameworks. The final version of the Roadmap will be published on MAPPA.fi in **November 2025**.

ECF4CLIM website (ecf4clim.eu)

- The project website will continue to host information and documentation related to the exploitable results for at least 5 years following the project's completion.
- In the longer term, all valuable materials identified for permanent preservation will be migrated to a dedicated section of *ciemat.es*, the official website of the ECF4CLIM project's coordinator.

Digital platform adaptation

- Beyond static storage, digital platforms will be designed to ensure long-term accessibility, adaptability, and usability for new users. This includes maintaining content in updated formats and ensuring compatibility with evolving educational and technological contexts.

Open Access Data Bases

- In addition to the long-term maintenance of the project website and digital platform, all valuable project materials—such as public deliverables, datasets, methodological guides, and communication outputs—will be uploaded to **ZENODO**, the open-access research repository supported by the European



Commission. This ensures that ECF4CLIM's outputs remain permanently accessible, citable, and interoperable within the broader European research ecosystem, in line with **Open Science** and **FAIR data principles** (Findable, Accessible, Interoperable, Reusable).

10.3 Institutional embedding: curricula, policies, strategies

A critical dimension of ECF4CLIM's long-term exploitation strategy is the **institutional embedding** of project outputs within schools, universities, and local educational authorities. Embedding ensures that methods (M1–M3), tools (T1–T6), knowledge (K1–K2), and the ECF4CLIM Roadmap for Sustainability Competences are **sustained, adapted, and integrated** into formal and non-formal educational structures, fostering systemic and lasting impact.

Some activities were directed at supporting the continuous institutional embedding, such as ensuring alignment with educational goals. All ECF4CLIM methods and tools are designed to integrate with existing curricula, enabling seamless incorporation into classroom activities, projects, and interdisciplinary learning. Digital learning content, gamified resources, and co-designed interventions (T4, M3) provide ready-to-use modules for teachers, facilitating the inclusion of sustainability competences in daily instruction. Demonstration interventions (K1) showcase replicable approaches that can be adapted across multiple grades, disciplines, and institutions.

The ECF4CLIM team, through the national coordinating organisations in Finland, Portugal, Romania, and Spain, **intends to continue providing guidance and informal support for the potential integration of project outcomes into educational curricula**. While opportunities for broader adoption in other EU Member States may arise, **any expansion will depend on the availability of resources and institutional interest**.

Policy integration remains an important aspiration of the project, approached through two complementary avenues: contributing to policy frameworks and supporting evidence-informed decision-making. Collaboration with national and regional educational authorities has laid the groundwork for potential uptake of the project's results in future policy development. Moreover, **the evidence gathered through D1 and pilot activities offers valuable insights that could inform future discussions and initiatives** related to sustainability competences and practices in education, should the appropriate conditions and support be secured.

On the other hand, institutional strategies are addressed by embedding sustainability into operational practices, long-term planning, and capacity building. Environmental audits (M2, T1) and retrofitting tools (T2) support schools and universities in developing strategies to reduce their carbon footprint, improve resource efficiency, and foster low-



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carbon institutional cultures. The ECF4CLIM Roadmap for Sustainability Competences (K2) and the hybrid participatory approach (M3) provide strategic frameworks for institutions to plan, implement, and monitor sustainability initiatives over time, ensuring continuity beyond the project's lifetime.

Looking ahead, the EG will build on these foundations by promoting the adoption of the Roadmap across diverse educational contexts, adapting it to local priorities while preserving its shared framework. The EG further commits to providing tailored guidance for institutions, policymakers, and stakeholders, supporting them in accelerating the uptake of low-carbon strategies and ensuring lasting impact. In addition, through ongoing training and workshops for educators, administrators, and policymakers, the EG will reinforce institutional capacity to sustain and expand sustainability initiatives independently, securing the continuity and evolution of the project's outcomes well into the future.

10.4 Future funding and partnerships for scaling up

Ensuring the sustainability and broader impact of ECF4CLIM results requires proactive planning for **future funding opportunities and strategic partnerships**. Leveraging networks, collaborations, and co-funded initiatives will enable the scaling up of project outputs—methods (M1–M3), tools (T1–T6), knowledge (K1–K2), data (D1), and the ECF4CLIM Roadmap for Sustainability Competences —beyond the demonstration sites and across European educational and community contexts.

The short-term strategy for funding and resource mobilization consists of: (1) **Horizon Europe and other EU programs** - The project outputs are well-positioned for inclusion in future EU-funded initiatives, particularly in education, climate action, and sustainability research, (2) **National and regional programs** - Schools, universities, and local authorities can access public funding to support the adoption of ECF4CLIM methods and tools, retrofitting initiatives, and capacity-building activities, (3) **Private and public partnerships** - Collaboration with companies, NGOs, and other organizations provides opportunities for co-financing, technical support, and scaling of pilot interventions.

The EG will be active to stimulate the maintaining and creation of strategic partnerships:

- **Educational networks:** Partnerships with school networks, universities, and educational associations facilitate wider dissemination, adoption, and replication of project outputs.
- **Policy and research institutions:** Collaboration with national and regional educational authorities, research centers, and advisory boards ensures that project results influence policy, curricula, and institutional strategies.



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- **Sister projects and European initiatives:** Synergies with GreenSCENT, GreenComp, Education for Climate, and similar projects provide opportunities to share best practices, coordinate activities, and amplify impact across Europe.

Involving efforts to identify and secure **future funding streams and strategic partnerships**, ECF4CLIM ensures that its outputs can be scaled up sustainably and adopted across a wide range of educational and societal contexts. These activities enhance the **long-term exploitation potential**, enabling the project to reach additional schools, universities, and communities while maintaining alignment with European frameworks and priorities for sustainability education.

10.5 Transferability to other educational communities

A core ambition of ECF4CLIM is to ensure that project outputs—methods (M1–M3), tools (T1–T6), knowledge (K1–K2), data (D1), and the ECF4CLIM Roadmap for Sustainability Competences —are **transferable and adaptable to a wide range of educational communities across Europe and beyond**. Transferability is central to exploitation, as it enables successful interventions, frameworks, and resources to be replicated in diverse institutional, cultural, and geographic contexts, while retaining their effectiveness and relevance.

Schools and universities beyond the demonstration sites can adopt ECF4CLIM methods and tools, drawing on evidence from pilots and interventions to guide local adaptations. This ensures that the project's benefits are not limited to participating institutions, but extend to broader educational ecosystems at regional, national, and international levels.

The following **mechanisms for transferability** were identified and will be implemented under the coordination of the EG:

- Creation of channels for cross-national learning and mutual support – Beginning with the four countries hosting demonstration sites, the EG will foster continuous collaboration with educational associations, networks, and policy bodies to enable structured exchange of experiences and solutions.
- Support for localization and adaptation – Where feasible, institutions will be encouraged to adapt and contextualize the project's outputs to their specific curricular, linguistic, and policy settings. Guidance materials and examples developed within ECF4CLIM may serve as reference points for this process. However, the extent of future localization efforts will depend on the availability of resources and institutional commitment, while maintaining consistency with the overarching ECF4CLIM framework.



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- Sustained guidance and documentation through knowledge-sharing platforms – Digital repositories, open-access resources, and interactive platforms will be maintained to facilitate easy access to practices, tools, and results, ensuring schools, universities, and stakeholders can continuously benefit from shared knowledge.
- Stimulation of partnership networks – Collaboration with educational associations, policy bodies, and sister projects will be expanded to create robust cross-national networks that reinforce mutual support, enhance visibility, and amplify impact.
- Capacity building and professional development – Targeted training and workshops for educators, administrators, and policymakers will ensure that competences required for transfer and adaptation are built and sustained within institutions.
- Monitoring, evaluation, and feedback loops – In case of successful identification of new dedicated funds, implementation in new contexts will be monitored, generating evidence that informs further refinement of methods and tools, thus ensuring adaptability and long-term relevance.

11 SYNERGIES AND NETWORKS

11.1 Links with GreenComp and Education for Climate initiatives

The ECF4CLIM project has been closely aligned with key European frameworks, notably GreenComp—the European sustainability competence framework—and the Education for Climate initiative. These linkages have been instrumental in enhancing the relevance, visibility, and long-term exploitation potential of project outputs.

The alignment with GreenComp is described by:

- Competence mapping: ECF4CLIM methods (M1–M3), tools (T1–T6), and learning resources (T4, T5) [6] have been explicitly designed to develop competencies aligned with GreenComp, such as environmental literacy, systems thinking, and responsible action.
- Curriculum integration: Educational materials [33] and interventions [26] are structured to facilitate seamless integration into existing curricula while adhering to European sustainability standards.

The alignment with Education for Climate Alignment includes:



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- Participatory approaches: ECF4CLIM's co-design and hybrid participatory methods (M1, M3) reflect Education for Climate principles by actively engaging learners, educators, and local communities in sustainability actions.
- Demonstrative interventions: Small-scale demonstration projects (K1) showcase practical applications of Education for Climate, providing replicable models for schools, universities, and communities.
- Policy and networking synergies: Collaboration with Education for Climate initiatives facilitates cross-project learning, dissemination of best practices, and alignment with European educational policies on climate action.

The strategic alignment with GreenComp and Education for Climate ensures that ECF4CLIM outputs are: (1) recognized and credible within European educational and policy frameworks, enhancing adoption potential, (2) transferable and scalable, allowing replication across different educational institutions and contexts, (3) supportive of systemic change, reinforcing long-term integration of sustainability competences into curricula, institutional strategies, and community practices.

ECF4CLIM was an active participant in the *GreenComp Community* (since its launching in 2022) established on the Education for Climate platform (education-for-climate.ec.europa.eu) to help people & organizations build on the European sustainability competence framework, developing knowledge, skills and attitudes for sustainable living.

ECF4CLIM was represented in the following events:

- *Education for Climate Days 2022* (Nov 2022) ([education.ec.europa.eu+2European Commission+2](https://education.ec.europa.eu+2European+Commission+2)) held under the theme “co-creating learning for climate resilience,”
- Workshops and Webinars: GD-SO Mission on Adaptation to Climate Change webinar 24th October 2023, GD-SO: Collaborative Session on Project Challenges 11 December 2023, Unlocking investment and funding opportunities for Green Deal projects 23 January 2024, GD-SO Mission on Adaptation to Climate Change webinar, 24th October 2024, GD-SO Communicating Effectively with Policymakers 5 December 2024, Green Deal: Support services to help maximize your project's impact 4 February 2025, Network of Multipliers webinar on the 30th April 2025 (easy contact with GDSO stakeholders), GDSO-Media relations essentials may 2025, Re-connecting with the community, 29 August 2025,
- Community cafés (peer-sharing events) such as the “GreenComp café” (2023 December 6, 2024 January 24, 2024 September 18, 2024 October 16, 2025 June 4, 2025 August 2025, 2025 October 8)



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- European Research & Innovation Days 16-17 September 2025, EU Week of Regions and Cities - 11th October 2023
- Green Week, June 8th 2023 (Citizen science: empowering & upskilling citizens towards a climate neutral and sustainable Europe)., presenting “ECF4CLIM: changing the conditions, the people and the systems. An innovative hybrid participatory approach to education”
- Knowledge & Citizens Working Group 13 November 2024, 5 December 2023
- GD-SO Interview (WP8 Leader, April 2025) offering feedback from ECF4CLIM on GD common activities

In the same framework, a valuable synergy was established between **ECF4CLIM** and **Eduquem+B** (<https://www.barcelonamasb.org>), focusing on the comparative testing of methods for assessing sustainability competences.

Eduquem+B is a Barcelona+B project that is supported academically by EADA Business School. Created with the aim of bringing sustainability into the classroom, it offers resources and activities based on the European Union's GreenComp framework.

Within the Demonstration Sites (DSs), ECF4CLIM partners applied selected Eduquem+B tools alongside those developed by the project, enabling a systematic comparison of their characteristics, usability, and added value.

In **Spain**, the Eduquem+B method was piloted in two distinct contexts: (i) with students engaged in Sustainability Competence Teams (SCTs), working in small groups, and (ii) with students from a full class where the teacher volunteered to collaborate. In both cases, the approach aimed to use individual results as inputs to stimulate collective debate, with the added objective of producing group reports to consolidate insights.

In **Romania**, the tool was applied during an Energy Systems course, involving both SCT members and other students. Unlike in Spain, the activity was carried out collectively, allowing the class to engage in a shared reflection process around sustainability competences.

Alongside these practical applications, discussions with Eduquem+B explored possible synergies, identifying pathways to strengthen collaboration and stimulate mutual benefits. These included the potential for joint methodological refinements, cross-validation of competence frameworks, and leveraging results to enhance both projects' capacity to inform policy and educational practice.

11.2 Cooperation with sister project GreenSCENT

ECF4CLIM has actively fostered **cooperation with its sister project, GreenSCENT**, to leverage synergies, share knowledge, and maximize the exploitation potential of both



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initiatives. This collaboration has been structured to **promote mutual learning, and coordinated dissemination** of sustainability education strategies.

During the execution of the two projects the following mechanisms of cooperation were used:

- **Advisory Board collaboration:** Project ambassadors from GreenSCENT were integrated into the ECF4CLIM Advisory Board, providing input on strategic directions and exploitation pathways, while ECF4CLIM nominated ambassadors to participate in GreenSCENT activities. For example, a representative of GreenScent participate in the 5th ECF4CLIM General Assembly held o-line in November 2023. The ECF4CLIM coordinators attended the final conference of GreenSCENT in December 2024).
- **Knowledge exchange:** Methods, tools, and educational resources developed by ECF4CLIM have been shared with GreenSCENT, and vice versa, to **enhance transferability, adaptation, and implementation** across diverse educational contexts.

In the cooperation with the sister project **GreenSCENT**, several potential **exploitation synergies** were identified, which may be further developed **subject to the availability of suitable resources**. These include:

- **Scaling and replication:** If future opportunities allow, the two projects could explore ways to replicate successful interventions and co-design approaches across a wider range of educational institutions and demonstration sites.
- **Policy alignment:** Joint communication and occasional exchanges with European and national authorities could help maintain consistency between both projects' frameworks and contribute to broader policy reflection on sustainability competences.
- **Network expansion:** When feasible, maintaining informal links between project partners and stakeholder networks would support the continued visibility of the results and create potential entry points for collaboration in future initiatives.

This prudent approach allows both consortia to build on their shared achievements while remaining realistic about the resource constraints following the end of project funding.

Through structured cooperation with GreenSCENT, ECF4CLIM has enhanced its exploitation strategy by: (1) increasing visibility and credibility of project outputs, (3) promoting sustainable, long-term integration of ECF4CLIM results into educational practices and policies. This partnership demonstrates that strategic collaboration with sister projects can amplify impact, maximize resource efficiency, and accelerate the uptake of innovative sustainability education initiatives at the European level.

11.3 Broader networks and EU policy alignment

A key factor in ensuring the **long-term exploitation and sustainability** of ECF4CLIM outputs is their integration within **broader European networks** and alignment with **EU policies and strategic frameworks** on sustainability education, climate action, and low-carbon competences. This alignment strengthens the credibility, visibility, and replicability of project results across different educational contexts.

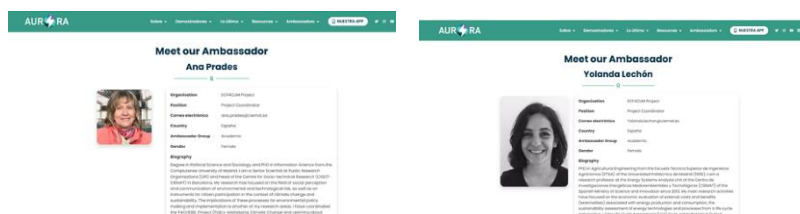
Coordination with other projects funded under the Green Deal call, topic 10.3. - The work was structured in 5 working groups (Clean energy, Climate change and biodiversity, Food and health, Urban development and transport, and Knowledge and citizens).

The ECF4CLIM is part of “Knowledge and citizens” (K&C) group, together with other 15 projects (ACCTING, AURORA, CIRCULAR FOAM, COMPARE, FRONTSH1P, GreenSCENT, I-CHANGE, ILIAD, PAUL, PHOENIX, PSLifestyle, REAL_DEAL, RI-URBANS, SHARED GREEN DEAL, and SOCIO-BEE) aiming for a just and inclusive transition towards sustainability, putting people first and bringing together diverse groups of citizens. The K&C group collaborate for: (1) Encouraging beneficial behavior change, (2) Enhancing citizen inclusion and empowerment, (3) Improving education and civic engagement. ECF4CLIM is involved in the last action, especially to improve the education.

The contribution of ECF4CLIM was mainly connected with the exchange of the expertise and good practices in using the own developed hybrid participatory method in relation with different audiences (educational communities, stakeholders) and in support of the development of a common policy brief.

ECF4CLIM participates in two of the cluster areas: ECF4CLIM coordinates area #1 Carbon Footprint Calculator. Interactions with AURORA and PFLifeStyle were held to explore the possibilities of jointly exploiting the Environmental Footprint Calculators developed in the three projects. A description of the clustering activities is presented in [34].

The ECF4CLIM coordinators are AURORA ambassadors.



ECF4CLIM representatives participated in some of the events of AURORA project, such as Aurora/CSGP Climate Change Mitigation WG - 23rd July 2025, Aurora Citizen Science & Climate Change Mitigation Working Group, 27 August 2025.

The engagement with broader networks was achieved through:



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European educational networks: ECF4CLIM has actively engaged with school and university networks, sustainability associations, NGOs, and professional communities, facilitating the dissemination and adoption of methods, tools, and interventions. The project and its outcomes have been presented at numerous events of scholarly associations of educational researchers, such as ECER, CHER and FERA; at interdisciplinary communities of sustainability researchers, such as JYU.Wisdom, SIRENE network, WEEC Network, and professional environmental and sustainability education communities like Finnish Round Table for Environmental Education and LYKE network, and training events for teachers interested in environmental education such as ULOS-UT-OUT.

- **Stakeholder partnerships:** Collaboration with policymakers, local authorities, and industry partners expected to promote the project outputs address practical needs, enhancing their relevance and adoption potential. In Finland, the National Board for Education cooperated the ECF4CLIM project in the crowdsourcing phase, and their project coordinator took part in the FECF4CLIM Advisory Board. The experts from the local educational, environmental, and food services administration in Tampere municipality have taken part in ECF4CLIM committees. The Vice Mayor of Tampere took part in General Assembly panel for policy action in Tampere. The results of the ECF4CLIM project will be an essential part of Finnish national projects assessing sustainability education: **KESTOT** project, run by The Finnish Education Evaluation Centre (FINEEC), and **YKAPO** project assessing sustainability projects that were funded by the Finnish National Agency for Education.

In terms of the EU Policy Alignment, beyond the GreenComp framework and Education for Climate (described above), the project can contribute with/for:

- **Evidence for policymaking:** Data collected (D1), demonstrative interventions (K1), and the ECF4CLIM Roadmap for Sustainability Competences (K2) provide empirical support for policy decisions, supporting replication and scaling at national and regional levels.
- **EU climate policies:** The project contributes to EU objectives on climate literacy, sustainability education, and the promotion of low-carbon competences, ensuring that interventions are policy-relevant and transferable.

ECF4CLIM published a success story ([Co-designing sustainability solutions in the education sector](#)) on GD-SO web page, reflecting the methodology and key exploitable results.

At the national level, several partnerships were established during the project, creating a strong foundation for continued exploitation beyond the lifetime of ECF4CLIM. In Portugal, the project successfully fostered collaborations that bridged schools,



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universities, and external stakeholders. At EB Bobadela, cooperation with **Sociedade Ponto Verde** led to the installation of new eco-islands for selective waste collection, while collaboration with **ADENE – the Portuguese Energy Agency** through the *Energy Route* initiative integrated national energy efficiency practices into school activities. At EB Camarate, the co-creation of the *Quinta do Charco* educational garden—developed jointly by the **Municipality of Loures, IST researchers**, teachers, parents, and students—stood out as a model of local partnership linking education, science, and urban sustainability planning.

In Romania, additional schools such as **Voila School** and **Mandra School** joined the existing network to benefit from the exchange of knowledge on sustainability, with the aim of adopting and applying ECF4CLIM's methods and tools in the future.

In Finland, the work of the ECF4CLIM project has also supported the launch of a national doctoral program in sustainability sciences. Finnish researchers involved in the project have been working as designers and supervisors in the national Sustainability Transformations (SusTra) doctoral school.

The ECF4CLIM project has also influenced the launch of the UNESCO Chair on Teacher Education for Sustainable Development at the University of Ljubljana in Slovenia. In its launch seminar in September 25th 2024 in Ljubljana, Professor Hannu Heikkinen contributed by presenting ideas from the ECF4CLIM research for developing sustainability education. Furthermore, in September 26th 2025, the ECF4CLIM team, in collaboration with the UNESCO Chair on Teacher Education for Sustainable Development and the Faculty of Education at the University of Ljubljana, organized an international seminar, one of the key elements of which was the ECF4CLIM research. Similarly, the work of the ECF4CLIM project was prominently featured at the CREA+BIRD seminar held in Koper, Slovenia, in September 23rd -25th, 2025.

Throughout the dissemination phase, several networking initiatives were undertaken to enhance the potential for exploitation. In Portugal, events such as the **IST Open Days** and the **European Researchers' Night** engaged students, educators, and the wider public, facilitating the transfer of ECF4CLIM's approaches and insights beyond the demonstration sites. These outreach activities helped stimulate interest, reflection, and opportunities for replication in new educational and research contexts.

12 MONITORING AND EVALUATION OF EXPLOITATION

12.1 KPIs for exploitation activities

To effectively monitor and evaluate the **success and impact** of ECF4CLIM's exploitation strategy, a set of **Key Performance Indicators (KPIs)** has been defined. These KPIs provide measurable criteria to track the uptake, adoption, and sustainable use of project outputs, including methods (M1–M3), tools (T1–T6), knowledge (K1–K2), data (D1), and the ECF4CLIM Roadmap for Sustainability Competences.

The planned and achieved KPIs for the exploitation and stimulation of the synergies are presented in Table 12.1.2.

Table 12.1.2. KPIs for the exploitation and stimulation of the synergies

Action	Measures to maximize the impact	KPI	Planned	Achieved
Exploitation of ECF4CLIM results	Early development of exploitation procedures Involvement of all partners in the process Nominate the EM Regular reporting (EM to SC)	Number of results launched in the exploitation process	12	12
		Number of DSs participating in co-design and testing of exploitable results	12	13
		Number of SCT contributing to the co-design of exploitable results	36	78
		Number of SCC involved in co-design of exploitable results	12	33
		Number of stakeholders in co-design and preparation of exploitation	Not planned	40 (25 in AB, 15 through GA)



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		Number of prepared presentation materials for exploitable results	Not planned	12
		Number of schools, universities, and local communities implementing ECF4CLIM methods and tools	12	14
		Number of teachers, students, administrators, and local stakeholders actively participating in co-design, testing, and feedback activities	Not planned	>800
		Number of selected interventions to offer guidance for replication in other educational units	Not planned	22
		Policies or institutional strategies influenced by project results	Not planned	14
Create links and synergies with local/national initiatives	Early identification of local and national initiatives having potential for synergies with ECF4CLIM actions	No of initiatives	8	8
Create synergies with GreenComp	Include the main results of GreenComp in the crowdsourcing activities with the schools and universities	No of schools/universities involved	12	13

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Create synergies with GreenScent	Early contact with GreenScent Periodic analysis for optimal use of the resources of the project and develop some common results	No of meetings with GreenScent	6	6
Create synergies with European Projects	Early start of the analysis of possible synergies, development of common results and exploitation of them	No of other projects contacted to create synergies	5	7

12.2 Progress tracking and reporting mechanisms

To ensure the effective monitoring and evaluation of ECF4CLIM's exploitation activities, a set of procedures for **progress tracking and reporting** has been established and used with the aim to provide timely feedback on the implementation, adoption, and impact of project outputs, supporting evidence-based adjustments and continuous improvement.

Regular Exploitation Group Meetings were organised: (1) meetings of the Exploitation Group (EG) review the status of ongoing activities, discuss barriers, and plan corrective actions, (2) Each potential exploitable result is assigned a responsible partner who provides updates on adoption, testing, and replication.

The KPIs defined in Section 12.1 were periodically tracked using quantitative and qualitative data, including participation rates, intervention outcomes, and institutional integration metrics.

Systematic feedback from schools, universities, local communities, and stakeholders was collected through surveys, workshops, co-design sessions, and interviews. Feedback informed about the suitability of methods, tools, and training activities, possible improvements and adaptations, ensuring outputs remain relevant, user-friendly, and impactful.

Exploitation progress was discussed in the monthly meetings of project. Summaries of exploitation progress and key findings were presented in the GA meetings to obtain strategic guidance and validation.



Early impact cases and best practices were shared via dissemination activities with broader networks, policymakers, and European initiatives to encourage replication and scaling.

12.3 Lessons learned

The exploitation process of ECF4CLIM has provided valuable insights into the **effective adoption, integration, and scaling** of sustainability education methods, tools, and interventions. These lessons are critical for guiding future exploitation activities and ensuring the long-term impact of project outputs.

The key lessons resulted from the exploitation process stages competed so far are:

Early and continuous stakeholder engagement is essential: (1) Active involvement of schools, universities, local communities, and policymakers from the co-design phase enhances ownership, relevance, and usability of methods (M1–M3) and tools (T1–T6), (2) Feedback loops from these stakeholders allow iterative refinement of interventions, increasing adoption and effectiveness.

Structured governance supports coordinated exploitation: The Exploitation Group, Exploitable Results Managers have provided clear roles, responsibilities, and decision-making processes that facilitate systematic planning, monitoring, and scaling of outputs. AB contributed with relevant recommendations for the exploitation activities and creating synergies with other projects and initiatives.

Alignment with European frameworks amplifies impact: Integrating outputs with GreenComp and Education for Climate frameworks ensured relevance, credibility, and transferability, making adoption by other institutions and networks more likely.

Demonstrative interventions build trust and evidence: (1) Small-scale demonstration projects and real-life interventions (K1) provide tangible examples of effectiveness, encouraging replication and institutional uptake, (2) Empirical data from pilots (D1) supports evidence-based policymaking and reinforces the value of the ECF4CLIM Roadmap for Sustainability Competences (K2).

Networking and collaborations enhance scalability: Cooperation with sister projects (e.g., GreenSCENT) and broader educational networks increases visibility, enables cross-project learning, and supports wider adoption.

Flexibility and adaptability are crucial: Methods, tools, and learning resources designed to be modular and context-sensitive may facilitate transferability to diverse educational settings and institutional strategies.

These lessons inform both **short-term and long-term exploitation strategies** by highlighting best practices, potential barriers, and key success factors. They emphasize the importance of **collaborative design, evidence-based implementation, policy**



alignment, and networked dissemination to maximize uptake, sustainability, and societal impact of the ECF4CLIM outputs.

13 CONCLUSIONS

The exploitation journey of **ECF4CLIM** has demonstrated how co-created methods, tools, knowledge resources, data, and the ECF4CLIM Roadmap for Sustainability Competences can be strategically embedded in educational communities to advance sustainability competences and low-carbon practices.

(C1) Exploitation as a strategic process. Exploitation within ECF4CLIM has gone beyond dissemination, ensuring that outputs are validated, adapted, and embedded in schools, universities, and policy contexts. By aligning with Horizon Europe priorities, GreenComp, and Education for Climate, the project has positioned its results for long-term uptake and policy relevance.

(C2) Effective governance and stakeholder engagement. The creation of the Exploitation Group (EG), supported by Exploitable Results Managers and the Advisory Board, provided clear structures and accountability. Early and continuous involvement of schools, educators, policymakers, and local communities strengthened ownership, ensured contextual relevance, and improved the usability of outputs.

(C3) Robust exploitable results portfolio. The project successfully identified and developed a coherent set of exploitable results: methods (M1–M3), tools (T1–T6), knowledge (K1–K2), data (D1), and the flagship ECF4CLIM Roadmap for Sustainability Competences. Demonstration interventions (K1) and baseline data (D1) have provided empirical foundations for replication and evidence-based policymaking.

(C4) Exploitation pathways validated in practice. Testing and piloting activities across the demonstration sites confirmed the applicability and adaptability of the project's outputs in diverse educational contexts. Several schools and universities outside the demonstration sites expressed interest in learning from the experiences, tools, and the ECF4CLIM Roadmap to assess the potential for adopting similar approaches, thus indicating promising scalability. Challenges such as limited institutional capacity and resource constraints were addressed through flexible, modular solutions that allow gradual and context-sensitive implementation

(C5) Sustainability and continuity mechanisms in place. Institutional embedding, open-access knowledge-sharing platforms, stakeholder networks,



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and alignment with European initiatives are expected to support the continuation and wider use of project outputs beyond the project's lifetime. Continuity is further strengthened through training activities, capacity-building initiatives, and the long-term storage of key resources on dedicated platforms such as MAPPA.fi, ecf4clim.eu, and ecf4clim.smartwatt.net.

(C6) Synergies amplify impact. Collaborations with GreenSCENT, GreenComp, and broader European networks have facilitated knowledge exchange, avoided duplication, and expanded the project's visibility and adoption potential. These synergies reinforce the scalability and policy alignment of ECF4CLIM outputs.

(C7) Monitoring and evaluation driving improvement. A robust system of KPIs and feedback loops has been essential to track adoption, stakeholder engagement, and institutional integration. Lessons learned highlight the importance of continuous co-design, flexible tools, and alignment with evolving policy frameworks.

In sum, ECF4CLIM has achieved substantial progress in exploitation by ensuring its outputs are **usable, transferable, and scalable**. By combining co-design, governance structures, policy alignment, and strong partnerships, the project has laid a solid foundation for **long-term impact on sustainability education and competences across Europe and beyond**.



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ANNEX 1. LIST OF DELIVERABLES WITH EXPLOITABLE RESULTS

	Deliverable	Type of results	Identified exploitable results
WP3	D3.1	Methodology	Methodology for national and international crowdsourcing exercises
		Data	Crowdsourcing results
		Analysis	Constraints and enablers of sustainability education, how to operationalize sustainability competences.
	D3.2	Analysis	International/national/regional policy frameworks
		Analysis	Mapping national curricula for climate change education
	D3.5	Methodology	Validation of ECF through internal and external validation
		Tool	ECF for climate change and sustainable development
WP4	D4.1	Method	Direct involvement and civic engagement of the entire educational community
		Data	Baseline of collective competences and environmental performance
		Methodology	Hybrid participatory approach to evaluate the collective competences
	D4.2	Data	Baseline of individual competences and environmental performance
		Methodology	Hybrid participatory approach to evaluate the individual competences
	D4.3	Data	Baseline Assessment of the environmental performance of the schools and universities
	D4.4	Methodology	Co-design to strengthen environmental awareness, engage the school communities, and strengthen knowledge, skills and attitudes
WP5	D5.1, D5.2	Methodology	Testing of the interventions in the schools and universities
	D5.4	Methodology	Deliberative process of reflection involving the educational community and other stakeholders (NGOs, relevant public and private-sector organisations, etc.)



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	D5.2	Data	Results of the testing of the interventions in the schools and universities such as viability of them and the impacts
	D5.2, D5.3	Knowledge	Small-scale demonstration solutions to improve sustainability jointly with the educational community
WP6	D6.1	Analysis	Evaluation of the collective competences for climate action and sustainability
	D6.2	Analysis	Evaluation of the individual competences: knowledge, skills, attitudes (WP6)
	D6.3	Analysis	Environmental evaluation of the selected educational establishments
	D6.3	Analysis	Evaluation of the interventions
	D6.4	Methodology	Participatory evaluation of the interventions
	D6.5	Knowledge	Proposals and recommendations on key components and requirements for the ECF
WP7	D7.8	Tool	Environmental footprint calculator
	D7.9	Tool	Retrofitting tool kit
	D7.10	Tool	Tools to evaluate the sustainability of interventions
	D7.12	Methodology	IoT Ecosystem for Multipurpose Monitoring
	D7.13, D7.14	Tool	Learning space and its educational resources (Digital Learning Contents, games, narratives, storytelling, and creative writing tasks integrated in the games)
	D7.15	Method	Use of the digital platform and its tools/products to empower the educational communities and the citizens
		Tool	Digital platform
		Tool	Crowdsourcing collaborative space



ANNEX 2. KEY STAKEHOLDERS

2A. Educational communities (<https://ecf4clim.eu/consortium/>)

Finland:

JUHANNUSKYLÄ SCHOOL (Tampere)

SAMKE UPPER SECONDARY SCHOOL (Tampere)

UNIVERSITY OF JYVÄSKYLÄ (Jyväskylä)

Portugal:

EB BOBADELA (Lisbon)

EB CAMARATE (Lisbon)

INSTITUTO SUPERIOR TÉCNICO (Lisbon)

Romania:

NICOLAE BALCESCU SCHOOL (Dragasani)

SERCAIA SCHOOL (Sercaia)

IULIA ZAMFIRESCH HIGH SCHOOL (Mioveni)

UNIVERSITY OF PITESTI (Pitesti)

Spain:

IES ITACA (Sevilla)

CEIP MOZART (Madrid)

UNIVERSITAT AUTÒNOMA DE BARCELONA (Barcelona)

2B. Advisory Board (<https://ecf4clim.eu/consortium/>)

Institution / Organization	Area of Expertise
Spanish Service for the Internationalisation of Education (SEPIE), Ministry of Universities	Education, internationalisation
GD of Innovation and Training Programs, General Directorate of Bilingualism and Quality of Teaching Education, Universities, Sciences and Spokesperson Office	Education policy and innovation



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National Parks Autonomous Agency (OAPN), National Centre for Environmental Education (CENEAM), Programme for the Recovery and Educational Use of Abandoned Villages (PRUEPA)	Environmental education, nature conservation
Ecoembes (Spanish organization for recycling and eco-design of packaging)	Industry, recycling, eco-design
ADEAC – Eco-schools, Environmental and Consumer Education Association	NGO, environmental education
Centre for Training, Innovation and Resources for Teachers (CEFIRE) / ESenRED	Teacher training, educational innovation
Sustainable Life Foundation	NGO, sustainability promotion
ODS Certificates CIFAL Málaga Association / UNITAR-ONU	UN-affiliated, SDG/education
Universitat Autònoma de Barcelona (UAB))	University
Comillas Pontifical University	University
Higher Institute for Educational Innovation, Madrid	Educational innovation
Universitat Autònoma de Barcelona, Faculty of Education Sciences	Teacher training, pedagogy
Territorial Center for Innovation and Training Madrid East (Educa Madrid)	Regional education authority
Biodiversity Foundation	NGO, biodiversity, environment
GD with the State and EU, Presidency, Justice and Interior Office	Government authority
Spanish Office for Climate Change (OECC)	National authority, climate change
Territorial Center for Innovation and Training Madrid South (Educa Madrid)	Regional education authority
Autonomous University of Madrid	University
Central Finland Centre for Economic Development, Transport and the Environment	National authority
Finnish Association of Nature and Environment Schools	NGO, environmental education
Environmental Specialist in the Department of Environmental Services in the Municipality of Kauniainen	Local environmental authority working with schools
National Agency for Environmental Protection	National authority
Agency for Environmental Protection, Argeş County	Regional authority
University of Galați	University



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Higher Institute of Educational Innovation (ISMIE), Madrid	Educational innovation
Institute of Government and Public Policy (IGOP), UAB	University research institute

2C. Local Communities

Pitesti, Mioveni, Dragasani, Sercaia in Romania

Tampere, Jyväskylä in Finland

Barcelona, Madrid, Sevilla in Spain

Lisbon in Portugal



ANNEX 3. ABBREVIATIONS & ACRONYMS

ECF	European Competence Framework
ECP	European Climate Pact
EG	Exploitation Group
EM	Exploitation Manager
ERF	Exploitable Result Form
ET	Exploitation Team
EU	European Union
IoT	Internet of Things
IPR	Intellectual Property Rights
JRC	Joint Research Centre
KPIs	Key Performance Indicators
LEDs	List of Exploitable Deliverables
LERs	List of Exploitable Results
MS	Member State
NGOs	Non-governmental Organizations
PERSS	Plan for the Exploitation of ECF4CLIM Results and for Stimulating Synergies
SC	Steering Committee
STEM	Science, Technology, Engineering, and Mathematics