D6.2 Regional Innovation Roadmaps

Regions 4Climate

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List of Acronyms

AA	Assumptions of Action
AI	Artificial Intelligence
AR	Augmented Reality
CIF	Common Innovation Framework
CINEA	European Climate, Infrastructure and Environment Executive Agency
CIP	Core Innovation Pilar
CLIMATE-KIC	Climate- Knowledge and Innovation Community
CR	Climate Resilience
CRIO	Climate Resilience Innovation Objective
CRML	Climate Resilience Maturity Level

CS	Challenge Suite
EIT	European Institute of Innovation and Technology
EU	European Union
GIS	Geographic Information System
GSBM	Green Social Business Model
IP	Innovation Package
KPI	Key Performance Indicator
NBS	Nature-Based Solutions
NGO	Non-Governmental Organization
PA	Public Authorities
R&D	Research & Development
R4C	Regions4Climate
RIR	Regional Innovation Roadmap
RIS	Regional Innovation System
RRI	Responsible Research and Innovation
RRML	Regional Resilience Maturity Level
RTO	Research and Technology Organisation
SDG	Sustainable Development Goal
SMART	Specific, Measurable, Achievable, Results-focused, Time-bound
SME	Small and medium-sized enterprises
TMM	Tangible, Manageable, Measurable
UHI	Urban Heat Island
VR	Virtual Reality

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- Assumptions of Action
- Common Innovation Framework
- Climate Resilience Innovation Objectives
- Innovation milestones
- Regional Innovation Roadmaps

Disclaimer

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Executive Summary

This document is developed as part of the Regions4Climate (R4C) EU project, which has received funding from the European Climate, Infrastructure and Environment Executive Agency (CINEA), under the Grant Agreement number 101093873.

Deliverable 6.2 (D6.2) – '*Regional Innovation Roadmaps'* is a public report within Task 6.1 (T6.1) '*Innovation Management',* part of Work Package 6 (WP6) '*Innovation Management & Exploitation*', led by SPI. Task 6.1 establishes strong connections across all work packages, playing a pivotal role in ensuring that innovation management is comprehensive, inclusive, and geared towards systemic transformation, using the Common Innovation Framework (CIF) as a reference framework – explained in D6.1. This task is closely linked to T6.2 (Exploitation Planning) and T6.3 (Innovation Screening) and will also contribute to the learning process under the Capacity Building task (T6.5). The innovation dimension addressed by T6.1 is also essential for WP4, regarding the impact of the Regional Innovation Roadmaps (RIR) on the Regional Resilience Maturity Model (RRMM) (as detailed in T4.1 and assessed under T4.3). Based on the collaborative effort among all R4C partners, the development of RIRs will contribute to establishing a framework that enables regions to better understand the resilience-building process, including governance and policy needs that may provide productive insights for T4.4 (Policy needs analysis) and T4.5 (S4+ conceptual development).

In line with D6.1 content, innovation has a pivotal role in driving progress to sustainable development by generating, developing, and implementing new ideas to address climate resilience challenges. The RIRs represent a commitment to transformative change and sustainable development, as they empower regions to navigate complex challenges with more clarity. The RIRs demonstrate how innovation should be boosted at the regional level (considering the context subsystems - 5 CIF dimensions) for effective climate resilience and systemic transformation. By presenting a clear and shared vision of the innovation journey across the 12 regions, the RIRs aim to contribute to regional transformation towards climate resilience, enhancing the collective capacity to tackle climate-related challenges.

The RIRs are strategic tools enhanced by visual diagrams that highlight key milestones to achieve climate resilience innovation objectives (CRIO) and the interconnections between them, providing valuable support in achieving specific objectives. Serving as guiding tools to achieve climate resilience through innovation and designed to be flexible and responsive, the RIRs were developed through a collaborative process involving key stakeholders (public authorities and RTOs from the 12 regions). This approach, which included information sessions and workshops, ensured that the roadmaps were tailored to the needs and strengths of each region.

Furthermore, the portfolio of Assumptions of Action (AAs) supports the journey of regions towards CRIO achievement, considering each regional innovation ecosystem and a self-assessment of the level of achievement in each region, ensuring post-project sustainability, and alignment with Responsible Research and Innovation (RRI) principles.

In this context, the document is organised into the following main sections:

- **Section 2 - Innovation roadmapping**: This section outlines the conceptual framework and methodology, explaining the adaptation of the traditional concept of roadmapping for the R4C reality, detailing the development stages of the methodology, as well as the interactions and fine-tuning of the approach to the regional context. The

section also explains the stakeholders' engagement process (cocreation process) and recommendations for RIR implementation, namely the Assumptions of action and the assessment under R4C.

- **Sections 3, 4, 5 - Regional Innovation Roadmaps reports:** 12 regional reports comprise the description of the roadmapping results (Graphic Roadmap) and key outcomes, defining the milestones for the short, medium and long term, on each region's pathway towards climate resilience and recommendations to foster innovation (portfolio of Assumptions of Action).

- **Section 6 - Conclusion:** This section reflects on the lessons learned, pointing out the main results achieved, and emphasizing the context conditions (assumptions of action) as crucial for a successful RIR implementation.

- **Appendices:** This section is organised by region, and it contains additional information, namely, the CRIOs' alignment with RRMM dimensions, the regional innovation ecosystem engagement in RIR (stakeholders to involve in the process) and the enabling projects Portfolio. The appendices can be found in a separate document.

1. Introduction

The Regions4Climate (R4C) project aims to support 12 European regions (local and regional administration authorities) in their transformation processes towards climate resilience in response to the EU Mission on Adaptation to Climate Change[1]. The 12 regional demonstrations were grouped on three pillars of the EU's swifter, smarter, more systemic approach to climate change adaptation (Challenge Suites), in line with the European commitments and the EU Adaptation Strategy (2021)[2]. Through the regionally tailored Innovation Packages (IP), the 12 demonstration regions provide meaningful knowledge that has been shared through cross-border and cross-sectoral cooperation.

In the R4C context, it is recognised the relevance of a sustainable transition while addressing social inequalities and integrating environmental, economic, and social dimensions, where innovation can help communities enhance their capacity to adapt to and thrive amid changing climate conditions. By embracing this interactive and cross-sectoral approach, regions can foster innovative solutions that should be part of a comprehensive local strategy to tackle climate change and effectively enhance climate resilience.

With the effects of climate change growing, innovation is expected to play a major part in enabling climate change adaptation/resilience. Addressing global challenges through innovation involves organizational, political, behavioural, social and economic changes within the regional ecosystem. The goal is to reduce risks from the harmful effects of climate change, but also make the most of any potential beneficial opportunities associated with climate change for a meaningful transformation.

As explained in D6.1, innovation is an interactive process of knowledge generation, diffusion, and application (Tödtling, Lehner, & Kaufmannb, 2009); it means developing original concepts and/or being able to set a different paradigm to identify new opportunities and the best methods to solve current issues, helping to turn challenging problems into manageable solutions (George et al., 2016). Innovation requires the combination of different knowledge, skills and resources - whether new or derived from incorporating, adapting or improving existing elements - in a cumulative process that transforms efforts (such as research activities) into results (innovation).

Developed to boost innovation for effective climate resilience, the Common Innovation Framework (CIF) (**Error! Reference source not found.**), in Deliverable 6.1, provides a consistent, replicable, and exploitable model for developing innovation packages and other innovation projects/processes, towards a systemic transformation and gives important references on the innovation process, including the interdependency with the local context, represented by the quintuple helix model's five systems (political, economic, education, media-based and culture-based (culture/people), natural environment (territory).

[1] R4C is one of the projects supported by the Mission. Organised in 3 different priorities, the first priority - "build resilience" block - aims to support a total of 75 demonstrations all across Europe (including 12 from R4C project) by upscaling solutions that may trigger transformations and developing enabling conditions and solutions. More information here.

[2] https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/strategy

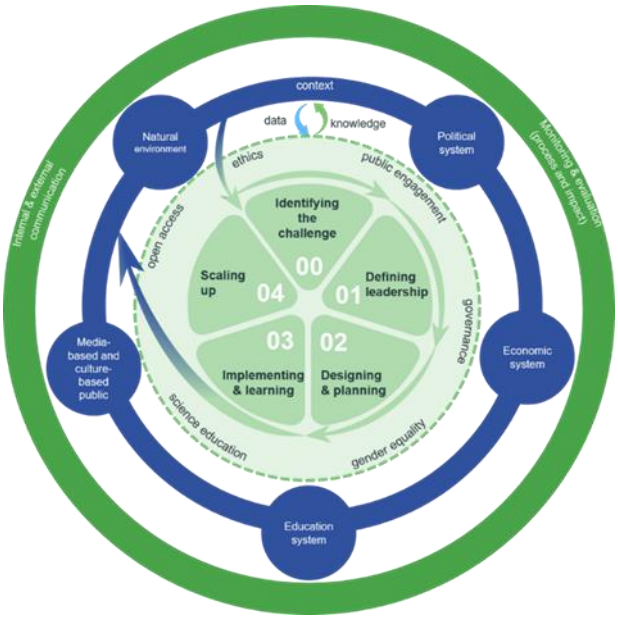


Figure 1. Common Innovation Framework (CIF).

To put this framework into practice, a set of enabling context conditions must be considered for successful and long-term innovation (Bajada et al, 2022)[3] and ultimately a transformative action. **In order to address the unique characteristics of each region, we have co-developed 12 Innovation Roadmaps, in close collaboration with the Regions. These roadmaps serve as comprehensive guides, effectively translating the overarching framework into accessible and actionable paths for fostering innovation, to facilitate a robust and realistic process of innovation, with the ultimate goal of driving sustainable progress towards resilience and sustainable development in each region.**

[3] Reference to D6.1 content.

2. Innovation roadmapping

2.1. RIR conceptual framework

According to Yun Ho (2017), in response to growing awareness among policymakers and stakeholders about their crucial role in facilitating innovation, **roadmapping has emerged as a widely adopted tool to guide strategic policy processes**. When embedded within innovation strategies, roadmapping can provide clarity on policy implications and suggest potential roles for governmental support in advancing initiatives. A roadmap is represented by a graphic structure that simplifies and communicates complex data, highlighting the major steps needed to reach specific objectives.

As defined by Okada et al. (2020), roadmapping is a strategic planning and management tool that allows organisations to graphically represent the pathways necessary to achieve specific goals and realise a vision within a temporal context. According to Hart (2019) “is a logical sequence of actions, with their dependencies highlighted, toward achieving a more or less well-defined goal over a period of time”.

This approach helps bridge the gap between the present situation and the desired future. Furthermore, the roadmap design method consists of two key phases: defining a sustainable vision and describing the pathways required to realise that vision. It is also important to highlight that the design of the roadmapping process must follow TMM (Tangible, Manageable, Measurable) and SMART (Specific, Measurable, Achievable, Results-focused, Time-bound) approaches. **The innovation roadmap, in particular, aims to serve as a strategic tool designed to incorporate innovation, combining multiple layers that display events, actions, and the interconnections between them.**

The concept of roadmapping has been “used for strategic planning and technology management” in order to “enable organizations to graphically represent the pathways that are required to achieve goals (...) and realize a vision in a temporal context, (...) bridging the gap between the present and the vision” (Okada et al.).

In this respect, a roadmap may be developed through workshops and joint activities involving stakeholders and experts, resulting in a graph structure with an enclosed timeline including multiple layers (e.g., market, product, technology, etc.) showing events, actions, and linkages between these and across layers. In particular, the design of a roadmap, according to Okada et al. (2020), is an “iterative process involving development, analysis, evaluation, and revision, through which the scope and details of the roadmap increase with each interaction”. Therefore, “the most important benefit of roadmapping is considered to be the discussions and exchanges that take place when generating and sharing knowledge at these workshops”. In this sense, the roadmapping process should be understood as a long-term systematic one that should engage ecosystem players over time. These players’ knowledge and available data will help update the medium- and long-term steps towards a set of objectives.

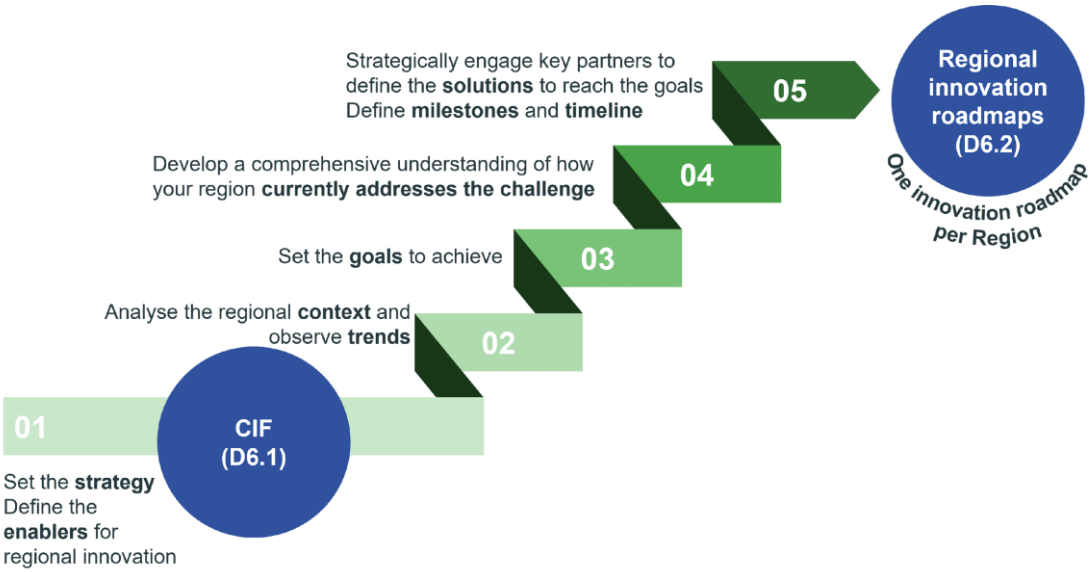
2.2. RIR approach - methodological steps

The Regional Innovation Roadmaps (RIR) were co-developed with the 12 regions ensuring the alignment with key stakeholder perspectives and certifying that the CIF (**Error! Reference source not found.**) was effectively adapted to each local/regional feature, thereby enhancing the relevance and sustainability of the project outcomes. By engaging a diverse group of public and private R4C partners in this initiative, we ensured that the RIR goals were both realistic and achievable.

The first step in developing a roadmap is identifying the problem or challenge at hand. As mentioned before, the 12 regions involved in the R4C project have their challenges well defined, as the 3 Challenge Suites are the key mottos that guide the regions towards climate resilience:

- Challenge Suite 1 – Faster adaptation aiming to “Protect the integrity of coastal ecosystems”.
- Challenge Suite 2 – Smarter Adaptation aiming to “Enhance climate adaptation through data”.
- Challenge Suite 3 – Systemic adaption aiming to “Build socio-cultural and economic resilience”.

These challenges result from a comprehensive understanding of how the region currently addresses climate change and the baseline against which future changes can be observed. Based on relevant information provided by other tasks under WP2, WP3 and WP4[4] and the historical data analysis (trends) that shape the socioeconomic, political and cultural context, each region was engaged to define the outcomes to achieve engaging key partners in the process (Figure 2).



[4] An important reference to the R4C outcomes that contribute to provide an overview of the current state in the 12 regions regarding the 5 CIF dimensions: (i) T2.1 contribution to understanding the social vulnerabilities in R4C demo regions (check D2.1), (ii) the T3.1 contribution to the analysis of the potential gaps and priorities of the R4C regions (check D3.1); and (iii) the T4.3. climate resilience maturity assessment that provides a set of policy-linked indicators aimed at assessing regional functions and characteristics contributing to its climate resilience maturity (check the first assessment already out in D4.2).

Figure 2. Innovation Roadmap general steps.

With this framework in mind, each region worked on defining future goals - Climate Resilience Innovation Objectives and CR commitments - and then working backwards to identify the necessary short- (2023-2030), medium- (2031-2040), and long-term (2041-2050) actions (milestones) required to reach their desired stage, aligned with Innovation Core Pillars that support innovation, established within the R4C project. Backcasting was an essential part of this process.

The main outcome of this deliverable is the development of 12 Regional Innovation Roadmaps depicted in a graphic format that outlines a detailed timeline (Figure 3), explained in detail as follows.

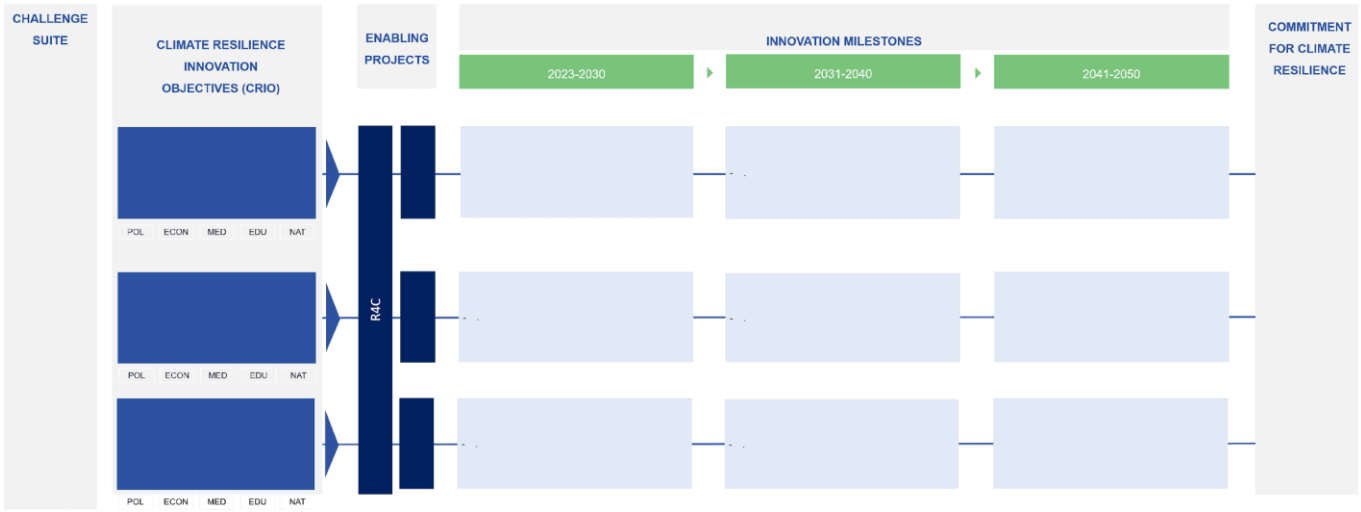


Figure 3. Regional Innovation Roadmap model.

The **Climate Resilience Innovation Objectives** are strategically aligned with the five dimensions of the CIF and play a crucial role in driving systemic transformation, through mitigating and adapting actions. This alignment is substantiated by the following:

- The CRIOs aligned with the political dimension are focused on establishing a political system that is more effective, of higher quality, and sustainable. This system aims to support climate resilience, especially in terms of political and legal capital, which includes regulations and governance.
- The CRIOs aligned with the economic dimension aim to create a more innovative economy by enhancing solutions that can impact the market and its actors, and by developing opportunities for a sustainable, future-oriented green and circular economy.
- The CRIOs aligned with the educational dimension aim to create a more effective, higher-quality, and sustainable educational system that positively impacts human capital skills and competencies and supports knowledge production related to climate action.
- The CRIOs that are aligned with the media-based and culture-based public dimensions are focused on raising public awareness about climate change issues. They seek to influence behaviours and lifestyles to encourage sustainable practices, while also aiming to increase public participation in decision-making processes related to climate action.

- The CRIOs that are connected to the territorial/natural environmental dimension encompass activities that focus on modifying urban and rural physical infrastructures and systems, which may include transportation and communication networks, resource management, and environmental conservation efforts.

As much as possible, CRIOs reflect political orientations, tailored to each region's needs and climate challenges. The **innovation milestones** refer to specific, measurable[5], and time-bound achievements to reach the Climate Resilience Innovation Objectives (CRIOs). The proposed timeline for achieving innovation milestones aligns with the conclusion of the R4C project (in 2027/2030) and the EU's climate targets for 2040 and 2050[6].

These milestones serve as key indicators of success, providing clear reference points to track progress, assess performance, and guide future adjustments, if necessary, within the Regional Innovation Roadmaps. Milestones help to ensure that efforts are focused, coordinated, and aligned with the broader goals of building climate resilience through innovation. They also facilitate accountability and enable regions to celebrate achievements and recalibrate strategies as needed based on progress and new insights. Assuming innovation as a booster, the milestones are classified according to the type of innovation[7] they might require, defined as follows:

- **Service innovations** form the first type and are closely related to service provision to public users. A novel service can be delivered to a group of existing users (Walker 2008). The provision of existing services to a new user group is also regarded as a new service innovation.
- **Administrative process innovations** refer to the creation of new ways, methods, and forms of undertaking tasks within the organization. These innovations are closely related to redesigning operational routines (De Vries, Bekkers, and Tummers 2016).
- **Technological process innovations** involve the application of technology to operational activities and service delivery mechanisms (Walker 2008), which can range from digital forms to automated decision-making by algorithms (Cinar 2021).
- **Conceptual innovation** is *"the development of new world views that challenge assumptions that underpin existing service products, processes, and organizational forms"* (Windrum 2008).
- **Governance innovations** introduce new participation mechanisms for citizens and novel ways to increase transparency and accountability within the public sector (De Vries et al. 2015) – they have a political nature (Wu, Ma, and Yang 2013).
- **Systemic innovations** capture *"new or improved ways of interacting with other organizations and knowledge bases"* to co-deliver public services and are a consequence of increasing interaction between PSOs, civil society, and businesses (Windrum 2008).
- **Social innovations** aim to meet the social needs of disadvantaged groups and target underlying reasons for social problems (Voorberg, Bekkers, and Tummers 2015).

This approach relates to the holistic view of innovation presented in the Common Innovation Framework (D6.1), as the roadmap tackles the types of innovation needed to achieve the milestones and settles the interconnections and dependencies between different elements.

[5] Not all regions assume this feature in their RIR.

[6] https://climate.ec.europa.eu/eu-action/climate-strategies-targets_en

[7] Cinar et al. (2024)

Several other projects have been identified that could support the achievement of the CRIOs and CR commitments. These initiatives will work together with the R4C project, as it does not function in isolation but rather as part of a collaborative effort. By integrating resources and knowledge from these complementary projects, we aim to enhance overall effectiveness and ensure that our collective goals are met. Regardless of their current status, the so-called "**enabling projects**"[8] address a wide range of topics such as urban planning, circular economy, Nature protection and restoration (including nature-based solutions), public awareness, digital tools for monitoring, and more. The regions selected these projects based on their potential to enhance the impact of R4C IP. SPI recommends utilizing this portfolio of Enabling Projects as a valuable resource that highlights exemplary practices which may prove useful for the regions. It serves as a guide to inspire local initiatives and foster effective strategies tailored to regional needs.

To foster a robust compromise, the regions were encouraged to thoroughly identify and outline the key stakeholders within their regional innovation ecosystem[9] that might be involved in the RIR implementation. These stakeholders play an active role in the process, contributing with their expertise and perspectives to enhance collaboration and innovation.

2.2.1. Co-creation process with the R4C regions

The approach was built on a mobilising and participatory methodology, incorporating various models of consultation and collaboration among the R4C partners. This provided an opportunity for active participation in shaping this strategic exercise. Key inputs for the roadmaps' concept and methodology were collected from November 2023 to February 2024, involving T6.1 partners in several sessions, namely: meeting with all WP6 task leaders to align innovation approach (15 December 2023); meeting with T4.1, T4.2, T4.3 and T4.4 task leaders to align the T6.1 approach with WP4 tasks (10 January 2024); meeting with WP leaders and Public Authorities and RTO representing the regions to present the first draft on the RIR concept and structure (11 January 2024 and 18 January 2024); meeting with coordination to share RIR planning (26 January 2024); meeting between T6.1 and T6.3 leaders for alignment (21 February 2024); meeting between T6.1 and T3.1/T3.3 leaders for alignment (November/December).

These collaborative sessions were essential for a comprehensive and inclusive process. By engaging a broad spectrum of stakeholders, the process fostered a sense of ownership and commitment to the roadmap's implementation.

After establishing the concept and methodology to implement, the Innovation Roadmaps were collaboratively developed with the 12 regions through three specific assignments, namely: (i) identifying the climate resilience innovation objectives (CRIO) and the Enabling Projects, (ii) Mapping the regional innovation ecosystem and (iii) Assumptions of Action self-assessment (see Figure 4). The assignments were designed to accurately reflect the local and regional context and strategic orientations for incorporating innovation into climate action. Each Regional Innovation Roadmap was carefully reviewed and approved by the respective regions.

[8] The regions have identified ongoing or planned projects that have a significant impact on achieving the CRIOs and CR commitments, complementing R4C IP. These enabling projects can be of any nature (public or private) and scale (local, regional, or national) and may receive funding from various sources, including European funds. The details of these Enabling Projects are described in the Appendices.
[9] See appendices.

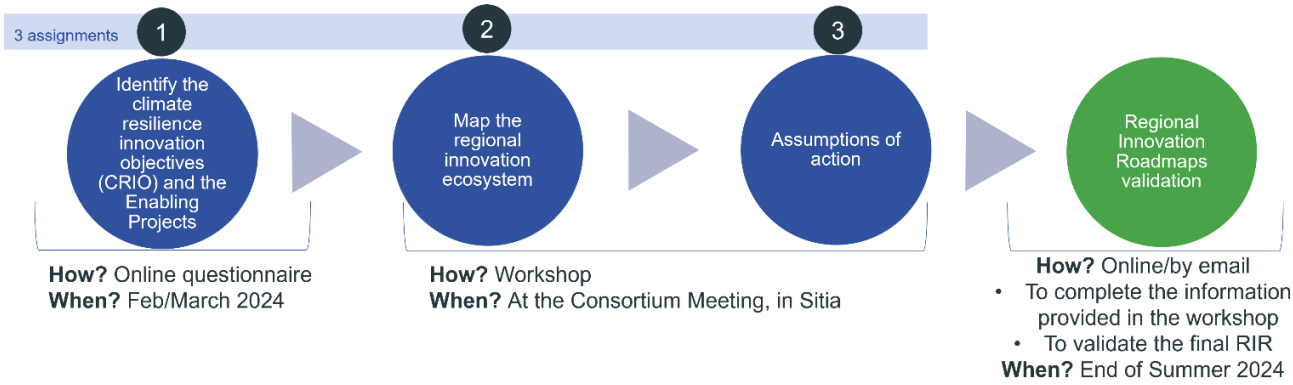


Figure 4. Assignments for the Innovation Roadmapping cocreation.

It has been assumed, since the beginning, that the development of Innovation Roadmaps is of great interest to public authorities and it may help, as a practical tool, to pave the way for more resilient communities. Therefore, SPI encouraged collaborative work between RTOs and Public Authorities (Regional Representatives in the R4C Consortium), as the latter holds the legitimacy and responsibility to effectively lead/take action.

During the co-creation process, several clarification sessions were held (helpdesk session in February and CS meetings in March) to provide a better understanding of the objectives, offer assistance, and address any questions the regions might have regarding the Regional Innovation Roadmap process.

Figure 5. RIR Workshop - Co-development with the regions (assignments 2 and 3) in Sitia (April 2024).

2.3. RIR Assumptions of Action

To move from the current *status quo* towards a more resilient future scenario in the Regions, it is important to highlight some relevant recommendations for the Regions to follow. Designed not only as a strategic tool, the RIR must be used as a practical guide that reflects each region's unique challenges and opportunities.

The successful implementation of the RIR relies on certain key conditions, known as **Assumptions of Action (AA)** that can foster innovation in the climate resilience process.

Based on relevant literature, SPI established the Assumptions of Action (AA) as the main factors that enable/hinder innovation and the context conditions necessary for successful and long-term innovation, according to the innovation building blocks, namely: 1) Drivers, 2) Cultivators; 3) Infrastructure and 4) Networking (Bajada et al, 2022).

Climate resilience requires a comprehensive strategy that acknowledges the interconnectedness of environmental, social, cultural, and economic systems. The Assumptions of Action are derived from this intricate interplay and aim to aid regions in establishing an ideal environment for fostering innovation. They encompass several thematic elements including political leadership, governance models and economic engagement, together with technological and digital solutions that may be implemented to support climate adaptation. These assumptions are aligned with all CIF dimensions and serve as a comprehensive guide for creating a supportive context conducive to climate resilience.

i. Clear national and/or regional strategic guidelines
ii. National, regional and local budgets specifically allocated to innovation for climate resilience
iii. Integration of climate action/climate resilience in multidimensional policies and regulations
iv. Leadership
v. Governance model
vi. Direct support for experimentation
vii. Strong and continuous public engagement model
viii. Transparent management and monitoring processes
ix. Strategic focus and investment in qualification and skills

The Assumptions of Action are designed to assist regions in creating an optimal environment for innovation to flourish. For guidance[10], we provide some recommendations for a successful RIR implementation:

Clear national and/or regional strategic guidelines

Multi-level governance mechanisms and enabling regulatory frameworks are needed to set and deliver ambitious climate goals across communities. Implementing strategic planning, shaping regulatory direction, enforcing legislation, establishing supportive initiatives/programmes, and creating financial mechanisms are some examples of strategic guidelines to drive innovation for climate action and resilience while ensuring alignment with national, regional, and local levels of governance.

[10] Specific recommendations for each region can be found in the RIR reports (sections 3, 4 and 5).

National, regional and local budgets specifically allocated to innovation for climate resilience.

Promoting innovation in CR requires mobilising appropriate capital. The **funding may be allocated to public initiatives, and to boost innovation in the private sector**, by accelerating the growth of innovative startups and SMEs that contribute to climate resilience (help them test, learn and scale sustainable products and services). Facilitating funding and investment access is needed to stimulate, create, and shape new solutions for CR.

Integration of climate action/climate resilience in multidimensional policies and regulations

Successful integration of climate action/climate resilience in policies and regulations can position regions as global leaders in sustainability and innovation. **Integrating this topic into strategies, planning, processes and plans positively influences regional development, aligning policies, decision-makers, and users, ultimately contributing to a more resilient and prosperous future.** This integration also enhances the climate change response capacity (strategic, operational and governance) of relevant sectors (social, urban development and territorial planning, etc.). Cross-sectoral action and knowledge transfer are key for reliable planning.
Several barriers may hinder integration efforts, including, resource constraints, institutional fragmentation, conflicting political and economic priorities, and insufficient stakeholder engagement.

Leadership

Public authorities have a crucial role in building climate resilience, as they are responsible for defining and implementing legal and policy frameworks and managing critical systems such as water, energy, mobility/public transport and infrastructures, housing, waste management, etc. Moreover, Public Authorities, especially at the local level, can encourage and enable broader changes in communities.
It must be their responsibility to establish a shared vision for climate resilience and to articulate with both inter and intragovernmental guidelines. Additionally, mobilise key stakeholders with legitimacy to make required changes to policies and funding for CR innovation, while making sure the general population is dedicated to fighting climate change. Essential information for innovative processes must be shared across all 5 CIF dimensions to facilitate knowledge transfer (e.g.: A portfolio of the needs and challenges that need to be tackled may be an important instrument to enhance innovation).

In the R4C context, the success of the innovation roadmapping implementation will largely depend on the support and commitment of public authorities. To acknowledge the political commitment to their RIR, the regions run a self-assessment based on three levels, namely:

> **Level 1: The Regional Innovation Roadmap reflects the effective commitments of the region regarding climate action, as assumed by the public authorities (at local and regional levels).**
> There is full commitment from the public authorities involved in the roadmapping development, indicating that this tool may be integrated into current and future decision-making processes.
>
> South Aquitaine and Burgas, both self-assessed at level 1; regions demonstrate a strong focus on making the RIR reflect the political commitments and the support of the public authorities.
>
> **Level 2: Part of the content of the Regional Innovation Roadmap reflects the effective commitments of the region regarding climate action, as assumed by the public authorities (at local and regional levels).**

This partial commitment may pose risks related to the operationalization of the roadmap, which could be due to a lack of political support or insufficient resources for implementation.

Basque Country, Azores, Uusimaa, Pärnumaa, Nordic Archipelago, and Troodos have self-assessed at this level. There might be a need for these regions to focus on bridging gaps and securing articulation between the RIR and current political instruments.

Level 3: The Regional Innovation Roadmap is primarily an exercise.
The RIR is seen as a theoretical document with minimal linkage to actual political decisions. This suggests a significant risk for the roadmap to be implemented.
Køge Bay and Castilla y León RIR may serve as the baseline for future strategic exercises but do not pertain to political support.

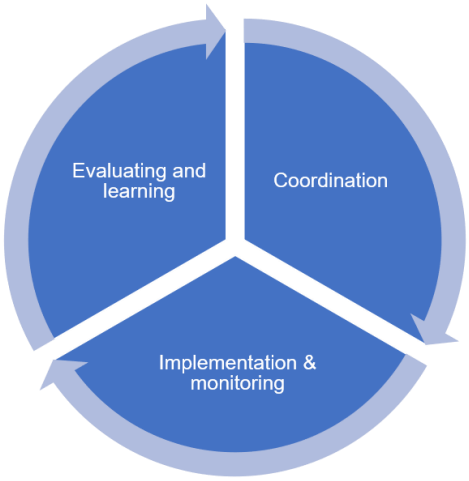
Governance model

Innovation thrives in collaborative environments. Assumptions include the need for partnerships between governments, the private sector, NGOs, and communities to share knowledge and resources.

It is crucial to create a supportive ecosystem that stimulates creativity, facilitates experimentation and provides the necessary resources and expertise/knowledge that will enable innovation. Successful transformative innovation requires collaboration between stakeholders from the 5 context dimensions, as referred to in CIF. By harnessing different perspectives and bringing together expertise, transformative innovation can thrive and bring positive change to the community (context).

To articulate intervention between all the stakeholders from the regional innovation ecosystem, it is important to put into practice a simple and flexible governance model that may foster synergies between the 5 CIF subsystems (through collective learning, knowledge transfer and cooperation enhancement). Continuous interaction between key stakeholders to approach innovative ways to solve CR problems/challenges and allocating the necessary resources (human, technological, etc.) and knowledge in order to achieve established goals, are some of the key recommendations.

As an example of a governance model with 3 dimensions should be covered: (i) **coordination** assumed by the regional/local authorities, (ii) **implementation & monitoring** by a dedicated unit (a multidisciplinary group within the local/regional authority that may be dedicated to innovation management and Climate Resilience) and other local stakeholders that may have an operational role, and the (iii) **evaluating & learning** engaging external partners in a Climate Resilience advisory board (scientific experts, public agencies and administration, NGO, etc.) that evaluates policies and identifies actions and opportunities to improve implementation and to successfully achieve the goals. This model is flexible enough to new configurations and dynamics.
The role of general coordination should be led by the Public Authority executive board (city/regional council), responsible for providing political and strategic guidelines, and overseeing the implementation of the



roadmap and institutional articulation, among others. The implementation focuses on operational issues, including monitoring the process and impact.

Additionally, **to ensure an efficient governance model RRI principles should be respected** - promoting transparency, inclusivity (equality), and access to open data (for internal and external communication) while ensuring that no one is left behind. Public engagement is also crucial in promoting regular sessions, co-creation initiatives and strong communication throughout the process.

Direct support for experimentation

The climate change challenges require a strategic focus on sustained investment in research and development (R&D) that can generate new knowledge and technologies for climate mitigation and adaptation, contributing to resilience. This approach can lead to advancements in renewable energy, carbon capture, sustainable agriculture, and more, ultimately fostering a more sustainable future. Collaboration across sectors—government, industry, and academia—will be essential to drive these efforts forward.

Therefore, regions (public authorities) should work as facilitators, providing simple and clear legislation/regulations and offering demonstration environments to accelerate innovation - the territory as a test bed for innovation dedicated to Climate action/climate resilience- using the outcomes to develop more suitable and improved public policies. Effective policies are necessary to create an enabling environment for innovation, including incentives for sustainable practices.

Strong and continuous public engagement model

Local stakeholders and communities (all part of the innovation ecosystem) have valuable insights that can inform innovative solutions. Engaging them in the decision-making process is crucial to achieve sustainable outcomes. Also, solutions must address the needs of vulnerable populations disproportionately affected by climate change, ensuring that innovation promotes social equity.

Mapping the stakeholders and their networks will certainly help to effectively mobilise them into open innovation and co-creation processes. This includes understanding their relevance/influence in the regional ecosystem, and the role they might play in the RIR implementation. For a strong public engagement, it is suggested open sessions, open data platforms (information and knowledge sharing), networking, available institutional channels to share problems and needs, and open innovation processes (experimentation/test with public participation).
A systematic effort that engages ecosystem players over time, might need innovative and interactive tools to facilitate public engagement throughout the innovation process. **As suggested in D6.1, the EIT Climate-KIC toolkit[11] is a comprehensive resource book for practitioners to map, analyse and facilitate systemic change and it is highly recommended.**

Transparent management and monitoring processes

Climate challenges are dynamic, necessitating an iterative process of learning and adaptation. Innovation should be flexible to evolve based on new information and changing circumstances.

[11] Download the visual toolbox here: www.climate-kic.org/insights/visual-toolbox-for-system-innovation/

Therefore, transparent and flexible management and monitoring processes are crucial to informing about achievements and necessary changes to reduce risks and increase expected impacts. This process should be cyclical, involving planning, data collection, analysis, and reporting back to partners, stakeholders, and the general public when appropriate. This continuous feedback loop allows for adjustments and improvements throughout the process. **Simple yet effective follow-up, monitoring, and evaluation mechanisms may be the most valuable**, among others:

- regular meetings between the operational unit and coordination for follow-up and to track progress;
- meetings with the external partners from the regional ecosystem (ex.: advisory board) to evaluate progress and give valuable input for improvements;
- annual monitoring reports that comprehensively evaluate the effectiveness of the implemented strategies, identify emerging challenges and measure performance against the established milestones.

It is also important to communicate these improvements to the public, providing updates on progress made, but also increasing social awareness on climate topics, and gathering input for improvements.

The incorporation of these monitoring insights in the Regional Innovation Roadmaps assessment promotes a successful implementation, steering regions towards their climate resilience and sustainable development objectives, post-R4C.

Strategic focus and investment in qualification and skills

The transition to a carbon-neutral economy will require new skills, training and qualifications. Climate literacy can help create jobs, build a green consumer market and allow citizens to better engage with their governments about climate change. Therefore, it is crucial to invest in climate education to build a better workforce with strong qualifications and skills in key areas of expertise to set groundbreaking climate resilience contexts. It is suggested: incorporating climate topics in the educational system (across all levels), creating interdisciplinary research networks (from the climate sciences to ecology and the social sciences, involving all steps of observation and experimentation) and cooperative projects that may help scientists to develop and expand their ability to develop sustainable solutions, and so on.

2.4. RIR assessment under R4C

The innovation roadmaps were designed to be dynamic and adaptive through time. This flexibility allows regions to respond to changes by integrating new insights over time (incorporating different types of innovation, widening the number of stakeholders, incorporating new outcomes, changing the approach, etc.), ensuring that the CRIOs and the CR commitments are tailored to the context (trends, needs/challenges and future ambitions) and contribute effectively for the Sustainable Development Goals[12].

Monitoring plays a crucial role in the innovation process and is a key feature of the CIF approach (D6.1). It empowers the regions to track performance and progress, identify areas for improvement, and optimise strategies for maximum

[12] This alignment is clearly identified in each RIR – Check “Conclusions and way forward”.

effectiveness. All necessary adjustments and corrections may be made along the way to ensure RIR's success. **In this context, monitoring progress means tracking innovation milestones achievement.**

In the absence of an expected assessment under T6.1, it is recommended to carry out a follow-up during T6.5 Capacity Building (also led by SPI) to discuss the progress on the short term innovation milestones and the underlying assumptions of action. Also, it will be a good opportunity to share knowledge and good practices between the regions, including sharing information regarding the enabling projects (mostly transboundary projects with EU funding) that may inspire new approaches to climate action.

It's important to acknowledge the clear influence of the RIR on the regional resilience maturity model (RRMM T4.1/T4.3). Achieving these milestones brings about significant changes across all CIF dimensions, which are strongly connected to RRMM dimensions (Table 1)[13].

Table 1. RRMM dimensions connection to CIF dimensions

RRMM dimensions (T4.1/T4.3)	CIF dimensions				
	Political system	Economic system	Education system	Media-based and culture-based public system	Natural environment (territorial)system
1. Regional Governance and Institutional capacity	●				
2. Plans and policy instruments	●				
3. Human resources and technical skills		●	●		
4. Participatory governance and stakeholder engagement	●	●	●	●	
5. Behavioural change and awareness	●		●	●	
6. Finance and Resources	●	●	●		
7. Data and Knowledge					●

This assessment will also provide a deeper understanding of the innovation approach in CR that will inform future policies and strategic thinking. These insights will be valuable for the work ahead, under T4.4 (Policy needs analysis) and T4.5 (S4+ conceptual development).

To enhance the effectiveness of our collaborative efforts, it is essential to create a clear and structured link between the various tools developed under R4C work packages, particularly the Just Transition roadmaps (T2.4). By integrating these resources, we can facilitate the seamless sharing of insights, strategies, and best practices among different initiatives and align action for more effective results. This interconnectedness will not only allow for continuous refinement but will also promote a more unified and coordinated approach to addressing challenges related to climate resilience transformation. Ultimately, such integration can lead to more impactful outcomes and a stronger collective response to climate change, covering all dimensions (social, economic, political and environmental).

[13] More information regarding the connection between RRMM dimensions and CRIOs, in each RIR, can be found in Appendices.

3. Challenge Suite 1 – Innovation Roadmapping reports

3.1. Basque Country

3.1.1. Introduction

The Basque Country is an autonomous region in northern Spain. With 75% of its population living in coastal areas, the region faces significant challenges due to rising sea levels driven by climate change. As the frontrunner of Challenge Suite 1: Faster Adaptation, the Basque Country is at the forefront of efforts to protect the integrity of coastal ecosystems.

Under WP5, Basque Country's IPs aim at restoring degraded areas, reconnecting marshes and wetlands, protecting existing seagrass meadows, and establishing a monitoring program for the Txingudi estuary. The main objectives are to develop an upscaling strategy for other areas in the Basque Country, enhance governance and planning structures, and implement a monitoring program to assess the effectiveness of resilience innovations. Additionally, the Basque Country is finalising its own comprehensive Climate Change Law, set to be implemented in the coming years, which will serve as a vital framework for integrating climate change considerations into other regional policies.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 2. Basque Country's demonstrations – contribution to the CS1 CIP

	Core Innovation Pillars (CIP) in CS1			
Dimension/Demonstrations	**(1) Benchmarking of techniques for coastal protection and restoration**	**(2) Examination of opportunities for Blue Carbon Credits**	**(3) Citizen education & engagement in resilience-building actions**	**(4) Cross-border actions, including multi-scale monitoring & multi-sectoral adaptation planning**
Policy & Governance - Develop a policy for transformative, dynamic adaptation to climate in the region: multisector & multiscale planning for resilience. Technical Board for Coastal Adaptation			●	●
Economic - Integrative tools for the adaptation of the fishing sector to changes in marine resources; active involvement of private actors & financing sector in climate adaptation.	●	●		●
Social - Systematic engagement of stakeholders within active innovation community & activation of the private-public ecosystem to ensure continuity of climate resilience actions			●	●

Environmental - Restoration of estuaries for blue carbon sequestration & climate adaptation; management tools for monitoring & forecasting extreme events & long-term changes at a regional scale.	●	●	●

3.1.2. Basque Country Innovation Roadmap

The **innovation roadmapping** for the Basque Country was co-developed by Basque Country's partners: the Consejería de Desarrollo Económico, Sostenibilidad y Medio Ambiente. Eusko Jaurlaritza-Gobierno Vasco (DESMA-Basque C), representing the public authority, as well as the Fundacion Tecnalia Research & Innovation (TECNALIA) and the Fundacion AZTI – AZTI Fundazioa (AZTI), both research and technology organisations, the Sociedad Publica de Gestion Ambiental (IHOBE SA), an industry, and the Zabala Innovation Consulting, S.A. ZABALA, a small-medium enterprise.

The Basque Country Innovation Roadmap (Figure 6) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 1 motto – Protect the integrity of coastal ecosystems. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments**: [14]

- **Policy for a transformative adaptation to climate** (particularly reliant on CRIO 1 and its associated milestones).
  The main challenge is to develop an effective approach to tackling climate change through an integrated regional strategy that coordinates planning efforts across various sectors and levels of government. This approach aims to enhance policy alignment and inter-institutional coordination, considering the region's high levels of self-governance in many local and regional policies. The implementation of the Climate Change Integral Law in the coming years will be crucial.

- **Ecosystem services valuation, knowledge transfer and cross-sectoral action** (particularly reliant on CRIOs 2 & 3 and their associated milestones).
  According to the information received from partners, the primary challenge for this region is to successfully implement the Basque Adaptation Mission. This mission will involve creating a catalogue of Demonstrator projects tailored to specific locations, along with proposed measures and strategies for funding. At the regional level, cooperation is essential for building resilience and addressing climate vulnerabilities. So, actively involving relevant stakeholders in the process and sharing experiences and strategies that will enable progress towards carbon neutrality and adaptation to climate change, as well as a resilient society is crucial. Pooling resources and expertise, namely by reviewing formal education itineraries to include climate adaptation, can lead to more effective and innovative solutions that are tailored to local conditions. This involves creating a coordination platform that brings together representatives from each sector (transportation, energy, agriculture, health, and water resource management) to discuss challenges, opportunities, and joint solutions.

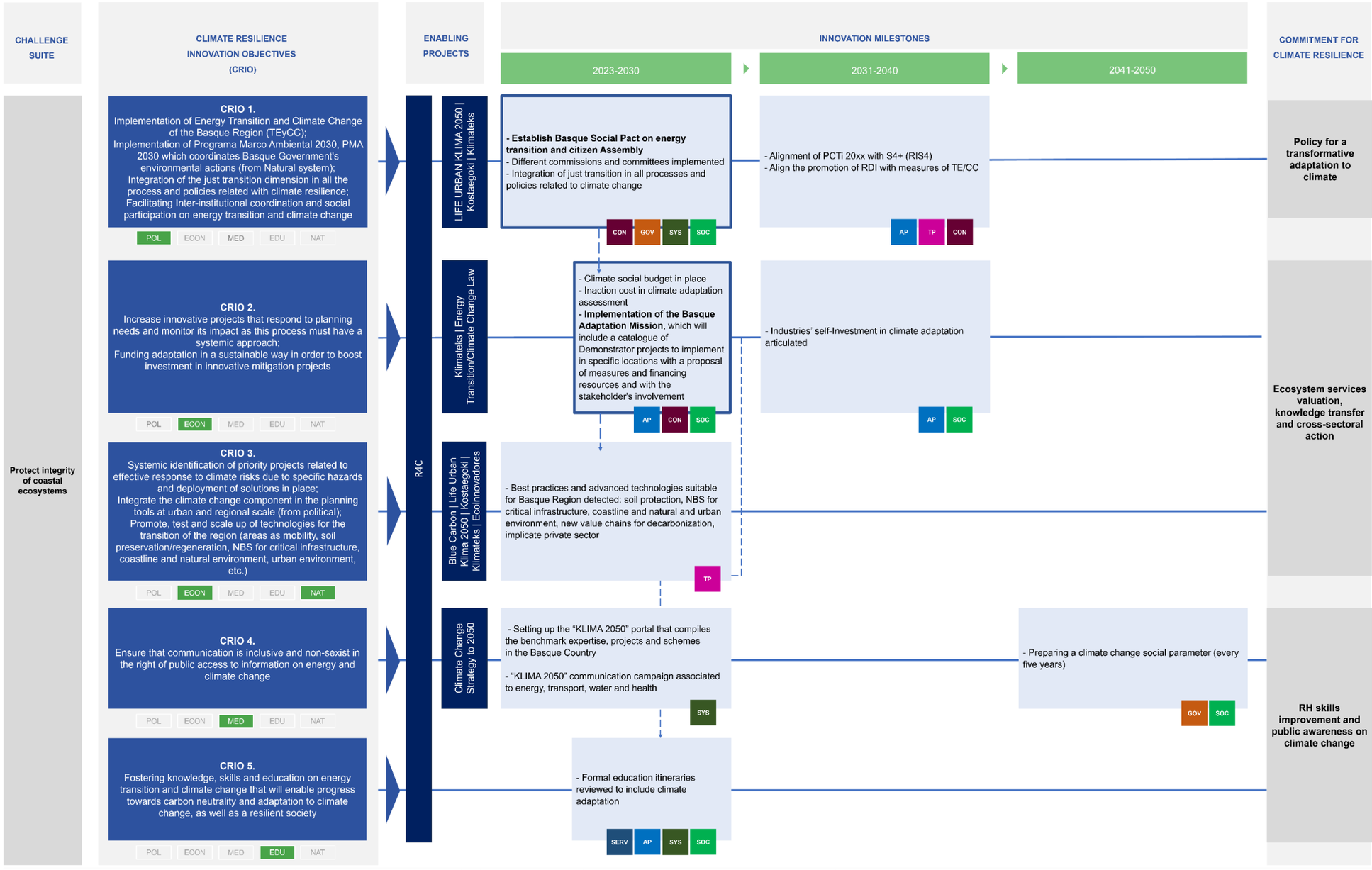
[14] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each "Commitment for CR" is accompanied by an explanation of its key accomplishments.

- Human resource (**HR) skills and public awareness on climate change** (particularly reliant on CRIOs 4 & 5 and their associated milestones).
  Considering that the majority of Basque Country's inhabitants (75%) live in the coastal areas and are affected by climate change-related events, an effective strategy requires the active involvement of local communities. Education and capacity-building are crucial to raising awareness of climate risks and encouraging the adoption of sustainable practices. Promoting workshops, information campaigns, and educational programs in schools can help raise awareness of climate change and the importance of adapting to it.

Several projects[15], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[16] from the regional innovation ecosystem in order to reach these goals.

[15] For more information regarding the enabling projects see Appendices.

[16] For more information regarding the stakeholders see Appendices.



SER - Service innovations; **AP** - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 6. Basque Country - Graphic RIR.

Among the milestones, the establishment of the **Basque Social Pact on energy transition and citizen Assembly** and the implementation of the **Basque Adaptation Mission** stand out as crucial milestones for the process. These **structural milestones** set the starting point for all subsequent actions, that will enable the integration of climate topics into comprehensive policies and regulations while ensuring alignment with the diverse levels of governance.

CRIO 1: Implementation of Energy Transition and Climate Change of the Basque Region (TEyCC); Implementation of Programa Marco Ambiental 2030, PMA 2030 which coordinates Basque Government's environmental actions (from Natural system); Integration of the just transition dimension in all the process and policies related with climate resilience; Facilitating Inter-institutional coordination and social participation on energy transition and climate change.

CRIO 1 is essentially related to the political CIF dimension, aiming to support decision-making, leading to more informed and effective land use planning.

In the short term (2023-2030), it is proposed to establish the Basque Social Pact on energy transition and Citizen Assembly (GOV/SOC) together with the implementation of different commissions and committees. The integration of just transition in all processes and policies related to climate change will be crucial to its success. This step will be crucial to achieving the proposed short term milestone of CRIO 2.

For the medium-term (2031-2040), as presented in the RIR of Basque Country, the established milestones will ensure the alignment of PCTi 20xx (“Plan de Ciencia, Tecnología e Innovación Euskadi”) with S4+ (RIS 4) and also the promotion of RDI with measures of TE/CC.

CRIO 2: Increase innovative projects that respond to planning needs and monitor its impact as this process must have a systemic approach; Funding adaptation in a sustainable way in order to boost investment in innovative mitigation projects.

This CRIO integrates the economic CIF dimension. To achieve this objective short term and long-term milestones shall be implemented.

In the short term (2023-2030), it´s important to ensure that the climate social budget is in place as well as to assess the inaction cost in climate adaptation. It also plans the implementation of the Basque Adaptation Mission, which will include a catalogue of Demonstrator projects to implement in specific locations with a proposal of measures and financing resources and with the stakeholder's involvement. This will be crucial to identify best practices and advanced technologies suitable for Basque Country (short term milestone of CRIO 3).

Regarding the medium-term milestone (2031-2040), the Basque Country needs to ensure the articulation of industries’ self-investment in climate adaptation. This involves creating policies and incentives that support industries in proactively investing in resilience measures. Additionally, fostering partnerships between the public and private sectors can help synchronize efforts, share best practices, and ensure that industrial self-investment contributes meaningfully to overall climate adaptation strategies.

CRIO 3: Systemic identification of priority projects related to effective response to climate risks due to specific hazards and deployment of solutions in place; Integrate the climate change component in the planning tools at urban and regional scale (from political); Promote, test and scale up of technologies for the transition of the region (areas as mobility, soil preservation/regeneration, NBS for critical infrastructure, coastline and natural environment, urban environment, etc.).

Tackling the economic and natural environment (territorial) dimensions, this CRIO intends to ensure that the best practices and advanced technologies suitable for the Basque Region are detected, namely soil protection, NBS for critical infrastructure, coastline and natural and urban environment, new value chains for decarbonization, implicate private sector (short term). This could be connected to revising formal education itineraries (CRIO 5).

CRIO 4: Ensure that communication is inclusive and non-sexist in the right of public access to information on energy and climate change.

This CRIO is related to the media-based and culture-based (culture/people) dimension, ensuring public access to information on energy and climate change.

The short term milestone (2023-2030) involves the setting of the “KLIMA 2050” portal, which should compile the benchmark expertise, projects, and schemes in the region. The portal ensures that communication campaigns associated with energy, water and health are inclusive and non-sexist.

For the long-term (2041-2050) milestone is proposed to prepare a climate change social parameter.

CRIO 4: Fostering knowledge, skills and education on energy transition and climate change that will enable progress towards carbon neutrality and adaptation to climate change, as well as a resilient society.

Short term milestones (2023-2030) include formal education itineraries review to include climate topics. This involves integrating climate adaptation topics across all levels of education, fostering a generation that is better prepared to tackle future challenges.

RIR’s political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

3.1.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in **Table 3**, the alignment between CRIO and SDG is clear on those dimensions related to climate action and life below water, but also those related to clean water and energy, ensuring quality education and the partnerships for the goals.

Table 3. Basque Country - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Implementation of TEyCC, PMA 2030; Integration of the just transition (…); Facilitating Inter-institutional coordination and social participation (…)						●	●						●	●		●	●
CRIO 2 Increase innovative projects (…); Funding adaptation (…)						●	●	●	●			●	●	●			●
CRIO 3 Systemic identification of priority projects (…); Integrate the climate change component in the planning (…): Promote, test and scale up of technologies (…)									●		●		●	●			●
CRIO 4 Ensure that communication is inclusive and non-sexist (…)				●	●					●			●	●			
CRIO 5 Fostering knowledge, skills and education on energy transition and climate change (…)				●		●	●				●	●	●	●			

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

3.1.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) composed of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment **(see key recommendations below, complemented by the information provided in section 2.3**). This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 4. Basque Country - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Completely achieved	Improve and reinforce strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance. The Plan de Transición Energética y Cambio Climático 2021-2024 and the Estrategia de Cambio Climático 2050 del Pais Vasco should be a reference.
					2. National, regional and local budgets specifically allocated to innovation for CR	Work in progress	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Work in progress	Improve the integration of climate considerations into comprehensive policies and regulations, as their role in a systemic transformation, addresses social challenges, urban development, and territorial planning in policies and legislation. This will facilitate knowledge exchange across the various dimensions of the innovation ecosystem.
					4. Leadership	Completely achieved	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative public-private innovation ecosystem. As they are responsible for defining and implementing legal and policy frameworks, as well as managing critical systems, public authorities can encourage and facilitate broader changes within communities.

							It is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks, social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem.
					5.	Governance model	Work in progress	Ensure the development of a robust governance model to align the stakeholders with the same CR vision, by establishing different levels of responsibilities (management, operational, monitoring) and creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6.	Direct support for experimentation	Starting to work on it / Starting to work on it	Accelerating the test of innovative solutions to tackle complex challenges such as climate change is crucial. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors should play a key role in this process. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7.	Strong and continuous public engagement model	Work in progress / Completely achieved	Continuously ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8.	Transparent management and monitoring processes	Work in progress	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9.	Strategic focus and investment in qualification and skills in key areas of expertise	Completely achieved	Reinforce the need for investment in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience, highlighting the key role of universities and other RTOs in enhancing knowledge.

3.2. South Aquitaine

3.2.1. Introduction

South Aquitaine is a coastal region in the south-west of France. Under WP5, the R4C project in South Aquitaine aims to develop an Adaptive Use Plan for waterfront areas based on real-time risk knowledge. The initiative will use observation and modelling techniques at local scales to offer continuous monitoring and forecasting of the coastal environment. Decision-aid indicators will help manage waterfront use dynamically, and the project will demonstrate tools on two waterfronts illustrating responses to climate change. A comprehensive adaptation program was initiated in 2021 for the area of Saint Jean de Luz, which involves a reconfiguration of waterfront use based on predictions of

the local climate change impact. It includes identifying priority areas to be maintained and protected, as well as re-naturalizing other sectors that will need to retreat due to rising sea levels and ocean storm impacts.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 5. South Aquitaine's demonstrations – contribution to the CS1 CIP.

	Core Innovation Pillars (CIP) in CS1			
Dimension/Demonstrations	**(1) Benchmarking of techniques for coastal protection and restoration**	**(2) Examination of opportunities for Blue Carbon Credits**	**(3) Citizen education & engagement in resilience-building actions**	**(4) Cross-border actions, including multi-scale monitoring & multi-sectoral adaptation planning**
Policy & Governance - Improve public management strategies on urbanised waterfronts exposed to climate risks; support the development of long-term adaptation policies incl. both coastal defence & retreat options.	●	●		●
Economic - Generate tools & services to support preservation of coastal economic activities; assess, communicate & mitigate costs related to climate impacts.	●	●	●	
Social - Development of risk culture, memory & anticipation among local administrations, coastal users & citizens.			●	●
Environmental - Coastal environment monitoring & forecasting tools to offer real time & long-term assessment of coastal risks at local scale; integrates green-grey coastal protection solutions.	●			●

3.2.2. South Aquitaine Innovation Roadmap

The innovation roadmapping for South Aquitaine was co-developed by the regional partners: the Communauté d'Agglomération Pays Basque, representing the public authority, Suez Eau France and the Université de Pau et des Pays de l'Adour (UPPA).

The South Aquitaine Innovation Roadmap (Figure 7), outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 1 motto – Protect the integrity of coastal ecosystems. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 2 **key accomplishments**: [17]

[17] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each "Commitment for CR" is accompanied by an explanation of its key accomplishments.

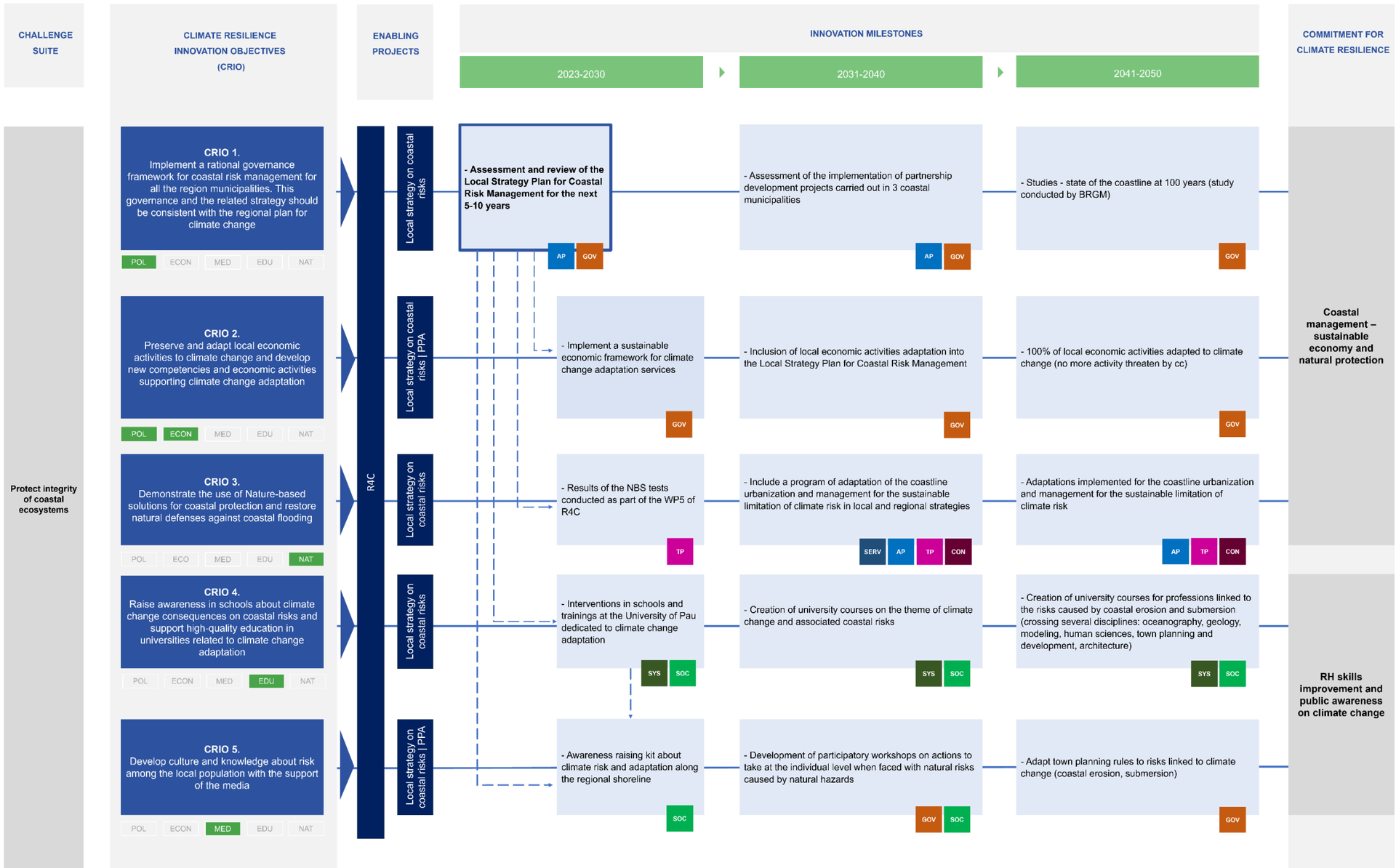
- **Coastal management – sustainable economy and natural protection** (particularly reliant on CRIOs 1, 2 & 3 and their associated milestones).
  Management and anticipation of coastal risks is a major issue in South Aquitaine. A key challenge is the development of new management strategies by regional authorities, which should rely on adaptive use of the waterfront based on real-time risk knowledge. The development of innovative numerical modelling solutions and a video monitoring system, deployed along the coast, could increase the capability to manage and anticipate coastal risks. The evaluation of the effectiveness of nature-based solutions (NBS) in mitigating the impact of ocean storms on shorelines and in reducing the degradation of coastal biodiversity is also crucial. The key challenge is to implement a sustainable economic framework for climate change adaptation services relying on decision support tools to be operated as part of future service provision contracts aiming at 100% of local economic activities being adapted to climate change.

- Human resource (**HR) skills improvement and public awareness on climate change** (particularly reliant on CRIOs 4 & 5 and their associated milestones).
  Raising awareness about coastal risks and understanding their impacts on everyday tasks, on the oceans and habitats are crucial steps in promoting sustainable behaviours and fostering a deeper sense of environmental responsibility among individuals and communities. To facilitate climate change adaptation the key challenge is to implement participatory actions/activities, that can be developed at an individual scale or by interventions in schools and universities, enhancing the importance of the creation of university courses for professions linked to the risks caused by coastal erosion and submersion, crossing several disciplines (oceanography, geology, modelling, human sciences, town planning and development, architecture).

Several projects[18], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[19] from the regional innovation ecosystem in order to reach these goals.

[18] For more information regarding the enabling projects see Appendices.

[19] For more information regarding the stakeholders see Appendices.



SER - Service innovations; **AP** - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

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Figure 7. South Aquitaine - Regional Innovation Roadmap.

Among the milestones that stand out as crucial for the process are the **assessment and review of the Local Strategy Plan for Coastal Risk Management for the next 5-10 years**. This structural milestone requires administrative and governance innovations and sets the starting point for all subsequent actions. It will play a crucial role in the assessment of the implementation of partnership development projects carried out in 3 coastal municipalities, as well as the inclusion of local economic activities adaptation. Several interdependencies, complementarities, and sequential relationships among these tools and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Implement a rational governance framework for coastal risk management for all the region municipalities. This governance and the related strategy should be consistent with the regional plan for climate change.

CRIO 1 is essentially related to the political CIF dimension, aiming to support decision-making, leading to more informed and effective land use planning. In the short term (2023-2030), and related to all short term milestones of the other CRIOs, it is proposed to assess and review the Local Strategy Plan for Coastal Risk Management (next 5-10 years).

In the medium term (2031-2040), the established milestone will ensure the evaluation of the implementation of partnership development projects in three coastal municipalities.

Looking further into the future, the long-term milestone (2041-2050) defines the necessity of conducting studies to assess the condition of the coastline over the next 100 years.

CRIO 2: Preserve and adapt local economic activities to climate change and develop new competencies and economic activities supporting climate change adaptation.

This CRIO integrates the political and economic CIF dimension. In the short term (2023-2030), it's important to ensure the implementation of a sustainable economic framework for climate change adaptation services.

Related to CRIO 1, the medium-term milestone (2031-2040) is associated with the inclusion of local economic activities adaptation into the Local Strategy Plan for Coastal Risk Management.

Associated with the long-term milestone (2041-2050), the ultimate objective is to ensure that 100% of local economic activities in South Aquitaine are adjusted to climate change.

CRIO 3: Demonstrate the use of Nature-based solutions for coastal protection and restore natural defenses against coastal flooding.

Addressing the natural CIF dimension, this CRIO aims to build on the results of the short term milestone (2023-2030) specifically, the outcomes of the NBS tests conducted as part of WP5 under the R4C.

Pursuing the medium-term milestone (2031-2040), the subsequent phase involves incorporating a program for adapting coastal urbanization and management to sustainably mitigate climate risks within local and regional strategies.

For the long-term (2041-2050) all adaptations, previously addressed, need to be fully implemented.

CRIO 4: Raise awareness in schools about climate change consequences on coastal risks and support high-quality education in universities related to climate change adaptation.

This CRIO addresses the educational CIF dimension. The steps to short term (2023-2030) and medium-term (2031-2040) milestones must ensure the implementation of interventions in schools, as well as trainings courses at the University of Pau dedicated to climate change adaptation and associated coastal risks.

For the long-term (2041-2050), the goal is to create university courses for professions linked to the risks caused by coastal erosion and submersion, crossing several disciplines, namely oceanography, geology, modelling, human sciences, town planning and development, and architecture.

CRIO 5: Develop culture and knowledge about risk among the local population with the support of the media.

CRIO 5 is related to the media-based and culture-based public (culture/people) dimension of CIF ensuring awareness raising about climate risk and adaptation. The short term milestone (2023-2030) is related to the creation of an awareness-raising kit about climate risk and adaptation along the regional shoreline.

The second step, focused on a participatory process, is the medium-term (2031-2040) development of a set of workshops on actions to take at the individual level when faced with natural risks caused by natural hazards.

Regarding the long-term milestone (2041-2050), it´s crucial to adapt town planning rules to risks linked to climate change (coastal erosion, submersion, etc).

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

3.2.3. Alignment with SDG

The R4C Innovation Packages (IP) and other enabling projects in progress play an important role in the systemic transformation, contributing to Sustainable Development Goals (SDGs). As illustrated in Table 6, the alignment between CRIO and SDG is clear on those dimensions related to climate action and life below water, but also with those related to sustainable communities and responsible consumption and production.

Table 6. South Aquitaine - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Implement a rational governance framework for coastal risk management (…)											●		●	●			●
CRIO 2 Preserve and adapt local economic activities to climate change (…)	●		●			●	●	●	●		●	●	●	●			
CRIO 3 Demonstrate the use of Nature-based solutions (…)								●	●				●	●	●		
CRIO 4 Raise awareness in schools (…)				●		●	●				●	●	●	●			
CRIO 4 Develop culture and knowledge about risk (…)				●		●	●	●	●		●	●	●	●			

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

3.2.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3**). This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 7. South Aquitaine - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
■					1. Clear national and/or regional strategic guidelines	Completely achieved	Reinforce strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance. The national strategies and policies that address coast protection[20] should be a reference.
■	■		■		2. National, regional and local budgets specifically allocated to innovation for CR	Work in progress	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
■				■	3. Integration of CR in multidimensional policies and regulations	Starting to work on it	Accelerating the integration of climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
■					4. Leadership	Completely achieved	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem.

[20] More information here.

							As leaders, the public authorities must align action into a collective direction and coordinate intra and intergovernmental resilience efforts. Also, they must take advantage of shared knowledge and resources while ensuring that the broader community is committed and supports action, promoting cross-border and macro-regional governance and cooperation.
					5. Governance model	Starting to work on it	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Completely achieved	Improve and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	Work in progress	Implement broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Completely achieved	Improve the management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Starting to work on it	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge.

3.3. Azores

3.3.1. Introduction

The Azores archipelago constitutes an Autonomous Region of the Portuguese Republic located in the mid-North Atlantic Ocean.

As part of R4C, the Innovation Packages (IPs) implemented in WP5 cover the whole region (all nine islands of the archipelago). Under this WP, the R4C initiative in the Azores aims to improve climate literacy among citizens and stakeholders by sharing targeted messages tailored to specific aspects of the water-energy-food-climate connection. It includes increasing awareness of planetary boundaries, promoting best practices, and creating and implementing digital applications for message dissemination and feedback collection. The initiative also plans to integrate existing digital tools for monitoring wildlife into a single online platform for real-time monitoring and scenario generation. Additionally, it aims to develop an interactive digital coastal vulnerability map for the Azores islands by building on a novel Coastal Vulnerability Index (CVI) tool, and an Azorean Footprint app to communicate with citizens, disseminate messages, and collect information to assist policy-makers in addressing climate change impacts in the Azores.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 8. Azores' demonstrations – contribution to the CS1 CIP.

	Core Innovation Pillars (CIP) in CS1			
Dimension/Demonstrations	**(1) Benchmarking of techniques for coastal protection and restoration**	**(2) Examination of opportunities for Blue Carbon Credits**	**(3) Citizen education & engagement in resilience-building actions**	**(4) Cross-border actions, including multi-scale monitoring & multi-sectoral adaptation planning**
Policy & Governance - Implement novel digital tools to facilitate decision-making processes & actively engage citizens & other stakeholders in decision-making and governing (management) processes	●			●
Economic - Identify critical stresses & sectoral development issues using nexus app & initiate adaptation planning; assess potential impacts of climate change on marine tourism sector.	●			●
Social - Enhance community involvement in the definition of regional climate change and resilience policies; increase stakeholder and citizen risk perception & climate change literacy.			●	●
Environmental - Interactive AR/VR vulnerability index tool; online water-energy-food-climate nexus based sectoral footprint app; bioindicators-based assessment of climate impact on marine life.	●			●

3.3.2. Azores Innovation Roadmap

The **innovation roadmapping** for the Azores was co-developed by regional partners: the Regional Fund of Science and Technology (FRCT - Fundo Regional da Ciência e Tecnologia) an R&D facilitator that has a strong link to the regional representative (Government and the municipalities), and the University of the Azores (UAc), a reference in high education with significant expertise in marine sciences, marine biology and oceanography.

The **Azores innovation roadmap** (Figure 8), outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 1 motto – Protect the integrity of coastal ecosystems. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 2 **key accomplishments**: [21]

- **Digitalization in decision-making processes (monitoring and communication)** (particularly reliant on CRIOs 1, 2, & 3 and their associated milestones).
  A key challenge to the governance system in the Azores is enhancing digitalisation schemes to ensure close monitoring of climate change impacts all across the archipelago. Streamlining decision-making processes based on accurate data and more inclusive models to support decision-making are the main commitments to address CR.

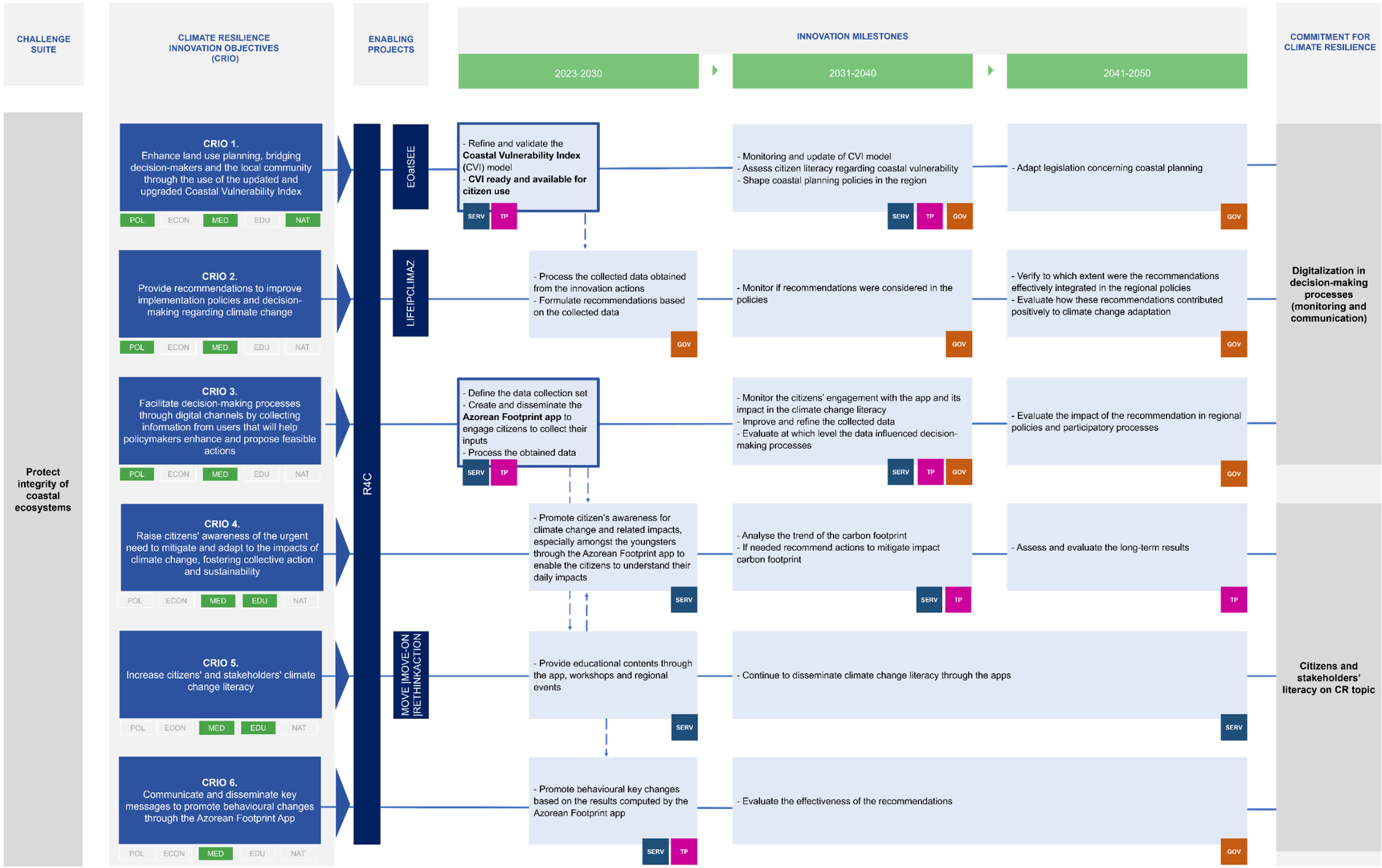
- **Citizens and stakeholders' literacy on CR topic** (particularly reliant on CRIOs 4, 5, & 6 and their associated milestones).
  The region shows low levels of literacy amongst citizens regarding climate change topics, which may impact consumption and behavioural patterns. This may contribute significantly to environmental degradation, exacerbating climate-related risks and hindering efforts to achieve sustainability and climate resilience. Raising awareness about climate change and understanding the impacts on habitats are crucial steps in fostering a deeper responsibility among individuals and communities.

Several projects[22], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[23] from the regional innovation ecosystem in order to reach these goals.

[21] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each "Commitment for CR" is accompanied by an explanation of its key accomplishments.

[22] For more information regarding the enabling projects see Appendices.

[23] For more information regarding the stakeholders see Appendices.



SER - Service innovations; **TP -** Technological process innovations; **GOV -** Governance innovations;

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Figure 8. Azores - Regional Innovation Roadmap.

Among the milestones, two innovative tools stand out as crucial for the process: (i) the **Coastal Vulnerability Index model** (CVI) and (ii) the creation of the **Azorean Footprint app**. These structural milestones require technological and service innovations and set the starting point for all subsequent actions. These tools will enable data gathering and processing information to support decision-making. Furthermore, they play a crucial role in increasing community literacy and awareness, thereby ensuring the digitalisation of decision-making processes. Several interdependencies, complementarities, and sequential relationships among these tools and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Enhance land use planning, bridging decision-makers and the local community through the use of the updated and upgraded Coastal Vulnerability Index (CVI).

CRIO 1 is essentially related to political, media-based & culture-based (culture/people) and natural environment (territorial) CIF dimensions, aiming to support decision-making, leading to more informed and effective land use planning. In the short term (2023-2030), it is proposed to refine and validate the **Coastal Vulnerability Index (CVI) model to finalise it and make it available for citizen use**, which is a **structural milestone**. Together with other monitoring tools, the CVI will contribute to providing recommendations for decision-making (CRIO 2).

For the medium-term (2031-2040), the milestones involve the monitoring and updating of the CVI model, assessing citizen literacy regarding coastal vulnerability, and shaping coastal planning policies in the region, requiring governance innovations (GOV) as they introduce new participation mechanisms for citizens and novel ways to increase transparency and accountability within the public sector.

In the long-term (2041-2050), the adaptation of legislation concerning coastal planning is expected.

CRIO 2: Provide recommendations to improve implementation policies and decision-making regarding climate change.

This CRIO integrates the political and media-based & culture-based (culture/people) CIF dimensions. To achieve this objective several milestones with governance innovations shall be implemented. In short term, the data will be processed (including the one provided by the CVI model) and recommendations will be formulated.

Sequentially, medium-term innovations milestones refer to monitoring if the recommendations proposed were considered in the policies.

Finally, in long-term, how those recommendations effectively were integrated into the regional policies and evaluate how the recommendations contributed to climate change adaptation.

CRIO 3: Facilitate decision-making processes through digital channels by collecting information from users that will help policymakers enhance and propose feasible actions.

CRIO 3 is embedded in political and media-based & culture-based (culture/people) CIF dimensions, and it is focused on digitalization in decision-making processes.

The baseline for achieving this CRIO is the creation of the Azorean Footprint App, a structural milestone. The steps to short term must include defining the data collection set, create and disseminate the app to engage citizens in order

to collect their inputs and then process the obtained data (Service Innovations and Process Innovations). These will also inform short term milestones of CRIOs 4 and 5 since they depend on the data provided by the app.

To medium-term (and sequentially to those steps) it is proposed to monitor the citizens' engagement with the app and its impact on climate change literacy, improve and refine the collected data and evaluate at which level the data influenced the decision-making processes.

The long-term milestone is to evaluate the impact of the recommendation on regional policies and participatory processes, which will require governance innovations.

CRIO 4: Raise citizens' awareness of the urgent need to mitigate and adapt to the impacts of climate change, fostering collective action and sustainability.

CRIO 4 is related with educational dimension of CIF and addresses to citizen's literacy. It involves educating and informing the public about the environmental, social, and economic consequences of climate change, highlighting the importance of collective action to promote sustainability. The goal is to create a more informed and proactive society in protecting the environment and ensuring a climate-resilient future for coming generations.

The first step (short term milestone) is to promote citizen's awareness for climate change and related impacts, especially amongst the youngsters, as the Azorean Footprint app should enable the citizens to understand their daily impacts. This will follow the dissemination of educational content through the app, workshops and regional events (linked to CRIO5).

In the medium-term it is proposed to analyse the trend of the carbon footprint and recommend actions to mitigate human impact and the long-term milestone to assess and evaluate the results.

CRIO 5: Increase citizens' and stakeholders' climate change literacy.

Tackling the media-based & culture-based (culture/people) and educational dimensions, CRIO 5 will be achieved by providing educational content through the app, workshops and regional events (short term), and, in the medium and long-term, further dissemination of climate change literacy.

CRIO 6: Communicate and disseminate key messages to promote behavioural changes through the Azorean Footprint App.

Finally, the path to achieving CRIO 6, related to the media-based & culture-based (culture/people) dimension, starts by promoting behavioural key changes based on the results computed by the Azorean Footprint app. For medium and long-term milestones, the action is about evaluating the effectiveness of the recommendations.

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

3.3.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 9, the alignment between CRIO and SDG is clear on those dimensions related to climate action and life below water, but also those related to public awareness for a more sustainable and responsible behaviour/action, promoting social inclusion where no one is left behind (just transition principles).

Table 9. Azores - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Enhance land use planning (…)									●		●		●	●			●
CRIO 2 Provide recommendations (…)											●		●	●			●
CRIO 3 Facilitate decision-making processes (…)											●		●	●			●
CRIO 4 Raise citizens' awareness (…)			●	●		●	●		●	●	●	●	●	●			●
CRIO 5 Increase citizens' and stakeholders' climate change literacy				●		●	●			●	●	●	●	●			●
CRIO 6 Communicate and disseminate key messages to promote behavioural changes through the Azorean Footprint App			●	●		●	●			●	●	●	●	●			●

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

3.3.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3).** This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 10. Azores - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	It will be achieved in 2030	Implementing strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance. The Regional Plan for Climate Change Adaptation (PRAC) should be a reference.
					2. National, regional and local budgets specifically allocated to innovation for CR	Starting to work on it	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Work in progress	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
					4. Leadership	Not started	As leaders, the public authorities must align action into a collective direction and coordinate intra and intergovernmental resilience efforts. Also, they must take advantage of shared knowledge and resources while ensuring that the broader community is committed and supports action, promoting cross-border and macro-regional governance and cooperation. Designate dedicated entities and multidisciplinary teams to oversee innovation management on climate resilience. Among their tasks, it is suggested to maintain

							a portfolio of regional needs and challenges that require attention (climate risks, social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem.
					5. Governance model	Not started	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Not started	It is crucial to experiment with and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	Starting to work on it	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes. The "Azorean Footprint app" may have a crucial role here.
					8. Transparent management and monitoring processes	Starting to work on it	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Starting to work on it	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge.

3.4. Tuscany

3.4.1. Introduction

Tuscany, a region in central Italy, is characterised by a coastal dune system that is experiencing many challenges due to climate change, with an impact on coastal erosion.

As part of R4C, the IPs implemented in WP5 aim to reinforce the dune system through nature restoration that will allow passive control of coastal erosion in Sterpaia Coastal Park along the Follonica Gulf. Furthermore, the region will implement an intensive monitoring network on-site to continuously measure weather parameters and assess hydrodynamics (waves, winds, currents) and morpho-dynamics (shoreline and coastal profile evolution). The ultimate goal is the development of territorial resilience plans based on monitored data and contextual factors.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 11. Tuscany's demonstrations – contribution to the CS1 CIP.

	Core Innovation Pillars (CIP) in CS1			
Dimension/Demonstrations	**(1) Benchmarking of techniques for coastal protection and restoration**	**(2) Examination of opportunities for Blue Carbon Credits**	**(3) Citizen education & engagement in resilience-building actions**	**(4) Cross-border actions, including multi-scale monitoring & multi-sectoral adaptation planning**
Policy & Governance - The participatory processes with relevant stakeholders is aimed at including the visions on the territory in the public decision-making process as well as in territorial policies.			●	●
Economic - Perform a complete costs and benefits analysis to identify the improvements linked to ecosystem solutions and services, and to assess the impact of the solutions for each stakeholder categories.	●			●
Social - Participatory and engagement actions for innovation promotion and integration of policies with the visions, ideas & values of all stakeholders, including tourists.			●	●
Environmental - Coastal & marine monitoring for the purpose of modelling & resilience assessment; NBS as actions for protecting shorelines from coastal erosion risks.	●	●		●

3.4.2. Tuscany Innovation Roadmap

The innovation roadmapping for Tuscany was co-developed by regional partners: the Regione Toscana, representing the public authority, RINA Consulting (RINA), the Scuola Superiore di Studi Universirari e di Perfezionamento S Anna (SSSA) and the Università degli Studi di Firenze (UNIFI), and IRIS sas Strategie per l'Ambiente (IRIS) and Nature and Environment Management Operators S.r.l NEMO), both small-medium enterprises.

The Tuscany Innovation Roadmap (Figure 9) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 1 motto – Protect the integrity of coastal ecosystems. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 2 **key accomplishments**: [24]

- **Improve NBS structures and environment protection** (particularly reliant on CRIOs 1 & 2 and their associated milestones).
  Tuscany is facing significant challenges due to coastal erosion and increasing human activity along the coast, which is why the defence and reconstruction of beach-dune habitats are significant issues in this region. Finding sustainable nature-based solutions (NBS) tailored to different shorelines with a focus on minimizing environmental impacts, that could be implemented on a large scale to mitigate the risks of coastal erosion and submersion in this region, is a major challenge. The development of tools and technologies towards preservation has a pivotal role in this process. Building and testing a laboratory-scale model of the coastal section and protection structures will provide valuable for designing the prototype structure that will be subsequently built *in situ*.

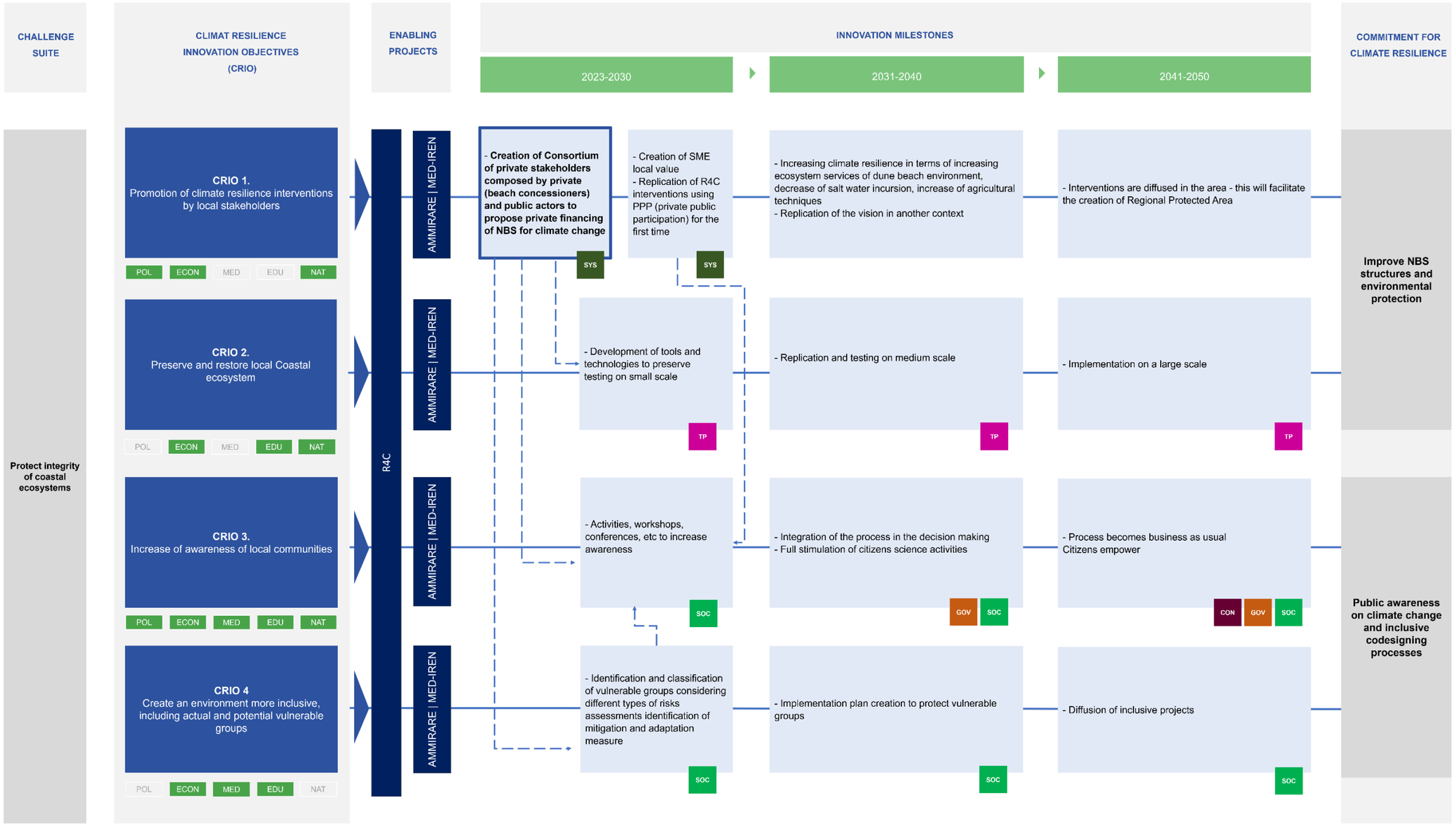
- **Co-designing practices involving citizens** (particularly reliant on CRIOs 3 & 4 and their associated milestones).
  Coastal management in Tuscany requires the integration of the needs of the various stakeholders who live and work on the coast. It is crucial to promote well-structured participation activities that allow citizens and operators to take part in the processes. Additionally, communication and participation in activities facilitate a climate of regular dialogue between public authorities, stakeholders, and the local community (improve education and employment tailored to protect the most vulnerable groups), allowing better management of the coastal zone and making the interventions "socially" acceptable.

Several projects[25], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[26] from the regional innovation ecosystem in order to reach these goals.

[24] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each "Commitment for CR" is accompanied by an explanation of its key accomplishments.

[25] For more information regarding the enabling projects see Appendices.

[26] For more information regarding the stakeholders see Appendices.



TP - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

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Figure 9. Tuscany - Regional Innovation Roadmap.

Among the milestones, one stands out, namely the **Creation of Consortium of private stakeholders** composed of private (beach concessioners) and public actors to propose private financing of NBS for climate change, which set the starting point for all subsequent actions. This milestone (systemic innovation) is pivotal to increasing climate resilience in terms of increasing ecosystem services of the dune beach environment, decreasing saltwater incursion, increasing agricultural techniques and replication of this vision in other contexts. Several interdependencies, complementarities, and sequential relationships among these tools and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Promotion of climate resilience interventions by local stakeholders.

The foremost short term (2023-2030) objective is to establish a consortium, comprising private stakeholders, including beach concessioners and public entities, aimed at proposing private funding for Nature-Based Solutions (NBS) in response to climate change. This milestone is closely associated with the imperative to replicate R4C interventions through public-private partnerships.

In the medium-term (2031-2040) is expected to increase the services of the dune beach environment and to implement sustainable practices in-site, aiming at creating a Regional Protected Area as the long-term milestone.

CRIO 2: Preserve and restore the local Coastal ecosystem.

The steps to short, medium and long-term milestones ensure the development of tools and technologies to preserve testing on a small scale to then have the possibility to replicate and test on a medium scale.

CRIO 3: Increase of awareness of local communities.

This CRIO encompasses all CIF dimensions and aims to raise awareness about climate change in local communities and actively involve citizens. The ultimate milestone is to enhance citizen empowerment in decision-making processes.

CRIO 4: Create an environment more inclusive, including actual and potential vulnerable groups.

The short term (2023-2030) objective involves the identification and categorization of vulnerable groups, and developing at medium and long-term, an inclusive strategic plan to safeguard vulnerable people.

RIR's political commitment: *NR*

3.4.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 12, the alignment between CRIO and SDG is clear on those dimensions related to climate action and life below water, but also those related to quality education, industry, innovation & infrastructure, and partnerships for the goals.

Table 12. Tuscany - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Promotion of climate resilience interventions by local stakeholders				●		●	●	●	●		●	●	●	●			●
CRIO 2 Preserve and restore local Coastal ecosystem									●				●	●			
CRIO 3 Increase of awareness of local communities				●							●		●	●			●
CRIO 4 Create an environment more inclusive, including actual and potential vulnerable groups				●	●					●			●	●			

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

3.4.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3)**. This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 13. Tuscany - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
■					1. Clear national and/or regional strategic guidelines	Completely achieved	Reinforce strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance. The Piano Nazionale di Adattamento ai Cambiamenti Climatici (PNACC) and Piano Energia e Clima (PNIEC) should be a reference.
■	■		■		2. National, regional and local budgets specifically allocated to innovation for CR	Completely achieved	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
■				■	3. Integration of CR in multidimensional policies and regulations	Starting to work on it	Accelerating the integration of climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
■					4. Leadership	Completely achieved	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem.

					5. Governance model	Not started	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Work in progress	Accelerate the experimentation and testing of innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Building and testing the scale model of the coastal section and protection structures in the large-scale wave-flume of LABIMA, the Laboratory of Maritime Engineering of Florence University it's crucial.
					7. Strong and continuous public engagement model	Work in progress	Accelerate broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Starting to work on it	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Work in progress	Investing consistently in education and skill development for human resources in critical areas of expertise is crucial for fostering innovation in climate resilience. Universities and other research and technology organizations (RTOs) play a crucial role in advancing knowledge in this field.

4. Challenge Suite 2 – Regional Innovation Roadmaps reports

4.1. Køge Bay

4.1.1. Introduction

Køge Bay is a shallow bay in the southern part of the Øresund maritime strait. The Køge Bay area covers two regional entities: 7 municipalities are located in the capital region of Denmark, and 4 are part of the Zealand Region.

As part of R4C, the Innovation Packages (IPs) implemented in WP5 cover the whole region (the 11 municipalities that stretch from Greater Copenhagen in the north to the chalk cliffs at Stevns Klint in the south). Under this WP, the R4C initiative in Køge Bay intends to communicate the impacts of climate change through immersive virtual and augmented reality visualisation tools, build social and health resilience plans adapted to dynamic coastal changes, and provide business models for multifunctional coastal landscapes. Demonstrate innovations within the context of the multi-layered safety concept (spatial planning, emergency response, prevention and recovery), focusing on meaningful stakeholder engagement in designing and promoting resilience innovations, and empowering citizens towards climate resilience in the Køge Bay region.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 14. Køge Bay's demonstrations – contribution to the CS2 CIP.

	Core Innovation Pillars (CIP) in CS2		
Dimension/Demonstrations	**(1) Bridging the science-stakeholder-policy gap via innovative evidence-based digital tools**	**(2) Raising citizens' awareness of climate issues, adaptation solutions, & potential trade-offs**	**(3) Improving the use of existing data via fusion of heterogeneous data sources & advanced analytics to support decision-making**
Policy & Governance - Promote AR/VR as a decision-making tool; improve horizontal & vertical policy integration; enhance collaboration across administrative boundaries.	●		●
Economic - Develop a scaling plan based on Strandparken nature-based coastal protection model as a structural & non-structural innovation for coastal regions in Europe.			●
Social - Improve citizen & stakeholder engagement processes through use of AR/VR to illustrate complex climate impacts & psycho-social educational group activities.		●	

Environmental - Illustrate future climate vulnerabilities & risks (AR/VR), highlighting Strandparken coastal protection, biodiversity enhancement & climate change adaptation benefits.	●	●	●

4.1.2. Køge Bay Innovation Roadmap

The **Køge Bay innovation roadmapping** was co-developed by regional partners: the Region Hovedstaden (REGIONH) and Region Sjaelland (ZEALCO), representing public authorities. Furthermore, it integrates the Naturstyrelsen (Danish Coastal Authority), a public organisation, and two high-education institutions, the VIA University College (VIA UC) and the Kobenhavns Universitet (UCPH).

- The Køge Bay **innovation roadmap** (Figure 10) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 2 motto – Enhance climate adaptation through data. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments:**[27]**Cross-sector and cross-municipal collaboration** (particularly reliant on CRIOs 1 and 2, and their associated milestones).

  The role of the regional administration is to foster coordination between municipalities, and other stakeholders as well as organisational support via cross-municipal and geographical projects. Furthermore, it may contribute to increasing awareness of the challenges and potential solutions related to climate adaptation and to making decisions that consider environmental justice and socioeconomic equity.

- **Human resources skills improvement & public awareness regarding CR topics** (particularly reliant on CRIOs 3 and 4 and their associated milestones).
  According to the information provided by the partners, in the Køge Bay area, several municipalities have a significant number of socially and economically disadvantaged groups. As a result, citizen engagement models are comprehensive. Furthermore, by investing in research, educational skills, and advanced training for HR, organisations can better prepare their teams to implement and promote climate resilience strategies and adaptation measures. It is essential to enhance public awareness and improve human resources skills related to climate resilience topics to build resilient communities and encourage a proactive approach to climate adaptation and sustainability.

- **Multidimensional approaches incorporating CR topics** (particularly reliant on CRIO 5 and its associated milestones).
  It is essential to embrace multidimensional approaches when undertaking projects and initiatives aimed at addressing climate change. By integrating CR considerations across various aspects of strategy and operations, it is possible to develop more comprehensive and adaptive solutions. This approach involves aligning social, environmental, economic and health factors to create robust strategies that not only mitigate risks but also seize opportunities for innovation and growth. Embracing such multidimensional strategies

27 The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

ensures that organisations are better prepared to respond to climate-related disruptions and contribute positively to sustainability goals.

Several projects[28], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[29] from the regional innovation ecosystem in order to reach these goals.

[28] For more information regarding the enabling projects see Appendices.

[29] For more information regarding the stakeholders see Appendices.

AP - Administrative process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 10. Køge Bay - Regional Innovation Roadmap.

The **National Climate Change Adaptation Plan** is considered a **structural milestone**. This plan sets the starting point for the most subsequent actions. It integrates a long-term vision and strategy, playing a crucial role in cross-municipal/regional collaboration, engaging the community and local actors in climate adaptation. Several interdependencies, complementarities, and sequential relationships among this tool and subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Inclusion of climate change adaptation and awareness as a political priority; Promotion of governance structures and legal framework that allow transparent and easy coordination and cross-sectoral collaboration; Cross-municipal collaboration.

CRIO 1 is related to the political CIF dimension, essentially aiming for cooperation across the municipalities to an easier coordination and cross-sectoral collaboration among them.

In the short term (2023-2030), the **National Climate Change Adaptation Plan** stands out as a **structural milestone** important to ensure the prioritisation of existing funds for cross-regional and cross-sectoral projects (CRIO 2) and also to promote a focus on participatory planning (CRIO 4).

For the medium-term (2031-2040), the milestones involve the structures for collaboration across current barriers, and in the long-term (2041-2050) it is expected that governance structures correspond with the geographic impact of the climate risk.

These milestones require administrative process innovations (AP) as they refer to the creation of new ways, methods and forms of undertaking tasks within the organisation, and systemic innovations (SYS) to capture new or improved ways of interacting with other organisations and knowledge bases.

CRIO 2: Strong enabling environment that supports the collaboration between knowledge institutions, development organisations and practitioners in climate change initiatives and projects.

This CRIO integrates the political, economic and educational CIF dimensions. To achieve this objective some milestones with systemic innovations and conceptual innovation shall be implemented. In the short term, the existing funds will be reprioritized and used for cross-regional and cross-sectoral projects (the National Climate Change Adaptation Plan (CRIO 1) may be crucial to tackle the available funding). The medium-term innovation milestones aim to ensure that funding promotes practitioner participation in climate resilience initiatives. Finally, in long-term, is expected that social approaches are prioritised.

CRIO 3: Strengthen the inclusion of climate change and climate resilience as a strategic matter at all educational levels; Increase practical use of existing research and educational skills on the impacts of climate change and needed adaptation measures.

CRIO 3 is embedded in the educational CIF dimension, and it is focused on increasing educational knowledge about climate change and climate resilience, which require administrative process innovations and conceptual innovation.

To achieve this, the short term steps include developing supplements for existing curricula with a focus on actionable knowledge and constructive approaches that may shift the status quo. In the medium term and long-term, other improvements will take place.

CRIO 4: Engaged local community action and high social resilience capacity, since they are prepared to meet the challenges of a changing climate.

CRIO 4 is related to the media-based and culture-based public (culture/people) and educational dimensions of CIF and requires several types of innovations, namely governance, social, systemic and conceptual innovations. It includes a systematic effort on participatory engagement with relevant impact in long-term milestones.

CRIO 5: Implement a holistic approach within social, environmental, economic and health spheres as a pre-requirement for projects and initiatives addressing climate change; Increase and mainstream NBS in land use/urban planning; Valorisation of ecosystem services in climate resilience policies and land use planning.

Integrating several CIF dimensions, CRIO 5 require experimentation support (short term) and upscaling of pilot projects and the transition to new planning practice (medium-term). Finally, in the long term, it is expected that the national and local planning systems prioritise NBS and holistic approaches.

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

4.1.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 15, the alignment between CRIO and SDG is clear on those dimensions related to climate action and sustainable cities and communities, but also those related to life below water, life on land, peace, justice & strong institutions, and quality education.

Table 15. Køge Bay - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Inclusion of climate change adaptation and awareness as a political priority; Promotion of governance structures and legal framework (…); Cross-municipal collaboration											●		●	●	●	●	●

CRIO 2 Strong enabling environment (…)										●		●	●	●	●	●
CRIO 3 Strengthen the inclusion of climate change (…) at all educational levels; Increase practical use of existing research and educational skills (…)			●							●		●			●	
CRIO 4 Engaged local community action and high social resilience capacity, (…)	●	●	●		●	●	●	●	●	●	●	●				
CRIO 5. Implement a holistic approach (…); Increase and mainstream NBS in land use/urban planning; Valorisation of ecosystem services (…)	●	●	●	●	●	●	●	●	●	●	●	●	●	●		

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

4.1.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3**). This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 16. Køge Bay - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Completely achieved	Implementation of strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance should be continuously improved. The National Flood Directive, the Regional Development Strategy and the Municipal Climate Plans should be a reference.
					2. National, regional and local budgets specifically allocated to innovation for CR	Starting to work on it	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Starting to work on it	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
					4. Leadership	Completely achieved	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem.

					5. Governance model	Work in progress	A robust governance model to align the stakeholders with the same CR vision should be ensured in the short term. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Completely achieved	Testing innovative solutions to tackle complex challenges such as climate change should be continuously improved. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	Completely achieved	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Completely achieved	Implementation of transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts should be continuously improved. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Work in progress	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. The universities and other RTOs play an important role in enhancing knowledge. Addressing climate resilience in all curricula may have a crucial role here.

4.3. Burgas

4.3.1. Introduction

Burgas is the fourth biggest city in Bulgaria (close to large wetlands) and flooding is a major threat. As part of R4C, the Innovation Packages (IPs) implemented in WP5 take place in Burgas Municipality and comprise an extensive zone including 7 city neighbourhoods and 2 village settlements. Under this WP, the R4C initiative in Burgas aims to incorporate innovative measures, namely integrated wetlands management, urban ecosystem and social resilience enhancement, and smarter city management. The goal is to demonstrate the integration of innovative water management solutions in both urban and rural areas of Burgas Province, integrating inland and coastal flood management actions and assessing the scalability of digital solutions. Additionally, the collaboration of stakeholders is crucial to design a "green bridge" pedestrian connection between two urban park areas, aiming to reduce flood risks, mitigate urban heat, and improve air quality.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 17. Burgas' demonstrations – contribution to the CS2 CIP.

	Core Innovation Pillars (CIP) in CS2		
Dimension/Demonstrations	**(1) Bridging the science-stakeholder-policy gap via innovative evidence-based digital tools**	**(2) Raising citizens' awareness of climate issues, adaptation solutions, & potential trade-offs**	**(3) Improving the use of existing data via fusion of heterogeneous data sources& advanced analytics to support decision-making**
Policy & Governance - Define a tailor-made climate resilience model & nature-based best practice framework to improve decision-making for climate change mitigation and adaptation planning.	●		●
Economic - Enhance flood risk knowledge & prediction capability to avoid flooding disasters & enable economic development of vulnerable areas; new green business opportunities.	●	●	●
Social - Introduce innovative co-creation & ownership approach to community engagement in spatial planning; introduce public asset preservation digital simulation for knowledge sharing.		●	●
Environmental - Implement a multi-functional nature-based solution to enhance urban ecosystem climate resilience & increase biodiversity.	●		●

4.3.2. Burgas Innovation Roadmap

The **innovation roadmapping** for the Burgas was co-developed by regional partners: Burgas Municipality (Burgas) which represents the public authority, and the “Risk-Space-Transfer” Technology Transfer Office (RST-TTO) a research and technology organisation.

The **Burgas innovation roadmap** (Figure 11) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 2 motto – Enhance climate adaptation through data. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments**: [30]

- **Sustainable urban planning, more focused on CR topics** (reliant on CRIO 1 and its associated milestones).
  Sustainable urban planning is key for climate change mitigation and adaptation. By prioritising CR in urban design and development, planners may have a detailed picture of the impacts on the urban ecosystem so that innovative green solutions will be implemented.

- **Technological solutions for climate adaptation and progress monitoring** (reliant on CRIOs 2 and 3 and their associated milestones).
  Investing in innovative tools for climate action, such as modelling and data management tools, is a commitment made at the regional level. For this to occur, various important steps address the strengthening of digital capabilities, leading to a beneficial effect on the digitisation of local government services.

- **Citizen’s awareness for climate change** (reliant on CRIO 4, and its associated milestones).
  According to the information provided by the partners, a commonly observed problem is the low level of public participation. Therefore, the RIR incorporates several milestones calling the community to the process. Raising citizens' awareness and increasing the level of knowledge about the impacts of climate change at the local level will motivate communities to actively be engaged in climate resilience.

Several projects[31], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[32] from the regional innovation ecosystem to reach these goals.

[30] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[31] For more information regarding the enabling projects see Appendices.

[32] For more information regarding the stakeholders see Appendices.

SER - Service innovations; **AP** - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 11. Burgas - Regional Innovation Roadmap.

Among the milestones, two of them stand out as crucial for the whole process: (i) the **upgrade of the Sustainable Energy and Climate Strategy 2021-2030,** and (ii) the **establishment of a Local Climate Resilience Unit**. This innovative approach set the starting point for all subsequent actions, enabling data gathering and processing information through the technological and digital capacity to support decision-making and contribute to the urban ecosystem and social resilience enhancement. Furthermore, they play a crucial role in increasing community awareness, thereby ensuring more effective climate-resilient behaviour and knowledge. Some interdependencies, complementarities, and sequential relationships among these milestones and other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Urban ecosystem and social resilience enhancement to climate change, physical and living environment improvement through higher concentration of innovative green solutions and practices in urban areas.

The baseline for achieving this CRIO is the upgrade of the Sustainable Energy and Climate Strategy 2021-2030, and the creation of a Local Climate Resilience Unit, both structural milestones. This will be crucial to implementing green solutions and nature-based solutions (NBS) in short-medium and long term, including promoting sustainable solutions in the private sector and establishing a comprehensive regulation to encourage sustainable practices in urban rehabilitation and new constructions.
For the long-term it is expected a horizontal climate change resilience approach in the decision-making process that may improve urban sustainability (e.g. ecosystem services management) along with public awareness.

CRIO 2: Enhanced technological and digital capacity of the municipality to reduce the frequently faced disruptive impact of climate change in flood-prone areas.

Innovative practices, tools and knowledge integration summarize the most important short term innovation milestones regarding this CRIO (mainly focused on risk management and public warning). For the medium-term (2031-2040), the milestones include investment in digitalization and technological solutions climatic hazards notification tool, and GIS for climate change monitoring, among others. Long-term milestones include governance model innovations, mostly.

CRIO 3: Smart and climate resilient city management.

It includes (2023-2030) the elaboration and implementation of an integrated model for adapting urban areas to climate change (e.g. energy monitoring systems in municipal buildings). Then (2031-2040) is required to enhance of digital tools for urban management; and knowledge transfer. In the long term (2040-2050), public engagement in decision-making will be the most important milestone, along with smart city management solutions.

CRIO 4: Raising citizens' awareness of climate change adaptation and mitigation, introducing the climate change topic in the educational programs and materials at educational institutions; Increasing the level of knowledge through demonstration-based learning using digital and NBS approaches among children and youngsters about the significance of climate change, its negative impact on our everyday life, prevention and mitigation measures implementation.

CRIO 4 focuses on increasing knowledge of climate topics and climate literacy. Short and medium-term milestones are essentially about communication and raising awareness among citizens and young people, along with

incorporating climate change topics into educational programmes. The long-term milestone is to sustain the significance and expand the role of the Local Climate Resilience Unit (CRIO 1) in the climate-resilient decisions for the development of the municipality and broad public involvement in climate change topics.

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

4.3.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 18, the alignment between CRIO and SDG is clear on those dimensions related to clean water and sanitation, industry, innovation & infrastructure climate, sustainable cities and communities and climate action, but also those related to affordable and clean energy, reduced inequalities and responsible consumption & production for a more sustainable and responsible behaviour/action towards climate resilience.

Table 18. Burgas - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Urban ecosystem and social resilience enhancement (…)	●	●	●		●	●	●	●	●	●	●	●					
CRIO 2 Enhanced technological and digital capacity of the municipality (…)		●			●				●		●		●	●	●		
CRIO 3 Smart and climate resilient city management					●	●	●	●	●	●	●	●					
CRIO 4 Raising citizens' awareness (…); Increasing the level of knowledge through demonstration-based learning (…)				●	●	●			●	●	●	●	●	●	●		

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

4.3.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3**). This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 19. Burgas - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Work in progress	Implementing strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance.
					2. National, regional and local budgets specifically allocated to innovation for CR	Starting to work on it	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Starting to work on it	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
					4. Leadership	Completely achieved	As leaders, the public authorities must align action into a collective direction and coordinate intra and intergovernmental resilience efforts. Also, they must take advantage of shared knowledge and resources while ensuring that the broader community is committed and supports action, promoting cross-border and macro-regional governance and cooperation. Designate dedicated entities and multidisciplinary teams to oversee innovation management on climate resilience. Among their tasks, it is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks,

							social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem. The “Local Climate Resilience” may have a crucial role here.
					5. Governance model	Starting to work on it	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Starting to work on it	It is crucial to experiment with and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	Starting to work on it	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities’ involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Starting to work on it	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Not started	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge. The creation of a major in Climate Change at Sofia University in the city of Burgas may have a critical role.

4.5. Uusimaa

4.5.1. Introduction

As part of R4C, the Innovation Packages (IPs) implemented in WP5 cover 26 municipalities, including the capital city. Under this WP, the R4C initiative in the Uusimaa Region aims to develop and validate a machine learning-based decision-making tool for assessing potential scenarios to facilitate future urban and land-use development. Identifying key areas for addressing urban heat island effects and stormwater management is crucial for citizen well-being and community engagement. To support climate change adaptation planning in the regional context of climate adaptation the region intends to produce a methodological guide for developing and scaling digital twins to integrate diverse data sources and processes.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 20. Uusimaa's demonstrations – contribution to the CS2 CIP.

	Core Innovation Pillars (CIP) in CS2		
Dimension/Demonstrations	**(1) Bridging the science-stakeholder-policy gap via innovative evidence-based digital tools**	**(2) Raising citizens' awareness of climate issues, adaptation solutions, & potential trade-offs**	**(3) Improving the use of existing data via fusion of heterogeneous data sources& advanced analytics to support decision-making**
Policy & Governance - Co-produce actionable knowledge for land use & urban planning & regional development via exploitation of digital twin and AI-based analyses in adaptation policy making.	●		●
Economic - Optimise investment planning & social acceptance for climate adaptation measures via predictive data analytics/ ML-based simulation & scenario generation.	●		●
Social - Systematically incorporate social valuation of green space through engagement of communities and stakeholders within predictive modelling of climate change impacts.	●	●	
Environmental - Enable land use & development planning specifically focused on preserving& enhancing ecosystem services delivery.			●

4.5.2. Uusimaa Innovation Roadmap

The innovation roadmapping for the Uusimaa was co-developed by regional partners: the Uudenmaan Liitto (Helsinki-Uusimaa Regional Council- HURC) representing the public authority, Forum Virium Helsinki Oy (FVH), a private non-profit organisation, the Teknologian Tutkimuskeskus VTT Oy (VTT), a research and technology organisation, and the Helsingin Yliopisto (UH) – University of Helsinki.

The **Uusimaa innovation roadmap** (Figure 12), outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 2 motto – Enhance climate adaptation through data. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments**: [33]

- **Data-based planning and monitoring** (particularly reliant on CRIOs 1 and 2 and their associated milestones).
  For more informed decisions, the region is committed to developing tools and innovative practices to integrate data and knowledge into planning and monitoring. Transformative action also relies on coherent planning, addressing climate change and other societal challenges that may impact and influence climate action.

- **Skills improvement on CR topics** (particularly reliant on CRIOs 3 and 4 and their associated milestones).
  Engaging communities in CR processes is crucial for more inclusive policies and commitment to CR.
  Besides promoting “green” skills and competencies based on climate change topics, the region is committed to accelerating the resilience transition by incorporating the creative sector, through innovative and creative approaches.

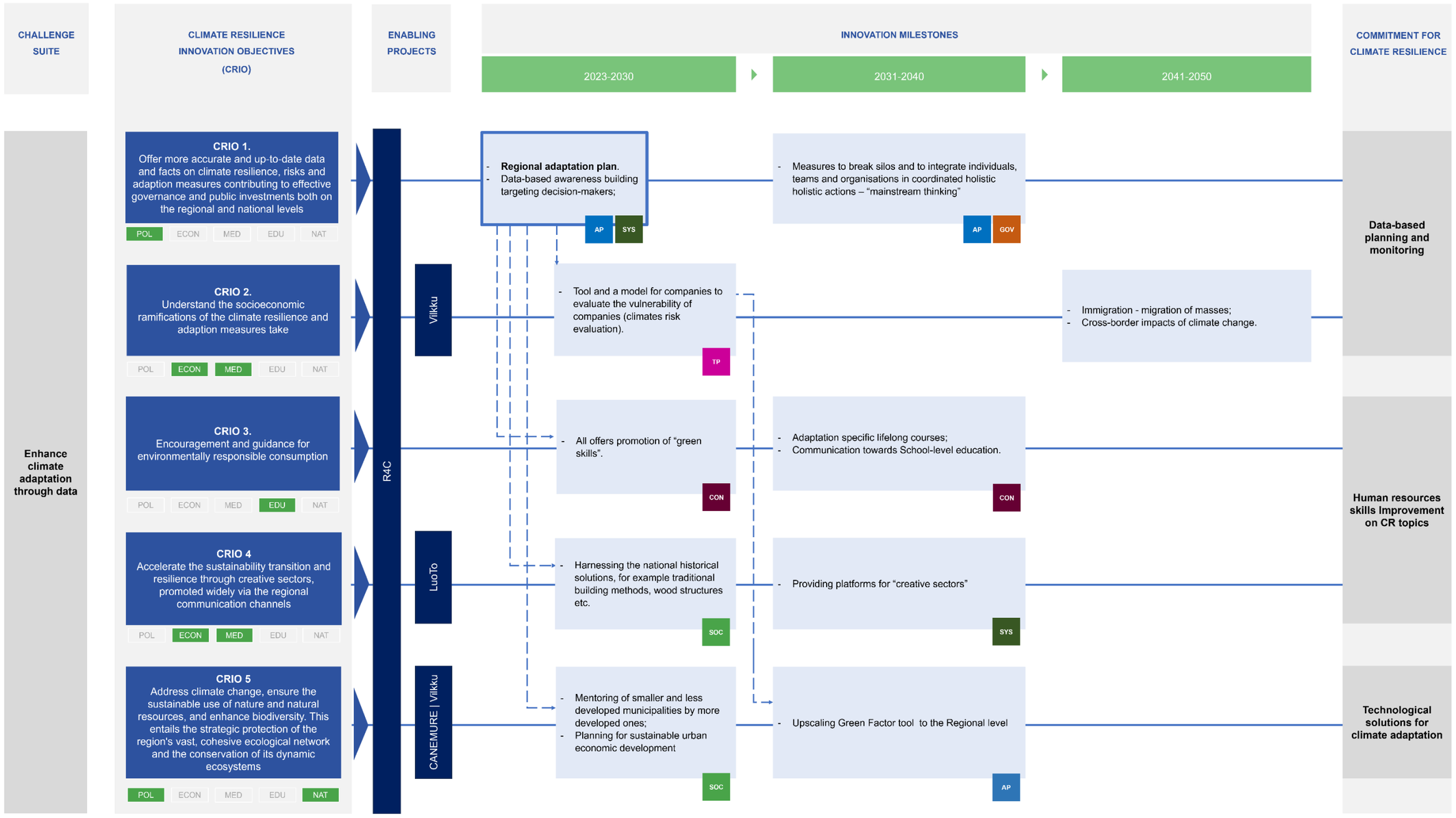
- **Technological solutions for climate adaptation** (reliant on CRIO 5 and its associated milestones).
  The region is committed to developing innovative technological solutions for data management and urban sustainable planning.

Several projects[34], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[35] from the regional innovation ecosystem in order to reach these goals.

[33] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[34] For more information regarding the enabling projects see Appendices.

[35] For more information regarding the stakeholders see Appendices.



AP - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 12. Uusimaa - Regional Innovation Roadmap.

Among the milestones, as crucial for the process, stands out: (i) the **Regional Adaptation Plan**, a **structural** milestone that requires administrative and systemic innovation and sets the starting point for all subsequent actions. This innovative instrument will enable the gathering and processing of data to better understand and support effective governance and public investments (informed by data-based awareness). Furthermore, they play a crucial role in raising community awareness and increasing the regional social resilience level. Some interdependencies, complementarities, and sequential relationships among these tools and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Offer more accurate and up-to-date data and facts on climate resilience, risks and adaption measures contributing to effective governance and public investments both on the regional and national levels.

CRIO 1 integrates the political CIF dimension and focuses on providing accurate data on climate change, aiming for effective governance and public investments. The baseline for achieving this CRIO is the **Regional Adaptation Plan** that may enable cross-sectoral actions and public engagement promoting “mainstream thinking” (this will require administrative governance innovations throughout the milestones accomplishment).

CRIO 2: Understand the socioeconomic ramifications of the climate resilience and adaption measures taken.

This CRIO highlights the need for more accurate monitoring of climate action impact on the community and economic agents (one of the milestones is to deliver a tool for companies to evaluate their vulnerability to climate change - risk evaluation).

CRIO 3: Encouragement and guidance for environmentally responsible consumption.

CRIO 3 is mostly related to the educational CIF dimension. Promoting offers for "green skills" and offering lifelong courses ensures that the community has the means to face the climate challenges, for environmentally responsible consumption.

CRIO 4: Accelerate the sustainability transition and resilience through creative sectors, promoted widely via the regional communication channels.

CRIO 4 engages the creative sector to accelerate the transition, including finding sustainable solutions for national historical heritage.

CRIO 5: Address climate change, ensure the sustainable use of nature and natural resources, and enhance biodiversity. This entails the strategic protection of the region's vast, cohesive ecological network and the conservation of its dynamic ecosystems.

Tackling the political and the natural environment (territorial) CIF dimensions, CRIO 5 will be achieved through capacity-building processes that will support smaller and less developed municipalities in sustainable urban development. In the medium term, the green factor tool should be upscaled to the regional level.

RIR’s political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

4.5.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 21, the alignment between CRIO and SDG is clear on those dimensions related to climate action, life below water and industry, innovation & infrastructure, but also those related to quality education, responsible consumption and production and life on land.

Table 21. Uusimaa - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Offer more accurate and up-to-date data (…)				●		●	●	●	●		●	●	●	●	●		●
CRIO 2 Understand the socioeconomic ramifications of the climate resilience and adaption measures take		●	●	●		●	●	●	●	●	●	●	●	●	●		●
CRIO 3 Encouragement and guidance for environmentally responsible consumption		●		●		●	●			●	●	●	●	●			
CRIO 4 Accelerate the sustainability transition and resilience through creative sectors (…)				●				●	●		●		●	●	●		
CRIO 5 Address climate change, ensure the sustainable use of nature and natural resources, and enhance biodiversity (…)											●	●	●	●	●		

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

4.5.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3)**. This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 22. Uusimaa - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Starting to work on it	Implementing strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance.
					2. National, regional and local budgets specifically allocated to innovation for CR	Starting to work on it	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Work in progress	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential. The "Regional Adaptation Plan" may have a crucial role here.
					4. Leadership	Starting to work on it	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem. Designate dedicated entities and multidisciplinary teams to oversee innovation management on climate resilience. Among their tasks, it is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks,

							social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem.
					5. Governance model	Starting to work on it	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Not started	It is crucial to experiment with and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	Starting to work on it	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Not started	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Not started	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge.

4.6. Pärnumaa

4.6.1. Introduction

To enhance climate adaptation through data, the Pärnumaa demonstration (WP5 IP) is focused on resilience in urban areas, including landslide risk area planning, design and tools to mitigate the urban heat island effect. Pärnu City has recently drawn up its first Climate and Energy plan where risks and measures are identified, so climate change adaptation and mitigation are not yet systematic. Pärnumaa is a region located in southwest Estonia.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 23. Pärnumaa's demonstrations- contribution to the CS2 CIP.

Dimension/Demonstrations	Core Innovation Pillars (CIP) in CS2		
	(1) Bridging the science-stakeholder-policy gap via innovative evidence-based digital tools	**(2) Raising citizens' awareness of climate issues, adaptation solutions, & potential trade-offs**	**(3) Improving the use of existing data via fusion of heterogeneous data sources& advanced analytics to support decision-making**
Policy & Governance - Improve the urban design and land use planning process with integrated digital tools and evidence-based models; improve policy integration, scaling social & environmental climate resilience from the city to the region.	●		●
Economic - Validate the economic benefit of integrating evidence-based planning tools focused on climate resilience within planning/ development processes. Models for resilient logistics solutions, i.e., Rail Baltic development area.	●		
Social - Implement innovations for evidence-based urban planning & citizen/ user-friendly land use management and urban planning tools.	●	●	●
Environmental - Utilise data-driven high-resolution UHI modelling with possible mitigation opportunities & upscale for the region. Renew & improve watershed landslide risk assessment & maps for better decision-making & regional planning.	●		●

4.6.2. Pärnumaa Innovation Roadmap

The innovation roadmapping for the Pärnumaa was co-developed by regional partners: the Parnu Linnavalitsus (PÄRNU), the regional representative, the Sihtasutus Parnumaa Arenduskeskus (SAPA), a private non-profit

organisation, the Stockholm Environment Institute Tallinn (SEI TALLINN), a research and technology organization, and Eesti Keskkonnauuringute Keskus (EKUK).

The **Pärnumaa innovation roadmap** (Figure 13), outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 2 motto – Enhance climate adaptation through data. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments**: [36]

- **Sustainable urban planning, more focused on CR topics** (reliant on CRIO 1 and their associated milestones).
  Modelling and other planning tools will contribute to smarter and more resilient urban planning. This is one of the achievements that will enable CR.

- **Low-carbon solutions and natural protection to address CR** (particularly reliant on CRIOs 2 and 3 and their associated milestones).
  Low-carbon solutions and natural protection strategies are essential for effectively addressing climate resilience (CR) challenges and providing benefits for the entire ecosystem (e.g. energy efficiency and renewable solutions, protecting biodiversity and urban green areas).

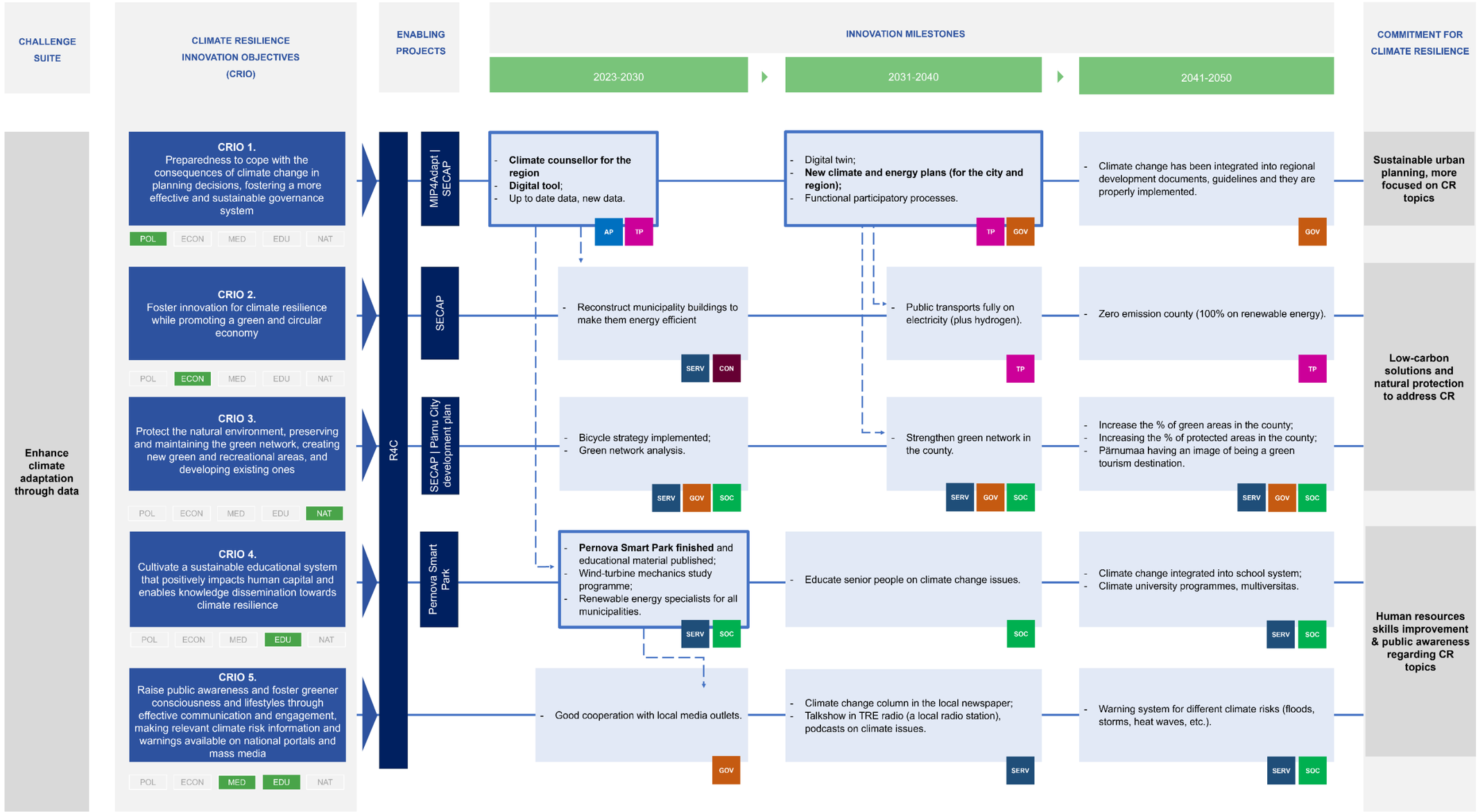
- **Human resources skills improvement & public awareness regarding CR topics** (particularly reliant on CRIOs 4 and 5 and their associated milestones).
  Pärnumaa aims to increase public awareness and integrate climate change topics into the educational system to equip individuals with skills to address climate change and build a more resilient community.

Several projects[37], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[38] from the regional innovation ecosystem in order to reach these goals.

[36] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[37] For more information regarding the enabling projects see Appendices.

[38] For more information regarding the stakeholders see Appendices.



SER - Service innovations; **AP** - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 13. Pärnumaa - Regional Innovation Roadmap.

Among the innovation milestones, stand out four as crucial for the process: (i) the creation of a **Climates counsellor for the region**, (ii) the creation of the **digital tool**, (iii) **New climate and energy plans (for the city and region),** and (iv) the **Pernova Smart Park finished**. These structural milestones require administrative, technological, service and governance innovations and set the starting point for all subsequent actions. Through them will be possible a more effective governance system, and increasing community literacy and awareness. Furthermore, they play a crucial role in promoting and preserving green areas and a circular economy. Several interdependencies, complementarities, and sequential relationships among these milestones and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Preparedness to cope with the consequences of climate change in planning decisions, fostering a more effective and sustainable governance system.

CRIO 1 is primarily associated with the political CIF dimension, leading to more sustainable governance (**climate** counsellor for the region and a digital tool, which are structural milestones). For the medium-term (2031-2040), the milestones involve digital twin, new climate and energy plans for the city and region (Pärnu City has only recently drawn up its first Climate and Energy plan), also a structural milestone. Additionally, functional participatory processes will be required. In the long term (2041-2050), it is expected that climate change will be integrated into regional development documents and guidelines, and properly implemented.

CRIO 2: Foster innovation for climate resilience while promoting a green and circular economy.

CRIO 2 is embedded in the economic CIF dimension. To achieve this objective the first step (short term milestone) is to reconstruct municipality buildings to make them energy efficient. Then, it is proposed (in the medium term) that public transport should be fully electric (plus hydrogen), reaching the zero-emission county (100% on renewable energy) in 2050.

CRIO 3: Protect the natural environment, preserving and maintaining the green network, creating new green and recreational areas, and developing existing ones.

This CRIO tacks the natural environment (territorial) dimension, and it includes implementing a bicycle strategy and conducting a green network analysis (short), strengthening the green network in the county throughout the years, to reach the vision of Pärnumaa as a leading green tourism destination.

CRIO 4: Cultivate a sustainable educational system that positively impacts human capital and enables knowledge dissemination towards climate resilience.

CRIO 4 is related to the educational dimension of CIF and focuses on transforming the educational system for climate resilience. This involves enabling knowledge dissemination and the creation of services and social innovations for the community. The baseline (short term) is about completing Pernova Smart Park (an education excellence centre dedicated to environmental education for everyone in Pärnu City) and publishing educational material, which is a structural milestone. Other milestones include integrating climate change into school education systems and university programmes.

CRIO 5: Raise public awareness and foster greener consciousness and lifestyles through effective communication and engagement, making relevant climate risk information and warnings available on national portals and mass media.

CRIO 5 aims to ensure good cooperation with local media outlets in which the climates counsellor for the region may play a pivotal role. Other milestones are related to communication channels and a warning system for risk alert.

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities.

4.6.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 24, the alignment between CRIO and SDG is clear on those dimensions related to climate action and sustainable cities and communities. However, some CRIOs demonstrate alignment with other important dimensions that enable innovation for climate resilience, such as quality education, decent work & economic growth, industry, innovation & infrastructure, and reduced inequalities.

Table 24. Pärnumaa - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Preparedness to cope with the consequences of climate change in planning decisions (…)											●		●				
CRIO 2 Foster innovation for climate resilience while promoting a green and circular economy		●				●	●	●	●	●	●	●	●		●		
CRIO 3 Protect the natural environment, preserve and maintain the green network (…)											●	●	●	●	●		
CRIO 4				●				●	●	●	●		●				

Cultivate a sustainable educational system (…)				
CRIO 5 Raise public awareness and foster greener consciousness and lifestyles (…)	●		●	●

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

4.6.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment **(see key recommendations below, complemented by the information provided in section 2.3)**. This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 25. Pärnumaa - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Starting to work on it	Implementing strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance.
					2. National, regional and local budgets specifically allocated to innovation for climate resilience	Not started	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of climate action/climate resilience in multidimensional policies and regulations	Starting to work on it	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential. The "New climate and energy plans" may have a crucial role here.
					4. Leadership	Starting to work on it	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem. Designate dedicated entities and multidisciplinary teams to oversee innovation management on climate resilience. Among their tasks, it is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks, social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem. The "Climates counsellor for the region" may have a crucial role.
					5. Governance model	Starting to work on it	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Work in progress	Keep and improve experiments with and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.

					7. Strong and continuous public engagement model	Not started	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes. The "Climate change column in the local newspaper" and the "Talkshow in TRE radio (a local radio station), podcasts on climate issues" may have a crucial role in engaging the public.
					8. Transparent management and monitoring processes	Starting to work on it	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Not started	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge. The proposals concerning to school system and university programmes may be pivotal to achieving this AA.

5. Challenge Suite 3 – Regional Innovation Roadmaps reports

5.1. Sitia

5.1.1. Introduction

The region of Sitia is the easternmost region of Crete in Greece. As the most exposed European region to drought, and a 'climate hotspot' Sitia is the frontrunner of Challenge Suite 3: More Systemic Adaptation.

As part of R4C, the Innovation Packages (IPs) implemented in WP5, Sitia is dedicated to establishing the UNESCO Geopark, focusing on a comprehensive range of activities integrated with national and local climate adaptation priorities. The goal is to increase public and stakeholder engagement to raise awareness and provide information about climate resilience and potential risks. This initiative aims to develop an advanced digital model to analyse climate and disaster risk factors, their impacts on regional socioeconomic activities, and interconnected effects. Additionally, it will identify connections to historical and future regional characteristics. Establishing a regional network of automated micro-climate stations and implementing a GIS-based informatics system will facilitate the assessment of regional vulnerabilities, risks, and resilience.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 26. Sitia's demonstrations – contribution to the CS3 CIP.

	Core Innovation Pillars (CIP) in CS3		
Dimension/Demonstrations	**(1) Green Social Business Models (GSBMs) for sustainable socioeconomic renewal, largely focused on primary industries**	**(2) Community engagement in regional climate resilience-building, including sustainable resource use**	**(3) Resource resilience strategy development supported by monitoring & modelling**
Policy & Governance - Promotion of sustainable local economic development via "women's cooperatives" for local products.	●	●	
Economic - Innovative business & financing models targeting increased market access, esp. for small-scale producers; exploit Geopark as the centre of economic activities; carbon neutral tourism.	●		●
Social - Citizen empowerment through community education in climate-neutral & regenerative tourism, using Sitia UNESCO Geopark as an outdoor classroom & sustainability incubator.		●	

Environmental - Carbon neutral & zero polluting olive processing; better adapted integrated pest management for biological certified products; informatics-driven regional water accounting & management.	●	●

5.1.2. Sitia Innovation Roadmap

The **innovation roadmapping** for Sitia was co-developed by regional partners: the Municipality of Sitia, representing the public authority, and the National Center for Scientific Research “Demokritos” (NCSR "D") a research and technology organisation.

Sitia's innovation roadmap (Figure 14) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 3 motto – Build socio-cultural and economic resilience. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments**: [39]

- **Carbon neutrality and more sustainable practices** (particularly reliant on CRIOs 1 & 2 and their associated milestones).
  The key challenge is to reduce the region’s carbon footprint through carbon-neutral & zero polluting solutions and the transformation of UNESCO GEOPARK into a sustainability “lighthouse”. Raising awareness about sustainable innovative business is crucial to promote sustainable behaviours and fostering responsibility among communities.

- **Science-driven decision-making** (particularly reliant on CRIO 3 and its associated milestones).
  Supported by a closer collaboration with Academia, the challenge is to create a regional network of automated micro-climate stations and provide a GIS-based informatics system to support the assessment of regional vulnerabilities and risks that may inform decision-making.

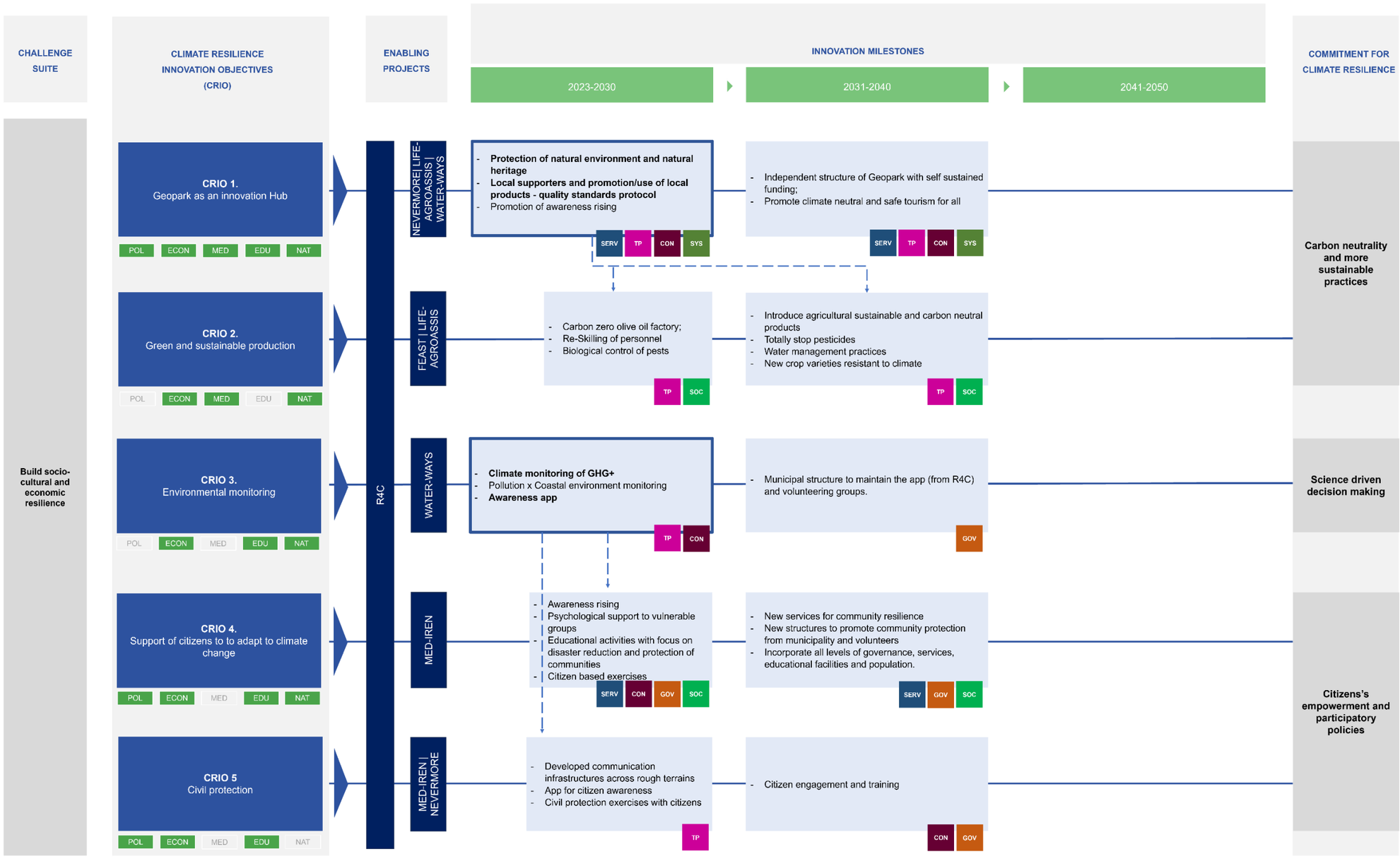
- **Citizens’ empowerment and participatory policies** (particularly reliant on CRIOs 4 & 5 and their associated milestones).
  Build upon a methodological framework to collaboratively develop with citizens and stakeholders a GIS-based application to visually represent interconnections/ interdependencies and feedback within the water-energy-food-climate nexus, focusing on water balance and stresses, in support of the establishment of a participatory policy framework and evidence-based decision-making.

Several projects[40], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[41] from the regional innovation ecosystem in order to reach these goals.

[39] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[40] For more information regarding the enabling projects see Appendices.

[41] For more information regarding the stakeholders see Appendices.



SER - Service innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 14. Sitia - Regional Innovation Roadmap.

Among the milestones defined for Sitia, three innovative instruments stand out as crucial for the process: (i) Q**uality standards protocol**; (ii) **Climate monitoring of GHG+**; and (iii) creation of an **Awareness app**. These structural milestones require technological, service, conceptual and systemic innovations and set the starting point for all subsequent actions. These tools will enable the processing of information to support decision-making and play a crucial role in increasing community literacy and awareness. Several interdependencies, complementarities, and sequential relationships among these tools and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Geopark as an Innovation Hub.

Its primary goal is to facilitate the preservation of the natural environment and heritage supported by raising awareness within the local community. Besides protecting the natural heritage, it is expected to work with locals in the use of local products and create a quality standards protocol, In the medium-term (2031-2040), the key objectives include setting up a self-sustaining financial model for Geoparks.

CRIO 2: Green and sustainable production.

To accomplish this objective, in the short term (2023-2030) the region intends to eliminate or fully offset its carbon emissions in the olive oil factory, adopting sustainable practices and develop new carbon-neutral products, discontinue the use of pesticides, introduce water management practices, and introduce new climate-resilient crop varieties (in the medium-term)

CRIO 3: Environmental monitoring.

It is focused on climate monitoring of GHG+ and the creation of an awareness app. It's important to note that the information collected through the application will be utilized to contribute to the assessment of regional climate risks.

CRIO 4: Support of citizens to adapt to climate change.

The short term milestone involves raising public awareness, especially the vulnerable groups, and developing educational activities and the creation of new services, structures and facilities to promote resilience.

CRIO 5: Civil protection.

The short term milestone (2023-2030) will be achieved by developing communication infrastructures across rough terrains and also providing an app for reinforcement of citizen awareness.

RIR’s political commitment: NR

5.1.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in the next table,

the alignment between CRIO and SDG is clear on those dimensions related to climate action, life below water, life on land and quality education, but also those related to clean water and sanitation, affordable and clean energy and responsible consumption and production.

Table 27. Sitia - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1 Geopark as an innovation Hub				●				●	●		●		●	●	●		
CRIO 2 Green and sustainable production		●				●	●		●			●	●	●	●		
CRIO 3 Environmental monitoring			●	●		●	●				●	●	●	●	●		
CRIO 4 Support of citizens to mitigate climate impacts				●		●	●		●			●	●	●	●		
CRIO 5 Civil protection				●							●		●				

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

5.1.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3)**. This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 28. Sitia - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Not started	Develop strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance.
					2. National, regional and local budgets specifically allocated to innovation for CR	Starting to work on it	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Work in progress	Accelerating and reinforcing the integration of climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
					4. Leadership	Starting to work on it	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem. Reinforce the leadership of the process; the public authorities have a crucial role in enabling innovation, as they can act as facilitators and provide the conditions for a collaborative public-private innovation ecosystem.

					5. Governance model	Work in progress	Reinforce the need to establish a governance model with different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Not started	Create conditions for experimentation and testing of innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this.
					7. Strong and continuous public engagement model	Starting to work on it	Implement broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes. Check section for more suggestions.
					8. Transparent management and monitoring processes	Not started	Develop transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Starting to work on it	Investing in education and skill development for human resources in critical areas of expertise is crucial for fostering innovation in climate resilience. Universities and other research and technology organizations (RTOs) play a crucial role in advancing knowledge in this field.

5.2. Castilla y León

5.2.1. Introduction

Located in north-western Spain, Castilla y León is an autonomous region that is facing many climate impacts related to drought, particularly fragile in rural areas, where there are older communities.

Under R4C, the Innovation Packages (IPs) implemented in WP5 are focused on the recovery of economic activity for rural areas under sustainable patterns and on supporting the region's natural resources. The goal is to implement a new production centre in two existing facilities in Tierra de Pinares (Segovia) that integrates greenhouse vegetable production using circular energy, water, and materials concepts with small livestock production. On the other hand, it's important to establish strong relationships among local businesses through the implementation and testing of a green and social business model, including regional training to foster entrepreneurship and cross-border cooperation to improve climate resilience.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 29. Castilla y León's demonstrations – contribution of the CS3 CIP.

	Core Innovation Pillars (CIP) in CS3		
Dimension/Demonstrations	**(1) Green Social Business Models (GSBMs) for sustainable socioeconomic renewal, largely focused on primary industries**	**(2) Community engagement in regional climate resilience-building, including sustainable resource use**	**(3) Resource resilience strategy development supported by monitoring & modelling**
Policy & Governance - Devise Regional Mitigation and Adaptation Strategy. Provide evidence base for decision-making regarding carbon neutral & zero polluting food production.	●		●
Economic - Derive & promote GSBMs through cooperatives & business agreements. Increase sectoral competitiveness & regional employment opportunities.	●	●	
Social - Increase rural economic opportunities through empowerment of women & young people; implement educational programme for primary producers.		●	
Environmental - Apply circular concepts and NBS for food production & energy generation. Novel, sustainable practices for food processing, packaging & distribution.			●

5.2.2. Castilla y León Innovation Roadmap

The **innovation roadmapping** for Castilla y León was developed by regional partners: the Consejería de Agricultura, Ganadería y Desarrollo Rural de Castilla y León - Junta de Castilla y León (AGDR-JCYL), representing the public authority, and the Fundación CARTIF, a research and technology organisation.

Castilla y León innovation roadmap (Figure 15) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 3 motto – Build socio-cultural and economic resilience. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 2 **key accomplishments**: [42]

- **Reviving rural landscapes and sustainable food systems - Recovery of economic activity in rural areas through sustainable models** (particularly reliant on CRIOs 1, 2, 3 & 4 and their associated milestones).
  Many of the current business models in agriculture and livestock follow unsustainable practices and lead to worsening environmental problems such as loss of biodiversity and ecosystems services, soil degradation and underground water pollution, among others. A key challenge in Castilla y León is to promote a new GSBM of intensive production in a circular concept that allows reducing the impacts of the activity.

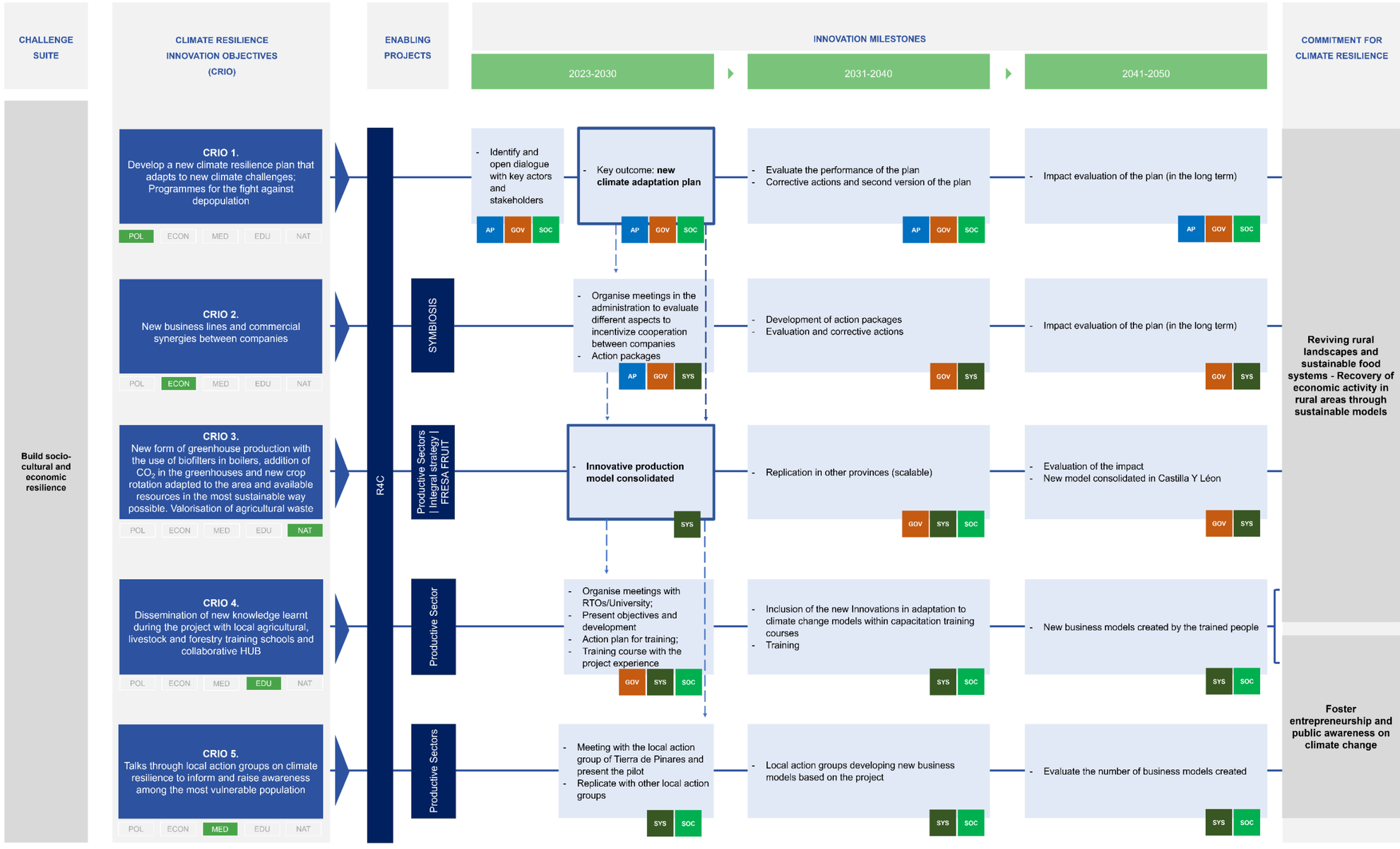
- **Foster entrepreneurship and public awareness on climate change** (particularly reliant on CRIOs 4 & 5 and their associated milestones).
  The incorporation of new and innovative activities/technologies may contribute significantly to prioritising social and local integration while ensuring profitability and a strong relationship among local businesses. Among other initiatives, should be enhanced the importance of citizen awareness (at school) and business promotion.

Several projects[43], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[44] from the regional innovation ecosystem in order to reach these goals.

[42] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[43] For more information regarding the enabling projects see Appendices.

[44] For more information regarding the stakeholders see Appendices.



AP - Administrative process innovations; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 15. Castilla y León - Regional Innovation Roadmap.

Among the milestones, two innovative tools stand out as crucial for the process: (i) **new climate adaptation plan** and (ii) **consolidation of an Innovative production model**. These structural milestones require administrative, governance, social and systemic innovations and set the starting point for all subsequent actions. These tools will enable more agile procedures, and collaborative processes involving local authorities and stakeholders. Moreover, they play a critical role in setting the stage for initiating meaningful conversations with important key actors and stakeholders to overcome future barriers. Several interdependencies, complementarities, and sequential relationships among these tools and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Develop a new climate resilience plan that adapts to new climate challenges; Programmes for the fight against depopulation.

CRIO 1 is essentially related to the CIF's political dimension, aiming to develop a new climate resilience plan integrating the new climate challenges and focused on the recovery of economic activity for rural areas and supporting the natural resources of the region. The following milestones regard the monitoring and performance evaluation.

CRIO 2: New business lines and commercial synergies between companies.

This CRIO integrates the economic CIF dimension, coordinating action across the food system. Medium-term innovation milestones involve developing action packages in production processes.

CRIO 3: New form of greenhouse production with the use of biofilters in boilers, addition of CO2 in the greenhouses and new crop rotation adapted to the area and available resources in the most sustainable way possible. Valorisation of agricultural waste.

CRIO 3 is embedded in the natural environment (territorial) CIF dimension, and it is focused on creating a development model to define the maximum size of local businesses and industries to respect local nature resources on a local and regional scale, consolidating an innovative production model.

CRIO 4: Dissemination of new knowledge learnt during the project with local agricultural, livestock and forestry training schools and collaborative HUB.

CRIO 4 is related to the educational dimension of CIF and addresses the increase of training that includes the climate change dimension. Among other activities, milestones intend to foster educational programs to replicate and scale up the innovative production model.

CRIO 5: Talks through local action groups on climate resilience to inform and raise awareness among the most vulnerable population.

CRIO 5 will be achieved by meetings with the local action group of Tierra de Pinares to present the pilot and replicate it with other local groups to inform and raise awareness about the model, especially among the most vulnerable population.

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

5.2.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 30, the alignment between CRIO and SDG is clear on those dimensions related to climate action and good health and wellbeing, but also those related to quality education, industry, innovation & infrastructure and life on land.

Table 30. Castilla y León - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1. Develop a new climate resilience plan (…); Programmes for the fight against depopulation.			●							●	●		●		●		
CRIO 2. New business lines and commercial synergies between companies								●	●				●				
CRIO 3. New form of greenhouse production (…); Valorisation of agricultural waste			●	●		●	●		●			●	●				
CRIO 4. Dissemination of new knowledge learnt (…)			●	●					●			●	●		●		
CRIO 5. Talks through local action groups on climate resilience (…)			●	●	●	●	●			●	●		●		●		

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals

of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

5.2.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3)**. This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 31. Castilla y León - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Work in progress (regional)	Improve and reinforce strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance. The “Plan de recuperación, transformación y resiliencia” and the “Estrategia regional de cambio climático” should be a reference.
					2. National, regional and local budgets specifically allocated to innovation for CR	Completely achieved	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Work in progress	Accelerating and reinforcing the integration of climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
					4. Leadership	Starting to work on it	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem.

							It is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks, social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem.
					5. Governance model	Not started	Develop a governance model with different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Not started (regional)	At a regional level create favourable conditions for experimentation and testing of innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. At a national level continuously reinforce the support for experimentation and testing of innovative solutions in the climate change dimension.
					7. Strong and continuous public engagement model	Work in progress	Develop and implement broad support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Not started	Develop and implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Starting to work on it	Investing in education and skill development for human resources in critical areas of expertise is crucial for fostering innovation in climate resilience. Universities and other research and technology organizations (RTOs) play a crucial role in advancing knowledge in this field.

5.3. Nordic Archipelago

5.3.1. Introduction

The Nordic Archipelago region includes Stockholm, Uppsala, Sörmland and Östergötland, and the provinces of southwest Finland, Uusimaa and Kymenlaakso, and Åland.

As part of R4C, the Innovation Packages (IPs) implemented in WP5 aim to implement a quantitative system modelling to assess transport between islands, including the renewal of transport links and the selection of renewable energy solutions. The strategy also involves utilising a linked transport-energy model to collaboratively explore options concerning longer-term transport and energy planning through a shared understanding of synergies, trade-offs and feedback loops, in light of regional climate targets. It is important to note that the transportation infrastructure in the Nordic Archipelago needs to be modernised due to the presence of ageing vessels, significant fluctuations in transport capacity during different seasons, and administrative challenges related to transport scheduling and routes. Additionally, the substantial increase in tourist activity during peak seasons exerts pressure on the region's resources.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 32. Nordic Archipelago's demonstrations – contribution to the CS3 CIP.

Dimension/Demonstrations	Core Innovation Pillars (CIP) in CS3		
	(1) Green Social Business Models (GSBMs) for sustainable socioeconomic renewal, largely focused on primary industries	**(2) Community engagement in regional climate resilience-building, including sustainable resource use**	**(3) Resource resilience strategy development supported by monitoring & modelling**
Policy & Governance - Develop standardised processes and workflows for regional issues that facilitate collaborative actions across Swedish, Åland, & Finnish political jurisdictions.			●
Economic - Sustainable business model for European company to support administration of transport issues across the region; establish cross-border company.	●		●
Social - Improve liveability of the region via collaborative optimisation of transport & energy systems, improve inter- and intra-regional connectivity & energy sustainability supply.	●	●	
Environmental - Reduce emissions from and improve resilience of transport & energy sectors through conceptual mapping using a circular approach.	●		●

5.3.2. Nordic Archipelago Innovation Roadmap

The **innovation roadmapping** for the Nordic Archipelago was co-developed by regional partners: the Allmanna Forvaltningen (ALMANNA FORVAL) which represents the public authority and Teknologian Tutkimuskeskus VTT Oy (VTT), a research and technology organisation.

The **Nordic Archipelago innovation roadmap** (Figure 16) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 3 motto – Build socio-cultural and economic resilience. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 2 **key accomplishments**: [45]

- **Sustainable transformation of regional transport and interlinked energy** (particularly reliant on CRIOs 1 and 2 and their associated milestones).
  According to the information provided by the partners, a key challenge to the Nordic Archipelago is the inter-regional transport and sustainable energy across the region. The need to develop a pathway for the sustainable transformation of regional transport and interlinked energy and systems is recognised. This will enhance inter-regional cooperation, stimulate socioeconomic renewal, and create models and a decision-making tool for designing preliminary transport and energy systems.

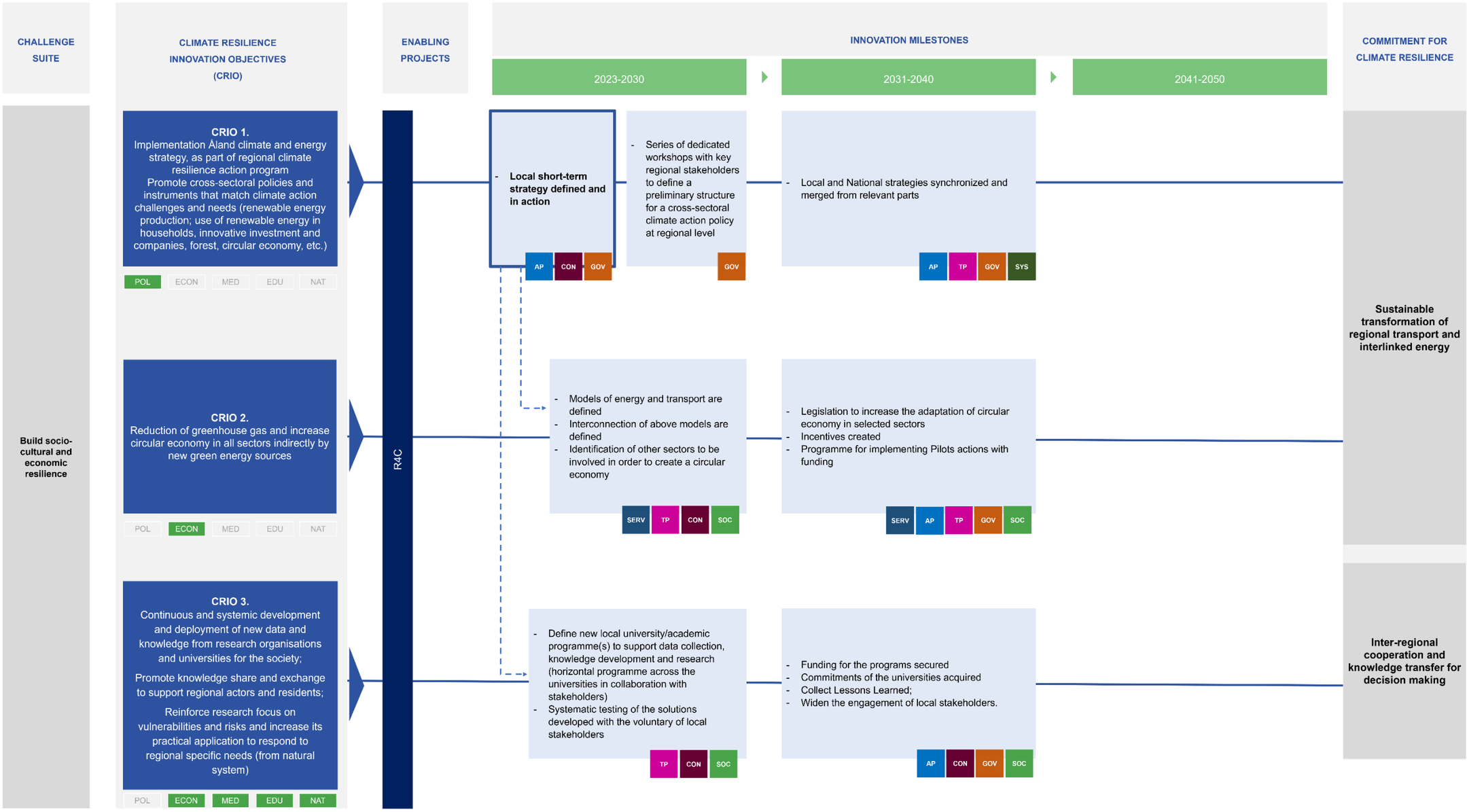
- **Inter-regional cooperation and knowledge transfer for decision-making** (reliant on CRIO 3 and its associated milestones).
  The region is committed to investigating different business models tackling transportation challenges. This involves cross-sectoral knowledge transfer to support decision-making and collaborative planning.

Several projects[46], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[47] from the regional innovation ecosystem in order to reach these goals.

[45] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[46] For more information regarding the enabling projects see Appendices.

[47] For more information regarding the stakeholders see Appendices.



SER - Service innovations; **AP** - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **GOV** - Governance innovations; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 16. Nordic Archipelago - Regional Innovation Roadmap.

Among the milestones, one innovative instrument stands out as crucial for the process: (i) the **local short term strategy**. This structural milestone requires administrative, conceptual and governance innovation and sets the starting point for all subsequent actions. This will set a strategy, gather key information to support decision-making, provide data for knowledge development and research, and foster increased cooperation. Several interdependencies, complementarities, and sequential relationships among the milestones are also evident (blue dashed arrows).

CRIO 1: Implementation Åland climate and energy strategy, as part of regional climate resilience action program. Promote cross-sectoral policies and instruments that match climate action challenges and needs (renewable energy production; use of renewable energy in households, innovative investment and companies, forest, circular economy, etc.).

CRIO 1 is associated with the political CIF dimension, focusing on enhancing regional climate resilience through essential cross-sectoral policies and instruments. The **local short term strategy** will provide recommendations and important data and will help facilitate cooperation and knowledge transfer for decision-making. Key regional stakeholders will be involved.

CRIO 2: Reduction of greenhouse gas and increase circular economy in all sectors indirectly by new green energy sources.

This CRIO integrates the economic CIF dimension. It is expected the development of models of energy and transport and their sectoral interconnections, in order to create a circular economy. The medium-term milestones include legislation to increase the adaptation of the circular economy and create incentives and a programme for implementing pilots' actions with funding.

CRIO 3: Continuous and systemic development and deployment of new data and knowledge from research organisations and universities for the society. Promote knowledge share and exchange to support regional actors and residents. Reinforce research focus on vulnerabilities and risks and increase its practical application to respond to regional specific needs (from natural system).

Academic programmes will support knowledge development and research on CR and systematic testing of the solutions, are the main milestones for this CRIO.

RIR's political commitment:

01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

5.3.3. Alignment with SDG

The R4C Innovation Packages (IP) play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 33, the alignment between CRIO and SDG is clear in a variety of dimensions, highlighting the ones related to climate action, water, energy, work and economic growth, industry innovation, sustainable communities, responsible consumption & production, and life on land.

Table 33. Nordic Archipelago - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1. Implementation Åland climate and energy strategy (…)			●	●		●	●	●	●		●	●	●		●		●
CRIO 2. Reduction of greenhouse gas and increase circular economy (…)						●	●	●	●		●	●	●	●	●		
CRIO 3. Continuous and systemic development and deployment of new data and knowledge (…); Promote knowledge share (…); Reinforce research focus on vulnerabilities and risks (…).			●	●		●	●	●	●	●	●	●	●	●	●		

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

5.3.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment.

Although Nordic Archipelago did not conduct the self-assessment on these AAs, it is highly recommended to use this Portfolio as a reference to establish a supportive environment for achieving the CRIOs and contributing to climate resilience (**see key recommendations below, complemented by the information provided in section 2.3)**. This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 34. Nordic Archipelago - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	Status quo	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	NR	Implementing strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance.
					2. National, regional and local budgets specifically allocated to innovation for CR	NR	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	NR	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.
					4. Leadership	NR	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem. Designate dedicated entities and multidisciplinary teams to oversee innovation management on climate resilience. Among their tasks, it is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks, social

							vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem.
					5. Governance model	NR	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	NR	It is crucial to experiment with and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	NR	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities' involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	NR	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	NR	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge.

NR: No response

5.4. Troodos

5.4.1. Introduction

Troodos is a rural region in the centre of Cyprus. As part of R4C, the Innovation Packages (IPs) implemented in WP5 cover three sub-regions of Troodos, namely Pitsilia Region, Marathasa Region and Solea Valley Region which will participate in the demo; the pilot actions are being implemented in one lighthouse community council per sub-region (Platres, Pedoulas, Kyperounta and Kakopetria). Under this WP, the R4C initiative in the Troodos aims to provide training opportunities for local businesses, small and medium enterprises (SMEs), authorities, and citizens in the principles of climate-neutral and regenerative tourism. The business model focuses on aligning tourism revenue with investments in ecosystem restoration and climate resilience. Priorities also include waste reduction in restaurants, support for local produce and seasonality, as well as the emphasis on energy efficiency and the use of renewable energy sources in accommodations. Additionally, the region is planning to implement infrastructure for sustainable mobility, such as bike paths, walkways, and other eco-friendly transportation options. This region aims to develop a sustainable tourism model, ensuring the resilience of its communities while preserving its traditional products and ecosystems for future generations and is committed to developing a certification for climate-neutral, inclusive and regenerative rural tourism.

The demonstration activities are supported by cross-sectoral Innovation Pillars, as described in the next table:

Table 35. Troodos' demonstrations – contribution to the CS3 CIP.

Dimension/Demonstrations	Core Innovation Pillars (CIP) in CS3		
	(1) Green Social Business Models (GSBMs) for sustainable socioeconomic renewal, largely focused on primary industries	**(2) Community engagement in regional climate resilience-building, including sustainable resource use**	**(3) Resource resilience strategy development supported by monitoring & modelling**
Policy & Governance - Development of a Climate Neutral, Inclusive and Regenerative 'Destination Management' Board - local businesses, citizens, local authorities, government departments, NGOs & other key stakeholders.		●	●
Economic - Derive sustainable business model to link tourism with ecosystem restoration & climate resilience; increase market access of local products; develop certification for Climate Neutral, Inclusive & Regenerative rural tourism.	●		●
Social - Train local businesses, SMEs, authorities and citizens in climate neutral & regenerative tourism, with a focus on young entrepreneurs and female entrepreneurs.		●	●

Environmental - Establish green transport routes between villages; demonstrate renewable energy options for tourist accommodations.	●	●

5.4.2. Troodos Innovation Roadmap

The **innovation roadmapping** for the Troodos was co-developed by regional partners: Diktyo Thematikon Kentron Troodos (DITHEKET) Ltd, a small-medium enterprise representing the public authority, and the Cyprus Energy (CEA), a private non-profit organisation.

The **Troodos innovation roadmap** (Figure 17) outlines the path for a systemic transformation, tailored to the regional context and its needs, addressing the Challenge Suite 3 motto – Build socio-cultural and economic resilience. The region identified Climate Resilience Objectives (CRIOs) and innovation milestones, arranged in chronological order, to achieve climate resilience through 3 **key accomplishments**: [48]

- **Governance reconfiguration** (reliant on CRIO 1 and its associated milestones).
  This reconfiguration seeks to streamline administrative processes, improve service delivery, and resource-sharing, and strengthen local decision-making, fostering a more effective governance approach to address local needs.

- **Public awareness of climate change** (particularly reliant on CRIOs 2 and 3 and their associated milestones).
  A key objective in fostering public awareness of climate change is the integration of climate resilience subjects into the curriculum of the upcoming Olympus Troodos University, currently under development. Furthermore, community engagement is crucial to determining a vision and action plan for what and how to become a climate-neutral, inclusive and regenerative tourist destination.

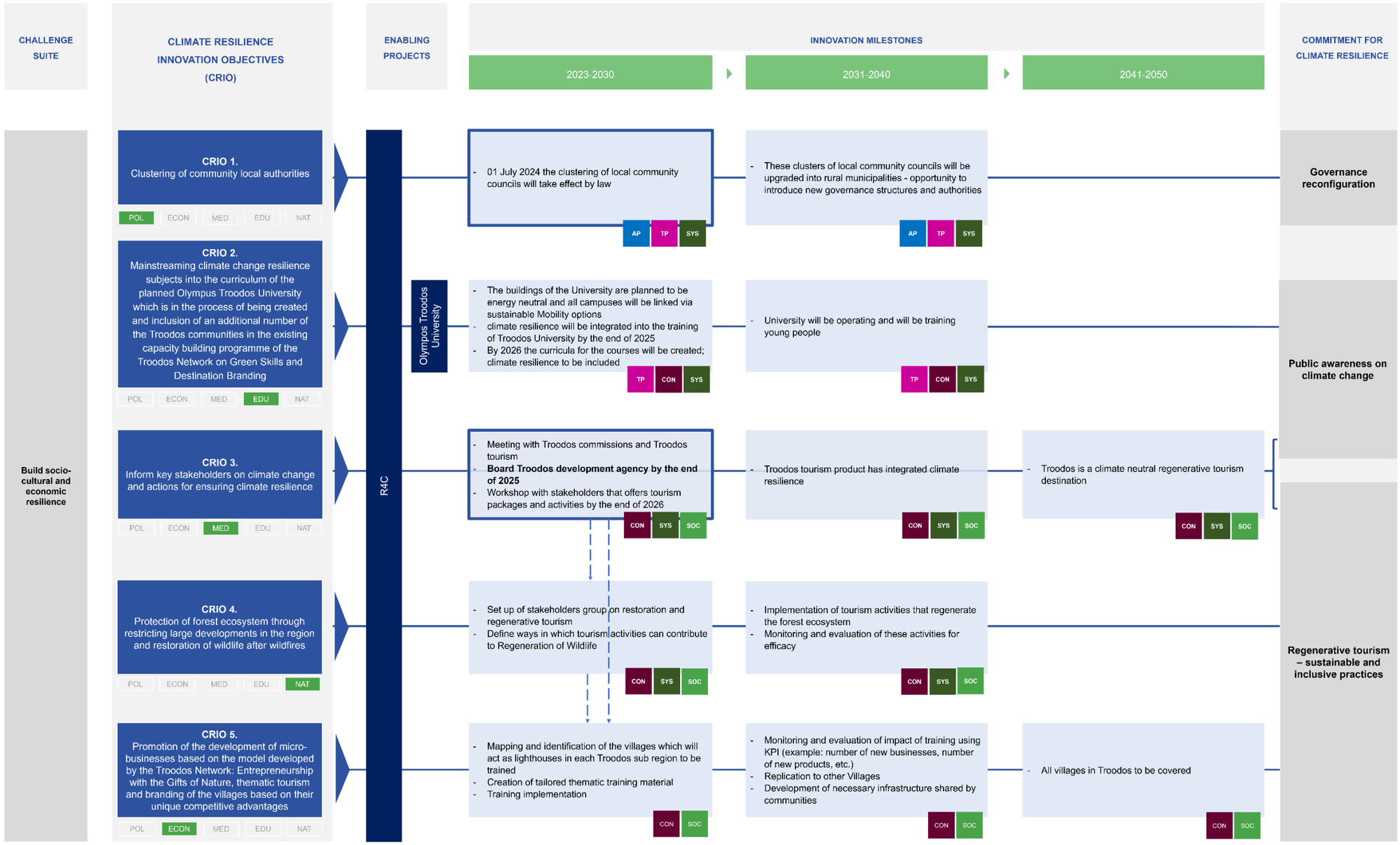
- **Regenerative tourism – sustainable and inclusive practices** (particularly reliant on CRIOs 3, 4 and 5 and their associated milestones).
  According to the information provided by the partners, tourism is a major economic sector in Cyprus. To diversify the activity, rural and inland tourism will be promoted. Therefore, Troodos is working towards developing a sustainable tourism model that ensures the resilience of its rural communities while preserving its traditional products and ecosystems for future generations.

Several projects[49], along with R4C, will facilitate this journey. Additionally, it is necessary to engage multiple stakeholders[50] from the regional innovation ecosystem in order to reach these goals.

[48] The innovation milestones should lead to the "Commitments for CR" outlined in the RIR. These commitments summarise the regional purpose and intention; the pillars of action. Each “Commitment for CR” is accompanied by an explanation of its key accomplishments.

[49] For more information regarding the enabling projects see Appendices.

[50] For more information regarding the stakeholders see Appendices.



AP - Administrative process innovations; **TP** - Technological process innovations; **CON** - Conceptual innovation; **SYS** - Systemic innovations; **SOC** - Social innovations

Click HERE for more zoom

Figure 17. Troodos - Regional Innovation Roadmap.

Among the innovation milestones, there are two that stand out as crucial for the process: (i) the **clustering of local community councils** that took effect by law on 01 July 2024 and (ii) the creation of the **board Troodos development agency** by the end of 2025. These structural milestones (administrative and systemic innovations) set the starting point for most of the subsequent actions. These milestones are important for strengthening local governance structures, improving decision-making, and promoting economic growth, environmental protection, sustainability, and social cohesion. Several interdependencies, complementarities, and sequential relationships among them and the other subsequent milestones are also evident (blue dashed arrows).

CRIO 1: Clustering of community local authorities.

CRIO 1 is closely related to the political CIF dimension to strengthen local governance structures and improve decision-making through administrative and systemic innovations. After the **clustering of local community councils,** it is expected that these clusters of local community councils will be upgraded into rural municipalities. All these actions require administrative, technological and systemic innovations.

CRIO 2: Mainstreaming climate change resilience subjects into the curriculum of the planned Olympus Troodos University which is in the process of being created and inclusion of an additional number of the Troodos communities in the existing capacity building programme of the Troodos Network on Green Skills and Destination Branding.

This CRIO is embedded in the educational CIF dimension and aims to increase climate change knowledge at the educational level. The short term plan (2023-2030) is to make University buildings energy-neutral and connect the entire campus with sustainable mobility options. Additionally, the plan includes integrating climate resilience into Troodos University's training by the end of 2025 and introducing climate resilience into the course curricula by 2026.

CRIO 3: Inform key stakeholders on climate change and actions for ensuring climate resilience.

CRIO 3 is embedded media-based and culture-based public (culture/people) CIF dimension and it is focused on increasing stakeholders' awareness and involvement for more sustainable and inclusive practices. The baseline for achieving this CRIO is the creation of the **board Troodos development agency** by the end of 2025, a structural milestone. In the long-term (2041-2050) the expectation is that Troodos becomes a climate-neutral regenerative tourism destination.

CRIO 4: Protection of forest ecosystem through restricting large developments in the region and restoration of wildlife after wildfires.

CRIO 4 is connected to the natural environment (territorial) CIF dimension and addresses the protection of forest ecosystems. Short term goals milestones include forming a stakeholder group for restoration and regenerative tourism and identifying ways in which tourism can help regenerate wildlife. In the medium term, the plan is to implement tourism activities that promote the regeneration of forest ecosystems, and to monitor and evaluate these activities for effectiveness.

CRIO 5: Promotion of the development of micro-businesses based on the model developed by the Troodos Network: Entrepreneurship with the Gifts of Nature, thematic tourism and branding of the villages based on their unique competitive advantages.

Tackling the economic dimension, CRIO 5 involves conceptual and social innovations. In the short term, this involves mapping and identifying villages which will act as lighthouses in each Troodos sub-region to be trained. Ultimately, in the long term, the goal is to extend this program to all villages in Troodos.

RIR's political commitment:	
01	The regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels)
02	Part of the content of the regional innovation roadmap reflects the effective commitments of the Region regarding climate action, assumed by the public authorities (at the local and regional levels).
03	The regional innovation roadmap is merely an exercise and does not pertain to public authorities

5.4.3. Alignment with SDG

The R4C Innovation Packages (IP) together with other enabling projects in progress, play an important role in the systemic transformation, also contributing to Sustainable Development Goals (SDGs). As illustrated in Table 36, the alignment between CRIO and SDG is clear on the dimension related to climate action, but also the one related to life on land.

Table 36. Troodos - CRIOs alignment with SDGs.

CRIOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CRIO 1. Clustering of community local authorities											●		●				●
CRIO 2. Mainstreaming climate change resilience subjects into the curriculum (…)				●									●		●		
CRIO 3. Inform key stakeholders on climate change and actions for ensuring climate resilience													●		●		●
CRIO 4. Protection of forest ecosystem (…)													●		●		
CRIO 5. Promotion of the development of micro-businesses (…)				●				●	●		●	●	●				

The alignment with the Sustainable Development Goals (SDGs) establishes a robust and persuasive framework for directing future efforts in Climate Resilience (CR). By placing a strong emphasis on sustainability, inclusivity, and

resilience, the Region can ensure that its Regional Innovation Roadmap (RIR) not only supports the broader goals of CR but also plays a pivotal role in advancing sustainable development. This strategic alignment will enable the Region to address complex challenges more effectively, fostering long-term social, economic, and environmental benefits.

5.4.4. Assumptions of Action to foster innovation

To successfully achieve the milestones and objectives (CRIO) outlined in the regional innovation roadmap, it is crucial to establish a conducive context, provide necessary resources, and establish supportive policies. Such a favourable environment will be pivotal in ensuring the successful execution of the regional innovation roadmap, ultimately driving forward progress and growth within the designated areas of innovation.

Fostering innovation requires high levels of commitment, including the fulfilment of a set of important assumptions of action (see section 2), and a strong and active innovation ecosystem aligned with CIF (see **Error! Reference source not found.**) comprised of a diverse group of actors who create value through collaborative efforts.

To develop the Assumptions of Action (AAs) portfolio, each region conducted a self-assessment within the current context in which the milestones will be carried out, providing their perception of the level of accomplishment. Although the evaluation is inherently subjective, given the collective perspectives on the regional context, this portfolio (see table below) should serve as a guide for fostering a supportive climate resilience environment (**see key recommendations below, complemented by the information provided in section 2.3**). This is particularly crucial for achieving the Climate Resilience Impact Objectives (CRIOs), based on recommendations that will assist the region in this endeavour.

Table 37. Troodos - Portfolio of Assumptions of Action.

CIF dimensions					Assumptions of Action dimensions	*Status quo*	Key recommendations
POL	ECON	MED	EDU	NAT			
					1. Clear national and/or regional strategic guidelines	Not started	Implementing strategic planning, enforcing legislation, establishing supportive initiatives, and creating financial mechanisms to drive innovation in climate action and resilience, while ensuring alignment with national, regional, and local levels of governance.
					2. National, regional and local budgets specifically allocated to innovation for CR	Not started	Funding may be allocated to public initiatives and to boost innovation in the private sector (accelerating the growth of innovative startups and SMEs to address territorial challenges in climate action and resilience, innovative solutions for public spaces, etc.).
					3. Integration of CR in multidimensional policies and regulations	Not started	Integrating climate considerations into comprehensive policies and regulations is crucial for meaningful systemic transformation. It's important to incorporate social challenges, urban development, and territorial planning into policies and legislation, while also aligning them with climate resilience objectives. Facilitating knowledge exchange across the five dimensions (academia- industry-administration-community-territory) is also essential.

					4. Leadership	Not started	Public authorities, in particular local/regional representatives (City/regional council), were expected to play a key role in leading the process, in close coordination with the regional stakeholders. These PA can act as facilitators and provide the conditions for a collaborative ecosystem. Designate dedicated entities and multidisciplinary teams to oversee innovation management on climate resilience. Among their tasks, it is suggested to maintain a portfolio of regional needs and challenges that require attention (climate risks, social vulnerabilities, etc.), a portfolio of ongoing research and climate experts. It also involves making any required adjustments to guidelines and budgets and facilitating the engagement of the stakeholders in the regional ecosystem. “Troodos development agency” may have a crucial role.
					5. Governance model	Not started	Develop a robust governance model to align the stakeholders with the same CR vision. It is necessary to establish different levels of responsibilities (management, operational, monitoring) by creating an operational task force and, if necessary, an Advisory Board. The governance model should promote collaboration between the 5 CIF subsystems through cross-sectoral innovation co-created with stakeholders, for the benefit of people (collective learning, knowledge transfer, and improved cooperation). It entails ongoing interaction among key stakeholders to explore innovative approaches to address CR problems/challenges by allocating the required resources (human, technological, and funding).
					6. Direct support for experimentation	Not started	It is crucial to experiment with and test innovative solutions to tackle complex challenges such as climate change. Platforms that enable open collaboration and knowledge sharing across political, economic, educational, and environmental sectors play a key role in this. Examples include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation. Additionally, offering rewards, incentives, and other forms of assistance dedicated to climate action and resilience while respecting and contributing to Responsible Research and Innovation (RRI) principles and Sustainable Development Goals (SDGs) is essential.
					7. Strong and continuous public engagement model	Not started	Ensure broad-based support and participation in CR initiatives, through open data platforms (information and knowledge share), networking, and inclusive channels to share problems and needs, communities’ involvement in experimentation, testing and open innovation processes.
					8. Transparent management and monitoring processes	Not started	Implement transparent management and monitoring processes to measure innovation and CR indicators effectively through regular reporting on achievements and necessary adjustments to mitigate risks and increase expected impacts. The information and data collected must contribute to decision-making by identifying potential areas of improvement in the region's innovation and climate resilience strategies, as well as opportunities for innovation and sustainable growth that are tailored to regional-specific needs.
					9. Strategic focus and investment in qualification and skills in key areas of expertise	Not started	Investing in education and skill enhancement of human resources in crucial areas of expertise is essential for promoting innovation in climate resilience. Here, the universities and other RTOs play an important role in enhancing knowledge.

6. Conclusion

This deliverable (D6.2) is the result of a comprehensive co-creation process that engages multiple stakeholders from each regional innovation ecosystem, reflecting the different innovation profiles that may influence climate resilience achievement.

Using the Common Innovation Framework (D6.1) as a reference, SPI co-developed with the regions, 12 Regional Innovation Roadmaps (RIR) that reflect local/regional conditions and strategic orientations regarding climate action, boosted by innovation. This exercise was an important key to promoting collective action and building a sense of ownership and commitment among the regional stakeholders involved in this process.

This reflection provided the identification of Climate resilience Innovation Objectives (and associated accomplishments) and the innovation milestones to achieve them, systematized in 12 structured innovation roadmaps that should support the regions in their pathway to climate resilience. The roadmap development process accommodated circumstances and insights gathered from the regional stakeholders, ensuring that the roadmaps remain relevant and responsive to emerging opportunities and challenges.

A comprehensive Portfolio of "Assumptions of Action (AAs)" are essential for the successful execution of each Innovation Roadmaps. These assumptions are intricately linked to the CIF dimensions and embody the contextual conditions that foster innovation within a responsive and collaborative innovation ecosystem. We remind that the innovation ecosystem refers to a heterogeneous constellation of actors that create value through collaboration (Adner, 2006; Adner et al., 2010; Vasconcelos Gomes et al., 2018), therefore, innovation depends mostly on the ecosystem and its ability to enhance development and spur the generation and diffusion of innovation.

Furthermore, the explanation included specific, detailed recommendations and suggestions for improvement, providing a comprehensive understanding of how to enhance the innovation process and how to overcome barriers to innovation. By addressing these assumptions, stakeholders can create more effective strategies for enhancing climate resilience through innovation.

Overall, the roadmapping process prompted the regions to reflect upon their strategies and projects concerning climate resilience under their Challenge Suite, thus creating synergies between R4C and the existing projects and strengthening the transformation process using innovation as a tool.

The Regional Innovation Roadmaps aim to guide regions towards achieving climate resilience through a well-defined innovation pathway. By offering a structured yet flexible framework, the innovation roadmaps are designed to be adapted according to the needs and context change, therefore, responsive to new insights and data.

For monitoring the RIR progress, SPI suggests a simple but effective approach (see subsection 2.4) that may facilitate the identification and analysis of any barriers and opportunities that may arise throughout the process, as well as the results achieved.

To foster a more dynamic and iterative process, it is also suggested that a clear link between the various tools available on R4C, such as the Just Transition roadmaps, is created. This integration will ensure that insights and strategies are effectively shared and refined across different initiatives, leading to a more cohesive approach to innovation and climate resilience transformation.

Regular updates to the roadmaps are crucial for assuring their relevance, effectiveness, and impact, allowing the Public Authorities to continuously define priorities and update goals, in a co-creation process involving the relevant stakeholders. This iterative approach enhances the roadmaps' role as a dynamic planning tool that can adapt to emerging challenges and opportunities. It makes it reasonable to reassess the AA by conducting a comparative reflection with the current regional self-assessment in several moments till 2027 (follow up during T6.5 Capacity Building) and give the regions the tools to keep monitoring the evolution. This would help to identify changes or developments during this period.

Also, throughout the process, it was not always possible to obtain accurate or detailed information from the regions to develop the RIR and its assumptions of action. In such circumstances, SPI reasserts the importance of a political commitment for RIR implementation, using this work as a baseline that can be easily changed/improved, receiving new input.

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D6.2 Regional Innovation Roadmaps - Appendices

Regions 4Climate

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Table of Contents

1. Introduction

These appendices deliver additional information for the Regional Innovation Roadmaps (RIR) but are too detailed to include in the main body of the deliverable 6.2.

It contains supplementary material that may help provide a more comprehensive understanding of the work developed by the regions to deliver the innovation roadmaps.

Therefore, each appendix, organised by region, contains:

- **CRIOs' alignment with RRMM dimensions**
  Section 2.4 of D6.2 emphasizes the substantial effects of RIR implementation on improving the Regional Resilience Maturity Level (RRML).
  Based on the exercise presented in section 2.4 (see Table 1) and using the CIF dimensions as a framework for connection, this section illustrates the impact of CRIOs on RRML.

- **The regional innovation ecosystem engagement in RIR**
  For the successful implementation of the RIR, the regions have identified the stakeholders that must be involved throughout the process. Acknowledging its participatory nature, we understand the importance of engaging stakeholders from the regional innovation ecosystem in RIR implementation.
  This section matches the innovation milestones and the stakeholders to involve, in order to achieve the desired CRIO.

- **Enabling Projects Portfolio**
  The regions have identified ongoing or planned projects (hereby called "Enabling Projects") that significantly contribute to achieving the CRIOs and CR commitments, complementing the R4C IP. For each "enabling project", the regions provided detailed information, including the promoter, a brief description, main actions, timeframe, current status, and online links.
  SPI suggests using this portfolio as a model of best practices for the regions.

2. Appendix 1 - Basque Country

2.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Basque Country				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●				
2. *Plans and policy instruments*	●				
3. *Human resources and technical skills*		●	●		●
4. *Participatory governance and stakeholder engagement*	●	●	●	●	●
5. *Public support. awareness*				●	●
6. *Financial capabilities*		●	●		
7. *Vulnerability and Risk Assessment*			●		
8. *Innovation Potential Assessment*	●	●	●	●	●

2.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML1.1: Establish Basque Social Pact on energy transition and citizen Assembly; Different commissions and committees implemented; Integration of just transition in all processes and policies related to climate change	ACLIMA, Ayuntamiento de Irun, Costas nível Ministerio, Diputación Foral de Guipúzcoa, Gobierno Vasco – Dep. Turismo, Hendaye, Hondarribia, IHOBE, Gov. Vasco – Dep. Patrim.
ML1.2: Climate social budget in place; Inaction cost in climate adaptation assessment; Implementation of the Basque Adaptation Mission, which will include a catalogue of Demonstrator projects to implement in specific locations with a proposal of measures and financing resources and with the stakeholder's involvement	Innobasque, Sprilur, University of Pais Vasco. Miren Onandia, IHOBE, Gov. Vasco – Dep. Patrim., Tecnalia, AZTI, ZABALA
ML1.3: Best practices and advanced technologies suitable for Basque Region detected: soil protection, NBS for critical infrastructure, coastline and natural and urban environment, new value chains for decarbonization, implicate private sector (TP)	ACLIMA, Innobasque, Sprilur, IHOBE, Tecnalia, AZTI, ZABALA, Private companies
ML1.4: Setting up the "KLIMA 2050" portal that compiles the benchmark expertise, projects and schemes in the Basque Country; "KLIMA 2050" communication campaign associated to energy, transport, water and health.	IHOBE, Gov. Vasco – Dep. Patrim.
ML1.5: Formal education itineraries reviewed to include climate adaptation	IHOBE, Gov. Vasco – Dep. Patrim.
ML2.1: Alignment of PCTi 20xx with S4+ (RIS 4); Align the promotion of RDI with measures of TE/CC	ACLIMA, Ayuntamiento de Irun, Costas nível Ministerio, Diputación Foral de Guipúzcoa, Gobierno Vasco – Dep. Turismo, Hendaye, Hondarribia, IHOBE, Gov. Vasco – Dep. Patrim.
ML2.2: Industries' self-Investment in climate adaptation articulated	Innobasque, Sprilur, University of Pais Vasco. Miren Onandia, IHOBE, Gov. Vasco – Dep. Patrim., Tecnalia, AZTI, ZABALA
ML3.4: Preparing a climate change social parameter (every five years).	ACLIMA, BBVA, University of Deusto, University of Pais Vasco. Miren Onandia, IHOBE, Gov. Vasco – Dep. Patrim.

2.3. Enabling Projects Portfolio

Enabling Project	Blue Carbon				
Promoter	IHOBE (Sociedad Publica De Gestion Ambiental IHOBE SA)				
Brief description	Blue carbon ecosystems (BCEs) such as saltmarshes and seagrass meadows, have been recently found to importantly contribute to global regulation services through their ability to sequester and store carbon. They also support a key set of services such as habitat provision, flood and coastal protection, enhancement of water quality and various tangible and intangible cultural services. These multiple co-benefits associated with BCEs underscores the importance of integrating nature-based solutions into climate change mitigation and adaptation strategies. The project aims to assess blue carbon sequestration potential in the Basque estuaries by estimating current organic carbon stock and provide insights for climate change mitigation management strategies involving conservation and restoration of BCEs.				
Main actions	Preliminary assessment (compiling cartography of BCEs, literature review and field sampling design) Field sampling on 3 BCEs habitat types (saltmarshes, Zostera noltei seagrass meadows and non-vegetated intertidal flats) BCEs hotspot identification (climate change vulnerability assessment) Action plan for integrated management of BCEs (defining management actions, prioritization criteria, hotspots management proposal, explore blue carbon market options)				
Implementation period (timeframe)	2023-2024				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	**Stage 02 designing and planning**	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.thebluecarboninitiative.org/				

Enabling Project	Life Urban Klima 2025				
Promoter	IHOBE (Sociedad Publica De Gestion Ambiental IHOBE SA)				
Brief description	The URBAN KLIMA2050 project for the deployment of the Basque Climate Change Strategy 2050 in the urban environment has been approved by the European Union within the Integrated Projects Area for mitigation and/or adaptation to climate change. The Basque Country's main aim with the URBAN KLIMA 2050 project is to contribute to the full implementation of the KLIMA 2050 STRATEGY. The general objective of the KLIMA 2050 STRATEGY is to develop a low-carbon and climate-change-resilient region by 2050.				
Main actions	The actions in the LIFE IP Urban Klima 2050 project are divided into 5 blocks: Analyse: Reviewed the KLIMA 2050 strategy through follow-ups and evaluations, with a continuous improvement approach, and expanding the climate risk analysis of the Basque Country by focusing the work on a new climate ambition context to meet the challenge. Define: Define how, where and when to act to reduce GHG emissions, increase absorption, and achieve territorial resilience, and integrate climate change into land management and the urban approach and develop guidelines for integrating climate change into health, water and energy policies. Act: Launch pilot projects at three levels of intervention: coast, river basins and urban/peri-urban areas, scalable to other areas of the Basque Country and to other regions. Empower: Work with the government and the community to promote climate awareness and move them to action and facilitate change through training and designing new tools. Manage: Create structures to facilitate climate governance and climate change observation and monitoring and define new models for climate governance and launch the Hub for observing and monitoring of climate change in the Basque Country.				
Implementation period (timeframe)	2019-2025				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.urbanklima2050.eu				

Enabling Project	Kostaegoki
Promoter	IHOBE (Sociedad Publica De Gestion Ambiental IHOBE SA)
Brief description	The main objective of Kostaegoki project is to provide relevant information and tools to the competent bodies relating to the effects of the sea level rise caused by the climate change and the impact of waves on the Basque coast in several scenarios (RCP4.8 and RCP8.5), with a view to using them to plan and manage coastal areas to meet the challenges posed by this global phenomenon. The results are published in Spanish at: https://www.ihobe.eus/publications/kostaegoki-i-vulnerability-and-risk-assessment The published document summarises the key points from the vulnerability and risk assessment. A cartographic viewer is also provided (https://gis.ihobe.eus/kostaegoki/) which makes possible to view both the flood spots in different scenarios and the results of the risk assessments carried out.
Main actions	Identification of potential flooded areas and beach erosion throughout the coast. Risk assessment on socioeconomic and environmental resources (due to sea level rise and wave action). Provide a set of ideas for

	coastal adaptation (adaptations options). Integration of Kostaegoki results on coastal planning (at regional and local scale).				
Implementation period (timeframe)	2018-2022				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.ihobe.eus				

Enabling Project	**Klimateks**				
Promoter	IHOBE (Sociedad Publica De Gestion Ambiental IHOBE SA)				
Brief description	Innovative projects to assess different topics on climate adaptation and resilient to cover the GAPs of the regions in different topics such as: Critical Infrastructures, Natural areas and ecosystems, Climate data, Mainstreaming adaptation in Planning Instruments, Roadmap for climate change adaptation and study of solutions. One of the tangible outcomes of one of these projects is a Guide for NBS (https://www.ihobe.eus/publications/nature-based-solutions-for-local-climate-adaptation-in-the-basque-country). These projects are pilot cases that are used to mainstream different variables related with adaptation turning into policies. They are annually planned.				
Main actions	Hazard assessment and response of the natural system to climate change Adaptation roadmapping through pilot studies Mainstreaming adaptation in planning instruments				
Implementation period (timeframe)	2016 -				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.ihobe.eus				

Enabling Project	**Ecoinnovadores**				
Promoter	IHOBE (Sociedad Publica De Gestion Ambiental IHOBE SA)				
Brief description	Pilot cases in different areas led by specific administrations that obtain lesson learned to be replicated or upscaled. In some cases, they are showcases of applying the results of Klimateks in the municipalities. They are annually planned.				
Main actions	Desing of urban places adapted to climate change, Participation of citizens on climate adaptation, Development of tools.				
Implementation period (timeframe)	2008 -				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.ihobe.eus				

3. Appendix 2 - South Aquitaine

3.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – South Aquitaine				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●	●			
2. *Plans and policy instruments*	●	●			
3. *Human resources and technical skills*		●			●
4. *Participatory governance and stakeholder engagement*	●	●		●	●
5. *Public support. awareness*				●	●
6. *Financial capabilities*		●			
7. *Vulnerability and Risk Assessment*			●		
8. *Innovation Potential Assessment*	●	●	●	●	●

3.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML1.1: Assessment and review of the Local Strategy Plan for Coastal Risk Management for the next 5-10 years	Communauté d'agglomération Pays Basque, Région Nouvelle- Aquitaine, Departement Pyrénées- Atlantique, Consorcio Bidasoa
ML1.2: Implement a sustainable economic framework for climate change adaptation services	Communauté d'agglomération Pays Basque, Shop managers, Hotel managers, Fishermen, Parking managers
ML1.3: Results of the NBS tests conducted as part of the WP5 of R4C	Communauté d'agglomération Pays Basque, BRGM, Cerema, Météo France
ML1.4: Interventions in schools and trainings at the University of Pau dedicated to climate change adaptation	Communauté d'agglomération Pays Basque, IUT des Pays de l'Adour, Universities, Schools, Cité de l'Océan de Biarritz, Cap Sciences
ML1.5: Awareness raising kit about climate risk and adaptation along the regional shoreline	Communauté d'agglomération Pays Basque, Cité de l'Océan de Biarritz, Cap Sciences, Sud Ouest, Surf Session, Le Marin, Le Monde de Jamy
ML2.1: Assessment of the implementation of partnership development projects carried out in 3 coastal municipalities	Communauté d'agglomération Pays Basque, Région Nouvelle- Aquitaine, Departement Pyrénées- Atlantique, Consorcio Bidasoa
ML2.2: Inclusion of local economic activities adaptation into the Local Strategy Plan for Coastal Risk Management	Communauté d'agglomération Pays Basque, Shop managers, Hotel managers, Fishermen, Parking managers
ML2.3: Include a program of adaptation of the coastline urbanization and management for the sustainable limitation of climate risk in local and regional strategies	Communauté d'agglomération Pays Basque, BRGM, Cerema, Météo France
ML2.4: Creation of university courses on the theme of climate change and associated coastal risks	Communauté d'agglomération Pays Basque, IUT des Pays de l'Adour, Universities, Schools, Cité de l'Océan de Biarritz, Cap Sciences
ML2.5: Development of participatory workshops on actions to take at the individual level when faced with natural risks caused by natural hazards	Communauté d'agglomération Pays Basque, Cité de l'Océan de Biarritz, Cap Sciences, Sud Ouest, Surf Session, Le Marin, Le Monde de Jamy

ML3.1: Studies - state of the coastline at 100 years (study conducted by BRGM)	Communauté d'agglomération Pays Basque, Région Nouvelle- Aquitaine, Departement Pyrénées- Atlantique, Consorcio Bidasoa
ML3.2: 100% of local economic activities adapted to climate change (no more activity threaten by cc)	Communauté d'agglomération Pays Basque, Shop managers, Hotel managers, Fishermen, Parking managers
ML3.3: Adaptations implemented for the coastline urbanization and management for the sustainable limitation of climate risk	Communauté d'agglomération Pays Basque, BRGM, Cerema, Météo France
ML3.4: Creation of university courses for professions linked to the risks caused by coastal erosion and submersion (crossing several disciplines: oceanography, geology, modelling, human sciences, town planning and development, architecture)	Communauté d'agglomération Pays Basque, IUT des Pays de l'Adour, Universities, Schools, Cité de l'Océan de Biarritz, Cap Sciences
ML3.5: Adapt town planning rules to risks linked to climate change (coastal erosion, submersion)	Communauté d'agglomération Pays Basque, Cité de l'Océan de Biarritz, Cap Sciences, Sud Ouest, Surf Session, Le Marin, Le Monde de Jamy

3.3. Enabling Projects Portfolio

Enabling Project	**Urban planning adaptation project (PPA)**				
Promoter	Communauté d'agglomération Pays Basque (CAPB)				
Brief description	The Projet Partenarial d'Aménagement (PPA) contract creates a partnership between the State and local players to encourage the completion of one or more complex development projects designed to meet sustainable development objectives. The mentionned project deals with spatial recomposition to ensure coastl resilience in the area of Saint Jean de Luz.				
Main actions	Consolidate and share the spatial recomposition project to adapt to the receding coastline Renaturalize the seafront, enhance the landscape and preserve natural heritage environments Adapt the tourism offer (open-air hotel, catering) to the receding coastline and better integrate it into the landscape. Reorganize mobility to link parking lots and remote activities to the seafront. Relocate the Archilua wastewater treatment plant, which is threatened by the receding coastline.				
Implementation period (timeframe)	2021-2024				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.communaute-paysbasque.fr				

Enabling Project	**Local strategy on coastal risks**				
Promoter	Communaute d'agglomération Pays Basque (CAPB)				
Brief description	Since 2017, the Communauté Pays Basque and the eight coastal municipalities have been implementing a proactive action program aimed at adapting to the hazards of coastal erosion and marine submersion over the next 20 to 40 years, thanks to a common tool: the "Local Coastal Risk Management Strategy". The latter is an adaptation of the national (SNGITC) and regional (GIP Littoral) methods, and its implementation is co-financed by European ERDF funds.				
Main actions	• Improve knowledge and awareness of risk; • Monitor and forecast erosion and flooding hazards, Improve crisis management; • Take account of natural hazards in urban planning documents; • Reduce the vulnerability of people and property; • Support natural processes ("soft" active control); • Maintain coastal protection works ("hard" active control).				
Implementation period (timeframe)	2017-				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.ocean-climate.org				

4. Appendix 3 - Azores

4.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs - Azores					
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5	CRIO 6
1. *Regional Governance and Institutional capacity*	●	●	●			
2. *Plans and policy instruments*	●	●	●			
3. *Human resources and technical skills*				●	●	
4. *Participatory governance and stakeholder engagement*	●	●	●	●	●	●
5. *Public support. awareness*	●	●	●	●	●	●
6. *Financial capabilities*						
7. *Vulnerability and Risk Assessment*	●					
8. *Innovation Potential Assessment*	●	●	●	●	●	●

4.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML1.1: Refine and validate the CVI model; CVI app ready and available for citizen use	DRAM, DRRFOT
ML1.2: Process the collected data obtained from the innovation actions; Formulate recommendations based on the collected data	DRAAC
ML1.3: Define the data collection set; Create and disseminate the app to engage citizens in order to collect their inputs; Process the obtained data	DRAAC
ML1.4: Promote citizens' awareness of climate change and related impacts, especially amongst youngsters; Through the Azorean Footprint app to enable the citizens to understand their daily impacts	Azores DMO, DRAAC
ML1.5: Provide educational content through the app, workshops, and regional events	Azores DMO, DRAAC
ML1.6: Promote behavioural key changes based on the results computed by the Azorean Footprint app	Azores DMO, DRAAC
ML2.1: Monitoring and updating of CVI model; Assessing citizen literacy regarding coastal vulnerability; Shaping coastal planning policies in the region	DRAM, DRRFOT
ML2.2: Monitor if recommendations were considered in the policies	DRAAC
ML2.3: Monitor the citizens' engagement with the app and its impact on climate change literacy; Improve and refine the collected data; Evaluate at which level the data influenced the decision-making processes	DRAAC
ML2.4: Analyse the trend of the carbon footprint; If needed recommend actions to mitigate the impact carbon footprint	Azores DMO, DRAAC
ML2.5: (Continue to disseminate climate change literacy through the apps	Azores DMO, DRAAC
ML2.6: Evaluate the effectiveness of the recommendations	Azores DMO, DRAAC
ML3.1: Adapt legislation concerning coastal planning	DRAM, DRRFOT
ML3.2: Verify to which extent were the recommendations effectively integrated into the regional policies; Evaluate how these recommendations contributed positively to climate change adaptation	DRAAC
ML3.3: Evaluate the impact of the recommendation in regional policies and participatory processes	DRAAC
ML3.4: Assess and evaluate the long-term results	Azores DMO, DRAAC
ML3.5: Assess and evaluate the long-term results	Azores DMO, DRAAC
ML3.6: Assess and evaluate the long-term results	Azores DMO, DRAAC

4.3. Enabling Projects Portfolio

Enabling Project	LifeIPClimaz				
Promoter	SRAAC – Secretaria Regional Ambiente e Alterações Climáticas (Regional Secretary for the Environment and Climate Change)				
Brief description	The LIFE IP CLIMAZ project focuses on ensuring the implementation of a group of measures whose objective is related to the implementation of specific and transversal key guidelines for adaptation and mitigation to climate change.				
Main actions	Increase knowledge and information about climate change and its effects; - Promote research, development of solutions and increased capacity to deal with adaptation and mitigation needs; - Improve monitoring and information capacity; - Promote the integration of adaptation and mitigation objectives into other sectoral policies; - Strengthen territorial resistance to climate change vulnerabilities and risks; - Promote the integration of adaptation and mitigation objectives into other sectoral policies; - Raise society's awareness of the main challenges posed by climate change, contributing to increasing climate governance and the action of individuals and organizations; - Promote and facilitate the involvement of local communities and stakeholders in identifying and defining roadmaps for adaptation.				
Implementation period (timeframe)	2021-2030				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.lifeipclimaz.com				

Enabling Project	ReThink Action				
Promoter	CARTIF				
Brief description	The RethinkAction project plans to develop a cross-sectoral decision-making platform tailored to the needs of different end-users. The platform will deliver clear and valuable information on climate change and increase awareness and attractiveness referring to land use-based mitigation and adaptation solutions. The platform will be centred on land use as a key to sustain life and reach objectives in the context of climate change and will help people to understand how individual changes in lifestyles as well as social behaviour can have an effect on land use in general.				
Main actions	• Empower citizens, stakeholders, and decision-makers to integrate climate change and climate action into the decisions that will affect our lives in the coming decades. • Contribution to the use of information and data from the Copernicus programme and the GEO initiative. • Improve robustness, predictive quality of data, as well as information and knowledge on climate adaptation and mitigation. • Gradual change in the use of knowledge and information, so that users can become active players in climate protection. • Make high-level information on climate change more accessible to people's lives and to provide data in a format that makes it useful for its users. Make people understand how lifestyle changes affect land. • Enhancing European capacity in terms of the availability of climate change adaptation and mitigation solutions, including by addressing sectoral and/or geographical gaps. • Provide appropriate responses to the European and international climate policies to which we are committed Increase the resilience of society, organisations (private and public) and individuals to multiple risks. • Support the development of the European Service sector regarding end-user climate services.				
Implementation period (timeframe)	2021-2025				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.rethinkaction.eu				

Enabling Project	Earth Observation Advanced science Tools for Sea level Extreme Events (EOatSEE)				
Promoter	Deimos Engenharia				
Brief description	Earth Observation Advanced science Tools for Sea level Extreme Events (EOatSEE) is a project funded by ESA and proposed by a consortium of institutions and companies that are internationally recognized for their work in the Marine, Coastal, and Earth Observation topics. It aims to provide an advanced reconstruction of the relevant processes included in extreme sea level (ESL) events and its related coastal hazards, by taking advantage of the novel capabilities and synergies offered by the latest advances in EO technology.				
Main actions	Short-term – where Science case 1 will be addressed using three distinct approaches: a high resolution downscaling process-based modelling approach (HRDW), together with the new EO-products implemented in the model chain; a linear summation empirical modelling downscaling method (LSDW), considering coastal morphology as passive (no changes along time); a reduced complexity forecasting coastal evolution model (ForCE), which adds the capacity to simulate active morphology (morphological response along the time, due to changes in water levels and waves). Long-term – where Science cases 1 and 2 will be addressed using the LSDW and ForCE approaches, considering the extremely high computational cost of performing long-term high-resolution numerical modelling as in HRDW; a combination of both short-term and long-term approaches shall also be employed to address Science case 3.				
Implementation period (timeframe)	2022-2024				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.eoatsee.eu				

Enabling Project	MOVE				
Promoter	FRCT - Fundo Regional da Ciência e Tecnologia (Regional Science and Technology Fund)				
Brief description	The MOVE pilot project intended to involve policymakers, researchers and civil society in the development of methodologies for Mapping and Assessment of Ecosystems and their Services (MAES) in Europe's Outermost Regions (ORs) and Overseas Countries and Territories (OCTs). A coordinated and synergistic approach was applied to turn the geographical, political and knowledge base fragmentation of these entities into assets, pooling resources and building robust participatory tools.				
Main actions	1) Build a collaborative network of local agents from a significant number of ORs and OCTs and mainland Europe teams; 2) Engage stakeholders in the identification of local priorities for MAES implementation; and, *3)* Collaborate in the development of case studies addressing those priorities.				
Implementation period (timeframe)	2018-2024				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	**Stage 04 Scaling up**
More information	www.gba.uac.pt				

Enabling Project	MOVE-ON
Promoter	FRCT - Fundo Regional da Ciência e Tecnologia (Regional Science and Technology Fund)
Brief description	The work developed under the MOVE project highlighted the steps forward in the implementation of Mapping and Assessment of Ecosystems and their Services (MAES) in Europe's Outermost Regions (ORs) and Overseas Countries and Territories (OCTs). The MOVE-ON project intends to develop four Anchor Projects to advance MAES implementation in those regions. These projects will cover both marine and terrestrial ecosystems in different geographical locations and scales, encompassing the spectrum from methodological development to decision-making support. The MOVE-ON project intends to contribute to the EU and International policies and goals, developing and disseminating good practice guidelines and policy recommendations for improving the health status of ecosystems.
Main actions	1) Fine-tune and develop methodologies adapted to the natural and human realities of the EU Overseas, and assist in their implementation;

	2) Promote knowledge exchange and capacity building between developers and implementers of MAES methodologies, creating opportunities for knowledge exchange and technical and methodological support of anchor project teams; 3) Implement a set of anchor projects, territory-focused but involving a geographically diverse team, mostly based on the EU Overseas working together with MAES experts from the EU mainland. The Anchor projects will be implemented in French Guiana, Macaronesia (the Azores, Madeira and Canary Islands), Reunion Island, and the South Atlantic Region; 4) Build on MOVE to create an EU Overseas Ecosystem Knowledge Network, bringing together technical and decision-making stakeholders from across the ORs & OCTs, promoting external stakeholder participation in project activities and fostering the development of parallel projects; 5) Issue regional or thematic strategies, good practice guidance and policy recommendations.				
Implementation period (timeframe)	2019 - 2023				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.moveon-project.eu				

5. Appendix 4 - Tuscany

5.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Tuscany			
	CRIO 1	CRIO 2	CRIO 3	CRIO 4
1. *Regional Governance and Institutional capacity*	●		●	
2. *Plans and policy instruments*	●		●	
3. *Human resources and technical skills*	●	●	●	●
4. *Participatory governance and stakeholder engagement*	●	●	●	●
5. *Public support. awareness*		●	●	●
6. *Financial capabilities*	●	●	●	●
7. *Vulnerability and Risk Assessment*	●	●	●	
8. *Innovation Potential Assessment*	●	●	●	●

5.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML1.1: Creation of Consortium of private stakeholders composed by private (beach concessioners) and public actors to propose private financing of NBS for climate change; Creation of SME local value; Replication of R4C interventions using PPP (private-public participation) for the first time	Comune di Piombino, Consorzio Bonifica Val di Cornia, Federalberghi, Federturismo, Società Parchi Val di Cornia, beach establishment concessioners*
ML1.2: Development of tools and Technologies to preserve testing on a small scale	ARPA, Comune di Piombino, Legambiente, Società Parchi Val di Cornia, tartAmare, University of Florence, WWF
ML1.3: Activities, workshops, conferences etc to increase awareness	Comune di Piombino, Consorzio Bonifica Val di Cornia, Federalberghi, Federturismo, Regione Toscana, Società Parchi Val di Cornia, University of Florence, University of Pisa, beach establishment concessioners, beach cleaning enterprises
ML1.4: Identification and classification of vulnerable groups considering different types of risk assessments identification of mitigation and adaptation measure	Comune di Piombino, Legambiente, Regione Toscana, Società Parchi Val di Cornia, WWF, beach establishment concessioners
ML2.1: Increasing climate resilience in terms of increasing ecosystem services of dune beach environment, decrease of saltwater incursion, increase of agricultural techniques; Replication of the vision in another context	ARPA, Comune di Piombino, Consorzio Bonifica Val di Cornia, Federalberghi, Federturismo, Legambiente, Società Parchi Val di Cornia, tartAmare, WWF, beach establishment concessioners
ML2.2: Replication and testing on medium scale	ARPA, Comune di Follonica, Comune di Piombino Comune di San Vincenzo, Legambiente, (Società Parchi Val di Cornia, tartAmare, University of Florence, WWF
ML2.3: Integration of the process in the decision-making; Full stimulation of citizens science activities	Comune di Piombino, Consorzio Bonifica Val di Cornia, Federalberghi, Federturismo, Regione Toscana, Società Parchi Val di Cornia, University of Florence, University of Pisa, beach establishment concessioners, beach cleaning enterprises
ML2.4: Implementation plan creation to protect vulnerable groups	Comune di Follonica, Comune di Piombino, Comune di San Vincenzo, Legambiente, Regione Toscana, Società Parchi Val di Cornia, WWF, beach establishment concessioners

ML3.1: Interventions are diffused in the area - this will facilitate the creation of a Regional Protected Area	ARPA, Comune di Piombino, Consorzio Bonifica Val di Cornia, Federalberghi, Federturismo, Legambiente, Regione Toscana, Società Parchi Val di Cornia, tartAmare, WWF, beach establishment concessioners
ML3.2: Implementation on a large scale	ARPA, Comune di Follonica, Comune di Piombino, Comune di San Vincenzo, Legambiente, Società Parchi Val di Cornia tartAmare, University of Florence, WWF, Comune di Cecina Comune di Pisa
ML3.3: Process becomes business as usual; Citizens empower	Comune di Piombino, Consorzio Bonifica Val di Cornia, Federalberghi, Federturismo, Regione Toscana, Società Parchi Val di Cornia, University of Florence, University of Pisa, beach establishment concessioners, beach cleaning enterprises
ML3.4: Diffusion of inclusive projects	Comune di Follonica, Comune di Piombino, Comune di San Vincenzo, Legambiente, Regione Toscana, Società Parchi Val di Cornia, WWF, beach establishment concessioners, Comune di Cecina, Comune di Pisa

5.3. Enabling Projects Portfolio

Enabling Project	**Ammirare**
Promoter	Coordination of the Sant'Anna School of Pisa, through the Interdisciplinary Center for Sustainability and Climate, and the involvement of the Tuscany Region.
Brief description	Ammirare project focus on the resilience of beaches in the western Mediterranean area. The project, funded under the Interreg Italy France Maritime program (call 2023) with more than 5 million euros, involves 14 academic and territorial entities in addition to the Sant'Anna School and the Tuscany Region. The Sant'Anna School, together with the Tuscany Region, developed the project idea that combines the protection of the natural habitat with the dynamics of social and economic development, characterized by the presence of high tourist flows. The Ammirare project aims, in fact, to increase the resilience of the coastal ecosystem to cope with climate change risks such as erosion, extreme events and loss of native species while maintaining its competitiveness and attractiveness. All project results will feed into a computer platform that will enable institutions responsible for coastal management to understand the effects of applied solutions, with respect to the climate risk mitigation process.
Main actions	• Introduce the concept of ecological beach, a model of coastal management participated by all categories of stakeholders who bring interests, to the coasts; • Testing of "nature-based solutions" at five sites on the Tyrrhenian coast as the main tools for mitigating the effects of climate change and improving coastal ecosystem functions; • Broad sharing in choices intended to improve activities on the coast: businesses in the tourist accommodation sector, beach managers and maintainers, trade associations, citizen representatives, and local institutions will be involved in raising awareness of climate change and its effects.
Implementation period (timeframe)	March 2024 to September 2027
Current state	Stage 00 identifying the challenge | Stage 01 defining leadership | Stage 02 designing and planning | **Stage 03 Implementing and learning** | Stage 04 Scaling up
More information	www.santannapisa.it www.isprambiente.gov.it

Enabling Project	**Med-IREN: Mediterranean critical Infrastructure Resilience Engineering with Nature based solutions**
Promoter	National Center for Scientific Research "Demokritos" (Coordinator) and 30 European partners
Brief description	The Med-IREN project aims to provide actionable demonstration on how to climate proof the Mediterranean critical infrastructures, across critical sectors, by introducing NBS both in terms of improving climate risk management and sustaining their business continuity to extreme climate change. Med-IREN will rely on the integration of the research output of more than 15 European and National projects, that focused on the (climate) resilience of infrastructures, regional adaptation and implementation of NBS. Med-IREN is conceived as a powerful showcase of the EU twin green & digital transition and an immediate success story of the EU Green Deal.
Main actions	• The project will be showcased in five lighthouse regions across the Mediterranean, each corresponding to a present-day challenge, that are aligned with regional policies and can constitute the EU as a global leader in the field.

	• Med-IREN will cover different and diverse types of CI (energy, transport, water, ICT, social), priority climate hazards within the Mediterranean, which is a climate hot-spot, and NBS interventions. • the interventions and solutions will be replicated into four more regions across the EU, covering the Mediterranean, Black Sea and Boreal regions. • provide evidence how key enabling conditions, such as participatory governance and citizen engagement, novel forms of financing, innovative urban/landscape planning and capacity building will support regional systemic transformation and provide the upscaling and replication mechanism within Mediterranean regions and beyond. • development of a high-end digital decision-making support toolset integrating data from multiple sources, both in situ and E.O., applying state-of-the-science models, as well as providing unprecedented visualization and sensemaking capabilities for understanding and quantifying resilience through-out the infrastructure and NBS life cycle.				
Implementation period (timeframe)	October 2024 to September 2028				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.santannapisa.it				

6. Appendix 5 - Køge Bay

6.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Køge Bay				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●	●			●
2. *Plans and policy instruments*	●	●			●
3. *Human resources and technical skills*		●	●	●	●
4. *Participatory governance and stakeholder engagement*	●	●	●	●	●
5. *Public support. awareness*		●	●	●	
6. *Financial capabilities*		●			●
7. *Vulnerability and Risk Assessment*					●
8. *Innovation Potential Assessment*	●	●	●	●	●

6.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML1.1: A national Climate Change Adaptation Plan with long-term vision, strategy and reliable funding; Awareness of the regional role among local actors	Municipalities, Regions, The State
ML1.2: Existing funds are reprioritized and used for cross-regional and cross-sectoral projects	The State, EU, Funding agencies
ML1.3: Develop supplements to existing curricula with focus on actionable knowledge, constructive approaches that shift the status quo	Ministry of Education, Universities, Educational institutions
ML1.4: Increased focus on participatory planning and outreach to local residents	Municipalities, Regions, The State, Knowledge institutions, Consultancy agencies
ML1.5: Environment that promotes experimentation with new concepts	Municipalities, Regions, The State, Knowledge institutions, Consultancy agencies
ML2.1: Structures for collaboration across current barriers	Municipalities, Regions, The State, Knowledge institutions
ML2.2: Funding promotes that practitioners participate in development focused on climate resilience initiatives	Municipalities, Regions, The State, EU, Funding agencies, Emergency managements, Utility companies
ML2.3: A climate resilience perspective is included in all curricula	Ministry of Education, Universities, Educational institutions
ML2.4: Residents collaborate to improve local community resilience to climate change. They are informed and act proactively and organized.	Municipalities, Emergency managements, Citizens, Local citizen groups, Local news agencies
ML2.5: Upscaling of pilot projects and transition to new planning practice	Municipalities, Regions, The State
ML3.1: Governance structures that correspond with the geographic impact of the climate risk	The State
ML3.2: Social approaches are equally prioritized as technical approaches in relation to climate resilience	Municipalities, Regions, The State, EU, Funding agencies, Emergency managements, Utility companies
ML3.3: All graduates have studied relevant climate issues relevant to their field	Ministry of Education, Universities, Educational institutions
ML3.4: Change of culture and mindset in relation to living with climate change	Municipalities, Emergency management, Local communities, The Coastal Authority

ML3.5: National and local planning system that prioritize NBS and holistic approaches	Municipalities, Regions, The State

6.3. Enabling Projects Portfolio

Enabling Project	The Climate Alliance: Implementation of Climate Action Plans in Denmark				
Promoter	Local Government Denmark, Realdania, and the five regions (Capital Region of Denmark, Region Zealand, Region of Southern Denmark, Central Denmark Region and North Denmark Region)				
Brief description	The Climate Alliance strives to assist the municipalities in achieving their climate action plans as well as promoting transversal climate cooperation between municipalities and the regions, that can contribute to the larger scale Danish climate goals.				
Main actions	• Development pathways will be initiated (cross-cutting ambitious projects to tackle climate challenges); • Implementation of climate actions plans; • Evaluation and certification of climate action plans.				
Implementation period (timeframe)	2023-2028				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.concito.dk				

Enabling Project	(Partnership for) Education for sustainable development (EDUSD)				
Promoter	80 partners divided into 8 networks, with Verdens Bedste Nyheder (World's best news) as the lead. With financial support from Danish Ministery of Education				
Brief description	EDUSD is about ensuring the fulfilment of basic human needs across populations and generations. A sustainable development must happen at a level and in a way where the natural basis is not and must not be destroyed and consider the complex interaction between social, economic and environmental conditions.				
Main actions	Educational projects on sustainable development at the primary and secondary school level				
Implementation period (timeframe)	State-level funding of partnership secretariat from 2024-2027				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	-				

Enabling Project	ClimatePol				
Promoter	University of Southern Denmark				
Brief description	The project will map how the climate has changed (1850-present) and is likely to change (now-2100). It will also identify the regional institutional drivers and barriers for addressing climate change and adaptation in southern Denmark and Northern Germany. The project has a strong behavioural perspective and will focus on the stakeholders who decide and implement the climate adaptation solutions.				
Main actions	Mapping of climate changes in the region / Identification of main barriers and drivers for adaptation / Establishment of microclimate				
Implementation period (timeframe)	2024-2026				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.uni-flensburg.de				

7. Appendix 6 - Burgas

7.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Burgas			
	CRIO 1	CRIO 2	CRIO 3	CRIO 4
1. *Regional Governance and Institutional capacity*	●	●		
2. *Plans and policy instruments*	●	●		●
3. *Human resources and technical skills*	●			●
4. *Participatory governance and stakeholder engagement*	●	●		●
5. *Public support. awareness*				
6. *Financial capabilities*	●			
7. *Vulnerability and Risk Assessment*	●	●	●	
8. *Innovation Potential Assessment*	●	●	●	●

7.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML1.1: Upgrade of the Sustainable energy and climate strategy 2021-2030 with a dedicated green infrastructure section comprising plan and measures for the development of long-lasting tree vegetation and expansion of green areas; Establishment of Local Climate Resilience Unit and its involvement as a main consultation pillar of the local administration in the process of climate change adaptation policies formulation and implementation; Realization of showcase green infrastructure aimed at climate adaptation, mitigation and landscaped public areas improvement; Introducing a new model for separate waste collection according to waste management plan of BM.	Burgas Trade – Industrial Chamber, Chamber of Tourism, National Environment Agency Bulgaria, Port of Burgas, Sofia University, Burgas Municipality, Chamber of architects Local Climate Resilience Unit, Local residents, Businesses, Companies specialized in the realization of green solutions and infrastructure
ML1.2: Innovative practices, tools and knowledge integration and wide application when outlining various public policies and solving public needs; Implementation of measures to reduce the risk of floods according to the Program for flood risk prevention in the Black Sea basin region; Integrated technological infrastructure available for early warning and information of the population about forthcoming flood risk in 29 flooding threatened areas; Collected climate-change related data from modernized and upgraded existing monitoring stations with new hardware and meteorological sensors; Climate Atlas put in practice and used by municipal experts with a section for catchment areas and flooding susceptible areas monitoring, exploited in the process of urban spatial planning and development	Asen Zlatarov University, Burgas Free University, Burgas Regional Administration, DIGIHUB, National Environment Agency Bulgaria, Sofia University, Burgas Municipality, Regional Council for development, Innovation systems municipal enterprise
ML1.3: Elaboration and implementation of an integrated model for adapting the structure of the urbanized territories to climate change and the UHI effect; Improving the air quality monitoring, including the modernization and upgrading of the mobile station for air pollution control and measurement, upgrading the information system for citizens about air pollution control with real-time data; Pilot introduction of energy monitoring systems in municipal buildings; Exploitation of satellite data for evidence-based decision-making, enhancing the resilience to climate change and promoting sustainable development practices in land management, infrastructure development and resource allocation; Creation of GIS based information systems for climate change monitoring.	Academy of Sciences, DIGIHUB, National Environment Agency Bulgaria, Burgas Municipality, Innovation systems municipal enterprise, Burgas Regional Administration, ICT companies and businesses

ML1.4: Elaboration and implementation of a communication strategy for knowledge sharing and information provided to citizens about climate adaptation topics; Execution of communication activities to increase public awareness, knowledge and attitudes regarding adaptation to climate change in a way to form climate resilient behaviour; Elaboration of school educational materials on climate adaptation subject; Realization of climate adaptation solutions in urban environment with tight citizens engagement, putting in practice community co-creation and ownership approach.	Asen Zlatarov University, Burgas Free University, Burgas Municipality, Local Climate Resilience Unit, Local residents, Schools
ML2.1: Expanding the scope of the innovative green solutions for public areas and buildings, incl. landscaping roofs and facade walls of public service buildings and multi-family residential buildings for air pollution and UHI effect minimization; Construction of pollution-absorbing green walls/panels on streets along busy transport links; Elaboration of encouraging mechanism for NBS implementation by private property owners and businesses; Formulation and introduction of specific requirements for new buildings construction and renovation of old ones to protect against overheating and overheating of the environment.	Burgas Municipality, Chamber of architects, Local Climate Resilience Unit, Local residents, Businesses, Companies specialized in the realization of green solutions and infrastructure
ML2.2: Increasing the level of digitalization and automation of services for citizens; Improvement of the technical support for response to climate hazards or disasters; Deepening the technological integration and bridging the database for flood risks early warning and information with neighbouring municipalities on a regional scop; Creation of a system for early notification of climatic hazards; Development and improvement of GIS information systems for climate change monitoring; Involvement of the Regional Council for development actively in order to seek adequate government support (AP); Development and implementation of a municipal catalogue of nature-based solutions to mitigate the threat and risk of natural disasters.	DIGIHUB, Sofia University, Burgas Municipality, Regional Council for development, Innovation systems municipal enterprise, Burgas Regional Administration
ML2.3: Enhancing the use of digital tools in the urban ecosystem climate adaptation and mitigation management; Conducting trainings and seminars to increase the knowledge and expertise of local experts complied with new innovation trends; Infrastructural provision for high tech, research and innovation solutions; Introducing smart management approach in public buildings.	Asen Zlatarov University, Burgas Free University, DIGIHUB, Sofia University, Burgas Municipality, Innovation systems municipal enterprise, ICT companies and businesses
ML2.4: Bottom-up approach applied in the implementation of public polices for climate change adaptation and mitigation; Opening a major in Climate Change at Sofia University affiliate in the city of Burgas; Collaboration with educational institutions for implementation of educational programs on the climate change topics; Organization of school and student hackathons for climate change adaptation solutions	Asen Zlatarov University, Burgas Free University, Sofia University, Burgas Municipality, Local residents, Schools
ML3.1: Development and management of ecosystem services; Integrated approach of business development, focused on decreasing the carbon footprint, supported by the local authorities; Raising awareness, provide support and encourage tourism business entities to carry out sustainable and ecofriendly tourism practices concerning using recyclable products, reuse resources and generating biodegradable waste and reducing the carbon footprint; Applying a horizontal climate change resilient approach in the process of decision-making, involving climate adaptation way of urban planning and development in all sectors; Quality improvement and development of the green system components on the territory of the municipality.	Chamber of Tourism, Kronospan, LIFA Burgas-Kameno, Lukoil, National Environment Agency Bulgaria, Port of Burgas, Burgas Municipality, Burgas Regional Administration
ML3.2: Reforming the structure of local self-government by defining an organ implementing a unified regional policy; Co-delivering public services between the four strands of quadruple helix – community, business, industry and Academia; Establishing a continues workflow of climate changes related data with neighbouring municipalities within Burgas region; Implementation of integrated digital framework for climate resilient city management.	Asen Zlatarov University, Burgas Free University, DIGIHUB, National Environment Agency Bulgaria, Sofia University, Burgas Municipality, Regional Council for development, Innovation systems municipal enterprise, Local Climate Resilience Unit, Local residents, Businesses, Burgas Regional Administration
ML3.3: Continuous capacity building of local experts for planning, implementation and monitoring of adaptation measures and activities; Metaverse digital framework implementation for smart city management.	Asen Zlatarov University, Burgas Free University, DIGIHUB, Sofia University, Burgas Municipality, Innovation systems municipal enterprise, Local Climate Resilience Unit, Local residents, ICT companies and businesses
ML3.4: Sustaining the significance and expanding the role of Local Climate Resilience Unit in the climate resilient decisions for development of the municipality; Broad public involvement in climate change mitigation topics;	Burgas Municipality, Local Climate Resilience Unit, Local residents

7.3. Enabling Projects Portfolio

Enabling Project	**METACITIES: Excellence Hub in South-Eastern Europe**
Promoter	University of Patras

Brief description	Three local innovation ecosystems in Cyprus, Greece, and Bulgaria are partnering to create a Center for Excellence for Future Cities and Regions in Southeast Europe (SEE). This pilot project will focus on gathering appropriate and valid data sources to create 3D digital twins of one or more public buildings. Then they will be used to demonstrate how AI and machine learning algorithms can be used to detect patterns and solve problems related to energy efficiency, air quality, or climate conditions.				
Main actions	The Bulgarian partners will use the tools of the Open Digital Twin Framework to enhance the existing GIS of the city and the Integrated Urban Platform SmartBurgas with tools related to the solar potential of the city. This will enable the expansion of the existing digital platform for energy efficiency with new 3D functionalities to assist in better resource management and utilization of unused rooftop spaces of public and private properties.				
Implementation period (timeframe)	2024-2026				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.metacities-hub.com				

Enabling Project	**RE-VALUE: "Revaluing Urban Quality Climate Neutrality in European Waterfront Cities"**
Promoter	Ålesund - leading city
Brief description	The main objective is to support the efforts of European regions aimed at adapting to and minimizing the impact of climate change through the implementation of large-scale demonstration activities with cross-border significance. Nine European coastal cities will demonstrate how climate neutrality and urban environment quality can be brought into alignment through reassessing their relationship with the coastline, strengthening associated benefits, and mitigating potential adverse effects – essentially through planning urban transition towards achieving climate neutrality. The cities will work with long-term Territorial Transformation Plans (TTP), combined with locally based coastal demonstration pilot activities. In the four leading cities (Ålesund, Bruges, Burgas, and Rimini), a pilot model for integrated urban planning and design will be implemented to achieve climate neutrality and significantly reduce greenhouse gas emissions by 2030. The other five cities (Cascais, Constanta, Izmir, Pisek, and Rijeka) will participate in the exchange of experiences and good practices.
Main actions	• Development of a joint intelligent information system for modeling and assessing the climate impact of measures implemented in urban design and planning, with technological capabilities for visualizing scenarios. • Implementation of a pilot project in the coastal urban area of Burgas municipality, aiming to demonstrate innovative and environmentally friendly solutions for achieving climate neutrality in the urban environment.
Implementation period (timeframe)	2023-2026
Current state	Stage 00 identifying the challenge / Stage 01 defining leadership / **Stage 02 designing and planning** / Stage 03 Implementing and learning / Stage 04 Scaling up
More information	www.re-value-cities.eu

Enabling Project	**RELAUNCHTOWIN: Regeneration of Mladost Sports Hall and the surrounding area**
Promoter	Burgas Municipality
Brief description	The project addresses all five challenges addressed in Art 11 of ERDF/CF regulation, focusing on 1. improving the urban environment in line with climate change adaptation; 2. creating an inclusive urban environment where ALL citizens are engaged; 3. modernizing and revitalizing urban spaces. General Objective: • The empowerment of the local communities as the primary agents of civil society and the ones to contribute to the sustainable development of the urban environment in response to the needs of the target groups. • The creation of innovative and effective conditions and mechanisms for active inclusion of the target groups at the local level through their involvement in the initiation, development and carrying of social, volunteer, educational, cultural and sports activities.
Main actions	The activities will focus on a dilapidated building and the area around it. The building will become a NZEB with an additional digital dimension and endowed with new functionalities to make it a welcoming and inclusive space. The empty area around will be regenerated with therapeutic gardens, with mixed land management which will draw citizens to a new social space. In an evolutionary approach Burgas Municipality will take the familiar approach of urban renovation and use it as a way to revitalize the community itself, to use NBS to promote inclusion and improve the sustainability of local culture and traditions. As a result, the community will be involved in a new model for regeneration of the local ecosystem. It will lead to better physical and mental health, and by involving local citizens directly it will give them a stronger sense of belonging to a community, of ownership of the place and of pride in the city.
Implementation period (timeframe)	2024-2027

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	**Stage 02 designing and planning**	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.transferpartners.urban-initiative.eu				

Enabling Project	**DEcarbonising the TOurism Industry Post Covid-19 Support (DETOCS)**
Promoter	Local energy agency Spodnje Podravje
Brief description	The EU has decided to decarbonize its economy by 2050 due to the need for climate change mitigation and adaptation. Concurrently, it aims to enhance its energy security, self-sufficiency, and competitiveness. The ongoing energy crisis has skyrocketed fuel and electricity prices, threatening the viability and profitability of the tourism infrastructure. Achieving the recovery of the EU's tourism infrastructure sector following the COVID-19 pandemic in the new environment of an energy crisis in a sustainable manner with low-carbon emissions, in line with the EU's long-term policies for decarbonizing the economy, is the main challenge addressed in the DETOCS Project.
Main actions	A) Facilitating the decarbonization of the tourism infrastructure, B) Increasing their energy efficiency of the tourism infrastructure, C) Enhancing their energy self-sufficiency of the tourism sector, D) Promoting new and emerging forms of tourism such as "virtual tourism" with low energy consumption and carbon footprint, E) Assisting the business entities in coping with the current energy crisis, which increases the share of energy expenses in their overall operational costs, jeopardizing their profitability and economic viability.
Implementation period (timeframe)	2023-2026

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	**Stage 02 designing and planning**	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.interregeurope.eu/detocs				

Enabling Project	**Green Burgas: fair and inclusive green policies (JUSTGREEN)**
Promoter	Rotterdam (lead partner), Burgas Municipality (partner)
Brief description	The project is financed under the Interreg Europe Program 2021-2027. In this context the Municipality of Burgas launched the implementation of the project "Green Burgas: Fair and Inclusive Green Policies" / JUSTGREEN, a climate project to develop and implement a joint approach for a socially just transition to climate sustainability. Due to climate change, cities increasingly face challenges such as higher temperatures, floods, and extreme weather. Therefore, it is important to adapt our living environments to this changing climate. Greening cities seems to be the best solution. But how do we ensure that all inhabitants of a city take a profit? The JUSTGREEN project focuses on inclusive greening in European cities. Greening cities in such a way, that all inhabitants, neighbourhoods and communities in need can benefit. The project particularly focuses on vulnerable groups of residents and residents of less affluent neighbourhoods. Inhabitants are actively involved in the fight against climate change and in the development of greening policies. In doing so, JUSTGREEN not only addresses climate problems but also improves the health and well-being of these residents. The idea is that by working together on inclusive green initiatives, we can not only improve cities but also change lives and strengthen communities. Cities who participate in the project, have set themselves the following goals: • Ensure a fair distribution of greening projects and greening funds; • Involve residents affected by climate change; • Listening to the various opinions on green and climate in the city.
Main actions	The planned activities include improving the effectiveness of greening and climate adaptation policies and involving the communities most vulnerable to the impact of the climate crisis in the development and implementation of these policies.
Implementation period (timeframe)	2021-2027

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	https://www.burgas.bg/bg/novini/obshtina-burgas-startira-izpalnenieto-na-proekt-zelen-burgas-spravedlivi-i-priobshtavashti-zeleni-politiki https://www.burgas.bg/bg/gradska-sreda/58486				

Enabling Project	**Plan for integrated development of the city of Burgas in the period 2021-2027 (IDP)**
Promoter	Burgas Municipality
Brief description	Plan for integrated development of the Municipality of Burgas (PIRO), defines the medium-term goals and priorities for sustainable development for the period 2021-2027. PIRO is a basic document of the system for strategic planning of regional and spatial development. It serves to determine the current problems, needs and potentials for the development of municipalities and settlements, which are taken into account in the development of investment programs and financial instruments, including those co-financed by the funds of the European Union. The normative need to prepare the PIRO derives from the Regional Development Act (RAD),

	which is a direct link between the EU policies in the field of regional development and the development policy at the regional level of the Republic of Bulgaria. As the main element of the Regional Development Plan, it is an instrument for determining the vision, priorities, goals and measures for the development of the territory of the municipality. The goal is Burgas to continue to establish itself as an attractive place for life and business, effectively using its potential for balanced and sustainable integrated development, but with preserved local identity and access to modern, resource-efficient, climate-adaptable and a competitive economy ensuring smart economic growth, spatial connectivity and access to services. The developed Plan is aimed at the development of the municipality and the city of Burgas from the point of view of its role as a centre of national and regional importance for the development of the Southeast region and the country as a whole.
Main actions	• Develop a document of the system for strategic planning of regional and spatial development; • Preparation and implementation of projects; • Investments for sports and social infrastructure; • Implementation of green and digital solutions and sustainable management of natural and urban ecosystems are foreseen to preserve and improve the natural capital of the territory.
Implementation period (timeframe)	2021-2027
Current state	Stage 00 identifying the challenge / Stage 01 defining leadership / Stage 02 designing and planning / **Stage 03 Implementing and learning** / Stage 04 Scaling up
More information	https://plan.smartburgas.eu/ https://www.burgas.bg/bg/plan-za-integrirano-razvitie-na-grad-burgas-v-perioda-2021-2027

Enabling Project	**National Climate Change Adaptation Strategy and Action Plan 2019-2030 (CAP)**
Promoter	Republic of Bulgaria
Brief description	This Plan is intended to serve as a reference document, setting a framework for climate change adaptation (CCA) action and priority directions up to 2030, identifying and confirming the need for climate adaptation action both at economy-wide and sectoral levels, while highlighting the consequences of no action. The development of this Plan has followed, to the extent possible, the principles and methodology for strategic planning in the Republic of Bulgaria (Council for Administrative Reform 2010). This includes the steps, methods, and content in developing strategic documents and adherence to the principle of public partnership between state institutions and citizens and their organizations. The Plan also draws on available resources for developing CCA strategies and action plans including the European Commission's Guidelines on developing adaptation strategies (EC 2013b) and the European Climate Adaptation Platform (Climate-ADAPT) This document builds on the National Climate Change Risk and Vulnerability Assessment of the Bulgarian Economic Sectors (MoEW 2014) and draws extensively on the information, analyses, and recommendations of the nine sector assessment reports, the Disaster Risk Management Assessment report, and the report on the 'Macroeconomic Implications of Climate Change'.
Main actions	• Activities (assessed as priorities to start in the short) term will be measures which enable and support following adaptation actions. Many of these priority actions across all sectors are soft measures (assessed as no cost or low cost) supporting the strategic and operational objectives related to building institutional capacity, mainstreaming and integrating CCA into existing national and sectoral plans and programs, and raising awareness. • These will provide the foundation for medium- and longer-term practical actions for building climate change resilience including through the management of infrastructure and assets, and the protection and enhancement of natural capital. Underpinning sector-based activities, a number of general coordinating and facilitating activities for the strategy and action plan are necessary to focus on delivering the general strategic objectives.
Implementation period (timeframe)	2019-2030
Current state	Stage 00 identifying the challenge / Stage 01 defining leadership / Stage 02 designing and planning / **Stage 03 Implementing and learning** / Stage 04 Scaling up
More information	https://www.moew.government.bg/ https://www.fao.org/faolex/results/details/en/c/LEX-FAOC222405/

8. Appendix 7 - Uusimaa

8.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Uusimaa				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●				●
2. *Plans and policy instruments*	●				●
3. *Human resources and technical skills*		●	●	●	
4. *Participatory governance and stakeholder engagement*	●	●	●	●	●
5. *Public support. awareness*		●	●	●	
6. *Financial capabilities*		●		●	
7. *Vulnerability and Risk Assessment*					●
8. *Innovation Potential Assessment*	●	●	●	●	●

8.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML 1.1: Data-based awareness building targeting decision-makers; Regional adaptation plan	
ML 1.2: Tool and a model for companies to evaluate the vulnerability of companies (climates risk evaluation)	NR
ML 1.3: All offers promotion of "green skills"	NR
ML 1.4: Harnessing the national historical solutions, for example traditional building methods, wood structures etc	NR
ML 1.5: Mentoring of smaller and less developed municipalities by more developed ones; planning for sustainable urban economic development	NR
ML 2.1: Measures to break silos and to integrate individuals, teams and organisations in coordinated holistic holistic actions – "mainstream thinking"	NR
ML 2.3: Adaptation specific lifelong courses; communication towards School-level education	NR
ML 2.4: Providing platforms for "creative sectors"	NR
ML 2.5: upscaling Green Factor tool to the Regional level	NR
ML 3.2: Immigration - migration of masses; Cross-border impacts of climate change	NR

8.3. Enabling Projects Portfolio

Enabling Project	Vilkku - Visioning a climate resilient Helsinki-Uusimaa
Promoter	Helsinki-Uusimaa Regional Council
Brief description	The project identifies the impacts of climate change on Helsinki-Uusimaa and lists possible adaptation actions. The effects of the impacts found are evaluated against the vulnerability and exposure of our region and the risks involved are identified. The aim is to identify the regional key risk factors, also to find and assess the regional adaptation needs and responsibilities.
Main actions	A model for risk and adaptation surveys. Regional adaptation plan.
Implementation period (timeframe)	2023-2026

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.uudenmaanliitto.fi				

Enabling Project	**DikaS**
Promoter	Forum Virium Helsinki
Brief description	The purpose of the DikaS project is to increase understanding of the digital twin and of how socio-economic phenomena can be analysed with data describing the built environment.
Main actions	The DikaS project aims to expand the usability of digital twins as knowledge management tools in various contexts beyond city planning. The project is a preliminary study that will provide an up-to-date description of the current state of the digital twin in terms of the premises of its social dimension, the preconditions for its utilisation and its potential. In particular, the project aims to examine how current social challenges, such as prevention of segregation, climate change adaptation and accessibility of services, can be promoted through the opportunities offered by the digital twin.
Implementation period (timeframe)	2024 - 2024

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.forumvirium.fi				

Enabling Project	**CANEMURE (LIFE)**
Promoter	Finnish Environment Institute SYKE (Coodinator + 21 Partners, including HURC)
Brief description	Towards Carbon Neutral Municipalities and Regions (CANEMURE) is a six-year (2018-2024) project for implementing Finnish climate policy, funded by the EU Life programme. The Canemure-project promotes regional climate work by supporting networks and by concrete measures through expert guidance.
Main actions	The CANEMURE project will provide novel climate change mitigation concepts, as well as increased capacity and enhanced cooperation between various stakeholders. CANEMURE will catalyse the implementation of the Finnish climate change policy at regional and municipal level and optimise the implementation of the National Energy and Climate Strategy and the Medium-Term Climate Change Policy Plan in 2018-2024, in order to mitigate GHG emissions arising from EU's Emission Sharing Decisions (non-ETS) activities. This is done by applying low carbon concepts in spatial planning, low carbon modes of consumption and production processes, enhancing energy efficiency and conservation, designing distributed renewable energy systems, as well as through the uptake of optimised mobility solutions and clean technology business development. Besides GHG emissions, economic and social impacts, as well as green public procurement, and an experimental culture to innovatively mitigate climate change are considered in the CANEMURE project.
Implementation period (timeframe)	2019-2024

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.hiilineutraalisuomi.fi				

Enabling Project	**LuoTo – Action Plan for ecological transition in cultural and creative sectors**
Promoter	Helsinki-Uusimaa Regional Council
Brief description	The LuoTo project works holistically to facilitate the sustainability transition in cultural and creative sectors by bringing together various sustainability projects and by offering check marks on the way to a sustainable low-carbon future. Sectors accelerating sustainability transition: The LuoTo Action Plan for ecological sustainability transition is paving the way for creating a sustainable future. The most important observations in the sustainability projects in cultural and creative sectors have been put together in the action plan, along with the challenges of climate work and recommendations for a speedier sustainability transition in these sectors. This project aims to highlight the role of cultural and creative sectors in accelerating the sustainability transition and possible connections between sustainable solutions in these industries. LuoTo supporting sustainability: There is certainly a need for actors in cultural and creative sectors to develop their sustainability expertise. Support is needed either as expert services from professionals in sustainability, or as more resources offered to develop the sustainability expertise of actors. Funding for actors in cultural and creative sectors, like that granted by funds, is essential for the possibility of taking sustainable procedures into use. To ministries and other important financiers, the LuoTo project offers current information on how sustainability targets can be reached. The sustainability activities of the industries will be accelerated when the most beneficial objects are getting resources. The Helsinki-Uusimaa Regional Council, Creasus ry, MyStash, the Ministry of the Environment, Uniarts Helsinki, and Aalto University. The Finnish Innovation Fund Sitra, Ministry of the Environment, and Ministry of Education and Culture are funding this project.

Main actions	• Diagnosis of the current situation; • Definition of sustainability targets; • Development of the action plan and a toolbox for ecological transition for the creative industry in cooperation with different fields. In a sustainability transition, all fields of society are rapidly adjusting their activities to the limits of the carrying capacity to slow down the climate crisis and biodiversity loss. The action plan and toolbox that will be created in this project will strengthen the preparedness of the actors for a sustainability transition, and to measure the impact of measures. There are many actors in the creative line of business. Half of the Finnish workplaces in cultural and creative sectors are found in Helsinki-Uusimaa.				
Implementation period (timeframe)	2022 -				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	https://uudenmaanliitto.fi/en/projects/luoto				

9. Appendix 8 - Pärnumaa

9.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Parnumaa				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●				
2. *Plans and policy instruments*	●				
3. *Human resources and technical skills*		●	●		●
4. *Participatory governance and stakeholder engagement*	●	●	●		●
5. *Public support. awareness*			●		●
6. *Financial capabilities*		●			
7. *Vulnerability and Risk Assessment*				●	
8. *Innovation Potential Assessment*	●	●	●	●	●

9.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML 1.1: Climate counsellor for the region; digital tool; up to date data, new data	Pärnu linna volikogu planeerimiskomisjon, Pärnu County Development Centre, Pärnumaa Omavalitsuste liidu strateegilise ja ruumilise planeerimise komisjon
ML 1.2: Reconstruct municipality buildings to make them energy efficient	Pärnu linna volikogu planeerimiskomisjon
ML 1.3: Bicycle strategy implemented; green network analysis	Pärnu linnavalitsus
ML 1.4: Pernova Smart Park finished, and educational material published; wind-turbine mechanics study programme; renewable energy specialists for all municipalities	Pärnu linnavalitsus, Tori vald. Häädemeeste vald, Lääneranna vald, Põhja-Pärnumaa vald, Saarde vald, Kihnu vald, Pärnumaa Vocational Education Centre, Pernova Education Center
ML 1.5: Good cooperation with local media outlets	Kihnu leht, Liiviranna, Lääneranna Teataja, Valla Teataja, Saarde Sõnumid, Tori Valla Teataja, Tõstamaa Tuuled, Kodused Hääled, Paikuse Postipaun, Pärnu Postimees, TRE raadio
ML 2.1: Digital twin; new climate and energy plans (for the city and region); functional participatory processes	Pärnu linna volikogu planeerimiskomisjon, Pärnu County Development Centre, Pärnumaa Omavalitsuste liidu strateegilise ja ruumilise planeerimise komisjon
ML 2.2: Public transports fully on electricity (plus hydrogen)	Pärnu linnavalitsus, Tori vald, Häädemeeste vald, Lääneranna vald, Põhja-Pärnumaa vald, Saarde vald, Kihnu vald, Pärnumaa ühistrasnpordi keskus
ML 2.3: Strengthen green network in the county	Pärnu linnavalitsus, Tori vald, Häädemeeste vald, Lääneranna vald, Põhja-Pärnumaa vald, Saarde vald, Kihnu vald
ML 2.4: Educate senior people on climate change issues	Pärnu eakate koostöökogu, Tartu Ülikooli Pärnu Kolledži Väärikate ülikool, Pärnu Pensionäride Liit
ML 2.5: Climate change column in the local newspaper, talkshow in TRE radio (a local radio station), podcasts on climate issues?	Kihnu leht, Liiviranna, Lääneranna Teataja, Valla Teataja, Saarde Sõnumid, Tori Valla Teataja, Tõstamaa Tuuled, Kodused Hääled, Paikuse Postipaun, Pärnu Postimees, TRE raadio
ML 3.1: Climate change has been integrated into regional development documents, guidelines and they are properly implemented	Pärnu linna volikogu planeerimiskomisjon, Pärnu County Development Centre, Pärnumaa Omavalitsuste liidu strateegilise ja ruumilise planeerimise komisjon
ML 3.2: Zero emission county (100% on renewable energy)	Pärnu linnavalitsus, Tori vald, Häädemeeste vald, Lääneranna vald, Põhja-Pärnumaa vald, Saarde vald, Kihnu vald

ML 3.3: Increase the % of green areas in the county; Increasing the % of protected areas in the county; Pärnumaa having an image of being a green tourism destination	Pärnu linnavalitsus, Tori vald, Häädemeeste vald, Lääneranna vald, Põhja-Pärnumaa vald, Saarde vald, Kihnu vald
ML 3.4: Climate change integrated into school system; climate university programmes, multiversitas	Ministry of Education and Research
ML 3.5: Warning system for different climate risks (floods, storms, heat waves, etc.)	Pärnu linnavalitsus, Tori vald, Häädemeeste vald, Lääneranna vald, Põhja-Pärnumaa vald, Saarde vald, Kihnu vald, Pärnu Kriisikomisjon, Estonian Rescue Board, Estonian Meterological Society

9.3. Enabling Projects Portfolio

Enabling Project	**MIP4Adapt technical assistance**				
Promoter	ELLE OÜ (In Pärnu City)				
Brief description	Climate Plan analysis for the City of Pärnu (climate adaption part). Identification of comprehensive list of adaptation options. Define selection criteria to prioritise adaptation options. Develop an adaptation strategy. Develop an action plan. Identification of projects based on the core objectives.				
Main actions	Climate Plan analysis for the City of Pärnu (climate adaption part). Identification of comprehensive list of adaptation options. Define selection criteria to prioritise adaptation options. Develop an adaptation strategy. Develop an action plan. Identification of projects based on the core objectives.				
Implementation period (timeframe)	2024-2024				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.climate-adapt.eea.europa.eu				

Enabling Project	**EC4RURAL, LIFE program**				
Promoter	Tartu University's Pärnu College (In Pärnu County)				
Brief description	The LIFE project EC4RURAL is an initiative focused on promoting the transition to clean energy in rural areas. It aims to foster deeper and transformative relationships between local and regional authorities and rural communities to aid in Europe's clean energy transition. The University of Vigo leads a multidisciplinary consortium for this project, which includes universities, municipal federations, energy agencies, and rural development organizations from Spain, Estonia, and Belgium.				
Main actions	The EC4RURAL project, by bridging the gap between rural communities and clean energy transition processes, aims to ensure that these communities are not left behind in the transition and that they can leverage their local resources effectively for sustainable development. The project's central goal is to enhance the creation of Rural Energy Communities (REC), with pilot initiatives in Estonian and Spanish municipalities, where it will test a socially and sustainably oriented energy model. It also involves close to 94,000 inhabitants across various municipalities, ensuring that rural communities actively participate in and benefit from the processes led by communities producing electricity, particularly through photovoltaic panels.				
Implementation period (timeframe)	2023-2027				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.ec4rural.webs.uvigo.gal				

Enabling Project	**Pernova Smart Park**
Promoter	Pernova Educational Centre
Brief description	Pernova is an educational centre in the city of Pärnu, which offers a large selection of activities, study programs and an exciting experience in the nature house visitor centre. Interest education is offered in nature education, technical and technological education as well as in extreme sports.
Main actions	• A model area for climate education has been completed in the yard area of Pernova Nature House. That is going to be a SMART PARK and renewable energy infrastructure area with an outdoor training class about the environment and climate change. There are also vertical wind turbines and solar panels with storage devices with the possibility of real-time monitoring. • Developed Climate change study programs. Pernova Education Centre can educate students, teachers, and local government officials. • Fossil-free fuel maintenance equipment for the maintenance of the park area, and electric cross-country motorcycles have been introduced in recreational activities.

	• A high-greenery zone has been created by planting trees to reduce the boundaries of the heat islands, using friendly planting methods and rainwater gathering solutions. The yard area of Pernova Nature House has been updated and the species diversity has been increased. The study garden is made, which provides knowledge for the construction of community gardens. • The lighting around the nature house has been switched to solar energy.				
Implementation period (timeframe)	Until 2030				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.eeagrants.org				

Enabling Project	**Sustainable Energy and Climate Action Plan (SECAP)**				
Promoter	City of Pärnu and the County of Pärnumaa				
Brief description	A Sustainable Energy and Climate Action Plan (SECAP) is a document outlining ways to reduce carbon emissions through better energy use and generation.				
Main actions	The SECAP reports on the current energy consumption, CO2 emissions and climate threats along with the strategy and action plan to tackle these issues and set goals for reducing greenhouse gas emissions.				
Implementation period (timeframe)	Until 2030				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.eeagrants.org				

Enabling Project	**Pärnu City development plan**				
Promoter	Pärnu City (city government)				
Brief description	"Pärnu development plan until 2035" initiative as a whole ensures that the future strategic goals and action plans of the city are connected to a common one with a broader vision and development directions.				
Main actions	1. Organization of human assets and community life - cohesive county 2. Knowledge-based economy 3. Tourism and county marketing 4. Technical infrastructure, mobility and adaptation to climate change				
Implementation period (timeframe)	Adopted and in place until 2035				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	**Stage 03 Implementing and learning**	Stage 04 Scaling up
More information	www.pol.parnumaa.ee				

10. Appendix 9 - Sitia

10.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Sitia				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●			●	●
2. *Plans and policy instruments*	●			●	●
3. *Human resources and technical skills*	●	●	●	●	●
4. *Participatory governance and stakeholder engagement*	●	●	●	●	●
5. *Public support. awareness*	●	●	●	●	●
6. *Financial capabilities*	●	●	●	●	●
7. *Vulnerability and Risk Assessment*	●	●	●	●	
8. *Innovation Potential Assessment*	●	●	●	●	●

10.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML 1.1: Promotion of awareness rising; protection of natural environment and natural heritage; local supporters and promotion/use of local products - quality standards protocol	Aenaos wind park Sitia, Archaeological Museum of Sitia, Crete Adventure, Kastellos Touristic Activities, Kriti Raid Excursions, Mountain Guides of Sitia district, Itanos tours, My Sitia Secret Excursions, Presos, Sitia Geopark, Toplou Monastery Foundation, Vitsentzos Kornaros Foundation, Municipality of Sitia
ML 1.2: Carbon zero olive oil factory; re-Skilling of personnel; biological control of pests	NR
ML 1.3: Awareness rising; psychological support to vulnerable groups; educational activities with focus on disaster reduction and protection of communities; Citizen based exercises	NR
ML 1.4: Climate monitoring of GHG+; Pollution x Coastal environment monitoring; Awareness app	NR
ML 1.5: Developed communication infrastructures across rough terrains; app for citizen awareness	NR
ML 2.1: Independent structure of Geopark sustain funding; promote climate neutral tourism safe tourism	Agricultural Cooperatives, Chamber of Commerce Sitia, EREN, Lithines, Papagiannades, Sitia Geopark, Women's Associations, Municipality of Sitia, Hotels, Kreon Wind Park, Mines of Sitia
ML 2.2: introduce agricultural sustainable and carbon neutral products; totally stop pesticides; water management practices; new varieties resistant to climate	NR
ML 2.3: New services for community resilience; New structures to promote community protection from municipality and volunteers; incorporate all levels of governance, services, educational facilities and population	NR
ML 2.4: Municipal structure to maintain the app (from R4C) and volunteering groups	NR
ML 2.5: Citizen engagement and training	NR

10.3. Enabling Projects Portfolio

Enabling Project	FEAST – Living Lab				
Promoter	Municipality of Sitia				
Brief description	The objective of FEAST is to identify effective methods and solutions that can be implemented locally to ensure the long-term sustainability of Sitia olive oil. As a product that has been given Protected Designation of Origin status, it is an essential component of the local Mediterranean diet and a crucial contributor to the region's economy.				
Main actions	The main actions are: *i) improving the quality of cultivation, reducing its environmental impact and preserving the rich endogenous biodiversity, by using biological practices and minimizing the use of chemicals, pesticides and fertilizers;* *ii) reducing energy costs and promoting new farming methods that are carbon neutral;* *iii) assessing the impact of climate change, given that the region has been identified as a "climate Hot Spot" by the Intergovernmental Panel on Climate Change (IPCC);* *iv) analyzing the role of local cooperatives and food culture;* *v) establishing strong partnerships to promote olive oil and the Cretan diet at a European level.*				
Implementation period (timeframe)	2021-2026				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.feast2030.eu/livinglabs/sitia				

Enabling Project	NEVERMORE				
Promoter	Bruno Kessler Foundation – FBK (lead partner); Municipality of Sitia (partner)				
Brief description	NEVERMORE it's a Horizon Europe project that helps to better understand the interactions between climate change impacts and mitigation and adaptation options to deliver sound technical and policy recommendations towards a climate-neutral and resilient society. The NEVERMORE project is determined to support excellence in research on climate science and climate policy. Focused on the modelling theory to take a significant step forward to overcome the current silo approach in favour of an integrated assessment for evaluating impacts, risks and interactions of climate change across sectors and adaptation and mitigation strategies towards a climate-neutral and resilience society, relying on the multiple feedbacks that occur between the variables involved in climate change.				
Main actions	The NEVERMORE project aims to develop an integrated common assessment framework (for modelling, simulating, and evaluating impacts of both climate change and policy measures) tailored to the needs of different stakeholders and end-users (public and private actors, decision-makers and citizens). It will include climate information, Earth Systems, human and impact models in a robust, reliable, detailed and transparent way, for delivering multi-sectoral climate impact assessments under consistent and integrated socio-economic and climate scenarios. The NEVERMORE approach integrates the information from physical modelling of impacts and risk analysis methodologies and aligns them across different scales: from national, EU and global scales to local and regional scales via five representative case studies that represent various socio-ecological systems.				
Implementation period (timeframe)	2022-2026				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.nevermore-horizon.eu/				

Enabling Project	WATER-WAYS
Promoter	Hellenic Mediterranean University (lead partner); Municipality of Sitia (partner)

Brief description	As part of Interreg V-A Cooperation Program Greece - Cyprus 2014-2020, the project concerns the enhancement and improvement of the attractiveness of areas of natural and cultural interest through the protection and promotion of important "water elements" on the E4 path in Crete and Cyprus. E4 has special environmental, cultural, and historical value for the two islands. It runs through areas and monuments of special natural beauty which are part of European and international protection networks such as Natura 2000 and the UNESCO Geoparks network to which the Sitia (Crete) and Troodos (Cyprus) Geoparks belong. Recognition of them, as a comparative advantage, provides unique opportunities and possibilities for local communities for sustainable development and promotion as geotourism destinations of excellence. The project highlights the value and special features of geological and cultural heritage, contributes to the protection and preservation of the natural and cultural environment and raises public awareness about climate change and sustainability. It is a tool of an integrated social and economic sustainable local development. The partners designed and submitted this project proposal as part of a joint effort to meet the development objectives that aims to exchange best practices, adopt common approaches, implement joint actions and produce common innovative products and services with the following common objectives
Main actions	The project will develop: • *actions to increase the capacity of existing infrastructure (places to visit and interactive models),* • *enrichment and development of activities, information and education of residents, tourists, students, and entrepreneurs using new ICT technologies specific to tourist / recreational/educational visits,* • *recording and documentation of monuments and areas of natural interest of water elements,* • *portable museum kits,* • *communication material, documentaries / small commercials,* • *pilot actions for the protection, conservation, and restoration of disturbed habitats.*
Implementation period (timeframe)	2021-2023
Current state	Stage 00 identifying the challenge / Stage 01 defining leadership / Stage 02 designing and planning / Stage 03 Implementing and learning / **Stage 04 Scaling up**
More information	www.projectwaterways.eu

Enabling Project	**Med-IREN: Mediterranean critical Infrastructure Resilience Engineering with Nature based solutions**
Promoter	National Center for Scientific Research "Demokritos" (Coordinator) and 30 European partners
Brief description	The Med-IREN project aims to provide actionable demonstration on how to climate proof the Mediterranean critical infrastructures, across critical sectors, by introducing NBS both in terms of improving climate risk management and sustaining their business continuity to extreme climate change. Med-IREN will rely on the integration of the research output of more than 15 European and National projects, that focused on the (climate) resilience of infrastructures, regional adaptation and implementation of NBS. Med-IREN is conceived as a powerful showcase of the EU twin green & digital transition and an immediate success story of the EU Green Deal.
Main actions	• The project will be showcased in five lighthouse regions across the Mediterranean, each corresponding to a present-day challenge, that are aligned with regional policies and can constitute the EU as a global leader in the field. • Med-IREN will cover different and diverse types of CI (energy, transport, water, ICT, social), priority climate hazards within the Mediterranean, which is a climate hot-spot, and NBS interventions. • the interventions and solutions will be replicated into four more regions across the EU, covering the Mediterranean, Black Sea, and Boreal regions. • provide evidence how key enabling conditions, such as participatory governance and citizen engagement, novel forms of financing, innovative urban/landscape planning and capacity building will support regional systemic transformation and provide the upscaling and replication mechanism within Mediterranean regions and beyond. • development of a high-end digital decision-making support toolset integrating data from multiple sources, both in situ and E.O., applying state-of-the-science models, as well as providing

	unprecedented visualization and sensemaking capabilities for understanding and quantifying resilience through-out the infrastructure and NBS life-cycle				
Implementation period (timeframe)	October 2024 to September 2028				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	https://www.santannapisa.it/en/progetto/med-iren-mediterranean-critical-infrastructure-resilience-engineering-nature-based				

Enabling Project	**LIFE-AGROASSIS: Regenerative approaches for building climate change resilience in EU agricultural regions prone to desertification**
Promoter	Agricultural Research Institute (ARI)
Brief description	The primary objective of AgrOassis is to assist climate change adaptation in the agricultural sector of the EU's two most south easterly countries, Cyprus and Greece, and beyond. To meet the objectives of the EU legislation and policy on climate action AgrOassis will develop, demonstrate and promote innovative techniques, best practices, methods and approaches, as well as close-to-market solutions in areas currently exposed to desertification. As a consequence of inappropriate land use and wildfires, these areas are expected to become even more vulnerable under climate change. The project will also markedly contribute towards climate change mitigation, promote carbon farming and biodiversity restoration. The latter will be achieved by promoting effective re-growth of trees and shrubs in degraded field margins and by aiding pollination processes, in regions of poor soil quality and very low natural vegetation cover. While regenerating ecosystem services within degraded agroecosystems, AgrOassis will also seek to identify and remove obstacles related to inappropriate governance and policies that obstruct the implementation of the EU's Green Deal Agenda and the aim of reaching climate neutrality by 2050. Preparatory work for AgrOassis, has identified Cyprus as a hotspot of unsustainable soil management practices connected to widely applied tillage. This appears as an indirect side-effect of government policies aiming to enforce CAP EU legislation, as well as a direct result of inappropriate counselling towards farmers and inadequate training on how to combat desertification. AgrOassis also attempts to mobilize the private sector by utilizing available unexploited resources to promote the circular economy concept in the agricultural sector of Cyprus. At the same time, the project will mobilize private investment towards close-to-market solutions on green waste sustainability and sustainable soil management in line with the EU's Farm to Fork Strategy.
Main actions	• Preparatory Actions and Implementation Plan to Combat Desertification and Adapt to Climate Change • Soil improvement by mulching and minimum or no-tillage • Resilient Hedgerow Installation in Burnt and/or Degraded Agricultural Land • Sustainable Production of Compost and its application on Degraded Soils • Sustainability, replication and exploitation of project results
Implementation period (timeframe)	October 2022 – December 2026

Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	LIFE – AgrOassis | Laona Foundation				

11. Appendix 10 - Castilla y León

11.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Castilla y León				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●				
2. *Plans and policy instruments*	●				
3. *Human resources and technical skills*		●		●	
4. *Participatory governance and stakeholder engagement*	●	●		●	●
5. *Public support. awareness*				●	●
6. *Financial capabilities*		●			
7. *Vulnerability and Risk Assessment*			●		
8. *Innovation Potential Assessment*	●	●	●	●	●

11.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML 1.1: Identify and open dialogue with key actors and stakeholders; Key outcome: new climate adaptation plan	Environmental Department of Junta Castilla y Léon, Diputaciones Provinciales
ML 1.2: Organise meetings in the administration to evaluate different aspects to incentivize cooperation between companies; Action packages	Environmental Department of Junta Castilla y Léon, Diputaciones Provinciales, Urcacyl, Vitartis
ML 1.3: Innovative production model consolidated	Hortafercar, Viveros Fuenteamarga, Expo Biomasa, Environmental Department of Junta Castilla y Léon, NAVALFRESA
ML 1.4: Organise meetings with RTOs/University; Present objectives and development; Action plan for training; Training course with the project experience	Environmental Department of Junta Castilla y Léon, ITACYL, ITAGRA, University of Valladolid, INEA, training centres
ML 1.5: Meeting with the local action group of Tierra de Pinares and present the pilot; Replicate with other local action groups	Environmental Department of Junta Castilla y Léon, Diputaciones Provinciales, Local action groups
ML 2.1: Evaluate the performance of the plan; Corrective actions and second version of the plan	Environmental Department of Junta Castilla y Léon
ML 2.2: Development of action packages; evaluation and corrective actions	Environmental Department of Junta Castilla y Léon, Diputaciones Provinciales, Urcacyl, Vitartis
ML 2.3: Replication in other provinces (scalable)	Hortafercar, Viveros Fuenteamarga, Expo Biomasa, Environmental Department of Junta Castilla y Léon, NAVALFRESA
ML 2.4: Inclusion of the new Innovations in adaptation to climate change models within capacitation training courses; Training	Environmental Department of Junta Castilla y Léon, ITACYL, ITAGRA, University of Valladolid, INEA, training centres
ML 2.5: Local action groups developing new business models based on the project	Environmental Department of Junta Castilla y Léon, Local action groups
ML 3.1: Impact evaluation of the plan (in the long term)	Environmental Department of Junta Castilla y Léon
ML 3.2: Impact evaluation of the plan (in the long term)	Environmental Department of Junta Castilla y Léon, Diputaciones Provinciales, Urcacyl, Vitartis

ML 3.3: Evaluation of the impact; new model consolidated in Castilla Y Léon	Hortafercar, Viveros Fuenteamarga, Expo Biomasa, Environmental Department of Junta Castilla y Léon, NAVALFRESA
ML 3.4: New business models created by the trained people	Environmental Department of Junta Castilla y Léon, ITACYL, ITAGRA, University of Valladolid, INEA, training centres
ML 3.5: Evaluate the number of business models created	Environmental Department of Junta Castilla y Léon, Local action groups

11.3. Enabling Projects Portfolio

Enabling Project	**Reindustrialisation, Entrepreneurship and Innovation in traditional productive sectors sectors (Productive sectors)**				
Promoter	ITACYL				
Brief description	The objective of the project is to promote innovation in the agri-food sector by means of the creation of methodologies and processes that enable the development of improved and validated products for the market, with emphasis on new products that create differentiation and new opportunities in foreign markets. in foreign markets. In addition, the project involves the creation of an inter-regional collaboration space that will improve external competitiveness and strengthen SMEs. The objectives of this project are framed within the Map of Agricultural and Agri-food R&I needs of Castilla y León, specifically through the Programme "Application of new and emerging technologies for the novel and emerging technologies to obtain differentiated products with greater added value".				
Main actions	The creation of a tool that will allow the promotion of entrepreneurship and the activation of small and medium-sized enterprises, covering aspects from the analysis and validation of markets, production processes to the and medium-sized enterprises, covering aspects ranging from market analysis and validation, production processes to distribution and logistics. distribution and logistics. In addition to allowing innovation associated with entrepreneurship to reach the agro-industrial sector more fluidly. and revitalise and strengthen the agro-industrial sector by increasing productivity and competitiveness in this sector, through initiatives to improve the sector, through initiatives to improve any part of the value chain and technological advances applied to agri-food. Therefore, improve the competitiveness of innovations at regional, national and international levels.				
Implementation period (timeframe)	October 2017 - September 2019				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.keep.eu				

Enabling Project	**Integral strategy for the use of agro-industrial by-products for food (Integral strategy)**				
Promoter	ITACYL				
Brief description	The implementation of a fundamental research action oriented towards aspects of special territorial interest for the Autonomous Regions, such as the revalorisation of industrial waste and its reincorporation into the production chain, mainly for sheep, with an important emphasis on giving it added value.				
Main actions	This project serves as a platform for successful collaboration between the participating institutions, sharing a common vision of the state of the by-products and animal feed sector and offering a clear advantage in the preparation of competitive proposals in the field of the valorisation of by-products for feed.				
Implementation period (timeframe)	2020-2023				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	www.itacyl.es				

Enabling Project	**New strategies for soil disinfection in strawberry nurseries in Castilla y León (FRESA FRUIT VIVERIES) (FRESA FRUIT)**				
Promoter	ITACYL				
Brief description	The strawberry nursery sector in Castilla y León is one of the most important in the world. It is currently facing a new challenge. The disappearance of 1,3-D and chloropicrin will lead to significant yield losses in strawberry nurseries, so the search for treatments and/or technologies that can be used to replace them is essential for the survival of the sector. This project aims to generate information about the existing alternatives to these products.				
Main actions	The investment in innovation in this project aims to generate information about existing alternatives, both chemical and biological, to these products for soil disinfection in strawberry nurseries in Castilla y León, with the following specific objectives: Objective 1. Control of fungal pathogens in strawberry plants. Adventitious plants associated with strawberry plant production. Incidence of nematodes in disinfected soils Objective 4. Objective 4. Soil as a living substrate				
Implementation period (timeframe)	April 2023 - March 2025				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	-				

Enabling Project	**Cross-border strategy for the promotion of efficient farm management through technological development and innovation: business and social transfer (0745_SYMBIOSIS_II_3_E) (SYMBIOSIS)**				
Promoter	ITACYL				
Brief description	The cross-border area of Castile-Leon and the central region of Portugal is characterised by an ageing and socially impoverished region, and by the predominance of rural municipalities. This is the result of the existence of a weak business fabric, based on small family businesses incapable of generating a high number of jobs, which makes it difficult for the population to settle in the area.				
Main actions	Promote the efficient and integrated management of farms to make them more profitable, competitive, and efficient through technological development and innovation. Encourage business investment in R&D&I by developing links and synergies between companies, research centres and universities. To develop technological products and services for the agricultural and livestock sector to stimulate demand in the region, ecological innovation in the sector and applied technological research. Early validation of the products or services resulting from the project through advanced manufacturing and first production, thanks to the development of enabling technologies and their dissemination to society.				
Implementation period (timeframe)	January 2019 - December 2021				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	-				

12. Appendix 11- Nordic Archipelago

12.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Nordic Archipelago		
	CRIO 1	CRIO 2	CRIO 3
1. *Regional Governance and Institutional capacity*	●		
2. *Plans and policy instruments*	●	●	
3. *Human resources and technical skills*		●	●
4. *Participatory governance and stakeholder engagement*	●		●
5. *Public support. awareness*		●	●
6. *Financial capabilities*			●
7. *Vulnerability and Risk Assessment*			●
8. *Innovation Potential Assessment*	●	●	●

12.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML 1.1: Local short-term strategy defined and in action; Series of dedicated workshops with key regional stakeholders to define a preliminary structure for a cross-sectoral climate action policy at regional level	NR
ML 1.2: Models of energy and transport are defined; Interconnection of above models are defined; Identification of other sectors to be involved in order to create a circular economy	NR
ML 1.3: Define new local university/academic programme(s) to support data collection, knowledge development and research (horizontal programme across the universities in collaboration with stakeholders); systematic testing of the solutions developed with the voluntary of local stakeholders	NR
ML 2.1: local and National strategies synchronized and merged from relevant parts	NR
ML 2.2: legislation to increase the adaptation of circular economy in selected sectors; incentives created; programme for implementing Pilots actions with funding	NR
ML 2.3: funding for the programs secured; commitments of the universities acquired; collect Lessons Learned; widen the engagement of local stakeholders	NR
NR	NR

12.3. Enabling Projects Portfolio

No information

13. Appendix 12 - Troodos

13.1. CRIOs' alignment with RRMM dimensions

RRMM Dimensions (T4.1/T4.3)	CRIOs – Troodos				
	CRIO 1	CRIO 2	CRIO 3	CRIO 4	CRIO 5
1. *Regional Governance and Institutional capacity*	●				
2. *Plans and policy instruments*	●	●			
3. *Human resources and technical skills*		●		●	
4. *Participatory governance and stakeholder engagement*	●		●	●	
5. *Public support. awareness*		●	●		
6. *Financial capabilities*				●	
7. *Vulnerability and Risk Assessment*					●
8. *Innovation Potential Assessment*	●	●	●	●	●

13.2. The regional innovation ecosystem engagement in RIR

Innovation milestones	Stakeholders to involve
ML 1.1: 01 July 2024 the clustering of local community councils will take effect by law	all
ML 1.2: The buildings of the University are planned to be energy neutral and all campuses will be linked via sustainable Mobility options; Climate resilience will be integrated into the training of Troodos University by the end of 2025; By 2026 the curricula for the courses will be created - climate resilience to be included	Troodos commissions, community councils, Troodos network
ML 1.3: Meeting with Troodos commissions Troodos tourism; Board Troodos development agency by the end of 2025; workshop with stakeholders that offers tourism packages and activities by the end of 2026	Cyprus Agrotourism Association, Troodos development company, Troodos Tourism Board, Troodos commissions
ML 1.4: Set up of stakeholders group on restoration and regenerative tourism; Define ways in which tourism activities can contribute to Regeneration of Wildlife	Cyprus Agrotourism Association, Troodos development company, Troodos Tourism Board, Troodos commissions. department of forest
ML 1.5: Mapping and identification of the villages which will act as lighthouses in each Troodos sub region to be trained; creation of tailored thematic training material; training implementation	Women's Association Agros, Women's Association Vouni; villages
ML 2.1: These clusters of local community councils will be upgraded into rural municipalities - opportunity to introduce new governance structures and authorities	all
ML 2.2: University will be operating and will be training young people	Troodos university
ML 2.3: Troodos tourism product has integrated climate resilience	Troodos Tourism Board
ML 2.4: Implementation of tourism activities that regenerate the forest ecosystem; Monitoring and evaluation of these activities for efficacy	Cyprus Agrotourism Association, Troodos development company, Troodos Tourism Board, Troodos commissions. department of forest
ML 2.5: Monitoring and evaluation of impact of training using KPI (example: number of new businesses, number of new products, etc.); Replication to other Villages; Development of necessary infrastructure shared by communities	Cyprus Agrotourism Association, Troodos Tourism Board, villages
ML 3.3: Troodos is a climate-neutral regenerative tourism destination	Troodos Tourism Board
ML 3.5: All villages in Troodos to be covered	Troodos Tourism Board

13.3. Enabling Projects Portfolio

Enabling Project	Olympos Troodos University				
Promoter	Troodos Network and Mesoyios College				
Brief description	Creation of a University in the region				
Main actions	5 schools oriented in rural sustainable development. Aim to have 5 schools: 1) Tourism and Hospitality 2) Agriculture and Innovation 3) Rural Business and Entrepreneurship 4) Technology and AI 5) Humanities and Mediterranean Studies. It is an innovative initiative as 5 universities from across Greece, Poland, Switzerland and Egypt with cooperate together to develop the University.				
Implementation period (timeframe)	2022-2027				
Current state	Stage 00 identifying the challenge	Stage 01 defining leadership	Stage 02 designing and planning	Stage 03 Implementing and learning	Stage 04 Scaling up
More information	-				