



D4.4

Draft Policy and Steering Instrument Recommendations



**Regions
4Climate**



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List of Acronyms

AAs	Assumption of Actions
CAPB	La Communauté d'agglomération du Pays Basque
CCAP	Climate Change Adaptation Plan
CCA	Climate Change Adaptation
CCAMIP	Climate Change Adaptation Mission Implementation
CIF	Common Innovation Framework
CoM	Covenant of Mayors

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CR	Climate Resilience
CRIO	Climate Resilience Innovation Objectives
CyL	Castilla y León
DMI	Danish Meteorological Institute
DRR	Disaster Risk Reduction
EIA	Environmental Impact Assessment
ERDF/FEDER	European Regional Development Fund
EU SACC	EU Strategy for Adaptation to Climate Change
EU CCAMIP	EU Mission for Adaptation Implementation Plan
FA	Faster Adaptation
HKI CCAP	Helsinki Climate Change Adaptation Policy
HKI SECAP	The SECAP of the city of Helsinki
ICLEI	Local Governments for Sustainability
Interreg	EU interregional cooperation programme
JTR	Just Transition Roadmaps
KLIMA 2050	Climate Change Strategy of the Basque Country to 2050
KPI	Key Performance Indicator
L	Local
LA	Local Authorities
LDP	Local Development Plan
M&E	Monitoring & Evaluation
NAQ CCAP	National
NbS	Nature based Solutions

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NA	Nordic Archipelago
NAQ	Nouvelle-Aquitaine
PPP	Public-Private Partnership
PB CCAP	Pays Basque Climate Change Adaptation Plan
PMA 2030	Programa Marco Ambiental 2030
R4C	Regions4Climate
RDP	Regional Development Plan
RIR	Regional Innovation Roadmaps
RIS3	Research and Innovation Strategy for Smart Specialisation
RRMM	Regional Resilience Maturity Model
S3	Smart Specialisation Strategy
S4+	Smart Specialisation Strategies for Sustainable and Inclusive Growth
SACC	Strategy on Adaptation to Climate Change
SEA	Strategic Environmental Assessment
SECAP	Sustainable Energy and Climate Action Plan
SDG	Sustainable Development Goals
SmA	Smarter Adaptation
SysA	Systemic Adaptation
WP	Work Package

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Keywords list

- Adaptation
- Climate resilience
- Steering instruments
- Policy instruments
- Regional Policy
- Coherence

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1. Executive summary

This deliverable presents policy recommendations from the Regions4Climate (R4C) project, focused on enhancing climate resilience (CR) through improved alignment of policy and steering instruments across 12 European regions. It builds upon prior R4C work, including the following component of R4C: Just Transitions Framework (D2.1), Climate Resilience Maturity Assessment (D4.2), Governance Recommendations (D4.3), the Common Innovation Framework (CIF) (D6.1) and Regional Innovation Roadmaps (D6.2).

The report combines two core analyses: a **cross-sectoral policy analysis** and a **steering instrument analysis**.

The cross sectoral policy analysis examined regional strategies — including Smart Specialisation Strategies (S3), Climate Adaptation Plans (CAPs), and Regional Development Plans (RDPs) — for alignment with the EU Strategy on Adaptation to Climate Change (SACC) and the EU Mission for Adaptation Implementation Plan (CCAMIP). It assessed how regional plans support smarter, faster, and more systemic adaptation, while integrating justice dimensions such as procedural, distributive, recognitional, and restorative justice.

The steering instrument analysis evaluated the regulatory, financial, and informational tools used by each region to support climate adaptation and resilience. It is based on the joint survey conducted by T4.2 and T4.4. which helped to identify steering instruments, synergies and conflicts between instruments. This survey was also the basis for the region-specific scores related to instruments referenced from D4.3 Governance Recommendations. The survey data from regional partners revealed gaps in the coordination, funding, and inclusiveness of adaptation planning.

Key insights include the need to:

- Strengthen integration of climate resilience (CR) in sectoral and innovation policies.
- Increase the use and diversity of financial tools.
- Enhance participatory governance and community-level knowledge use.
- Develop monitoring systems and evaluation metrics for adaptation impact.
- Scale up nature-based solutions and ensure long-term freshwater sustainability.

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Each region's analysis culminates in a tailored set of policy and instrument recommendations, grounded in context-specific challenges and governance structures. These recommendations are designed to improve the uptake and implementation of adaptation strategies and to advance socially just climate resilience transitions.

The deliverable contributes with strategic inputs for future policy briefs (D4.5) and Smart Specialisation Strategies for Sustainable and Inclusive Growth (S4+), supporting a coherent, learning-oriented, and just approach to climate adaptation and resilience in Europe.

2. Introduction

This deliverable assesses the existing policy and steering instruments in Regions4Climate (R4C) regions and makes recommendations for how both policies and steering instruments could be strengthened to align with their regional ambitions for climate resilience (CR). It builds on earlier R4C work and feeds into T4.5. D4.4 is a deliverable from T4.4 in Regions4Climate, which reads as follows¹:

T4.4 Policy needs analysis (SKT, SPI, ICL, UH, ZAB, FRC, CPB, RT, RGH, ZEA, URC, FVH, BUR, SIT, NCD, JCL, ALF, CEA, TEC, UCP, EKK, SPA, DRI, VTT, RS) [M14-M42] Review alignment of regional CR ambitions and roadmaps for just transition (T2.4) with existing policy instruments. Assess each region's progress during the project towards equitable and just adaptation/resilience using relevant KPIs collected through WP2,3,4 and mapped against relevant SDGs. This progress assessment will be reflected in policy briefs together with the analysis of policy instruments in each region. Examine existing S3/4 macro-regional strategies and identify links between smart specialisation and mission-oriented policy for sustainable development, focusing on innovations for transformative change within the context of socially just transition and evidence-based climate change adaptation. Generate specific recommendations of future policy needs to advance the CR of each demonstration region and cluster recommendations within thematic policy briefs (D4.4). Synthesise the information from each demonstration region in collaboration with regional stakeholders and within the context of the Common Innovation Framework (CIF) (T6.1) to derive specific recommendations that serve as strategic inputs for the ideation of (macro-)regional Smart Specialisation Strategies for Sustainable and Inclusive Growth (S4+) in T4.5 (D4.4). In addition, this task delivers D4.5 Policy briefs.

D4.4 includes results from the following components of T4.4:

- Review alignment of regional CR ambitions and roadmaps for just transition (T2.4) with existing policy instruments.
- Examine existing S3/4 regional strategies and identify links between smart specialisation and mission-oriented policy for sustainable development, focusing on innovations for transformative change within the context of socially just transition and evidence-based climate change adaptation.

¹ Minor changes in the T4.4 have been agreed upon with the Regions4Climate Policy Officer.

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- Generate specific recommendations of future policy needs to advance the CR of each demonstration region.
- Synthesise the information from each demonstration region in collaboration with regional stakeholders and within the context of the Common Innovation Framework (CIF, T6.1) to derive specific recommendations that serve as strategic inputs for the ideation of (macro-)regional Smart Specialisation Strategies for Sustainable and Inclusive Growth (S4+) in T4.5 (D4.4).

Note that this deliverable does not include the following, as it will be mentioned in the Policy Brief (D4.5):

- Assess each region's progress during the project towards equitable and just adaptation/resilience using relevant KPIs collected through WP2,3,4 and mapped against relevant SDGs. This progress assessment will be reflected in policy briefs together with the analysis of policy instruments in each region.

D4.4 also builds upon earlier outputs and work in Regions4Climate, including:

- Just Transitions Framework (D2.2, Klein et al. 2023).
- Just Transition Roadmapping process in each region for the alignment of regional CR ambitions and roadmaps for Just Transition (T2.4) with existing policy instruments.
- Climate Resilience Maturity Assessment (D4.2).
- Governance surveys sent to regions in Spring 2024 and recommendations in D4.2.
- Governance Recommendations (D4.3, Malmström et al. 2024).
- Common Innovation Framework (CIF) & Solutions Portfolio (D6.1, Thompson et al. 2023).
- Regional Innovation Roadmaps (D6.2).

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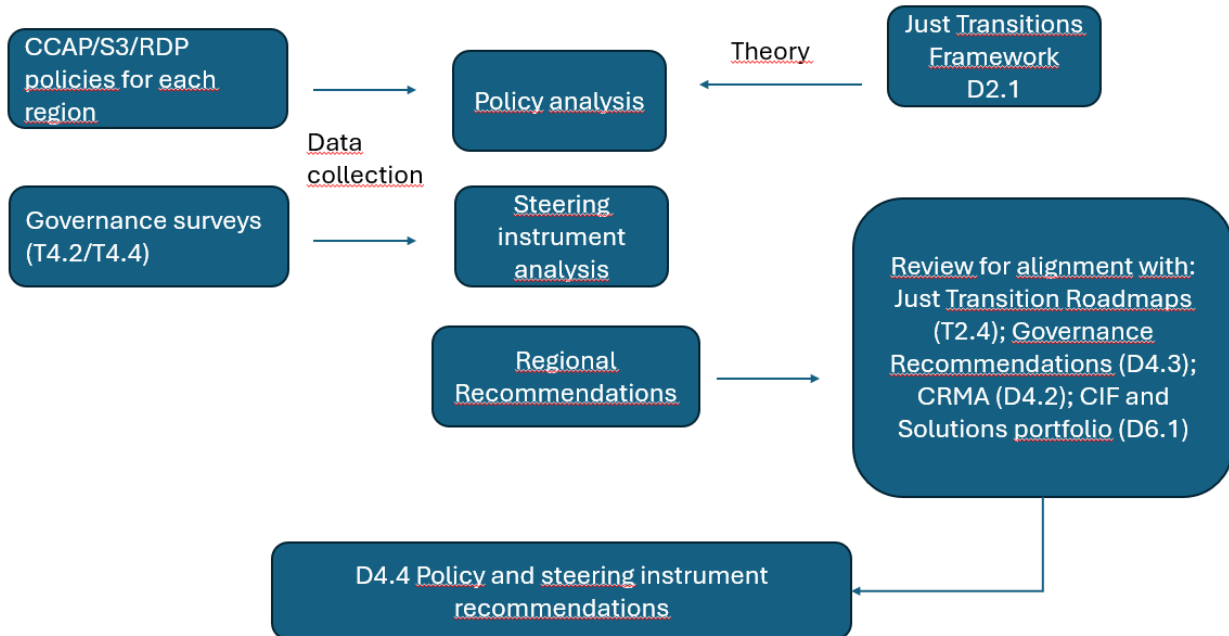


Figure 1. Interlinkages between different components of R4C and D4.4.

Glossary:

- **Climate change adaptation (CCA)** refers to “the process of adjustment [of human and natural systems] to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” (Möller et al. 2022, p. 2898).
- **Climate resilience (CR)** refers to the enhancement “of the capacity of society and the natural systems we rely on to persist, adapt and transform, in anticipation of and response to disruption and crises” (Lager et al., 2023, p. 4). This is in line with the understanding of adaptation from small incremental measures to larger transformative societal changes. “The capacity of interconnected social, economic, and ecological systems to cope with a hazardous event, trend or disturbance, responding or re-organising in ways that maintain their essential function, identity, and structure. Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation” (Möller et al. 2022, p. 2920).
- **Authority-controlled** means that the instrument is initiated and coordinated by an official public authority/government body, in contrast to e.g., a guiding strategy for regional development that is

put forth by a non-governmental organisation. Being a public authority does not require having legislative powers.

- **Equity** refers to the concept of fairness in the treatment of individuals and groups within a various context. It includes accounting for their specific needs and capacities. Some examples of legal frameworks or policies that explicitly support equity include regulations that require specific standards of participation or engagement of vulnerable groups; accessibility-related regulations for public buildings, or sectoral or cross-sectoral plans that specifically include a focus on vulnerable groups, etc.
- **Justice** refers to the principle of moral and/or legal rightness involving systems and structures that ensure fairness and protection of rights. We identify four dimensions of justice (distributive, procedural, recognitional and restorative dimensions) which are also used in D2.3.
- **Steering instruments** are defined as intentional and repetitive techniques used by actors (often governmental authorities) to affect society and support the delivery of certain policy goals (Huppes and Simonis 2009, Mickwitz 2003).

2.1 Structure

In this document, each region is analysed, first in terms of its cross-sectoral policies (Smart Specialisation Strategies (S3), regional development strategies and climate change adaptation strategies) to identify the alignment with the EU Climate Change Adaptation Strategy, and second in terms of the region's steering instruments as found in each region's policy documents, surveys, and innovation strategies (D6.2). The details of the analytical process and data used in the policy recommendations are outlined in the following two sections: 2.1 Cross-sectoral policy analysis and 2.2 Steering instrument analysis. The cross-sectoral policy analysis of regions' adaptation, development and smart specialisation policies identifies regional policy coherence and gaps, while the steering instrument analysis identifies strengths and gaps in the various types of steering instruments supporting CR in each region. Building off this integrated analysis, policy and steering instrument recommendations are formulated for each region 1) to improve and better implement relevant steering instruments and 2) to identify gaps and opportunities in order for each region to achieve their CR goals and for CR policy to be in better alignment with the EU climate adaptation strategy (Smarter, Faster, and More Systemic Adaptation). These are reviewed against the D4.2 and D4.3 indicators and supplemented with aligned input from the Just Transition Roadmaps (D2.4) and Regional Innovation Roadmaps (D6.2) as shown in Figure 1. Based upon each region's policy documents, a table, immediately following the policy and steering analysis, identifies if each region has addressed relevant Climate Adaptation Concepts.

3. Aims and Methods

3.1 Cross-sectoral policy analysis

3.1.1 Aim

The aim of this analysis is to assess existing S3 macro-regional and regional smart specialization strategies to identify links between S3 and mission-oriented policy for sustainable development focusing on the innovations for transformative change within the context of socially just transition and evidence based CCA.

3.1.2 Methods

Data Collection

To fulfil the aim, we assessed S3 strategies, regional development plans (RDPs), and climate adaptation plans (CCAPs) for each region. The RDPs and climate adaptation plans were identified via the Governance survey, while the S3s were identified using the EU JRC's S3 platform. Regional documents were used unless they were not available, or they were not the main steering instrument. In these cases, local or national documents were used depending on which were more influential for steering. The documents are identified in Annex 2 (Datasets).

Data analysis

The documents were assessed against the main components of Smarter, Faster and Systemic Adaptation categories used in the EU Strategy on Adaptation to Climate Change (SACC) and EU Climate Change Adaptation Mission Implementation Plan (CCAMIP). While the EU SACC and the EU CCAMIP both use the Smarter, Faster, and Systemic Adaptation categories, their components differ slightly. However, the coding used in the analysis is detailed in Table 1 below. Also, while the EU Adaptation Strategy reflects equity and justice aspects in several places, we have gone into more depth in terms of the analysis. For this, we used the “Dimensions of Justice” framing that are also used in D2.1 (Just Transitions Framework). This includes distributional justice, procedural justice, recognitional justice and restorative justice. This is also described in Table 1 below. The analysis is also aligned with the Common Innovation Framework (CIF, T6.1/D6.1). Transversal to S3, RDP and Adaptation Strategies, the CIF emphasise the key elements for innovation, including supportive structures (“supportive ecosystem”), data management, stakeholder engagement, knowledge creation and transfer, networking, learning and capacity building. As these aspects are also emphasised in the EU SAASS and EU CCAMIP, they are central to our analysis and recommendations, which relate to innovation and learning, multi-level governance and public engagement, all aligned with the CIF rationale, which was co-developed with regions.



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Note that for the policy analysis, all three types of adaptation are covered (i.e., faster, smarter, and systemic), and all regions generally demonstrate activity in all three. The scope of the analysis is to identify, address, and provide recommendations regarding all three types of adaptation where relevant. Therefore, while the regions are categorised by Challenge Suites, there is not a specific focus on the respective Suites for each individual region, instead the same model is broadly applied to each region. The analysis and recommendations provided in the D4.4 Policy Recommendations will be used in the D4.5 Policy Briefs, which will deliver three policy briefs – one per R4C Challenge Suite – and will synthesis previous work to provide more specific analysis tailored around each of the three types of adaptation.

Table 1. CCA Concepts and Coding Information.

Types of adaptation	Concept	Description based on EU Adaptation Strategy (EU SACC) and/or the EU Mission for Adaptation Implementation Plan (EU CCAMIP)	What was coded for
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Collecting and standardising data on climate-related economic losses and physical risks to improve risk assessment and investment decisions ^{1, 2} , Step 1 in the Mission transformational journey). Distributive justice can be reflected through the assessment of distributional effects of impacts of climate change.	Assessments of costs, benefits, distributional effects (distributive justice), vulnerabilities, inequalities ² and losses ¹ .
	Pushing the frontiers of knowledge on adaptation	Advancing research on climate risks, socioeconomic vulnerabilities, adaptation costs, and effective policies to improve decision-making (^{1, 2} , connected with Cross-cutting theme in EU CCAMIP Mission transformational journey). Recognitional (or epistemological) justice can be reflected through the generation or documentation of local, traditional or indigenous knowledge in a way that affirms the value of knowledge that has previously been suppressed or marginalized.	Digital transformation or other innovations for knowledge production, acquiring knowledge that reflects system complexities, e.g. interdependencies between climate change and ecosystems; generation or documentation of local, traditional or indigenous knowledge (recognitional justice).
Faster adaptation (FA)	Effective and inclusive governance mechanisms	Mechanisms to ensure dialogue between policymakers and scientists as it supports decision making under uncertainty, facilitates planning and ensures scientific knowledge informs policy ¹ , including mechanisms for multilevel governance ² (Step 2 in the Mission transformational journey).	New ways of organising governance; multi-level governance mechanisms; mobilisation of support and engagement; collaboration; changes in aspects of power, e.g. sharing power or

Types of adaptation	Concept	Description based on EU Adaptation Strategy (EU SACC) and/or the EU Mission for Adaptation Implementation Plan (EU CCAMIP)	What was coded for
		Procedural justice can be reflected through the establishment of new governance structures to steer transformation through inclusive and deliberative processes, also engaging with citizens ² .	responsibility; participation with mention of decision making (procedural justice).
	Trans-boundary cooperation	As climate impacts cross borders, cooperation across borders is needed as it provides shared resources, required coordination of strategies that ensure resilience ¹ ; creation of cross-border value through the reapplication of successful solutions in regions sharing similar challenges ² (Step 6 of the Mission transformational journey and cross-cutting theme). (In EU CAS, it is originally in SysA, but moved to FA as LAs can use cooperation to accelerating adaptation (Heikkinen 2023)	Collaboration between LAs to add cross-border value; reapplication of successful solutions identified to broad regions sharing similar challenges and expanding across national borders.
	Piloting and testing solutions	Development and testing of transformative solutions; measures for evaluation of solution effectiveness before scaling up to ensure efficiency; experimentation of a range of different innovations and solutions addressing an identified challenge ² (Step 4 of the Mission transformational journey).	Testing of innovations through pilots and experiments; learning development and testing of relevant climate resilient solutions, tested and/or brought close to the market.
	Accelerating the rollout of adaptation solutions	Developing and deploying innovative, science-based adaptation solutions rapidly; reducing climate related risk through climate-proofing infrastructure and land-use to prevent future damages ¹ , (could link with EU CCAMIP Step 5 of the Mission transformational journey creating impact at scale).	Implementation of adaptation solutions, especially land-use and infrastructure related solutions; scaling up.
	Mobilising sustainable finance	Increasing insurance coverage for climate-related damages to reduce economic losses and promote proactive adaptation measures ¹ . This will remove barriers to climate	Financial support mechanisms, financial risk management and risk sharing mechanisms

Types of adaptation	Concept	Description based on EU Adaptation Strategy (EU SACC) and/or the EU Mission for Adaptation Implementation Plan (EU CCAMIP)	What was coded for
	and resources for closing the climate protection gap	resilient investments, support the development of insurance products and risk-transfer mechanisms and the development of regional financial risk strategies against climate-related damages and losses ² . Financial mechanisms that reduce either uninsured or unmitigated climate related losses.	(originally from SysA but moved to FA due to their acceleration of the transformation of the financial sector to internalise and reward climate resilient investment and the role of insurance in accelerating recovery), financial mechanisms to reduce non-insured losses.
	Leveraging the CCA and DRR synergies	Leveraging the synergies between CCA and DRR and prevention in order to utilise the range of shared approaches to manage climate risks and build resilience ¹ .	Including mention of early warning, crisis management, preparedness, safety, and territorial vulnerability, recovery, etc.
Systemic adaptation (SysA)	Improving adaptation planning	Climate adaptation plans and strategies at all levels must be effective and science-based; monitoring, and evaluation are needed to measure progress on adaptation; policy coherence in support of adaptation in order to avoid maladaptation ¹ .	Improved effectiveness through policy coherence and integration of monitoring, reporting, evaluation, as well as use of new data sources; integration of climate resilience and other sectoral plans; mainstreaming.
	Promoting NbS for adaptation	Implementing NbS, which are multipurpose and provide multiple benefits, at scale would increase resilience ¹ .	Implementation of NbS (blue and/or green infrastructure, restoration, conservation, etc.) across larger areas, also considering connectivity.

Types of adaptation	Concept	Description based on EU Adaptation Strategy (EU SACC) and/or the EU Mission for Adaptation Implementation Plan (EU CCAMIP)	What was coded for
	Ensuring the availability and sustainability of freshwater	Freshwater availability and sustainability is of fundamental importance for climate resilience, as so many sectors are dependent on it ¹ . (Note: in the EU CAS this is placed under FA. We categorise it as SysA as its water is systematic).	Measures to promote the availability and sustainability of freshwater, e.g. Promoting water-saving practices, sustainable land management, and cross-border water resource planning to mitigate droughts and water shortages.
	Fostering local and just resilience	Localisation is fundamental to adaptation progress as action takes place locally. Achieving resilience in a just and fair way is essential so that the benefits of climate adaptation are widely and equitably shared ¹ .	Considering equity and justice issues, economic impacts from climate change or green transition, or pre-existing inequalities and vulnerabilities in activities, aims or actions that improve the equitability of distribution of impacts (distributive justice); citizen participation without mention of decision making (procedural justice); integration of local, traditional or indigenous knowledge through participatory processes (recognitional justice); and mechanisms to compensate for historical or past injustices and inequities (restorative justice).

Note: 1 refers to EU CCAS; 2 refers to EU CCAMIP.

3.2 Steering instrument analysis

3.2.1 Aim

The main aim of this analysis is to review alignment of regional CR ambitions and roadmaps for just transition (T2.4) with existing policy instruments. In accordance with D4.2 and to differentiate the policy analysis of CCA concepts' presence in each region (carried out in the cross-sectoral policy analysis section) with steering instruments, we are from here forward using the term “steering instruments”, which indicate the (financial, informational, and regulatory) instruments that steer CR. This is similar to how steering instruments (i.e., steering mechanisms) were coded for in the D4.3 Governance Recommendations. Steering instruments can be understood as the tools available to the region to carryout CR implementation and influence actors via incentives and/or penalties to achieve CCA goals. Several examples of steering instruments are provided in the introduction and throughout the analysis. Additionally, recognising that progress on CR is influenced by steering instruments from other policy areas (i.e. development and innovation), we aim to identify perceived synergies and conflicts between steering instruments from other policy areas, which are not directly climate related but have reliant overlapping influence on climate actions.

3.2.2 Methods

Data collection

We fulfil the aim through identifying (i) the existing policy steering instruments in the regions that steer CR, (ii) synergies and conflicts between steering instruments from other policy area s, and (iii) the steering instruments needed for achieving CR visions. To do so, we collected data using a governance survey conducted together with T4.2, as well as the regions' input into the Common Innovation Framework & Solutions Portfolio (CIF, D6.1).

We categorised steering instruments into three commonly used categories (Vedung, 1998): regulatory, financial and informational. Regulatory instruments modify the set of options (actions or behaviour) available and include legislation, bans, permits, standards and guidelines, zoning and use restrictions, planning documents, agreements and intergovernmental mandates. Financial instruments modify the economic conditions under which actions or behaviours are undertaken. Examples include incentive instruments such as grants, subsidies, green bonds or loans, insurance tax incentives or tax breaks as well as research funding and market instruments. The category also includes penalising instruments, such as deterrent taxes or user charges, direct expenditure and budget allocation, demonstration projects and public procurement. Technically, it does not include project-related funding as it is short-term, but we have included it below to explain how resilience is being funded. Informational instruments aim at changing the discourse associated with the issues and the importance of the issue. This includes knowledge mobilisation, knowledge sharing, and knowledge generation, as well as engagement with indigenous and local knowledge, monitoring and evaluation and public outreach.



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The data for the steering instrument analysis was collected with the climate resilience governance assessment (D4.3) through a survey to the R4C partner regions. The survey was conducted between June-August 2024, with several iterations of answer collection with respondents to receive as full set of answers as possible. On average, every region revised and clarified the answers to the survey twice. The questions were built on the base of the indicators of CR governance (see Table 2, D4.3) and included yes/no questions, multiple-choice and open-ended questions. The survey respondents were regional representatives of relevant authorities. In some cases, they answered the survey collectively (several respondents per each survey form) to arrive at internal consensus and avoid conflicting answers. Data related to the steering instruments was also pre-collected by task leads from the input of regions into D6.1, as well as at the annual partners meeting at a workshop using a single, more comprehensive table, alongside a presentation on steering instruments. This also served to test the question format, which was changed to break the questions down into individual steering instrument categories.

The survey collected data related to the three different categories of steering instruments. It also asked respondents to identify steering instruments from other sectors that they perceived to either hinder or support climate adaptation (CCA) or resilience (CR). This was done for all categories of steering instruments. Respondents were also asked to justify their answers. This served to identify synergistic and conflicting steering instruments (across sectors or policy areas). The responses are found in the questions 9a, 14a and 17a of the survey (see Annex 1).

Data analysis

From the survey answers, we summarised the perceived importance of the following categories of instruments for steering climate resilience (CR) in each region: regulatory, financial, and informational instruments. We also identify instruments from other sectors which are perceived to support resilience and negatively influence resilience, as well as instruments that, if altered in some way, are thought to have potential to support resilience. Here supporting refers to tools, policies, or measures that if implemented could enhance a region's ability to withstand, adapt to, and recover from climate-related stresses. Some instruments in question are relevant in some capacity to adaptation planning though the primary aim is not adaptation focused. For example, the (Spanish) Basque region's hydrogen energy infrastructure plan, while primarily mitigation focused, includes a secondary adaptation element by requiring climate proofing of energy infrastructure. These were based directly on survey responses, see Annex C (Datasets).

3.3 Integrated analysis and recommendations

The cross-sectoral policy analysis (Section 3.1) and steering instrument analysis (Section 3.2) are assessed to identify gaps and recommendations for just climate adaptation and resilience policy making in each region. Building off this integrated analysis, policy and steering instrument recommendations are formulated for each region in order to 1) improve and better implement relevant steering instruments and 2) identify gaps and opportunities in order for each region to achieve their CR goals and for CR policy to be in better alignment with the EU climate adaptation

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strategy (Smarter, Faster, and More Systemic Adaptation). These are supplemented with aligned input from the Just Transition Roadmaps (D2.1) and Regional Innovation Roadmaps (D6.2).

A table, immediately following the policy and steering analysis, identifies if each region has addressed relevant *climate adaptation concepts* based upon each region's policy documents. The recommendations are made to both regional and local level governments, depending on the governance situation in each region. For example, if regions do not have policy making authority, we have suggested informal policy or coordination, or focused on other steering instruments or made recommendations at the local level, etc. To create a more cohesive approach to CR transformation, we aimed to connect various outputs from R4C, including Just Transition Roadmaps (D2.4) and Regional Innovation Roadmaps (D6.2) to further strengthen the links between equity, resilience and innovation. We also link the recommendations to the gaps identified by scoring done in WP4 (D4.2 and D4.3) (see Tables 2,3 and 4).

Related to the **Just Transition Roadmaps (D2.4)**, SEI Tallinn provided input into the method used in the Just Transition Roadmapping process (T2.4) to enable analytical alignment. In the process, most regions identified actions that needed to be taken to achieve their jointly agreed-upon goal. These actions were divided into six categories, three of which connect with the three categories of steering instruments: changes in laws and regulations (which connects to the regulatory instruments); changes in the financing of adaptation (which connects to the financing instruments); and changes in knowledge and information (which connects to the informational instruments). These categories of actions identified by the regions were analysed to identify alignment with the recommendations to fill the identified gaps related to existing instruments.

Related to the **Common Innovation Framework (CIF, D6.1)** as a reference, 12 Regional Innovation Roadmaps (RIR) were co-created by the regions (under D6.2), providing Climate Resilience Innovation Objectives (CRIO) and innovation milestones to achieve them, which should support the regions in their pathway to climate resilience. CRIOs represent political directions tailored to each region's specific needs and climate challenges. The milestones illustrate how the regions plan to innovate concerning CCA, adapting their actions to emerging challenges and opportunities. To support these innovation roadmaps, intricately linked to the CIF dimensions, a comprehensive portfolio of "Assumptions of Action" was showcased and reflecting the contextual conditions that foster innovation within a responsive and collaborative innovation ecosystem.

As much as possible, these milestones and assumptions from the D6.1 reflect the policy recommendations, providing a clear justification for their inclusion in this deliverable. While acknowledging that this approach is a strategic and dynamic guiding tool to support climate action, requiring regular updates, it's important to note that the level of political commitment to these initiatives planned in the project is not consistent across the 12 regions, which can impact the overall effectiveness of climate action. Nonetheless, the innovation roadmaps provide a relevant baseline for the work conducted in Task 4.4. These roadmaps not only reflect current practices but also highlight areas for improvement and collaboration, ensuring that the efforts remain rooted in innovation and in compliance with sustainable development goals.



3.4 Steering instrument-related scoring from other parts of Regions4Climate

Below we have compiled the scoring done throughout R4C project related to Steering instruments using data from Climate Resilience Maturity self-assessment D4.2, as well as the scoring included in the Governance Recommendations D4.3. We have broken those up into Regulatory steering (Table 2), Financial steering (Table 3), and Informational steering (Table 4). The colour codes are as follows: green represents the high end of the scale (satisfactory situation), yellow represents the middle part of the scale (improvement is needed), and red represents the lower end of the scale (significant improvement is needed). These scores are now referred to, when relevant, in the recommendations, e.g. when a set of recommendations could help improve a certain score.

Within the **D4.3 Governance Recommendations**, different criteria were used to score the three steering mechanisms (regulatory, financial, and information), as follows:

- **Regulatory steering** measures the existence of a formal legal requirement that establishes adaptation requirements: 3 - Climate law and/or regional strategy (or a requirement to develop one), 2 – No climate law or climate law exists but doesn't steer regions to adapt; there is a regional strategy based on voluntary initiative with formalised coordination, 1 - Voluntary action but not coordinated by the regional council (voluntary policies only), 0 - No regional strategy or voluntary policies for adaptation.
- **Financial steering** scoring was split into financial instruments and allocated funding, each with different scoring metrics. Regarding Financial Instruments, the model gives higher scores where established and regular financial instruments are in place: 3 – the region is using a mix of established financial instruments (e.g. taxes, subsidies), 2 – the region is using a mix of sporadic financial instruments, (e.g., ad hoc grants or projects) OR one established, 1 – the region is using only irregular financial instruments, 0 – there are no financial instruments. Allocated Funding was scored as follows: 3 – funding is continuous and secured for the whole policy cycle including M&E & re-planning, 2 – Funding for planning and/or implementation, 1 – Project-based funding, 0 – No funding allocated.
- **Informational steering** measures the existence and implementation of knowledge generation services (e.g. climate service), science-policy orgs, local/indigenous knowledge, participation, and public outreach: 3 – knowledge generation coupled with networks/boundary organisations, 2 - knowledge generation + one any other information instrument, 1 - knowledge generation simpliciter, 0 – no knowledge generation.

The Regional Resilience Maturity Model (RRMM) self-assessment is an updated version, which was originally outlined in the **D4.1. Regional Resilience Maturity Model and Framework** and the **D4.2. Climate resilience maturity assessment**. The RRMM scores certain indicators on a 0-4 range. Each indicator is narrowly tailored to address the capacity of certain policy dimensions, in the following tables the relevant dimensions touched upon are Regional Governance and Institutional Capacity (1.0), Policy instruments (2.0), Stakeholder Engagement (4.0),

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Financial (6.0), and Data and Knowledge (7.0). Each indicator's specific scoring framework is laid out in detail in Annex b; broadly a score of 4 indicates a sufficient level of maturity and useability for a region, while a score of 0 signifies the complete absence of an indicator within a region. For more detail on individual indicators look to Annex "b", which provides a description and an outline of the scoring system used for each individual indicator.

Table 2. Regulatory steering or general scoring about policy instruments.

Region	Regulatory steering (D4.3, 0-3)	RRMM Indicator 2.4 Policy instruments supporting regional resilience-building (D4.2, 0-4)	RRMM Indicator 2.7 Recognition of socially just transition to CR in regional policy instruments (D4.2, 0-4)
Basque	3	4	2
Tuscany	1	4	2
Azores	3	4	0
South Aquitaine	2	3	0
Køge Bay	1	1	2
Pärnumaa	1	2	0
Uusimaa	2	3	0
Burgas	2	4	1
Sítia	2	N/A	3
Nordic Archipelago	Mainland Finland (2) Åland (1) Mainland Sweden (3)	N/A	N/A
Troodos	0	0	0
Castilla y León	3	3	2

Table 3. Financial instruments.

Region	Financial steering: financial instruments (D4.3, 0-3)	Financial steering: allocated funding (D4.3, 0-3)	RRMM Indicator 6.1 Identification of financial needs (D4.2, 0-4)	RRMM Indicator 6.3 Budget allocation and distribution at local level (D4.2, 0-4)	RRMM Indicator 6.4 Budget allocation for planning (D4.2, 0-4)	RRMM Indicator 6.5 Budget allocation for implementation (D4.2, 0-4)
Basque	3	2	2	4	4	4
Tuscany	1	2	1	2	2	1
Azores	2	1	1	1	3	3
South	2	1	2	1	1	1
Køge Bay	3	1	N/A	3	1	1
Pärnumaa	1	1	0	1	1	1
Uusimaa	2	2	0	0	1	0
Burgas	2	2	3	4	4	2
Sitia	3	3	2	3	2	2
Nordic Archipelago	2	Mainland Finland (1) Mainland Sweden	Blank	Blank	Blank	Blank

Troodos	2	1	0	N/A	N/A	N/A
Castilla y León	2	1	2	2	0	2

Table 4. Informational instruments.

Region	Informational steering (D4.3, 0-3)	RRMM Indicator 1.6 Engagement in Networks (D4.2, 0-4)	RRMM Indicator 1.7 Monitoring and evaluation system (D4.2 0-4)	RRMM Indicator 7.3 Alignment of risk assessments with justice and equity (D4.2 0-4)	RRMM Indicator 4.5 Engagement with private sector (D4.2 0-4)	RRMM Indicator 4.6 Engagement with organised civil society and citizens (D4.2 0-4)	RRMM Indicator 4.7 Engagement with academia and research community (D4.2 0-4)
Basque	3	3	2	2	4	2	4
Tuscany	2	3	3	1	2	2	3
Azores	1	4	1	0	2	2	4
South Aquitaine	2	2	1	1	3	2	1
Køge Bay	3	4	0	N/A	2	2	3

Pärnumaa	1	2	2	0	1	1	1
Uusimaa	3	4	0	1	1	1	2
Burgas	3	3	2	3	2	4	3
Sitia	2	4	2	3	2	2	3
Nordic	3	Blank	Blank	Blank	Blank	Blank	Blank
Troodos	1	3	N/A	N/A	0	0	1
Castilla y León	1	3	2	1	2	2	1

4. Integrated Regional Results

Below are the summaries of the results per region, divided into analysis and recommendations.

4.1 Basque region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Spain is a unitary decentralised state which is *de facto* federalist; legislative powers are at a sub-national level, with autonomous regions (such as Basque Country) primarily responsible for the enforcement of national rules and regulations. Thus, the analysis for Basque Country is carried out on the regional level, as it is on that level where policies are both created and actualised.

For Basque region, the following documents were analysed: the Climate Change Strategy of the Basque Country to 2050 (KLIMA 2050) (R, 2015) as CCAP, Urban Agenda for the Basque Country (Basque 2050) (2021, R) as RDP and Euskadi 2030 Science, Technology and Innovation Plan (2021, R) as S3.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where specific mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.1.1 Cross-sectoral policy analysis

Smarter adaptation is supported across regional RDP and CCAP documents **which underline the objective of** pushing the *frontiers of adaptation knowledge and assessing risks and losses*. The CCAP address the production of *more and better climate-related risk and losses data* by supporting the incorporation of possible effects of climate change in the short, medium and long term in the environmental assessment processes (Environmental Impact Assessment – EIA and Strategic Environmental Assessment – SEA) of certain plans, programmes and, as applicable, projects. In terms of pushing the frontiers of knowledge, the RDP sets a general goal of innovation and knowledge transfer to improve scientific knowledge on climate change and its effects, while the CCAP include plans for specific studies. The RDP aims to align with the CCAP, with the stated goal of promoting local knowledge to increase innovation and knowledge transfer about climate change. For example, the RDP aims to promote and disseminate intergenerational knowledge and learning for the transmission of knowledge regarding NbS and reducing pollution. Topics include projections of climate change effects, and the design of new drought thresholds and indicators related to water demand (CCAP). The CCAP requires an Interim Impact Assessment, which is to be carried out decennially (since 2020) to make sure that CCA actions are being implemented properly and provide recommendations on how to address implementation shortfalls. The CCAP also includes plans to set up a “KLIMA 2050” portal that

compiles the benchmark expertise, projects and schemes in the Basque Country. The CCAP also outlines the “Klima TEC” Forum as a knowledge sharing forum for the transfer of advanced knowledge and to showcase demonstration projects between local stakeholders, such as universities and tech-companies.

Faster adaptation is supported across all three sets of policy documents, including the S3 (National Strategy for Smart Specialisation 2030), through its impulse of *new governance structures* and by at least one document in terms of *transboundary cooperation*, leveraging *synergies between climate adaptation and disaster risk reduction*, *accelerating the rollout of adaptation solutions* related to land use, and *piloting and testing solutions*. Both RDP and national S3 support forming *governance structures* needed for transitioning. The RDP discusses developing support tools and methods to promote cooperation with municipalities, e.g., through the Udalsarea 2030 network, in the context of sustainability transition, while S3 focuses on public-private cooperation between the private sector, research institutes, and local authorities in accelerating the green and inclusive transition. The RDP recognises the need to “mobilise” actors through *transboundary collaboration*, e.g., via inter-regional and international networks working on CC.

In terms of leveraging the existing *synergies between climate adaptation and disaster risk reduction*, the RDP includes mentions of emergency preparedness and early warning actions. *Accelerating the rollout of adaptation solutions* relates to land-use and climate-proofing infrastructure. The RDP focuses on incorporating CCA into urban planning and risk anticipation related to critical infrastructure, including water supply. Specifically, this is achieved through the incorporation of CCA-related criteria into planning. The Region’s Climate Change Strategy fosters an interinstitutional coordination mechanism regarding climate change among the different Basque authorities (CCAP). Within the RDP there is a strategy to reduce water use and preserve river ecosystems to comply with the regional water framework directive. The CCAP outlines a Water Management Plan (pending approval) to carry out future projections and establish a course of action to meet water demand and climate-proof the water management infrastructure. According to the CCAP, the region’s primary water supply sources are sufficient to meet current demand while maintaining ecological criteria; however, there are specific local-level climate-related issues due to certain poor infrastructure and management models. Regarding *piloting and testing solutions*, the national S3 mentioned pilots and demonstrations related to environmental impacts, including climate adaptation.

Systemic adaptation is supported across all three sets of policy documents in terms of *improving adaptation planning* and *scaling up NbS for adaptation*. The national S3 recognises that a systematic approach to change is needed and considers sustainable development, just transition, climate mitigation and resilience to be interlinked. The S3, and regional RDP and CCAP support the *improvement of adaptation planning*, e.g. through the incorporation of climate change impact management and mitigation into planning of civil protection (S3, RDP), territorial strategy (S3, RDP, CCAP), coastal management (S3), waterway management, urban planning and land-use planning guidelines (RDP). The CCAP also mentions incorporating CCA into innovation projects. *Scaling up NbS for adaptation* is promoted across the policy documents, while *freshwater resource quality and quantity* are only mentioned in the CCAP. The S3 and RDP both have resilience as a goal connected to NbS and support it by promoting green infrastructures or other NbS solutions specifically for CCA in urban

(S3, RDP) and natural coastal areas (RDP). The S3 recognises NbS's complementary role in the energy-climate transition. The CCAP recognises other agendas, such as biodiversity protection, food production, and coastal management. It outlines not only risk assessments related to hazards, e.g., flooding, but also previous risk assessments related to various policy areas, including farming, the forestry sector, and coastal wetlands. The scaling up of NbS is specifically pointed to as a policy priority in the RDP. The RDP discusses larger scale initiatives, such as green infrastructure belts, local agrifood strategies, while the S3 discusses NbS in the context of building and neighbourhood scale initiatives.

All policy documents of Basque support *local and just resilience* and **social equity**. Aspects of justice are reflected in the S3, while recognitional justice measures are found in the RDP, and procedural justice is reflected in the RDP and CCAP. The S3 aims for a triple transition (*technological-digital, energy-climate and social-health*) and generally promotes a greener, smarter and inclusive region. In the context of climate adaptation, the RDP supports *recognitional* and *procedural* justice, e.g. traditional and local knowledge and practices (recognitional) and citizen participation and joint responsibility for adaptation and participation at the strategy level (procedural). These two aspects also connect to faster and smarter adaptation, contributing to *pushing the frontiers of knowledge and new governance structures*, respectively (see previous sections). The CCAP also promotes procedural justice through its support of inclusive participation, joint responsibility for adaptation, and sharing of local knowledge, which is then integrated into decision-making. However, they specify that “local knowledge” refers to knowledge coming from municipal governments.

4.1.2 Policy and Steering Instrument Analysis

Regulatory instruments: The most influential **regulatory** instrument in the Basque Country is the CCAP/KLIMA 2050, which is steered by the National (Spanish) Climate Change and Energy Transition Law and, in turn, steers local strategies and plans. The most influential *planning documents* are the regional climate change strategy, an energy transition and climate change plan, as well as the regional soil protection strategy. Other instruments include regional *regulations* (climate change and the energy transition, civil protection and spatial planning, regional guidelines for spatial planning) and *national regulations* (climate law, flooding risk regulation, coastal law and technical building code). Other regulatory steering instruments identified in the survey include *regional standards* (guidelines for planning of functional areas, protection and planning of the coastal area, and an urban planning manual).

The approval of the Energy Transition and Climate Change Roadmap 2050 will define the path to achieve climate neutrality and the resilience of the territory, with the necessary alignment with the regional S4+. Also, there is planned alignment with the Programa Marco Ambiental 2030 (PMA 2030), which coordinates the Basque Government's environmental action. In order for this alignment to occur, a Basque Social Pact on energy transition will be established and the Basque Government will give shape to the Citizen Assembly of Energy Transition and Climate Change of the Basque Country, regulating its composition, organisation, and operation by decree, according to the Basque Innovation Roadmap (Regions4Climate T6.1/D6.2).

In terms of *agreements and intergovernmental mandates*, the region has an intergovernmental mandate in the form of a climate change and agriculture board responsible for cross-sectorial issues and CR of the agricultural sector. The region is also part of the transnational organisation “Working community of the Pyrenees” (CTP), which has a coordinating cross-border mandate to implement climate policies on EU directives within projects. For example, they have a cross-border initiative for the Pyrenees Climate Change Observatory (OPCC), which monitors climate change and supports territorial adaptation.

Financial instruments: The region has a range of *incentivising financial instruments*, including regional-level grants for private sector R&D, as well as technical, eco-innovation, and eco-social innovations, climate adaptation, environmental protection, sustainable resource management, renewable energy, and energy efficiency. Respondents felt that funding for renewable energy and energy efficiency also had synergies with adaptation, potentially due to the support for diversification of energy sources and decreased dependencies. The following instruments were also identified: (i) local level *grants* available for actions related to sustainable development, green transition, and sustainable energy; (ii) grants for eco-social alliances established to promote a just ecological transition and reduce inequalities in sustainable development; (iii) a national and regional law that sets *tax deductions* for environmental investments, also related to energy transition and climate change; (iv) *green public procurement*, and innovative public procurement; and (v) *penalising instruments, used at regional level*, for non-compliance with the Climate Change and Energy Law.

Although mitigation oriented and somewhat vague, the law indicates that public administrations are accountable if they fail to implement adaptation measures in line with the strategy. In terms of funding for CR, the region is very strong in accessing EU *project funding* in support of CR. Further, energy and climate change plans (Roadmap 2050 and Strategy 2030 for Energy Transition and Climate Change of Euskadi) include a provision to allocate regional *budget* for climate actions (pending at the time of publication). There was no mention of any *demonstration projects* in the survey.

According to the Basque Innovation Roadmap (Regions4Climate T6.1/D6.2), efforts will be made to adapt funding more sustainably to bolster investment in innovative mitigation projects (as an example, the creation of a climate social budget, the inaction cost in climate adaptation assessment, and demonstrator projects with financing guaranteed).

Informational instruments: Several *networks for knowledge* mobilisation are utilised, including the regional coastal observatory for monitoring and protection of the Basque Coast, regional network of municipalities for sustainability (UDALSAREA), as well as transborder initiatives like the OPCC, which aims to be a cross-border reference platform of knowledge on adaptation and climate change in mountain ecosystems and transborder scientific interest groups who collaborate on strategies for climate change and shared monitoring. *Instruments for knowledge generation* include regional vulnerability assessments and climate change impact modelling. *Monitoring and evaluation instruments* encompass OPCC activities and spatial planning databases (e.g., Udalplan urban planning database, GeoUskadi). For public outreach and awareness raising, the region has a network of environmental education centres (Ekoetxea network) which provide educational activities and public engagement in sustainability and climate issues at several locations. The Basque government also organises a climate and energy week (AsteKlima), which aims to promote public awareness and community participation. Survey answers made no mention of instruments to engage with indigenous and local knowledge on

adaptation/resilience. It is noteworthy that the CCAP and RDP require local knowledge integration into policy strategies. The CCAP outlines several knowledge generating mechanisms, mainly focusing on scientific knowledge generation, such as aiming to set up the “KlimaTEC” Forum for knowledge transfer and the Udalsarea Network Forum, which includes local organisations in preparation of the regional climate strategy.

The Basque Innovation Roadmap (Regions4Climate T6.1/D6.2) highlights the Basque Adaptation Mission as a crucial milestone in the process. This initiative will include a catalogue of Demonstrator projects to be implemented in specific locations, along with proposals for measures and financing resources, and stakeholder involvement. This will be crucial to identify best practices and advanced technologies suitable for the Basque Country. Fostering knowledge, skills, and education on energy transition and climate change, and the integration of justice in all processes and policies related to climate change are crucial to climate resilience. Additionally, there is a reference to the 'KLIMA 2050' platform (currently under development), which involves a strong communication campaign and serves as an excellent example of cross-sectoral collaboration and knowledge sharing. It brings together benchmark expertise, projects, and schemes in the Basque Country.

Synergistic instruments from other sectors: In the Basque region, steering instruments are cohesive. Legal frameworks from sectors such as nature protection, soil protection, circular economy, and energy are considered to support climate resilience, as synergies between mitigation and adaptation are accounted for. For example, according to the survey, hydrogen energy infrastructure will ideally have risk assessments, which will help climate-proof future energy infrastructure. Similarly, financial instruments from the energy and forestry sectors, such as Public-Private Partnerships (PPPs), are considered to support resilience. Particularly, hydrogen partnerships play a crucial role in climate-proofing the energy transition. Meanwhile, 2Zero partnerships support the adaptation and decarbonisation of the mobility sector. This includes introducing regenerative processes within mobility decarbonisation initiatives, prioritising biodiversity and green infrastructure in cycling, and implementing environmental procurement criteria. Additionally, land stewardship contracts between provincial and regional governments and local land tenants have been established in Gipuzkoa to create a PPP related to sustainable forest management.

Good Practice: Financial tools such as tax breaks backing climate action and formal PPP structures around NbS and environmental protection support CCA.

Conflicting instruments from other sectors: Agricultural sectoral policies are considered to conflict with climate resilience, as it is pointed out that objectives of productivity and food security are perceived to sometimes undermine adaptation priorities such as water management, energy efficiency, and sustainable practices. This is despite the climate change and agriculture board, which has the responsibility to address climate resilience in the agricultural sector. Additionally, transport and mobility, as well as energy policy, were perceived as having negative impacts on climate resilience due to the narrow focus on greenhouse gas reduction and the lack of consideration of climate risks facing these sectors.

Instruments with potential: Despite the above examples of alignment between resilience, energy and mobility, survey answers indicate that alignment could be strengthened through the mainstreaming of

resilience objectives of these sectoral frameworks and solutions, as well as the consideration of future climate conditions in the development of new energy transition related technologies, specifically within the context of climate proofing. Respondents also perceived the potential to develop existing financial instruments to support climate resilience better. For example, the national insurance compensation consortium could support CR if it were adapted to provide better insurance coverage for extreme weather, such as hydrometeorological risks. Additionally, if banks and real estate companies better accounted for climate-related investment risks in their risk management decisions, investments could potentially support resilience.

Table 5. Summary of Climate Adaptation concepts across Basque Region's policy documents.

Types of adaptation	Concept	S3 (2021) (R)	RDP (2021) (R)	CCAP (2015) (R)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data			Yes	Yes (Coastal observatory)
	Pushing the frontiers of knowledge on adaptation	Yes	Yes	Yes	Yes (KlimaTec)
Faster adaptation (FA)	Effective and inclusive governance mechanisms	Yes	Yes		Yes (Green Public Procurement)
	Trans-boundary cooperation			Yes	Yes (OPCC)
	Piloting and testing solutions	Yes			
	Accelerating the rollout of adaptation solutions	Yes	Yes	Yes	Yes (penalizing Climate Law noncompliance)
	Mobilising sustainable finance and resources and closing the climate protection gap				Yes (tax deductions for environmental investments)
	Leveraging the CCA and DRR synergies		Yes		
Systemic adaptation (SysA)	Improving adaptation planning	Yes	Yes	Yes	Yes (vulnerability assessment)
	Promoting NbS for adaptation	Yes	Yes	Yes	Yes (Gipuzkoa forest management)
	Ensuring the availability and sustainability of freshwater		Yes	Yes	
	Fostering local and just resilience/ Justice	Yes (dis)	Yes (Rec, pro)	Yes (pro)	Yes (grants for eco-social alliances)

Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.1.3 Basque Region recommendations

A. Recommendations relating to modification and improvement of steering instruments:

1. Mainstream of climate adaptation and resilience into sectoral policies.

Specifically:

- Authorities could update regional and local plans, such as those within the mobility, energy, and agricultural sectors, to integrate climate adaptation and resilience aspects. This includes alignment with the main adaptation documents (strategy and plan), but also the soil protection strategy.
- Mainstreaming could look to the strong monitoring and evaluation-related databases that the Basque Country has access to and utilise stakeholder and community participation to ensure that potential trade-offs are considered already in the planning phase.
- Further, safeguards and guidelines can ensure that circular economy, energy and mobility related initiatives truly maximise alignment with climate adaptation and avoid maladaptation.
- Alignment should not only focus on climate-proofing specific industries but also ensuring that climate proofing in certain sectors and industries do not present obstacle to other sectors in achieving their climate proofing goals. Minimising conflicting strategies should be a priority, for example in the energy, mobility, and transport sectors.
- Basque's Just Transition Framework Action Plan (Regions4Climate D2.2) aims to bring collectives within the region together, via identifying communities most affected by climate change and coordinating with agents to develop adaptation plans that cut across sectors. This recommendation, with its call for a more coherent and mainstreamed CCA approach, hopes to help the region achieve that goal.

2. Consider new financial instruments.

- Consider how demonstration projects related to public property and facilities could be used to promote CR actions, also in the private sector. None were mentioned in the survey responses. Also, green and climate bonds (see [Paris as a case](#)), equity financing, and public-private partnerships (PPPs) can be used to attract private capital. Explore the feasibility with national authorities of national insurance programmes expanding their coverage of damage and losses from extreme weather events. Authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#). Further, accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects. This would improve the incorporation of climate-related risks into investment decisions. The OECD's [full compendium of financial instruments to support subnational climate action](#) can provide more options and ideas for financing.

3. Push for clarifications related to national law.

- Currently, the **national Climate Change and Energy Transition Law** lays out penalties for non-compliance, though the penalties related to mitigation are much more clearly defined than those for adaptation. An assessment of climate mitigation enforcement mechanisms within the existing legislation and identifying their potential transferability to the monitoring and enforcement of adaptation would help with penalty enforcement and deterrence. Pushing for more precise definitions of adaptation-related penalties that enable their implementation can help advance adaptation by deterring actions that conflict with it.

4. Strengthen interaction with the local level via utilising informational steering instruments.

- In the survey, there was no mention of engaging with indigenous and local knowledge on adaptation and resilience, public outreach or local level plans/strategies. Alignment between the regional (Basque Country) and local level planning is important because adaptation and resilience actions and implementation take place at the local and community levels. Further, local communities have knowledge of how they are affected by climate change and how they have adapted to changes in the environment in the past. Knowledge of traditional land, forest, and coastal management, traditional agricultural and fishing practices, and water resources management methods, as well as knowledge of community structures, can help in improving adaptation planning. To mobilise this local level knowledge related to adaptation and resilience, community participation methods could be incorporated into multi-level governance practices. This process should not require the establishment of a novel informational steering instrument, as the RDP already outlines requirements and a framework of local engagement, but rather the full exploitation of existing requirements for integrating local knowledge into decision-making for adaptation and resilience. The Basque Just Transition Framework Action Plan (Regions4Climate D2.2) outlines the goal of expanding data use by public bodies, incorporating local knowledge into policy planning. This will enable the region to make progress towards achieving its objectives.

B. Policy Recommendations in terms of gaps and opportunities:

What is missing?

1. Developing support mechanisms to close the climate protection gap.

- The region uses grants to fund adaptation and resilience, and the Roadmap 2050 and Strategy 2030 for Energy Transition and Climate Change of Euskadi dedicates part of the budget to climate action. However, policy documents do not specifically discuss the role of risk transfer methods, such as insurance, and how they could be used to close the climate protection gap in the region. Developing risk-sharing and support mechanisms to manage the financial risks that come with climate change would contribute to reducing non-insured losses.

What could be strengthened or built upon?

2. Extend and adjust existing collaborative governance structures toward adaptation.



- The RDP and S3 support sustainable or green transition through various collaborative structures, including tools and methods for collaboration with local municipalities and cooperation between the private sector, research institutes, and the public sector. Explore how these, in addition to the needed inter-regional and international networks mentioned in the CCAP, could be used to accelerate adaptation and resilience.

3. Identify ways to pilot and scale adaptation solutions.

- The national S3 mentions pilots and demonstrations related to environmental impacts related to CCA (e.g. BERRINGURUMENA (DDESMA) (S3 p. 82)). However, to better incorporate CCA into innovation projects, as mentioned in the CCAP (p.52), the region could specifically promote piloting through its CCAP. This could potentially also create opportunities for public-private cooperation. This work can build on the existing larger scale NbS activities planned, e.g. green infrastructure networks mentioned in the RDP.
- According to the Innovation Roadmap (Regions4Climate T6.1/D6.2), additional effort is required for direct support of experimentation. Notable steps toward CR include the creation of a catalogue of demonstrator projects under the Basque Country Adaptation Mission, which aims to accelerate the testing of innovative solutions for addressing complex challenges.
- According to the Basque Innovation Roadmap (Regions4Climate T6.1/D6.2), new value chains for decarbonisation, involving the private sector, will be developed, hoping to incentivise private self-investment in climate adaptation. In the short term, these new value chains will generate best practices and advanced technologies suitable for the Basque Region, regarding soil protection, NBS for critical infrastructure, coastline, and natural and urban environment.

4. Build up coherence in the approach to smarter adaptation.

- Assess climate risks and losses more broadly. The CCAP, along with Basque region policy documents, already considers climate risks such as increased rainfall, coastal erosion, flooding, and impacts on industries including farming and forestry. However, the region is also exposed to broader risks, including health and economic impacts and the growing likelihood of extreme weather events that can cause significant losses. This context underlines the importance of establishing planned, periodic risk assessments across as many sectors as possible (e.g., tourism, transportation, energy infrastructure) to support a more comprehensive and robust adaptation strategy. The region should reflect on these risks and loss to build a comprehensive approach to smarter adaptation. Also, develop a cross-sectoral knowledge base to facilitate smarter adaptation by leveraging the technological-digital transition activities mentioned in S3, such as the development of dynamic urban planning tools. Best practices regarding monitoring and evaluation instruments can be learnt from OPCC -a cross-border reference platform of knowledge- and tools to integrate cross-border initiatives into regional planning should be pursued.

5. Bridging justice and climate change adaptation (CCA) actions.

- While all Basque's policy documents support local and just resilience, the region should go beyond statements of aims and reflect on these topics with concrete actions. S3 includes general statements of support for a just transition to achieve CR and the aim of improving democratic governance and citizen participation. For instance, concrete procedural justice measures could include specific participatory mechanisms in specified processes to engage the public and ensure that innovation is socially acceptable. The RDP supports distributive and procedural justice by aiming for equity in access to services (healthcare, housing, energy, education), preventing segregation and isolation, and incentivising pluralistic civic co-existence. These overarching aims of the RDP could be connected to CR either in the RDP or the CCAP. For example, inequity in access is further exacerbated by climate change impacts and aims could also include ensuring that just or equitable resilience is accounted for. Further, the aims could be backed up with more concrete actions. Finally, the CCAP could broaden its use of "local knowledge" to also include knowledge originating at the community level, in addition to that from the municipal level.
- Note that Basque regulatory steering instruments are ranked highly (score – 3/3, see Table 2), though there is room for improvement regarding recognition of socially just transition for CR within those regulatory instruments (score – 2/4, see Table 2).

4.2 Tuscany region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Italy is a unitary state with regions that possess legislative powers, with regions (such as Tuscany) being responsible for the enforcement of national rules and regulations. Thus, the analysis for Tuscany is carried out on the regional level, as it is on that level where policies and administrative competencies are exercised.

For the Tuscany region, the following documents were analysed: the National Plan for Climate Change Adaptation (PNACC) (2023) (N) as CCAP, the Tuscany Region: Regional Development Programme 2021-2025 (R) as RDP and the Intelligent Specialisation strategy of Toscana 2021-2027 (preliminary version) (R) as S3.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where specific mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.2.1 Cross-sectoral policy analysis

Smarter adaptation is supported across all three sets of documents. Measures that contribute to *pushing the frontiers of adaptation knowledge* are found in the S3 (R), the RDP (R), and the CCAP (N). The S3 focuses on promoting interventions to support the ecological transition, resilience, and biodiversity in general. The S3 and the RDP both aim at monitoring the shoreline. The S3 focuses on reducing shoreline loss, and both plans mention intervention to monitor the shoreline and beach on a regional scale constantly, and the use of technologies for hydrogeological and hydraulic risk studies, monitoring, and forecasting. To some extent, these measures contribute to *assessing risks*, but not to the assessment of losses. In its CCAP, Tuscany plans to develop a research program for the improvement and systematisation of the knowledge framework on climate change impacts, vulnerabilities, and risks.

Faster adaptation is supported in all three types of policy documents relevant to Tuscany. Measures contributing to *new governance structures* are found in the RDP and the CCAP. The RDP highlights joint public actions to prevent and manage climate change-related risks (floods, coastal erosion, and fires). The CCAP mentions cooperation between the national and local levels to set up the National Heatwave Health Effects Warning System, as well as aims for local community empowerment through local adaptation strategies and active civil society involvement in planning and monitoring. In terms of support for *accelerating the rollout of solutions* related to land use and infrastructure, both the CCAP and RDP focus on infrastructure. The CCAP supports “adaptation of facilities and infrastructures” but does not provide information about how to achieve this goal. The national RDP specifically focuses on improving the CR of port infrastructure to hydraulic and hydrogeological risk, as well as public buildings to seismic risk. The S3 and RDP leverage *synergies between CCA and DRR*, which can accelerate adaptation. The priority in both plans is to strengthen the civil protection system, including risk

forecasting and efficient management of emergency situations, in collaboration with the National Civil Protection Department, local authorities, and volunteers.

The RDP and the CCAP contribute to **systemic adaptation** through *improved adaptation planning*, *fostering just and local resilience*, scaling up NbS for adaptation, and ensuring fresh water. The national RDP recognises the need for *improved adaptation planning*, specifically the need to articulate a comprehensive, integrated, and effective adaptation response with concrete interventions and ensure the required capabilities are available. The CCAP sets up a new National Observatory for Adaptation to Climate Change to mainstream adaptation into planning at all levels and establish criteria for the evaluation of adaptation actions. The RDP and the CCAP also support *NbS for adaptation*. The CCAP mentions regulatory changes to protect areas and suggests that planning solutions, such as restoration and rehabilitation of damaged forests or wetlands, recognise the many ecosystem services that these ecosystems can provide. The RDP broadly recognises that NbS can provide multiple benefits, including how sustainable farming and forest management can restore degraded areas and enhance the diversity of the traditional rural landscape. In terms of *ensuring fresh water supply*, the CCAP only mentions the need for sustainable urban water management. The RDP gives freshwater more emphasis through its focus on the protection of regional water resources and ensuring that activities also account for climate change adaptation. Here, both water quality and quantity are of concern. Specific actions, such as irrigation efficiency and reservoir construction and renovation, are suggested to deal with drier periods.

All three policy documents work towards building **social equity and justice** and recognise social equity and justice as contributing to a more resilient regional future. Together, they also promote procedural, distributive, and recognitional dimensions of justice. In terms of *procedural* justice, all three documents promote stakeholder participation. The S3 refers specifically to innovation stakeholders and local institutional participation in the revisions of the S3 plan itself. In contrast, the national RDP refers to multilevel governance, civil society, and social inclusion in general. The CCAP provides more detailed information on its processes, emphasising the promotion of civil society, stakeholder participation, and awareness. It also organises public consultations in environmental decision-making, community-led natural resource management, and implements a multilevel risk adaptation governance. Additionally, it ensures stakeholder involvement in climate adaptation through a dedicated forum.

In terms of *recognitional* justice, which supports systemic adaptation, the RDP and the CCAP both pay attention to factors of vulnerabilities but do not mention concrete measures. According to the RDP, the region aims to increase equality between socio-economic classes, genders, generations, and territories. It recognises the disadvantages related to low income or migrant status and the need for flexibility in employment to improve gender equality. It emphasises the need for equal access to services, e.g., education (RDP). The CCAP also recognises specific vulnerable groups, stressing socioeconomic and health factors. However, unlike the RDP, it does not set any goals related to equity.

Elements of *distributional* justice, which support systemic adaptation, are also found in the RDP and CCAP. Both plans underline the need for community empowerment. The RDP aims to achieve the equality in access to services and inclusive economic growth. The CCAP refers to fair allocation of resources, protection of the most at-risk populations during heatwaves, and economic support for vulnerable communities facing climate impacts. Tuscany's RDP further touches upon restorative justice, aiming at correcting the structural weaknesses limiting female employment growth.

4.2.2 Policy and Steering Instrument Analysis

For the Tuscany region, the Governance survey sent to regions in Spring 2024 was used for the following analysis, as well as input from the D6.2 Innovation Roadmap for Tuscany region.

Regulatory instruments: The region has two main regulatory instruments guiding regional CR: the national climate change adaptation plan and the legislature establishing the regional plan for ecological transition or **Istituzione del piano regionale per la transizione ecologica (PRTE)**. Among the main influential regulatory instruments there are a regional sustainable development strategy, a regional development plan as well as integrated territorial plans. The survey also identifies other less influential steering instruments. For example, *regional laws* on flood risk and watercourse protection, soil protection, and conservation of natural heritage, together with *planning documents*, such as the landscape plan, coastal protection masterplan, regional biodiversity strategy and *national guidelines* for coordination of territorial and landscape management, guide regional resilience. The region also has public-private agreements for sustainable practices, including public and private stakeholder agreements for fluvial and coastal management, as well as voluntary river management contracts (Contratti di Fiume). The Tuscany region also participates in the Model Forest of the Florentine Mountains, which applies a stakeholder approach to forest management.

Good Practice: PPPs in Tuscany, specifically the way they incorporate local stakeholders into regional climate adaptation strategies, are a model that is replicable and scalable.

Financial instruments: The survey answers emphasised the National Recovery and Resilience Plan (PNRR) as one of the main instruments used to incentivise regional resilience. The PNRR covers the green transition and improving the sustainability, resilience, and equity dimensions of the economic system. Financial incentives related to the energy transition are also perceived as guiding CR, which are provided through the European initiative RepowerEU. In terms of *project related funding*, the region has utilised the ERDF, Horizon, and Interreg. The survey answers do not mention any of the following instruments: *penalising*, *budget allocation*, *demonstration projects on publicly controlled land* or *public procurement*. The Region plans, in its Innovation Roadmap (Regions4Climate D6.2), to create a consortium of private stakeholders; this PPP will simultaneously consolidate private funding for Tuscany's NbS coastal projects and establish a model which can be replicated in other regions.

Informational instruments: Survey answers reveal multiple initiatives and projects aimed at *knowledge mobilisation* and *generation*, including *public outreach*. The region utilises Interreg projects, such as AMMIRARE, which aims to engage various local stakeholders through educational training and awareness-raising initiatives focused on enhancing CR, particularly for beach areas. The Innovation Roadmap (Regions4Climate D6.2) outlines a plan to establish a robust governance model for stakeholders, benefiting the local community. The region aims to establish different levels of responsibility and create an operational task force or Advisory Board to accomplish this goal.

Several initiatives have involved *engaging with indigenous and local knowledge on resilience*, including voluntary river management contracts and initiatives to engage stakeholder knowledge in sustainable management of land use and farming, as well as forest management. The Tuscany Region also manages the Mediterranean regional network secretariat for model forests, which generates and disseminates knowledge. In terms of *knowledge generation*, the region has a planning tool to identify strategic points for forest resilience through forest fire prevention. There has also been a project to *evaluate* the impact of regional policies in general, and, according to the Tuscany Innovation roadmap (Regions4Climate D6.2), initial steps have been made towards establishing regular *reporting* and *monitoring* regarding CR project achievements and identifying necessary adjustments to mitigate risks and achieve anticipated innovation goals. Also, the Innovation Roadmap aims to establish an open data platform for information and knowledge sharing for CR initiatives. The data platform has a procedural justice element in that it will include stakeholders in an open innovation process, though making sure that there is an active mechanism to include local knowledge (in terms of recognitional justice) would be ideal.

Good Practice: Several regions lack a mechanism for integrating local knowledge into CCA policies. Voluntary River Management Contracts (Contratti di Fiume) provide this.

Synergistic instruments from other sectors: Several regional legislative frameworks from other sectors are perceived to have a positive effect on regional resilience, including a regional plan for ecological transition, regional strategy for biodiversity, and a territorial guidance plan for sustainable management of the landscape and territorial heritage. They promote greater ecosystem protection, ecosystem resilience, and adaptation. The regional development program, which promotes the integration of environmental, social, and economic innovation, is also seen to be aligned. Financial instruments from other sectors with a positive effect on CR include the complement for rural development, the Prioritised Action Framework for the Natura 2000 Network, and funding related to the operational document for the conservation and enhancement of Tuscan natural heritage. They support sustainable and resilient agriculture, ecosystem quality enhancement, as well as biodiversity and nature protection.

Conflicting instruments from other sectors: According to the survey respondent, the National Forest Strategy may hurt CR; however, no reasoning was given. The survey did not indicate any financial or informational instruments negatively affecting CR in the region.

Instruments with potential: The survey answers mention four instruments that currently have the potential to influence resilience. First, it is suggested that local forest management plans for private landowners, which are already mandatory, could be used to financially compensate landowners for protecting forest assets as carbon sinks. It is unclear whether this was also meant to compensate for co-benefits provided, e.g., CR. Second, regional legislation is also in place, offering the possibility of financially rewarding consortia of beach resort managers for projects related to renewing beach concessions. These projects implement measures to improve coastal ecosystems, mitigate the tourist load, and maintain equipped and sustainable paths. Third, the regional hunting and wildlife plan could be used to implement measures for ecosystem protection and sustainable wildlife management. Fourth,

local urban planning regulations and landscaping plans could be used to a greater extent to identify and map local conditions and ecological networks from a CR point of view.

Table 6. Summary of Climate Adaptation concepts across Tuscany's policy documents.

Types of adaptation	Concept	S3 (2021) (R)	RDP (2021) (R)	CCAP (2023) (N)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Yes		Yes	Yes (open information platform)
	Pushing the frontiers of knowledge on adaptation	Yes	Yes	Yes (<i>National Climate Change Adaptation Platform</i>)	Yes
Faster adaptation (FA)	Effective and inclusive governance mechanisms		Yes (<i>Joint public actions</i>)	Yes (<i>National Heatwave Health Effects Warning System</i>)	Yes (Advisory board in development)
	Trans-boundary cooperation				Yes (Mediterranean regional network for model forests)
	Piloting and testing solutions			Yes	Yes (NbS coastal projects)
	Accelerating the rollout of adaptation solutions	Yes	Yes	Yes	Yes
	Mobilising sustainable finance and resources and closing the climate protection gap			Yes	Yes (PPPs and EU funding model)
	Leveraging the CCA and DRR synergies	Yes (<i>National Civil Protection Department</i>)	Yes		
Systemic adaptation (SysA)	Improving adaptation planning		Yes	Yes (<i>National Observatory for Adaptation to CC</i>)	Yes
	Promoting NbS for adaptation		Yes	Yes	Yes (NbS coastal projects)
	Ensuring the availability and sustainability of freshwater		Yes (<i>Tuscan Water Authority</i>)	Yes	Yes (Contratti di Fiume)
	Fostering local and just resilience/ Justice	Yes (Pro)	Yes (Pro, Rec, dis)	Yes (Pro, Rec, dis)	Yes

Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.2.3 Tuscany region recommendations

A. Recommendations relating to modification and improvement of steering instruments:

1. Ensure there is a cohesive strategy for regional adaptation and resilience.

- As Tuscany is steered by a national strategy for climate adaptation and a regional plan for ecological transition, regional adaptation and resilience planning could suffer from fragmentation. However, the regional adaptation plan, which is being adopted, can help to ensure that Tuscan regional needs are considered. While in this transitory phase of waiting for the plan to be adopted, it is possible to consider other instruments that can then support the regional adaptation plan:
 - updating the regional ecological transition strategies to ensure that future CCA projects and risks are considered and that central goals related to adaptation are identified;
 - including a chapter focused on adaptation in the regional development plan; or
 - ensuring that adaptation is coherently mainstreamed through other regional and local policy documents and that key adaptation-related goals are monitored.

Based on the scoring laid out in Table 2, Tuscany's regulatory steering instruments are ranked poorly (score – 1/3, see table 2), and this recommendation aims to increase coherence within the regional strategy which will help to increase the strength of regulatory instruments.

- Enhance multi-level cooperation to ensure alignment and coherence between national policies, the coming regional and sectoral policies, with particular attention to regional challenges and specific needs of vulnerable sectors such as forest management. It was noted that the National Forest Strategy may have unintended negative effects on CR (mentioned as a conflicting instrument), highlighting the need to address potential policy conflicts. PPPs can serve as effective mechanisms for fostering cooperation where a formal governmental structure would be impractical.
- Invite research institutes to assess the social, economic, and environmental effects of the public-private agreements *were* pointed to in the “regulatory Instruments” *survey* as existing good practices by the region. If results are positive, explore how stakeholder management principles and public-private agreements could be expanded to also apply to other types of ecosystems.
- Systematise the instruments and policies with an impact on regional CR (across governance scales) and develop an intuitive and straightforward information system that allows the reinforcement of collective (public and private sector) knowledge and awareness and helps in the verification of existing complementarities and overlaps/inconsistencies. The information system could be a centralised online platform for regularly updated information.
- This set of recommendations could help achieve the goals set out in Tuscany's Just Transition Framework Action Plan (Regions4Climate D2.2). Which included a call for alignment of local planning with regional strategies, as well as identifying and rectifying inconsistencies between

existing policies. There were even calls for a governance body which will focus specifically on achieving the region's long-term Just Transition Vision.

2. Consider new types of financial instruments.

- In alignment with the recommendations in Governance Recommendations (Regions4Climate 2024, p. 44) to use financial instruments to “increase the engagement of the private sector in adaptation implementation,” consider how demonstration projects or public procurement related to public property and facilities could be used to catalyse further CR actions in the private sector. Green and climate bonds (see [Paris as a case](#)) and equity financing can be used to attract private capital. None were mentioned in the survey responses. The OECD’s [full compendium of financial instruments to support subnational climate action](#) can provide more options and ideas for financing.
- Explore how Payment for Ecosystem Services (PES) mechanisms could be set up to financially compensate landowners for improving or maintaining the level of ecosystem services generated by local forests. This could build on the strong stakeholder practices that Tuscany has built up with its public-private partnerships related to river and forest management. Tuscany’s Just Transition Framework Action Plan (Regions4Climate D2.2) aims to map ecosystem services and establish a systematic method for quantifying their value. By building on existing practices, it will enable the mapping of soil, forestry, and other areas for farmers and local landowners. This mapping could be used in exploring a PES mechanism.
- Create awareness and stakeholder interest in the regional legislation that provides the possibility of co-designing interventions with financial rewards to the private sector for beach renewal and coastal ecosystem improvement. Finding research institutes or public authorities to monitor the improvements can ensure that the funding is providing a positive effect. Also, if this results in mutual economic and environmental benefits, then this mechanism could be replicated in other areas. Explore with regional or national authorities the potential of replicating accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects.
- Secure for local administrators “continuous funding for monitoring & evaluation, and if needed for re-planning or adjustment of the current [adaptation related] programs” for the benefit of long-term adaptation progress (Regions4Climate 2024).

B. Policy Recommendations in terms of gaps and opportunities:

What is missing?

1. Developing a regional adaptation framework.

- Currently, Tuscany is steered by a national adaptation strategy and plan, and adaptation is integrated into sectoral policies at the regional level. This is evident from the regional development plan and the S3 and their support for faster and smarter adaptation elements. However, creating a regional adaptation plan, similar to some other regions in Italy, may allow for Tuscany to bridge some of the gaps identified below and have goals that are specific to its region's adaptation needs,

e.g., the coastline. According to Governance Recommendations (Region4Climate 2024, p. 44), a regional framework, especially one that is legally binding, can also “enhance actor involvement but also provide a stronger basis for enforcing, as well as provide clarity in terms of task assignment, division of responsibilities, clarification of goals”. It could also provide a basis for regional level budget allocation for adaptation and resilience. Alternatively, the RDP could have a specific chapter on adaptation and resilience (similar to Pärnumaa).

2. Outlining strategic opportunities and mechanisms for learning.

- Piloting, testing, and transboundary cooperation provide learning opportunities, which are important for the acceleration of adaptation. Tuscany is involved in many transboundary collaborations, e.g., through its LIFE, INTERREG, and Horizon projects. The region also has many pilots. The Med-IREN project, of which Tuscany is a member, aims to provide demonstrations and models on how to climate-proof Mediterranean infrastructure and introduce NbS into risk management strategies. However, the region’s regional policy documents (S3 and RDP) do not mention either transboundary cooperation or the piloting and testing of solutions. In order to catalyse innovation around CR, these strategies, as well as the coming regional adaptation strategy, could explicitly support learning mechanisms to ensure that it occurs.

3. Providing resources, investment and funding, to accelerate CCA action.

- The regional policy analysis supports the Governance Recommendations (Regions4Climate D4.3) call for Tuscany to further diversify its financial steering instruments. The CCAP, which is national level, mentions insurance and other risk transfer mechanisms as important and sectoral instruments exist. However, such mechanisms can also be established at the local and regional levels, e.g. see Uusimaa Cross-sectoral policy analysis for an example related to Espoo City SECAP, Helsinki capital area (HKI) SECAP, to protect assets and decrease disaster risk. In order to address the insurance protection gap and manage their risks, authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#).

What could be strengthened or built upon?

4. Strengthen the approach towards a faster implementation of adaptation policies.

- According to the documents, Tuscany has a consistent policy towards participatory governance, and both regional and national policy documents (especially the RDP and CCAP) reflect commitments to improve the various dimensions of justice, including restorative justice (RDP), which is relatively rare. Despite this, the R4C Tuscany region partners identified the lack of awareness among key stakeholders and the public regarding the implications and urgency of CCA as a main barrier (Malmström et al., 2024, p. 45). Stakeholder and public awareness could be increased through strengthened stakeholder and public engagement throughout the adaptation planning and implementation at the local level as it does not exist at the regional level. Also, the

RDP, which recognises the importance of social inclusion, civil society engagement, and related goals, could take a step further and provide details about how this will be ensured at the subnational level. The CCAP can be looked at as an example of how to accomplish this aim of civic engagement. Incorporating a more comprehensive view of justice, e.g., the distributional and recognitional dimensions, into the S3 could enhance social acceptance of policies and accelerate the uptake of necessary changes for CR. However, Tuscany's policy documents reflect a recognition for the role innovations play in accelerating adaptation. According to the S3, "advanced technologies [that] accelerate innovation and increase employment" are the basis for sustainable development. These innovations are perceived as a global and interdisciplinary approach to addressing challenges, such as climate change. However, further specification is needed on how technologies will be considered as resources and investments to achieve faster adaptation. This could also help introduce pilots and experimentation needed for technological advances, and faster learning and upscaling needed for accelerating adaptation.

5. Build a comprehensive approach to climate risks by assessing climate change risks, as well as losses.

- Tuscany's risk assessments and adaptation measures are very focused on the coast. Along the coast, measuring and monitoring losses from climate change impacts would help to evaluate and possibly justify further adaptation interventions economically. Studies to identify whether the combination of climate risks and seismic risk (mentioned in RDP) could result in compound risks could also help in DRR. An established risk assessment model could help Tuscany assess whether other geographic areas or sectors would also benefit from risk assessments and adaptation measures.

6. Recognition of more possibilities with NbS and sustaining freshwater resources.

- The S3 and RDP highlight concerns related to shoreline loss. However, the RDP does not mention the development of NbS in coastal ecosystems. The RDP and CCAP focus on NbS in specific ecosystems (forests, wetlands, farming landscapes). Although coastal NbS may be considered as part of sectoral policies, policy coherence would be higher if the policies supported each other with emphasis on different aspects. As Tuscany also focuses on NbS in coastal areas in Regions4Climate, feeding project results and identified gaps back to policymakers could strengthen future policy support for coastal adaptation.
- Ongoing NbS can be scaled up for a larger impact. Innovation can also play a role here, as NbS also covers green-grey solutions. Thus, consider whether the S3 could also support these policy objectives, creating a stronger link between innovation and adaptation. Tuscany's Innovation Roadmap aims to establish private financing of NbS projects related to freshwater resources, or at least the sharing of best practices with potential freshwater-focused projects. In terms of sustaining freshwater resources, the disconnect between the focus national CCAP and the RDP around freshwater resources, and specifically the urban focus of the CCAP, may indicate the lack of national support for ensuring the resilience of regional water resources in Tuscany. Stakeholder engagement with both local and national authorities can help ensure that the concerns related to water quality and quantity receive the necessary support and attention at all levels.

4.3 Azores region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), the Azores is an autonomous region with full legislative autonomy. This allows the region to have full independence in its legislative competence when forming and implementing climate policy.

For Azores region, the following documents were analysed: the Regional Strategy for Climate Change (ERAC) (2011) (R) and the Regional Program for Climate Change (PRAC) (2019) (R) as CCAPs, the Action Plan 2019-2030 Azores (R) as RDP and Research and Innovation Strategy for Smart Specialisation in the Autonomous Region of the Azores (R) as S3. Note that, according to the Azores' Basic Climate Law, the region is required to update its climate change plan (PRAC) every two years.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where specific mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.3.1 Cross-sectoral policy analysis

Smarter adaptation is supported by the regional S3, regional RDP, and regional CCAPs through their shared focus on *pushing the frontiers of knowledge* on adaptation. The S3 and RDP have a similar focus: to use earth observation technologies to collect oceanographic data and improve adaptation knowledge. In the case of the S3, there is a general statement consolidating knowledge regarding the prediction of climate change on agriculture, livestock, and forestry. The CCAP highlighted the need to develop and consolidate scientific support for mitigation and adaptation techniques (ERAC CCAP) and to strengthen coastal monitoring (PRAC CCAP). *More and better climate-related risk and losses data* is addressed in the RDP and S3. The RDP outlines an action plan to monitor the resilience of the fajãs (flat coastal plans from lava flows, unique to the Azores) in relation to rising sea levels. The S3 aims to standardise data and monitoring for early warning systems regarding extreme weather events and natural hazards. The S3 points to Azores' "Science Azores" Roadmap, which includes the goal of creating a single, integrated, cross-cutting platform at the regional level to provide data on land use, forestry and agricultural health, water resources, and climate impacts.

Each of the policy documents promotes **faster adaptation** through their support of *effective and inclusive governance mechanisms, transboundary cooperation, piloting and testing solutions, accelerating the roll out of adaptation solutions, or leveraging CCA and DRR synergies*. *Accelerating the roll out of adaptation solutions* is supported in the CCAP (PRAC). The CCAP (PRAC) includes an assessment and program related to relocating buildings and infrastructures away from risk zones. The CCAP also reinforces restrictions on land use in risk zones (PRAC CCAP). *Transboundary cooperation* is touched upon by the RDP, and the CCAP (ERAC). According to the RDP, the Azores regularly collaborates in projects with its regional Macaronesian partners (*Azores, Madeira, Canary Islands and French Guiana*). These collaborative projects range from mapping marine protected areas (*MSP-OR*), planning sustainable areas (*PLASMAR+*), and monitoring microplastics on beaches (*MPLAMAC*). The CCAP (ERAC) states that the region is committed to continued and further involvement in transregional programmes with Macaronesian neighbouring regions. In terms of *piloting and testing solutions*, the S3 states that between 2014 and 2021, numerous research projects were conducted, including several that examined the impact of climate change on various sectors (such as agriculture), along with pilot trials and testing of climate solutions.

The S3 and CCAPs put in place *effective and inclusive governance*. The CCAP (ERAC) does so by establishing a working group with the explicit aim of increasing coherence in CCA policy implementation through the establishment of a shared technical-scientific framework, which itself is based upon regional climate knowledge, climate protection, similarities of future climate scenarios, and identification of vulnerability. Also, the CCAP (PRAC) aims to reduce risks by limiting land use on land that has been mapped as too high risk in its municipal land-use plans. The S3 includes an aspirational statement about how regions and institutional bodies should create collaborative spaces to design sustainability policy, as well as the establishment of knowledge sharing hubs. For *leveraging CCA and DRR synergies*, the S3 calls for the development of integrated biodiversity systems, which was deemed crucial for addressing threats from natural hazards, pollution, and their impact on geo-biodiversity. The S3 also, in its Data Science section, calls for the implementation of monitoring, risk detection and alert services for natural and extreme phenomena.

The RDP and the CCAP support **systemic adaptation** through *improving adaptation planning*, and the CCAP (PRAC) supports *scaling up NbS for adaptation*. The S3 mentions *freshwater access*, in its water management plan, but does not provide details on drought-specific strategies nor on specific sustainability policies.

Both the RDP and one of the CCAPs (PRAC) contain examples of *improved adaptation planning*. The RDP recognises the need to anticipate, monitor, and respond to risk situations and states that the new flood risk and water scarcity management plans will be finalised and updated. The CCAP sets the integration of CCA and risk mapping into municipal land-use plans as a goal to reduce risks (PRAC CCAP). This comprehensive approach to risks improves the efficiency of adaptation strategies and plans. The CCAP also promotes regional *scaling up NbS for adaptation* through measures such as a ban on grazing on wasteland to foster passive restoration and the promotion of adaptive management of protected areas by adapting land use planning to climate change (PRAC CCAP).

The CCAP and RDP policy documents support *fostering local and just resilience* in terms of procedural, recognitional, and distributive justice. The CCAP and RDP support procedural justice through their support for the participation of stakeholders in decision-making. The CCAP aims at mobilising the participation of a broad set of stakeholders (local, regional, and central administration, economic actors, civil society, and citizens) (PRAC CCAP). The RDP focuses on civil society and citizen participation in policymaking, and is more specific, defining some of its policymaking areas, e.g. nature conservation. In terms of *recognitional* justice, in addition to acknowledging the value of different types of knowledge and stakeholder perspectives, one of the CCAPs recognises the vulnerabilities of different groups of people and the need for society to adapt to climate change (PRAC CCAP). Such a statement could be reinforced with concrete measures to tackle vulnerabilities, for instance, to support systemic adaptation better. Finally, *distributive justice* is only mentioned in the CCAP (PRAC CCAP), e.g., promoting awareness and capacity building (citizens, technicians, and decision-makers).

4.3.1 Policy and Steering Instrument Analysis

Regulatory instruments: The regional climate strategy is considered the most influential regulatory steering instrument for regional resilience. At the regional level, the primary documents include a strategy and a separate program for climate change. Also influential are a regional flood risk management plan, a coastal management plan. Influential *national planning documents* include a climate change adaptation strategy, a spatial planning policy program, a recovery and resilience plan, and the Climate Framework Act. Other less influential instruments identified in the survey are *regional standards* (risk mapping, delimitation of flood areas, and building certifications); *national regulations and planning documents* (energy transition, electrical mobility); and *municipal planning documents* (master plan, climate change adaptation strategy, and action plan). No *agreements or intergovernmental mandates* were mentioned.

Also relevant, the [Regional Strategy for Smart Specialisation](#) (RIS3 Açores 2022-2027) based on priority areas in which the region has relevant resources/assets and/or established critical mass, in conjunction with a set of cross-cutting areas that arise in response to a set of concrete challenges facing the region. The “Environment and climate action” is considered a transversal dimension that supports the development of the RIS3 priority areas, such as space and data, sea and blue growth, tourism and heritage, among others. “The area of Environment and climate action, including natural hazards, have consistently gained prominence and deserved attention given the geodynamic, oceanic, and archipelagic context of the RAA, particularly in terms of planning, management, monitoring, assessment, and, when necessary, response to various risk factors, which translates into conditions conducive to the unfolding of problems typical of small island and outermost territories.” (Governo dos Açores, 2022)

Financial instruments: The main financial instrument for *incentivising* CR mentioned in the survey is the legal and financial support for climate emergencies. It works both as an insurance for the restoration of damaged property due to extreme weather events, as well as a fund to support public investment aimed at improving resilience to the effects of climate change. A less influential funding instrument is a national environmental fund, which allocates support for climate-related projects and supports recovery from extreme events. *Sanctions and taxation* are applied to environmental crimes. The region has an

allocated budget for climate action within its regional program Açores 2030, co-financed by the European Union. The region also is involved in recovery and resilience plan, a nationwide programme which implements the EU Recovery and Resilience Facility (RRF), the main financial instrument of the NextGenerationEU programme. The region also participates in several EU-funded *projects* under Horizon, Life, and Interreg. The survey did not mention any of the following instruments: *demonstration projects on publicly controlled land* and *public procurement*.

Informational instruments: The region generates knowledge through State of Spatial Planning reports concerning the alignment of spatial planning policies and CR for certain municipalities. Though not mentioned in the survey, Ponta Delgada, Ribeira Grande, and Lagoa-Açores are signatories to the CoM. The region employs various tools for *public engagement and awareness*. These initiatives include information campaigns as part of European projects (PlanClimac, Life IP Climaz, Rethink), a public competition for climate innovation, and regular outreach on the Circular Economy concept to engage the public. Respondents felt that resilience was improved through circular economy measures. The circular economy's focus on waste reduction and resource conservation reduces dependency on resources. Answers from the survey did not mention any instruments for *knowledge mobilization*, *engaging with indigenous and local knowledge*, and *monitoring and evaluation*. As mentioned in the Cross-sectoral policy analysis' *fostering local and just resilience* section, the region has certain ambitions and initiatives to involve multiple stakeholders and support vulnerable groups.

Synergistic instruments from other sectors: Legal frameworks from the *land use sector*, *energy sector*, and *construction sector* are considered to have a positive effect on CR in the region. Land use policies contribute to the identification of risk zones and impose norms and restrictions on land development, which align with broader CR objectives. Policies from the energy sector promote the use of renewable energy sources, incentivise geothermal mix energy production, and energy production in the archipelago. Locally produced renewable energy is perceived to reduce vulnerability of the energy supply during extreme weather events. This is due to diversification of the energy mix and reducing dependency on any single source, ensuring a more stable and reliable energy supply, mitigating the risk of disruptions, and decreasing vulnerability to fossil fuel price volatility. The housing and construction sector includes building codes and technical solutions that promotes energy efficiency in buildings, which contributes to a decreased energy demand overall and increased resilience of households and society in terms of energy dependency. Using the same line of thinking, financial instruments from other policy areas that are perceived to have a positive effect on CR are instruments that *contribute to the energy transition*, and include incentives for installing systems for solar energy, the production and storage of renewable energy, and the purchase of electric vehicles.

Good Practice: The region synergises climate mitigation and adaptation well by diversifying energy sources to shore up protection from extreme weather risks.

Conflicting instruments from other sectors: Legal frameworks from the *tourism sector* and *mobility sector* are considered to have a negative impact on CR. The survey respondent indicates a lack of sustainable mobility plans at the regional and municipal levels, which could negatively impact the resilience of the transport system and its ability to function in extreme weather or future climate

conditions. Currently, transport relies on fossil fuels and contributes to congestion and air pollution. This hinders climate mitigation and increases the region's vulnerability to energy supply disruptions.

Instruments with potential: The survey respondent suggests that municipal master plans could potentially steer land use, if strengthened. Plans could better boost resilience through the support for sustainable practices, such as water management, flood reduction, biodiversity protection, and carbon sequestration. Answers indicate that there is a need for better integration of CR within land use and urban planning, notably a need for planned river stream control and improvement of infrastructure, as well as creation of more urban spaces with shaded areas. Another instrument with potential is the Azorean Regional Energy Strategy. Although it focuses on the reduction of greenhouse gases, respondents felt that energy measures, such as the adoption of renewable energy, improving energy efficiency, and promoting sustainable transport, could also improve the region's vulnerability to climate impacts, alongside co-benefits such as improved air quality and sustainable economic growth.

Table 7. Summary of Climate Adaptation concepts across Azores' policy documents.

Types of adaptation	Concept	S3 (2022) (R)	RDP (2022) (R)	CCAPs (ERAC-2011) (PRAC-2019) (R)	Steering Instruments
Smarter adaptation (Sma)	More and better climate-related risk and losses data	Yes	Yes		
	Pushing the frontiers of knowledge on adaptation	Yes	Yes	Yes	Yes (Spatial Planning reports)
Faster adaptation (FA)	Effective and inclusive governance mechanisms	Yes		Yes	Yes
	Trans-boundary cooperation		Yes	Yes	
	Piloting and testing solutions	Yes			
	Accelerating the rollout of adaptation solutions			Yes	
	Mobilising sustainable finance and resources and closing the climate protection gap				Yes (insurance for extreme weather events)
	Leveraging the CCA and DRR synergies	Yes			
Systemic adaptation (SysA)	Improving adaptation planning		Yes	Yes	
	Promoting NbS for adaptation			Yes	
	Ensuring the availability and sustainability of freshwater				
	Fostering local and just resilience/ Justice		Yes (Rec, Pro)	Yes (Rec, Dis, Pro)	

Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.3.3 Azores region recommendations

A. Recommendations relating to the modification and improvement of steering instruments:**1. Mainstream of CCA and CR into different sectors.**

- Authorities could update regional and local plans, such as the regional tourism development plan, energy strategy, and land use plans, e.g., spatial plans, to integrate climate adaptation and resilience aspects. This includes alignment with the main adaptation documents (strategy and program), but also plans for coastal management, flood risk management, and land use to ensure risks related to e.g., heat and flooding are considered. Mainstreaming urban development plans could look to land-use plans, which are perceived as successful in identifying risk zones and including development restrictions to support CR.
- According to the survey, the mobility and transport sector is considered to have a negative impact on resilience, and regional and local sustainable mobility plans are lacking. This relates not only to infrastructure, but also to energy supply. To ensure that mobility is climate-proof, regional authorities could consider:
 - including mobility into their climate adaptation planning documents,
 - develop a regional sustainable mobility plan to ensure coherent, sustainable, and climate-proof development of transportation systems, or
 - include aspects for sustainable and climate-proof transportation in other plans, e.g., Agenda 2030, etc.
- The previous work on climate-proofing sectors (such as transportation) can build on the past work related to the energy transition in the Azores to diversify the energy mix and climate-proof the energy supply. Basque Country's financial instruments section can be looked at as a model, where the region implemented penalising instruments for non-compliance with the Climate Change and Energy Law.
- According to the Innovation Roadmap (Regions4Climate T6.1/D6.2), further action is needed to strengthen CR leadership and governance. Political constraints related to the archipelago's regional autonomy may hinder effective leadership in CR efforts. To address this, the regional ecosystem must be strengthened by providing the necessary resources and expertise/knowledge to foster innovation and promote synergies across various contextual dimensions, as outlined in the CIF dimensions according to T6.1/D6.1. This must be grounded in strong regional-level governance and leadership, benefiting from the integration of CR in multidimensional policies and regulations, and the creation of multidisciplinary teams dedicated to CR.
- Azores' Just Transition Framework Action Plan (Regions4Climate D2.2) aims to ensure that departments are key players, consistently playing a role in CCA policy, rather than changing roles and levels of involvement. By implementing this recommendation, the region will be closer to obtaining a more stable and robust regulatory framework.

2. Incentivise resilience using diversified funding instruments.

- Although current policy documents lack comprehensive funding and investment strategies to accelerate adaptation, the steering instruments survey indicates the existence of legal and financial mechanisms for climate emergencies, as well as support through the national environmental fund. If both instruments operate primarily at the national level, developing complementary regional funding mechanisms could strengthen climate risk management and broaden the financial base for adaptation. Such instruments could also build on ongoing regional projects and partnerships, enhancing coherence and long-term sustainability of adaptation efforts. A good example of this is the PPP platform that Tuscany established to consolidate private funding for the region's NbS coastal projects.
- Incentivising financial instruments are currently applied in the energy sector, as outlined in the synergistic instruments sector. However, it could be considered how the tourism sector and mobility sectors could use tax incentives and grants to incentivise actors, such as business owners, to invest in climate-resilient infrastructure, land use, and sustainable practices. Also, green and climate bonds (see [Paris as a case](#)), equity financing, and public-private partnerships (PPPs) can also be used to attract private capital.
- The region or local governments could also consider funding adaptation and resilience measures within the public sector, e.g., in buildings and facilities. For example, Burgas' financial instruments section outlines how funds are dedicated to the restoration of public infrastructure and for maintenance measures that mitigate risks, e.g., maintaining permeability. The OECD's [compendium of financial instruments to support subnational climate action](#) (dashboard database) (OECD, 2022) can provide more options and ideas for financing.

B. Recommendations in terms of gaps and opportunities:

What is missing?

1. Build a comprehensive approach to smart adaptation by assessing climate risks and losses.

- The policy documents demonstrate policy coherence in their support for advancing the frontiers of knowledge in adaptation and risk assessment. However, the regional CCAPs are less specific than the RDP and S3 in terms of technologies and risk assessments. For example, as stated in the smarter adaptation section, the S3 is standardising data on extreme weather and providing early warning systems. The CCAPs could more explicitly link its goals to and build on the RDP and S3, which would help to evaluate and possibly justify further adaptation interventions economically. Risk and loss assessment could also be extended to include the impacts on society. This could help identify differentiated vulnerability and support different groups to adapt, which is recognised as important by the CCAP, but not explicitly operationalised in the policies. It would also enable the document to consider the justice implications of adaptation better.
- Focused on the Azores IP, the Coastal Vulnerability Index model (CVI), developed under R4C, will enable the efficient collection and processing of data, providing essential support for informed

decision-making; this exemplifies how academia collaborates closely with public authorities in the Azores. The Azores Innovation Roadmap (Regions4Climate T6.1/D6.2) outlines that digitalisation based on accurate monitoring and more inclusive models to support decision-making are the main commitments to address CR.

- Azores ranks poorly in terms of its informational steering instruments (score – 1/4, see table 4) and the monitoring and evaluation systems within the region are quite poor as well (score – 1/4, see table 4). However, there are many opportunities for improvement and this recommendation with its call for standardisation on early warning systems will help improve the region's position in this regard.

What could be strengthened or built upon?

2. Strengthen the integration of local and traditional knowledge related to adaptation and resilience.

- The RDP encourages the dissemination of knowledge of cultural heritage and promoting Azores culture where possible within the region's initiatives, but without a clear adaptation focus. The CCAPs do not mention traditional knowledge. Local communities have knowledge of how they are affected by climate change and how they have adapted to changes in the environment in the past. Knowledge of traditional farming and water resources management methods, safe locations, native plants, and community structures can help improve adaptation planning. To mobilise local-level knowledge related to adaptation and resilience, incorporating community participation methods into multi-level governance practices could also be beneficial.

3. Bridging justice and climate change adaptation (CCA).

- There is general support for stakeholder participation in the policy documents, which are a solid foundation from which to increase equity and justice in policymaking. This means there is an opportunity to learn from the stakeholder engagement conducted in the various policymaking spheres and further develop efficient and effective stakeholder practices. However, the steering instruments analysis revealed no actualised knowledge mobilisation or engagement with indigenous/local knowledge that the region is utilising. It would be beneficial to clarify the role of stakeholders in climate adaptation policymaking and identify which stakeholder groups should be prioritised. For example, the CCAP acknowledges the vulnerabilities of different groups of people and the need for society to adapt to climate change (PRAC CCAP). Still, such statements could be supported by plans for risk and vulnerability studies to consider the differentiated impacts of climate change and measures on society, as well as concrete measures to tackle these vulnerabilities. Such vulnerability assessments could also benefit S3 and RDP strategies in case there are employment, economic, or technology-related implications.
- The Azorean Footprint app (developed under R4C) will play a crucial role in enhancing community literacy and raising awareness about climate change challenges, empowering individuals, and fostering a more informed and engaged community.

4. Strengthening the approach towards a faster implementation of adaptation policies.



- To accelerate adaptation, the Azores could strengthen links between the S3 and CCAPs in innovation. The S3 mentions piloting in terms of adaptation, which is a strength. Further linking S3 related innovation aspects and approaches, such as piloting and testing of solutions, with the RDP and CCAPs might be a way to accelerate learning regarding CCA and thus implementation as well.
- The policy documents could also strengthen their integration of water, land use, and infrastructure-related activities due to their scale, and accelerate the rollout of adaptation actions. This could also be combined with increased application of NbS for further adaptation and broader co-benefits. This could also help address the need reflected in the survey for better integration of CR into land use, urban planning, and infrastructure.
- Direct support for experimentation and testing innovative solutions to address the complex challenges posed by climate change has also been identified as a gap, according to Innovation Roadmap (Regions4Climate T6.1/D6.2). This requires using the territory as a testbed, offering conditions to accelerate innovation in climate action, including dedicated funding for CR.

4.4 South Aquitaine region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), France is a unitary state, where the regions lack legislative powers and have the central role of implementing regulations and distributing funds from their budget. Note that “South Aquitaine” is not a formal administrative unit in France and instead is part of the larger administrative region of Nouvelle-Aquitaine. The South Aquitaine region corresponds to the former French region of Aquitaine before the 2016 regional reform. The analysis of South Aquitaine is carried out with a focus on Communauté d’Agglomération Pays Basque (CAPB), an administrative unit within the department of Pyrénées-Atlantiques, which itself is within the region of Nouvelle-Aquitaine.

The analysis is based on the latest relevant policy documents available. It thus includes additional territories from the current larger region called Nouvelle-Aquitaine, though with a focus on and recommendations for the Communauté d’Agglomération Pays Basque.

For the South-Aquitaine region, the following documents were used for the policy analysis: Anticipating Climate Change in Nouvelle-Aquitaine (R) (Nouvelle-Aquitaine CCAP/ NAQ CCAP) and the Basque Country Climate Plan -territorial climate-air-energy plan (L) (Pays Basque CCAP or PB CCAP) as the CCAPs, the Regional scheme for economic development, innovation and internationalisation 2022-2028 SRDEII (R) as the Nouvelle-Aquitaine RDP and S3, which will be cited as “NAQ RDP/S3”. The documents analysed for the region of South-Aquitaine cover a larger area. Note that the PB CCAP is subdivided into three documents: an environmental review, an action plan, and a strategy plan; for the sake of brevity, all three documents are referred to as the “PB CCAP” within this policy brief.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, in which certain relevant mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies in order to steer CCA policy.

4.4.1 Cross-sectoral policy analysis

All the policy documents analysed NAQ RDP/S3 support **smarter adaptation** by promoting better climate-related risk and losses data and pushing the frontiers of knowledge on adaptation to some extent. First, the NAQ RDP/S3 promotes cross-sectoral and regional data pooling for monitoring and steering around environmental issues. As this can also be considered a governance structure, it can also enable faster adaptation. In terms of improving climate-related risk and losses data, the NAQ CCAP mentions the mapping of climate change impacts in the region through the IMPACT2C project and calls for further risk assessments to be built on this dataset. The PB CCAP includes monitoring studies focused on climate change related health risks, as well as regional cross-border air quality. To push the frontiers of knowledge of adaptation the NAQ RDP/S3 encourages digitalisation projects related to CR goals and the establishment of regional innovation testing and demonstration centers which aims to promote and develop innovations aligned with Néo Terra’s ambitions. Néo Terra is Nouvelle-Aquitaine’s ecological and climate roadmap, launched in 2019 and updated in 2025, which aims to ensure that the

region's public policy is in alignment with CR and CCA goals. This also supports faster adaptation. The NAQ CCAP includes aspirational statements about building surveillance, interconnected databases, and a uniform definition of indicators regarding CCA policy. Recognising links between biodiversity and adaptation, the PB CCAP also plans to improve knowledge of biodiversity at the regional level via defining a methodology for analysing and cross-referencing knowledge to qualify and territorialise issues. The Basque region will also structure a local scientific council and research dedicated to biodiversity and the effects of climate change (PB CCAP).

Faster adaptation is supported in all policy documents, with a least one document supporting new governance structures, transboundary cooperation, accelerating the roll out of adaptation solutions, and CCA and DRR synergies. As mentioned in the previous section, the NAQ RDP/S3's monitoring and steering strategy for data regarding environmental policy can be seen as governance structures. NAQ RDP/S3The NAQ CCAP also supports governance structures through its intention to widen stakeholder participation to include economic actors and currently unengaged citizens. This document aims to improve knowledge sharing, ensure fair representation and distribution of decision-making power, empower citizens through capacity building, and promote wider public involvement in climate action. Regarding governance structures, the PB CCAP outlines plans for a new regional scheme (SRADDET, part of NOTRe law) to identify opportunities and projects that will contribute to environmental protection and the ecological and energy transition. The region's strong transboundary cooperation is reflected in its policy documents. While the NAQ CCAP references a proposed trans-regional agreement between France, Spain, and Andorra, related to ecosystem protection within the Pyrenees; the PB CCAP includes coordination with the Spanish Basque Country, on shared issues and involvement in European initiatives where possible. It also mentions the development of exchanges of experience to draw inspiration from actions carried out by other municipalities and the pooling of resources.

In support of piloting and testing solutions, the NAQ RDP/S3 encourages the establishment of regional innovation testing and demonstration centres, which aim to promote and develop innovations aligned with Néo Terra's ambitions. The NAQ RDP/S3 also accelerates the rollout of adaptation solutions related to land use. For example, it plans to limit the artificialisation of land and anticipate environmental risks such as coastline retreat and flooding by better considering tourism in regional and local land use strategies. The NAQ RDP/S3 also leverages existing synergies between CCA and DRR through the inclusion of plans for improved crisis management systems. The PB CCAP references several funding mechanisms and schemes, e.g. "Contrat de Relance et de Transition Écologique" (CRTE) and the "France Relance" recovery plan, which includes a section on ecological transition. However, these plans lack a clear CCA element or funding requirement. Thus, the region lacks clear steps for closing the climate protection gap and establishing transformative pathways. **Systemic adaptation** is reflected in the NAQ RDP/S3 and both CCAPs with all documents improving adaptation planning, ensuring freshwater, and fostering local and just resilience. The NAQ RDP/S3 and PB CCAP address scaling up NbS for adaptation.

In terms of improved adaptation planning, the region has a reasonable basis for policy cohesion as the NAQ RDP/S3 mentions CCA/CR, water resources, and biodiversity, and further recognises the interconnectedness of these topics and the local economy. The NAQ CCAP backs improved adaptation planning, by applying scientific understanding to policy development and having scientific input

supported by groups like AcclimaTerra -a committee of scientists supporting climate policy coherence and implementation-, of which the NAQ CCAP itself is a product of the committee's guidance. Further, the PB CCAP explicitly mentions the translation of the improved regional knowledge of biodiversity and improved methodologies for analysis into planning tools. Thus, the policy documents can be considered cross-sectoral.

In terms of scaling up of NbS practices, the NAQ RDP/S3 promotes NbS for adaptation in the agricultural sector, e.g., agroecological practices to preserve biodiversity and soils. The PB CCAP makes NbS a central element of climate action and includes the continued management of Natura 2000 sites in climate action. In terms of ensuring fresh water, the plans focus on water related environmental management. The RPD/S3 plan supports environmental impact mitigation and actions to preserve water quality and quantity. The RDP/S3 encourages the development of solutions for the treatment of pollutant discharges (industrial and medicinal) into water, and supports actions to preserve water resources, in terms of both quality and quantity. The NAQ CCAP mentions water management, the restoration and protection measures for water resources, and the implementation of smarter exploitation with smarter infrastructure. The PB CCAP includes the implementation of a new environmental management system for water and wastewater. Unlike the other two policy documents, the RDP/S3 also seeks to identify future constraints likely to impact water availability in the region and plans to diversify water resources by identifying new reservoirs.

The NAQ RDP/S3, PB CCAP, and NAQ CCAP support local and just resilience and consider the recognitional, procedural, and distributive dimensions of justice. The NAQ RDP/S3 contributes to several broad aims, including equitable development, cohesion, consideration of vulnerabilities, and promotion of bottom-up civil society participation. Specific goals, i.e., equitable sharing of wealth, digital inclusion, and reaching equality in the workplace and the labour market for vulnerable groups, support recognitional and distributive justice in general. Although most of these are not specifically CCA focused, the document includes specific measures that do relate to just CCA/CR, e.g. training to support major economic changes like the ecological transition, focusing on areas exposed to climate-related risks such as coastal areas and industrial basins. The PB CCAP addresses recognitional justice through the inclusion of awareness-raising initiatives on the health risks associated with climate change and possible impacts on vulnerable groups (e: elderly, disabled, pregnant). The PB CCAP touches on distributive justice by outlining an initiative to support households in the renovation efforts, specifically by helping them identify if they are low-income and eligible for subsidies.

The NAQ CCAP aims to improve procedural justice by localising stakeholder participation, sharing knowledge across multiple domains (including climate sciences and public policy), and ensuring a fair representation and distribution of decision-making power through democratic practices, among other goals. It recognises the need for broader public participation and involvement in decision-making and has a stated policy goal of increasing citizen participation in climate policy development. These include the integration of local voices and knowledge into all stages of policymaking and raising public awareness, including through education. The region also recognises the importance of diverse knowledge sources, accessible language, and inclusive policymaking. The PB CCAP similarly aims to enrich its CCA plan with procedural justice via local initiatives and actions.

4.4.2 Policy and Steering Instrument Analysis

Regulatory instruments: The main regulatory steering instruments for South Aquitaine are the municipal risk plans within its region. Also influential are documents at all governance levels, including the national Climate and Resilience Law, national plans (integrated coastline management, biodiversity, protected areas creation), regional strategies (climate and biodiversity), as well as municipal plans and strategies (e.g., coastal risks, climate, biodiversity). Other less influential *instruments* include national *regulations governing* the territorial adaptation to coastal retreat and *planning documents* (such as the national climate, air, and energy plan, regional planning documents related to recovery, transformation, and resilience in energy and mining, and municipal safety and coastal risk management). The survey also mentions an *agreement* for state-region collaboration on economic development (CPER), which steers regional resilience. CAPB is involved in initiatives like GIS Littoral Basque, which is a scientific interest group focusing on coastal policy and projects. There, the CAPB is a member and takes part directly in monitoring and piloting projects, such as the Local Strategy for the Basque Coast, an action programme which carries out coastal monitoring, creates crisis response drills, and implements sand replenishment operations.

Financial instruments: The region uses green funds (Fonds Vert, a nationally managed project fund) to *incentivise* CR, as well as *demonstration projects*, e.g., recomposition of coastal space as a response to coastal retreat. The survey answers did not mention any of the following instruments: *penalising*, *budget allocation*, *project-related funding*, or *public procurement*. However, as the region is participating in Regions4Climate, the region can be assumed to have knowledge of EU-funded projects (e.g., Horizon Europe). Also, the NAQ RDP/S3 lists several projects throughout the region, and many of the region's projects acquire their funds from EU-funded projects (e.g., Interreg, Horizon, and the Green New Deal's Farm to Fork strategy).

Informational instruments: Survey answers include two regional collaborative initiatives: GIS Littoral Basque and a BRGM Coastal observatory, which function as instruments for *knowledge mobilisation* in collaboration between stakeholders, science, and public authorities, as well as *knowledge generation* and *monitoring* through several projects concerning coastal DRR and managing the coastline. The region further mobilises knowledge using the French agency for ecological transition, which supports and provides expertise for businesses and stakeholders involved in the ecological transition. In terms of *monitoring and evaluation*, survey answers refer to the High Council for Climate (Haut Conseil Climat), an independent advisory body, created in 2018, that since 2022 has been responsible for evaluating France's domestic adaptation policies. *Public outreach* is conducted through several NGOs, such as ADEME and RAC – France. The survey answers did not mention any instruments for *engaging with indigenous and local knowledge on adaptation /resilience*.

Synergistic instruments from other sectors: Regulatory instruments that are synergistic with CR in the region include environmental policies and urban planning policies, notably the preservation of carbon-capturing, blue and green networks, the development of NbS, and an urban planning provision to prohibit the creation of new artificial green zones in urban areas. Financial instruments with a positive impact include grants for the restoration and conservation of ecosystems, and locally managed European funds for agriculture, due to their promotion of planting hedges and environmental agricultural

measures. A synergistic informational instrument mentioned is a local map service on water issues that includes flood risk maps for inland and sea floods that can also be used for DRR planning.

Conflicting instruments from other sectors: The main conflicting regulatory instruments in the region are policies from the tourism sector, transport and mobility sector, and national economic plans. The survey answers indicate that the development of tourism is sometimes incompatible with CCA due to the retreat of the coastline, posing a conflict of interest between these two sectors. Also, initiatives for public transport and soft mobility are developed, but not climate - proofed. National economic plans have negative impacts on CR because of their focus on industrialisation and urban development create value related conflicts. Locally managed European funds for agriculture are a financial instrument that is both synergistic and. While these funds may encourage some types of sustainable agriculture practices which benefit CR, they also encourage intensive production in agriculture, which degrades soils, pollutes water, and causes biodiversity losses, which negatively impact CR.

Instruments with potential: The respondent states that local strategies for coastal DRR could potentially support CR because they are based on a precise inventory of risks and a detailed action plan customised to the municipality. However, they currently do not support this approach because, although these strategies were identified as helpful, they were also seen as insufficient on their own to build a robust DRR strategy for the region, indicating that more was needed. They also mention the national Law on Climate and Resilience, which sets national reduction and mitigation targets and serves as a coordinating instrument. However, its influence could be enhanced if the funds were more precise and provided clearer incentives for specific funds to promote certain CCA actions.

Table 8. Summary of Climate Adaptation concepts across South Aquitaine's policy documents.

Types of adaptation	Concept	NAQ RDP/S3 (2022) (R)	PB CCAP (2021) (L)	Nouvelle-Aquitaine CCAP (2018) (R)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Yes	Yes	Yes	Yes (GIS Littoral Basque and BRGM Coastal observatory)
	Pushing the frontiers of knowledge on adaptation	Yes	Yes	Yes	Yes (coastal DRR and coastline management projects)
Faster adaptation (FA)	Effective and inclusive governance mechanisms	Yes	Yes	Yes	
	Trans-boundary cooperation	Yes	Yes	Yes	Yes (GIS Littoral Basque platforms projects and regional collaboration)
	Piloting and testing solutions	Yes			Yes (Fonds Vert, funds/supports demonstration projects)

	Accelerating the rollout of adaptation solutions	Yes	Yes		
	Mobilising sustainable finance and resources and closing the climate protection gap				
	Leveraging the CCA and DRR synergies	Yes			Yes (flood mapping)
Systemic adaptation (SysA)	Improving adaptation planning	Yes	Yes	Yes	
	Promoting NbS for adaptation	Yes	Yes		Yes (funds for ecosystem conservation)
	Ensuring the availability and sustainability of freshwater	Yes	Yes	Yes	Yes (local map service on water issues)
	Fostering local and just resilience/ Justice	Yes (Rec, Dis)	Yes (Rec, Pro, Dis)	Yes (Pro, Dis)	

Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.4.3 South Aquitaine region recommendations

A. Recommendations relating to the modification and improvement of steering instruments:

1. Mainstream climate adaptation and resilience into sectoral policies.

- Authorities could update regional and local plans, such as those related to tourism and transport, to integrate CCA and CR aspects. Strategies should utilise stakeholder and community participation, recognised in the NAQ and PB CCAPs as important and needed, to ensure that potential trade-offs are considered in the planning phase. Alignment should not only focus on the climate-proofing of that sector in a way that benefits the sector. It should also include steering instruments that enable such win-wins. See Tuscany region's Financial Instruments section and Instruments with Potential section for examples of how to utilise steering instruments to do so.
- To take action on the perceived negative impacts of the national economic plans for industrialisation and urban development on CR, the subnational governments could collectively communicate their concerns to national authorities. Alternatively, they could look to join a European project, as a case study, where these issues are further studied and solutions developed, and communication is targeted to changes in national level policies.

- The Innovation Roadmap (Regions4Climate T6.1/D6.2) highlights the need to accelerate the integration of climate considerations into comprehensive policies and regulations, which is vital for achieving meaningful systemic transformation. This integration also affects governance; the resulting changes can create a more cohesive supporting ecosystem that aligns and engages regional stakeholders towards CR.

2. Strengthen financial support for resilience.

- Private sector and private individuals could be incentivised via local or regional level grants, penalties, and subsidies to fund climate proofing agriculture or tourism initiatives, which are areas identified as needing work within the survey. Green and climate bonds (see [Paris as a case](#)), equity financing, and public-private partnerships (PPPs) can also be used to attract private capital.
- Allocation of regional budget for CR measures (which is not mentioned in the survey) and continued active participation in EU projects could also provide a balance of short- and long-term funding for resilience. For example, Burgas' CR funding comes from a combination of EU funding and a national Recovery and Resilience Plan, as outlined in their financial instruments section. Also, as outlined in Sitia's financial instruments, the regional authority bypasses a project-based funding model by regularly allocating its budget to support CR projects and policy directly.
- Explore the possibility with other authorities of replicating accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects in France.
- The South Aquitaine Innovation Roadmap (Regions4Climate T6.1/D6.2) outlines the preservation and adaptation of local economic activities to climate change, as well as the development of new competencies and more resilient economic activities, which will likely require dedicated financial instruments to address this challenge.

3. Diversify informational instruments to support CR.

- Promote collaboration, public-private partnerships, land stewardships, and agreements with actors in agriculture and tourism to solve potential conflicts of interest. According to the survey, these types of instruments have not been applied yet in South Aquitaine. For a model, please see the (Spanish) Basque region's synergistic instruments section or the Tuscany region's regulatory instruments section, where PPP plans and strategies are laid out. Tuscany's PPPs scheme regarding coastal protection policy may be of particular interest for the South Aquitaine region.
- The South Aquitaine Innovation Roadmap (Regions4Climate T6.1/D6.2) assumes transparent management and continuous monitoring processes, which are currently overseen by the public authorities, benefiting from the regional ecosystem. One example of knowledge sharing and generation in the context of CR is the work being developed in close collaboration with the university under the R4C IP. A continuous assessment of the implementation of development projects carried out in the three coastal municipalities under the review of the Local Strategy Plan for Coastal Risk Management will generate important data for coastal management. Furthermore, future studies

examining the coastline over 100 years will provide valuable insights for land planning and CR strategies.

- South Aquitaine's Just Transition Roadmap (Regions4Climate D2.2) sets the goal of developing and implementing a just and efficient knowledge acquisition and sharing process with coastal municipalities. To fulfil this goal, supportive actions like the development of a Coastal Resilience data portal, will be implemented contributing to diversification of informational instruments and strengthening CR in the region.

4. Strengthen interaction with the local level.

- While the survey lacks mention of engaging with indigenous and local knowledge on CCA and CR, or local or regional instruments for public outreach, the two regional CCAPs outline plans for local involvement in CCA and sharing of knowledge, and the NAQ CCAP recognises the value of diverse knowledge. However, the CCAPs could benefit from more specific plans on engaging with local communities to understand their perspectives, including how they are affected by climate change and how they have adapted to past environmental changes. Knowledge of traditional land, forest, and coastal management, traditional agricultural and fishing practices, and water resources management methods, as well as knowledge of community structures, can help in improving CCA planning.
- According to the South Aquitaine Innovation Roadmap (Regions4Climate T6.1/D6.2), assessing and reviewing the Local Strategy Plan for Coastal Risk Management over the next 5 to 10 years is a crucial milestone in the process. This review will establish a regulatory framework for investment projects in the three coastal municipalities and may require changes in administrative and governance dimensions.

B. Recommendations in terms of gaps and opportunities:

What is missing?

1. Providing resources, investment, and funding, to accelerate climate adaptation action.

- The NAQ RDP/S3 includes plans to provide equity funding to companies for carrying out renewable energy projects and supporting land redevelopment to improve ecological and energy transitions. CCA and/or CR are not explicitly mentioned in those plans. Adding funding criteria to ensure that the planned transitions are climate-resilient or extending this funding to include other types of CCA and/or CR measures would accelerate regional resilience.

What could be strengthened or built upon?

2. Extend the existing goals related to justice to adaptation.

- The NAQ RDP/S3 and NAQ CCAP are rather general when considering justice, focusing more on goals than actions, with only the PB CCAP providing tangible examples of CCA-related justice (NAQ RDP/S3, PB CCAP). The documents do not build on the potential synergies between local and just

resilience (systemic adaptation) and recognitional and distributive justice. While the goals are reasonable starting points, each strategy could benefit from more detailed explanations of how equity will be improved through specific processes. For example, the NAQ CCAP aims to ensure that diverse knowledge sources, including the knowledge and experience of laypeople, will be incorporated for inclusive policymaking. However, it does not specify how this knowledge will be integrated and which aspects of CCA it will support. Also, the documents could strengthen the overlap between their shared justice-related goals. Labor market equity and equitable distribution of wealth are also issues that are affected by climate change and could be influenced through innovation. Creating a shared or aligned plan of action would create synergies. For examples of good synergies between justice and CCA refer to Burgas' and Tuscany's social equity and justice sections.

- Investing in education and skill development in critical areas of expertise and public awareness for climate change are dimensions that the region acknowledges need more consistent action. Proposed in the South Aquitaine Innovation Roadmap, new courses on climate change and environmental risks may be created at the University of Pau. Specialised courses about coastal resilience are also planned to be developed in schools and in regional universities, according to the South Aquitaine Just Transition Roadmap (Regions4Climate D2.2). By implementing the actions mentioned in the Just Transition Roadmap, the region of South Aquitaine would increase the awareness of coastal municipalities, citizens and economic actors and facilitate engagement for CR.

3. Recognise the potential of cohesive NbS planning across the region.

- The NAQ RDP/S3 recognises NbS as a factor of economic competitiveness and NbS are mentioned in the context of agriculture, but not in terms of scaling. The NAQ CCAP only mentions that the regional councils have the competence to protect natural spaces and preserve ecological continuity. Only the PB CCAP has concrete NbS planning and project implementation. Creating a cross-cutting plan for scaling up NbS for regional development could ensure that trade-offs between ecological continuity, economic development, and agriculture are dealt with consistently and strategically. Scaling up requires pilots and demonstrations. Sitia's systemic adaptation section can be referenced to see mainstreaming of NbS into policy action, e.g., forest restoration and reforestation; restoring wetlands and soil to prevent erosion; and increasing urban greening.

4.5 Køge Bay region analysis

As outlined in the Governance Recommendations (Regions4Climate D4.3), Denmark is a unitary state, where regions and municipalities do not have legislative powers and are primarily responsible for enforcing national rules and regulations. Municipalities and Regions have self-governing capacities. Køge Bay is not a formal administrative unit within the Danish system. It is comprised of 11 municipalities and falls within two regions: Zealand (Sjælland) and the Capital Region of Denmark (Hovedstaden). In Denmark, all municipal bodies are required to produce climate risk assessments and adaptation plans.

For Køge Bay region, the following nine documents were analysed: the Climate Plan 2020-2030 for Solrød Municipality (L), the DK2020 Climate Plan of Køge municipality (L) and the Climate Action Plan 2050 of Greve municipality as CCAPs of the Zealand region, and the Climate Plan 2050 of Ishøj municipality (L), the DK2020 Climate Plan for Brøndby (L) and the Climate Plan 2023 of Vallensbæk municipality (L) as CCAPs for the Capital Region, Together for a Sustainable Capital Region - Capital Region of Denmark (R) and the Region Zealand for Citizens - Strategy 2022-2025 (R) as RDPs and Business Development in all of Denmark 2024-2027 (N) as S3.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where specific mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.5.1 Cross-sectoral policy analysis

Smarter adaptation is addressed by both local CCAPs and the RDPs in terms of pushing the *frontiers of knowledge* and *risk assessment*. More specifically, *assessing risks and losses* is supported by Greve, Køge, Vallensbæk, and Ishøj CCAPs. Greve received hazard and risk-mapping data from the National Coast Directorate and is using that data to build a protection level map that ensures that critical infrastructure is not in a flood zone. In its CCAP, the City of Køge states that updated and new data, including from the Danish Meteorological Institute, will help improve the existing climate adaptation plan. The data will be used to map flood-prone areas to address flood risks, but also to assess drought and heat island effects. The CCAP of Ishøj includes the creation of an overview of the extent of risk in relation to drought and heat waves, improving the knowledge on adaptation to such risks. Both the Ishøj and Vallensbæk CCAPs outline *risk management plans* for flooding by working with nearby municipalities to support their strategy.

Pushing the frontiers of knowledge on adaptation is addressed in the Capital region's RDP, S3, and the CCAPs of Brøndby, Greve, Ishøj, and Solrød. Brøndby established a platform between organisations and municipal departments to facilitate knowledge sharing regarding the green transition of social housing and CR skills development, along with a climate forum for managers and municipal employees. Greve and Solrød are both platforms that involve citizens in *knowledge generation*. Greve has a formal Climate Citizens' Assembly where citizens from all backgrounds contribute to recommendations and

proposals for policy action. Solrød established a collaboration platform with the goals of increasing citizen involvement and local knowledge generation, though the platform has been primarily used for mitigation projects. The RDP (Copenhagen) also mentioned knowledge sharing platforms, though again most projects are mitigation focused. The regional S3 calls for more investment into better data collection and data use for CCA and water management projects, and for pooling resources for more research and knowledge sharing.

The national S3, the RDP of Copenhagen, and all the municipal CCAPs have sections that support **faster adaptation**. Measures related to *new governance structures* are found in the Capital region RDP, S3, and three CCAPs. *Transboundary cooperation* and *accelerating the rollout of adaptation* are supported by the regional RDP, as well as several local CCAPs. Few local CCAPs supported the *integration of CCA and DRR, with only two addressing piloting and testing solutions to close the climate protection gap*.

In terms of *governance structures*, the Greve and Ishøj municipalities collaborate with citizens to ensure protection against flooding, sea level rise, and storm surges, involving the citizens in climate adaptation projects. The Capitol Region RDP aims to support municipalities and establish a common regional model for realising their municipal climate plans via increasing coherence for cross-cutting and transboundary projects. The S3 established *Business lighthouses (Erhvervsfyrårn)*, which pool funding streams from Horizon and other EU and national funds to support innovation. These lighthouses support local actors in achieving compliance with EU law and reaching CR/CCA goals.

In terms of *transboundary cooperation*, the RDP of the Capital region calls for joint ambitions and actions between municipal authorities across regional and national borders to answer the challenges posed by climate change. The RDP aims to support municipalities in the realisation of their climate plans and carry out sharing of best practice, starting cross-cutting projects, for example, by integrating NbS, international CCA know-how, and social perspectives into projects throughout the region. The RDP specifically calls for EU consortium formation around CCA projects. Several CCAPs (Greve, Brøndby, Køge Bay, Solrød) also touch upon transboundary cooperation. However, for Brøndby, Køge Bay, and Solrød, trans-boundary collaboration is limited to the sharing of best practices, knowledge sharing initiatives, and inspiration from other regions. Note that Greve is currently building a model and impact assessment for storm flood risks together with the neighbouring municipalities of Strandparken and Copenhagen. Also, Greve, Køge Bay, and Solrød are members of the CoM, which also reflects transboundary cooperation.

Policy support for *accelerating the rollout of adaptation solutions* is found in the RDP of the Capital region and every CCAP (Brøndby, Greve, Køge Bay, Ishøj, Solrød, Vallensbæk). The RDP recognises the need to adapt to climate change to limit future significant damage to infrastructure, housing, natural and recreational areas. The city of Ishøj focuses on adaptation planning and land use through a climate-proof drainage system and the relocation of elements sensitive to flooding. Greve's CCAP only mentions adaptation concerning downpours whereas Solrød and Vallensbæk emphasise the need to design the cities and countryside to handle downpours, storm surges, and other extreme events to limit damage to nature, buildings and assets. These measures also support *improving adaptation planning* (systemic adaptation). Additionally, Ishøj released a new wastewater plan in 2023 to support climate

adaptation, with a focus on seepage, groundwater, and on spreading climate adaptation responsibility to citizens, for instance, for handling rainwater flows on their property.

In terms of *integration of CCA and DRR*, the CCAP of Ishøj includes extreme weather phenomena preparedness planning. Finally, Brøndby's CCAP proposes to create green partnerships with local businesses that both support the municipality's goal of CO₂ neutrality by 2050 and protection against extreme weather events through robust climate adaptation. While this measure primarily focuses on climate mitigation, the model can also be applied to CCA projects, creating risk-sharing mechanisms and supporting the closure of *the climate protection gap*.

Piloting and testing solutions are addressed in both the Solrød and Vallensbæk CCAPs. Solrød's standard project implementation structure includes an ideation phase with a fundamental cost-benefit analysis, where errors and possible solutions are identified before scaling up a project. Vallensbæk, on the other hand, established a Living Lab where climate and resilience solutions are tested before scaling up, though historically it has primarily focused on climate mitigation projects.

Systemic adaptation is supported by the S3, RDPs, and each of the CCAPs of Køge Bay region. At least one type of document mentions measures related to *improving adaptation planning, scaling up NbS for adaptation, ensuring fresh water supply, and fostering local and just resilience*. *Improving adaptation strategies and plans* is supported by the regional S3 and several local CCAPs. The S3 supports this element via knowledge sharing and best practice initiatives, which will inform organisations and actors within the region, such as SMEs, of their CR and CCA obligations under EU law. The S3 also outlines a plan for upskilling and sharing of best practice, improving data collection and reporting, in order to reach specific sustainability goals. Several CCAPs (Brøndby, Køge, Ishøj, and Greve) directly work to *improve adaptation planning*. The cities of Køge and Greve commit to preparing new risk assessment and management plans, with a particular focus on ensuring synergy with other projects for the case of Greve. In the CCAP of Ishøj, monitoring plays an important role as the climate plan's adaptation effects will be monitored annually.

Additionally, the city integrates CCA into municipal building and construction projects and planning. Similarly, the CCAP of Brøndby specifies that spatial planning related initiatives, ideas, and projects contributing to climate adaptation will be highlighted in the city's 2022 Plan Strategy. For example, Brøndby aims to ensure the municipality is CR in terms of managing heatwaves and general heat management.

Scaling up NbS is mentioned in the two RDPs and five local CCAPs. The RDP of the Capital region declares support for NbS, e.g., recreational areas, that provide added value for citizens. The RDP of Zealand, on the other hand, plans to designate areas for wild nature and to create an action plan to ensure that wild nature is an asset for the benefit of the citizens. The local CCAPs prioritise greening buildings, planting trees, creating green spaces (Vallensbæk CCAP), afforestation plans and projects to develop biodiversity and climate-resilient forests (Køge, Ishøj and Greve CCAPs), and nature-based coastal protection (Ishøj's CCAP). Køge Bay city is climate proofing by building a storm surge dike, which is the culmination of nearly a decade of planning. The city is also integrating NbS into infrastructure projects (e.g., permeable pavement parking lots, green spaces, and fields in urban areas). Although it is unclear whether these previously mentioned NbS initiatives are scaling NbS, Brøndby's

CCAP concretely *scales up NbS for adaptation* with the following measures: developing templates for local plans which focus on sustainability and biodiversity, establishing a plantation of 6000 trees or equivalent plantings throughout the municipality by 2030, and planting 20 hectares of eelgrass. Such scaling can accelerate the rollout of adaptation planning.

Finally, measures *ensuring fresh water supply* are addressed in the RDPs, the S3, and several CCAPs. Both RDPs recognise the need for the region to provide clean drinking water for every citizen and manage groundwater contamination. The CCAPs also include various measures to support *ensuring fresh water in terms of quantity and quality*: reuse water streams and lakes to irrigate green space (Vallensbæk CCAP), acknowledge the need for adaptation and restructuring of water extraction (Køge CCAP), prioritise CCA in wastewater plans, preserve drinking water (Greve CCAP), reduce the use of pesticides (Ishøj and Brøndby CCAPs), and set services to avoid seawater entering sewers during storm surges (Ishøj's CCAP). The S3 calls for investment into projects around wastewater treatment, groundwater mapping, and restoration of biodiversity in order to ensure surface water and soil health.

The RDP of Copenhagen and several CCAPs *foster local and just resilience*. The different CCAPs emphasise *distributive, recognitional, and procedural* justice and the RDP mentions *distributive* justice. In general, Copenhagen's RDP supports justice through its focus on social perspectives. In terms of *recognitional* justice, the CCAPs recognise the role of local actors in the inclusive implementation of the plans (Greve and Vallensbæk CCAPs), the climate impacts on vulnerable people (particularly the elderly) (Greve CCAP), and their needs (Ishøj's CCAP), as well as a better social inclusion of vulnerable unemployed persons on the labour market. Further, although more mitigation focused, the Copenhagen RDP plans to support and empower the workforce, especially the young people, with the skills and knowledge needed to implement new green solutions. The CCAPs also point out different measures of *distributive* justice, i.e., the equitable distribution of responsibilities to implement climate adaptation measures, fair collaboration and access to participatory dialogues among local stakeholders (Vallensbæk and Køge CCAPs), equitable involvement of citizens (Køge and Greve CCAPs), equitable distribution of resources and resilience measures with attention to vulnerable groups (Greve, Ishøj, Brøndby, and Solrød CCAPs). *Procedural* justice is supported by all CCAPs with particular focus on inclusive participation and public involvement in project development (Vallensbæk, Køge, Greve, Brøndby, and Solrød CCAPs), inclusive decision-making (Greve, Ishøj, Brøndby, Solrød CCAPs), collaborative climate action (Ishøj's and Brøndby CCAPs), and capacity building of trained local climate agents to act as project leaders (Solrød CCAP). For example, Ishøj has stakeholder forums such as 'Ishøj Climate Forum' and the 'Green Council' in Ishøj, and Brøndby is creating a digital Citizen panel.

4.5.2 Policy and Steering Instrument Analysis

Regulatory instruments: The main steering instruments for adaptation and resilience are all regulatory instruments. This includes several *national regulations*, such as the Climate Act, flood act, planning act, water sector act, environmental protection act, and building regulations, and *planning documents* at all levels, including a national climate adaptation plan, national planning report, regional development plans, and municipal climate action plans. While the new Danish Climate Law places the adaptation related regulatory instruments at the local level, it also mandates cooperation among national, regional, and local authorities and includes target setting, reporting, and climate action plans that require multi-

level governance. Similarly, the Water Sector Act mandates municipal cooperation on water management issues, such as stormwater management, wastewater treatment, and flood prevention. Additionally, less influential instruments identified in the survey include national standards in various fields, such as wind load standards, energy efficiency in construction, cloud burst and rainwater management guidelines, and guidelines for coastal protection and risk management plan development. Survey answers also include several *agreements and intergovernmental mandates* on all levels of governance, including the Climate Alliance (consisting of municipalities, regions, and advocacy groups), as well as the coastal authorities who have an intergovernmental mandate concerning coastal management and flood risk.

Financial instruments: Financial instruments incentivising adaptation and resilience include national level funds, e.g., funds for research and innovation that address climate change and resilience solutions, a fund for coastal protection through the Danish coastal authority and a national fund for forest restoration of natural hazards.

Good Practice: There are several Danish regional development funds that financially support development projects, many with CCA elements.

Danish regional development funds also support municipal climate adaptation initiatives, and many municipalities also allocate a budget for local adaptation and resilience projects. Further, adaptation projects are also partially financed by landowners based on a law that states that landowners who benefit from an adaptation project must contribute to its financing. It is noted that applying it in practice is complicated. Utility companies in the region finance adaptation projects through tariff/rate-based revenue, long-term investment planning, loans, bonds, and PPPs. Project-related funding includes a national fund for sustainable urban projects (Realdania), regional development funds, and financing within European projects, including LIFE and Horizon. The survey answers did not mention any instruments for *penalising*, *public demonstration projects*, or *public procurement*.

Informational instrument: The region participates in several networks for *knowledge mobilisation*, such as the national network for climate adaptation, a sector-specific knowledge sharing network for municipal technical managers and an association for professionals in environmental planning. *Knowledge is also mobilised* through regional and local climate projects and the website of the Ministry of Environment. In terms of *engaging with local knowledge on CR*, the region has participatory deliberation in the form of citizen assemblies for a local perspective, and several organisations create forums for youth perspectives on climate issues. Local knowledge is also involved in climate action through dike association groups and emergency management by volunteers and local actors. The national meteorological institute and a geological service have been identified as instruments of *knowledge generation*, together with a national green think tank and the coastal authorities. *Public outreach* and citizen involvement processes are mandatory steps in planning, and there are various projects engaging citizens in climate action.

Furthermore, there are different types of early warning systems in place for extreme weather events, and public service has a responsibility to communicate about climate issues. The survey answers did not mention any instruments for *monitoring* or *evaluation*. Monitoring mechanisms were identified in the

Ishøj CCAP; thus, monitoring mechanisms do exist on a municipal level, though there is no evidence of region-wide coordination of monitoring in the data collected.

Synergistic instruments: Regulatory instruments with a positive effect identified in the survey include the *Nature Protection Act*, which generally aligns with broader CR goals, as well as the *Planning Law*, which highlights the consideration of flood risk in the development of new areas. Financial instruments considered to have a positive effect include a *Green Area Fund* and *utility company funding*. The new green area fund incentivises farmers to release low-lying soils from agricultural use, which not only holds carbon in the ground but also benefits flood prevention, as these soils are often near streams. According to the survey, utility company modernisation projects are easier to finance if climate adaptation components are included in the project. Informational instruments with a positive effect on CR include municipal websites, which provide information on adaptation when citizens or users search for topics such as green energy transition and other mitigation-related topics. Also, due to an increase in security and energy crisis, the government has started to communicate about risk preparedness in general, which also applies to climate related risks.

Conflicting instruments: The Nature Protection Act was perceived to be both a synergistic and conflicting regulatory *instrument* regarding its influence on CR. Although the objectives of environmental protection generally align with resilient development, examples from the region show that adaptation projects for coastline protection have been stalled due to Natura2000 criteria in the area. Concerning informational instruments, the survey respondent underlines that *public communication for environmental issues* and climate mitigation often gets confused and mixed up with climate adaptation, resulting in confusion among citizens on the goals and benefits of specific initiatives such as the planting of eel grass or stone barrier reefs. This is also reflected in the CCAPs, where many CCA and mitigation projects and goals are mixed, without a clear delineation of adaptation policy.

Instruments with potential: The main potential for CR in the region lies in defining responsibilities and competences of actors. *The planning law*, stated as a synergistic instrument because it considers flood risks in planning, could benefit from better defining where the responsibility of the municipalities meets citizen and landowners' responsibility which currently creates confusion. The survey respondent highlights the need for clearer governance structures and alignment between regional and national governance, where a second national climate adaptation plan and a regional initiative to increase regional competencies are considered instruments with potential. Utility company funding could help finance adaptation projects within municipalities; however, it is necessary to review the limitations on what they can pay for, as utility companies are only allowed to cover water management within the scope of climate adaptation projects. As highlighted in the survey, utility companies are currently only allowed to pay for water management within an adaptation project, while additional costs must be covered by the municipality's budgets, which is often not possible due to limited budgets and poses a barrier to these projects.

Table 9. Summary of Climate Adaptation concepts across Køge Bay's policy documents.

Types of adaptation	Concept	S3 (2024) (N)	RDP Zealand	CCAP (MULTIPLE) (L)	Steering Instruments
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			(2023) (R) Copenhagen (2024) (R)		
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Yes		Yes	Yes (National Metrological Institute)
	Pushing the frontiers of knowledge on adaptation		Yes	Yes	Yes (at the national level with the Climate Alliance)
Faster adaptation (FA)	Effective and inclusive governance mechanisms	Yes	Yes	Yes	
	Trans-boundary cooperation		Yes	Yes	Yes (at least on the national level via the Ministry of Environment)
	Piloting and testing solutions			Yes	
	Accelerating the rollout of adaptation solutions		Yes	Yes	Yes (Natural Hazards Council and fund for coastal protection)
	Mobilising sustainable finance and resources and closing the climate protection gap			Yes	Yes (funds for innovation and research, ex: coastal protection, forest restoration)
	Leveraging the CCA and DRR synergies			Yes	Yes (extreme weather early warning system)
Systemic adaptation (SysA)	Improving adaptation planning	Yes	Yes	Yes	Yes (national level Water Sector Act)
	Promoting NbS for adaptation		Yes	Yes	
	Ensuring the availability and sustainability of freshwater	Yes	Yes	Yes	Yes
	Fostering local and just resilience		Yes (Dis, Rec)	Yes (Rec, Pro, Dis)	Yes (citizen involvement is required in project planning phase)

- **Note:** (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.5.3 Køge Bay region recommendations

A. Recommendations relating to the modification and improvement of steering instruments:

1. Climate-proof the nature protection legislation.

- According to the survey, there are cases where nature protection legislation, e.g. Natura2000, has hindered coastline protection. Consider raising awareness among national authorities regarding the criteria for site-specific adjustments to management measures for specific areas, ensuring that future climate impacts are also accounted for in protection.
- Increased professional awareness of the just transition and climate adaptation were mentioned in Køge Bay's Just transition framework action plan (Regions4Climate D2.2). The region hopes to achieve an appropriate level of awareness among professionals by the end of 2025. This will be achieved by highlighting specific areas where there are opportunities for CCA integration into certain strategies and sectors.

2. Diversify the use of financial instruments.

- The region has local funding for adaptation and resilience research and implementation, although it is municipalities lack dedicated budgets for CR. Using the local authority network for adaptation, local authorities in the region can share good practices about the impacts of funded adaptation measures (see [Copenhagen as a case](#)) to justify dedicating parts of their budget to CR. In parallel, consider how to leverage existing demonstration projects and public procurement for public assets and facilities to drive further climate-resilience (CR) actions. This could also include utilizing intercommunal financing mechanisms, embedding climate-proofing criteria into public investments, using tax incentives (e.g. rainwater tax) and financial penalties to encourage sustainable practices. Participatory budgeting can also be used to support targeted adaptation using existing public finances.
- Although the survey responses did not identify specific CR-focused PPPs, Greve's CCAP seeks to ensure heat-resilient commercial space, which could also create jobs and accelerate the green transition; the next step then would be to develop a concrete plan for engaging private actors. Also, expand S3's "Virksomhedsguiden" or the digital hubs guiding alignment of businesses and organisations with EU climate legislation to include adaptation and resilience support. Finally, build on the region's experience with PPPs in utilities and collaborations with farmers by developing partnerships with a broader set of private-sector actors; Tuscany's regulatory instruments offer a useful model for PPPs advancing climate-change adaptation goals. The OECD's [compendium of financial instruments to support subnational climate action](#) (dashboard database) (OECD, 2022) can provide more options and ideas for financing.
- According to D4.3, Køge Bay actually scores very well in terms of general financial steering via financial instruments (score - 3/3, see table 3), but is lacking in terms of financial steering through dedicated allocated funding (score - 1/3, see table 3) and specifically for budget allocation of planning and implementation (score - 1/4, see table 3). The Innovation Roadmap (Regions4Climate T6.1/D6.2) further highlights the need to reinforce financing allocated to innovation for CR and to develop a more holistic approach by integrating CR in multidimensional policies, regulations, and projects. Thus, these recommendations aim to enhance the existing financial instruments.

3. Stronger use of informational instruments for knowledge generation, monitoring, and evaluation.

- Køge Bay has a diverse set of informational instruments to mobilise, generate, and disseminate knowledge mostly at the local and national level, but also at the regional level. However, according to the survey, this knowledge is not used for monitoring and evaluation. Monitoring and evaluation practices provide feedback on progress. They can indicate needed changes in adaptation and resilience planning and can build on the knowledge generated by the national agencies (GEUS, KDI, etc.). Monitoring can take place at the national or local level. As outlined in the Capital region RDP, KKR Hovedstaden, along with surrounding municipalities, participate in knowledge sharing regarding mobility policy, and such a model could be applied to CCA.
- According to the Køge Bay Innovation Roadmap (Regions4Climate T6.1/D6.2), in the following years, a National Climate Change Adaptation Plan will be developed, integrating a long-term vision and strategy, which will play a crucial role in cross-municipal/regional collaboration, engaging the community and local actors in climate adaptation.

4. Increase awareness of climate adaptation and its unique challenges and benefits.

- Køge Bay region has a diverse network of actors working on climate issues, yet the survey identified gaps related to a general understanding of the differences between adaptation and other green transition issues, as well as an understanding of the general benefits of adaptation measures. Each municipality is obligated to host a website outlining its climate strategy and must provide certain key elements of its plan to the public (green energy transition, other mitigation work, green transport etc.). Here, a summary of the municipality's climate adaptation vision, measures, and a clarification between adaptation and other green transition initiatives (namely in the scope of mitigation), as well as their synergies, could be helpful.
- While the national government already communicates about climate risk preparedness, further awareness raising is still needed to link these two issues better. Consider engaging with the wide network of actors to broaden the campaign. Increased awareness might also increase landowners' willingness to contribute to the financing of adaptation measures, which is identified as a challenge in the survey response. Awareness raising can also be raised through citizen assemblies, such as the one conducted in Greve, aimed at CCA proposal creation.

B. Recommendations relating to policies:

What is missing?

- 1. Build up a stronger comprehensive approach to smart adaptation by assessing climate risks and loss.**
 - While the local CCAPs address smarter adaptation, Greve, Ishøj, and Køge Bay CCAPs all have data collected for risk management, ranging from heatwaves, drought, and flooding risks. However, the recent S3 calls for more investment into better data collection, demonstration pilot projects, and development for CCA and water management projects, and the pooling of resources for more research and knowledge sharing. Also, the Capital region RDP utilises knowledge sharing for sectors like mobility, but not for CCA in any formal way. The region is interested in broadening

knowledge on climate-related risks and losses and revising its plans to include appropriate measures to support this goal. Coordinating in a way that creates links between the development (S3 and RDP) plans and the local plans would strengthen the efforts.

- The Køge Bay Innovation Roadmap (Regions4Climate T6.1/D6.2) assumes that knowledge mobilisation and knowledge sharing will be reached through a strong regional ecosystem and a more comprehensive inclusion of climate change and CR in all dimensions. As an example, the roadmap stands for the implementation of a more holistic approach within social, environmental, economic, and health spheres as a prerequisite for projects and initiatives addressing climate change and strengthening the inclusion of climate change as a strategic matter at all educational levels.

2. Comprehensive plans for faster and systemic climate adaptation action.

- The S3 makes aspirational statements about the “potential for the development of technological solutions in CCA” but does not outline specific measures to accelerate CCA actions. The plan could be revised to integrate concrete measures to support CCA in a way that adds value at the local level. There is a risk that without such links, adaptation and resilience are uncoordinated and lead to maladaptation or ineffective adaptation.
- The S3 could also establish a link between social inclusion and the reduction of vulnerabilities towards climate change, green transitions, and their consequences, as these are overlooked in the current strategy.
- Moreover, the Copenhagen RDP could be more comprehensive. It could foster the piloting and testing of solutions, the creation of CCA and DRR synergies, deepen the approach to transboundary cooperation, and integrate measures for evaluating and monitoring plans to improve adaptation planning.

What could be strengthened or built upon?

3. Improve policy cohesion to increase systemwide adaptation and resilience.

- Many measures in the RDP of the Capital region and the local CCAPs support the acceleration of adaptation solutions. However, synergies between the Copenhagen RDP and the CCAPs of Solrød, Køge, and Greve municipalities could be strengthened, creating more ambitious climate adaptation pathways for the region. Also, concerning the region of Zealand, while the local CCAPs support faster adaptation, the RDP does not. Increasing policy cohesion between the plans will ensure more efficient CCA policies. For example, the capital region RDP outlines the Climate Alliance in the Capital Region, which works to establish collaboration between regions and municipalities. The RDP also identifies weaknesses within municipal plans and works with the Greater Copenhagen EU Office to identify and acquire EU funding where possible. The S3 highlights the “potential” for the development and application of novel technological solutions to soil and water management. Still, the S3 requires a concrete cooperation model at the regional level in order to increase regional cooperation between municipalities for the rapid implementation of adaptation solutions.

- After the recent administrative changes to the Danish policy, the regions currently have no statutory tasks or responsibilities related to climate adaptation, as this is a shared responsibility between the state and the municipalities. Nevertheless, the Køge Bay Innovation Roadmap (Regions4Climate T6.1/D6.2) states the importance of climate change adaptation as a political priority. These changes necessitate restructuring the governance model and collaboration dynamics, all while preserving the existing bonds within the supportive ecosystem to facilitate comprehensive action.
- Here, Køge Bay scores low in terms of regulatory steering (score - 1/3, see table 2), though the region is hindered from implementing binding regional plans due to national policy, it can still work to provide collaborative and cooperative platforms for municipal actors to work together to improve the regional regulatory framework.

4. Recognise the potential of cohesive NbS planning across the region.

- As for other regions, Køge Bay's policy documents are not tapping into the full potential of NbS. Many NbS are mentioned, and they often support the acceleration of the rollout of adaptation solutions as they are related to land use solutions, in many cases. However, the dimension of scaling up these solutions, which provides even more support for faster adaptation, is overlooked. The region should better consider cohesive NbS planning in its policy documents.
- In line with the Køge Bay Innovation Roadmap, the public authorities state the importance of increasing the practical use of scientific knowledge, improving knowledge transfer, and implementing a holistic approach to climate action. Increasing and mainstreaming NbS in land use/urban planning and valorisation of ecosystem services in CR policies and land use planning are two examples of sustainable solutions that require experimentation, support, and upscaling of pilot projects and the transition to new planning practice. Prioritising existing funds for cross-regional and cross-sectoral CR initiatives and projects is key to improving collaboration within the supportive ecosystem.

4.6 Uusimaa region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Finland is a unitary state, where the regions are primarily responsible for enforcing national rules and regulations. There is a high level of municipal autonomy and self-governance; thus, most of the analysis for Uusimaa is carried out on the municipal level, as it is on that level where policies are actualised, and the regional strategy for adaptation, which is under development by the Helsinki-Uusimaa Regional Council, has not been published as of writing. It should be noted that, according to the Helsinki-Uusimaa Regional Council, the RDP and S3 have a limited view on adaptation because there has been no regional plan for adaptation to support. However, the next RDP, also under development, will better support climatic issues.

For Uusimaa region, the following documents were analysed for the policy recommendations: Since there is no regional strategy for adaptation, this analysis has compiled and carried out on the major local climate adaptation plans (CCAP) under Uusimaa: the SECAP of the city of Helsinki (2021) (HKI SECAP, L), the Helsinki Climate Change Adaptation Policy 2019-2025 (2018) (HKI CCAP, L), the SECAP of Espoo (Espoo SECAP, L), the Espoo Climate Change Adaptation Action Plan 2022-2025 (Espoo CCAAP) (L), the KUUMA municipalities Adaptation to Climate Change Plan (Ras CCAPs). The Regional Development Plan (RDP) is the Well-Ahead Helsinki-Uusimaa Regional Programme 2022-2025 (R), and the Smart specialisation strategy (S3) used is the Smart Specialisation Strategy for Helsinki-Uusimaa Region (R).

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies in order to steer CCA policy.

4.6.1 Cross-sectoral policy analysis

Relevant mentions of **smarter adaptation** are found in the local CCAPs within Uusimaa through their coverage of risk assessments and pushing the frontiers of knowledge. Collectively, the CCAPs address *assessing risks and losses*. For example, the SECAP of Espoo includes an assessment of the magnitude of damage caused by exceptional weather and the cost of preparedness. Espoo CCAP includes the monitoring of climate risks to environmental control sites, which uses spatial data analysis to model floodplains and their associated waste sites and environmental control sites. The HKI CCAP addresses the risk of flooding, including the identification and modelling of risk areas for stormwater flooding. The plan also recognises that water level and wave height data are needed to define safe heights for coastal development.

Each of the local CCAPs are also *pushing the frontiers of knowledge* on adaptation. In the Helsinki SECAP, the goal is to integrate new knowledge, from the latest sea level rise data and scenarios, to updating the Flood Strategy. The capital city acknowledges the need for research and data on the risk of heat and hot weather, as well as the need for investigation into cooling systems, their energy

efficiency, and cost implications (HKI CCAP). The city of Espoo focuses on understanding and modelling extreme heat island phenomenon and stormwater flooding (Espoo SECAP), as well as producing floodway studies for urban centres and flood modelling of several metropolitan areas (Espoo CCAAP). Espoo's CCAAP also includes a habitat restoration mapping exercise and collection of data on invasive species. Finally, the CCAP of the KUUMA municipalities highlights the need to identify erosion and landslide risk areas associated with flood risk areas.

The local CCAPs in Uusimaa support **faster adaptation** to various degrees. Five CCAPs reflect *new governance structures*, while three CCAPs reflect *transboundary cooperation* and *closing the protection gap*. *Piloting and testing solutions* and *CCA and DRR synergies* are found in only two CCAPs.

Regarding *new governance structures*, two CCAPs include plans to involve residents in adaptation planning (Helsinki and Espoo SECAPs). Generally, adaptation plans, including SECAPs, mention using collaboration to scale up adaptation strategies. Regarding *transboundary cooperation*, the KUUMA municipalities take a comprehensive approach and have regional projects integrated in adaptation guidelines. Similarly, the capital city cooperates on CCA with universities and research institutes and actively participates in international cooperation networks and encourages other countries to adapt based on Helsinki's good practices (HKI CCAP). The HKI CCAP also supports faster adaptation through *piloting and testing solutions*, i.e. pilot area for stormwater design solutions.

Two CCAPs support *accelerating the roll out of adaptation solutions* related to land use and climate proofing infrastructure, mainly with transport (Espoo SECAP, KUUMA CCAP). According to the Espoo SECAP, Helsinki in, cooperation with other municipalities of the capital region, is working to on adapting the transport system to climate change. The KUUMA municipalities also ensure that new road projects in coastal areas are designed for adequate flood protection (KUUMA CCAP). Two documents specifically address climate proofing of buildings and infrastructure, as well as climate change in general (KUUMA CCAP, HKI CCAP). Another aspect of faster adaptation is developing solutions to *close the climate protection gap*. Financial support mechanisms are mentioned in three plans. The Espoo SECAP includes exploration of opportunities for cooperation with insurance companies. The Helsinki SECAP states that insurance can be used to transfer, share, and pool risks. At the same time, in the HKI CCAP, the responsibility to reduce non-insured losses falls on the citizens and businesses of the city. The plans also ask citizens and private entities to act on their own by taking adequate insurance against floods and storms (HKI CCAP).

Good Practice: Espoo's and Helsinki's SECAPs address the climate protection gap by recognising the role of insurance.

The final aspect of faster adaptation is encouraging *synergies between CCA and DRR*, which the KUUMA plan supports. KUUMA municipalities plan to upgrade municipal preparedness plans to integrate climate change-related emergencies in cooperation with rescue services. Other means to increase CR are mentioned: better emergency planning (KUUMA CCAP), and heat warning systems (Espoo CCAAP). In addition, municipalities will promote information and preventive planning for storm damage, the impact of climate change on vulnerable groups will be identified, and action plans for the protection and assistance of those groups will be drawn up (KUUMA CCAP). These measures also *foster local and just resilience* and contribute to systemic adaptation.

The RDP of Uusimaa and local CCAPs support **systemic adaptation**. All plans consider *improving adaptation planning* and *scaling up NbS for adaptation*. *Ensuring freshwater* availability is mentioned in every policy, except for the Espoo CCAAP. *Fostering local and just resilience* is mentioned in every local adaptation strategy. Regarding *improving adaptation planning*, Helsinki-Uusimaa's RDP focuses on integrating climate-related risks (rainfalls, heat and drought, urban and coastal flooding) into the planning of new areas and into the normal maintenance and renovation of buildings and infrastructure. Two local CCAPs improve reporting and monitoring of CCA measures (Helsinki SECAP and HKI CCAP), e.g., to increase the efficiency of adaptation (HKI CCAP). KUUMA municipalities, as mentioned before, prioritise preparedness planning and mainstreaming risk reduction into other plans (KUMMA CCAP). The Espoo CCAAP is very comprehensive regarding *improving adaptation planning*. The plan includes risk management reporting and planning for flooding, sea level rise, heat waves, biodiversity loss, and risk and damages preparedness and monitoring regarding potential impacts on infrastructure and biodiversity. These measures create synergies between systemic and faster adaptation as the local plans improve the effectiveness of adaptation plans and implement land-use and infrastructure related solutions for adaptation.

NbS are mentioned in every local CCAP, and the Espoo and Helsinki SECAPs plan to scale up NbS in larger areas, mainly urban areas. Increasing permeable surfaces, green areas, and green and blue infrastructure are mentioned in four plans (Helsinki and Espoo SECAPs, Espoo CCAAP, HKI CCAP). Helsinki SECAP and Espoo CCAAP tap into NbS's potential to manage risk, especially in the context of stormwater management. The Espoo CCAAP includes the development of further regulations on strategic areas; the creation of ecological connections outside of protected areas and mainstreaming green roof structures in the building process. Finally, HKI CCAP applies the ecosystem services approach generally. These solutions to *scale up NbS solutions* also contribute to *accelerating the roll out of adaptation solutions*, as NbS directly relates to land-use and infrastructure-related adaptation. In the context of *ensuring fresh water*, five plans highlight stormwater management and especially overflow strategies to prevent flooding from entering water bodies (Helsinki and Espoo SECAPs,) and create separate sewage (KUUMA CCAP). KUUMA municipalities share this concern for groundwater protection and will create a plan to safeguard the purity and sufficiency of water (KUUMA CCAP). HKI CCAP includes risk mapping for water using comprehensive models to assess the water supply system.

Good Practice: Espoo's Stormwater Management system and Helsinki's annual Environmental Managers Water Meeting maintain a high level of DRR and CR regarding flooding and overall water quality.

Finally, to *foster local and just resilience*, the CCAPs supports **social equity and justice** measures that reflect *recognitional, distributive, and procedural* justice.

Regarding **recognitional justice**, three plans identify vulnerable groups, vulnerability factors (Helsinki and Espoo SECAPs and HKI CCAP), and underline the need for improved climate related vulnerability assessment (HKI CCAP). These aspects of *recognitional* justice also contribute to smarter adaptation, as such assessments improve the knowledge of adaptation. Helsinki's SECAP acknowledges how social vulnerabilities influence adaptative capacity. A majority of the local CCAPS build resilience by communicating and identifying at-risk groups and their needs (Espoo and Helsinki SECAPs, HKI CCAP,

KUUMA CCAP) and adapting social and health services to changing climate and extreme weather events (Espoo CCAAP and SECAP). Moreover, new guidelines for crisis with a self-preparedness dimension foster local resilience in Vantaa and Helsinki (HKI CCAP).

In terms of **distributive justice**, all of the local CCAPs prioritise vulnerable groups in climate adaptation measures and want to ensure equitable access to climate adaptation resources for vulnerable groups (Helsinki and Espoo SECAPs and HKI CCAP). In addition, Espoo SECAP aims to ensure equitable adaptation efforts by improving the adaptive capacity of vulnerable groups. Other municipalities focus on ensuring fair distribution of adaptation measure impacts (KUUMA CCAP).

Finally, **procedural justice** measures support systemic, but also faster, CCA in the CCAPs of Uusimaa. Three plans include measures for raising awareness for cross-sectoral collaboration (Espoo SECAP, Espoo CCAAP, and HKI CCAP). Further, Helsinki organises public consultations with citizens through the city's website on city planning, participatory budgeting, collaborative development of indicators on climate change and vulnerabilities (Helsinki SECAP), as well as collaboration with citizens and businesses in developing and implementing adaptive measures (HKI CCAP). The HKI CCAP is the only document that explicitly works towards involving residents in developing a CCA strategy with its "Stand up for yourself campaign," which attempts to increase residents' own preparedness. Espoo aims to activate and empower citizens through participation in climate-friendly activities and calls for residents' engagement in planning and decision-making processes (Espoo SECAP), while KUUMA municipalities include rescue services into a participatory process. Espoo plans to activate and empower citizens through participation in climate-friendly activities and calls for residents' engagement in planning and decision-making processes (Espoo SECAP), while KUUMA municipalities include rescue services in a participatory process.

4.6.2 Policy and Steering Instrument Analysis

Regulatory instruments: The most influential regulatory instruments in Uusimaa are *planning documents* such as municipal adaptation plans, detailed land use plans, the regional strategy (*Uusimaa ohjelma*), regional risk maps and risk analyses as well as recommendations related to the minimum elevation requirements to mitigate flooding impacts, and adaptation guidance around water-related issues provided by the Centres for Economic Development, Transport and the Environment. The forthcoming Helsinki-Uusimaa regional adaptation strategy is expected to play an important role. Other instruments identified in the survey include *national regulations* such as the Climate Act, flood risk laws, the regional development act, and a nature conservation act. There is also a national obligation for electricity providers to ensure the capacity and resilience of their networks established through the Electricity Market Act in Finland. There are also additional standards at different levels of governance, including the national standards for flood preparation, stormwater guidance from the Association of municipalities, climate adaptation guidance for the KUUMA municipalities, and Helsinki's stormwater management programme and guidance on flood prevention and control. Other *planning documents* include ministerial adaptation plans, climate change adaptation plans on national level, regional climate roadmaps, land use climate plans, and municipal strategies for climate adaptation. Although Espoo and Helsinki are members of the CoM, the survey did not mention any *agreements* or *intergovernmental*

mandates that directly assist adaptation policy. Also, the Covenant of Mayor's portal only shows adaptation commitments for Espoo.

Financial instruments: Financial instruments were not considered highly influential in guiding regional CR. However, *instruments incentivising* adaptation and resilience in the region include non-compulsory harvest insurances for agriculture to cover extreme weather events, as well as private home insurance which covers exceptional floods. As mentioned before, Espoo is planning on working with insurance companies to support CCA. There is also *budget allocation* for municipal flood protection works in larger cities vulnerable to floods, as well as limited time *project-related funding* from European initiatives such as ERDF, LIFE, and Horizon. Public funding is also allocated to *demonstration projects on publicly controlled property* related to stormwater control schemes in different cities. The survey did not mention the use of tax incentives, grants, bonds, *public procurement*, nor did it mention *penalising instruments*.

Informational instruments: Risk assessments, namely the Helsinki-Uusimaa regional risk assessment, flood risk maps, and recommendations for lowest construction heights, and risk analysis by the Uusimaa region rescue department, are considered highly influential for regional CR. There is also a joint climate unit of Centre for Economic Development, Transport and the Environment (ELY), which has adaptation responsibilities and was recently established. The centre employs two adaptation experts and functions as a bridge between national level steering from the Ministry of Agriculture and Forestry and regional adaptation work by the regional ELY-centres and regional councils. Other informational instruments mentioned in the survey include the Ministry of Agriculture and Forestry and its work on leading CCA (national risk assessments and strategies), as well as the Nordic Council of Ministers working group on adaptation, and Innovation networks (CLIC) as instruments for *knowledge mobilisation*. Knowledge mobilisation is also done to an extent through projects, informal knowledge-sharing, and research publications, e.g., by the Finnish Climate Change Panel. There are government research activities on Sami adaptation to climate change, but this is relevant for northern Finland. *Knowledge is generated* using regional risk assessments in projects funded through ERDF, e.g., VILKKU. The survey mentions that regional level *monitoring and evaluation* will be developed more in the coming years. According to the policy analysis, it is already taking place at the local level in Helsinki. Instruments for *public outreach* were not mentioned for the regional level; however, public consultations take place at the local level, e.g., and were mentioned in several local adaptation policy documents (Espoo SECAP, Espoo CCAAP, and HKI CCAP).

The Green factor, a tool for urban planning based on research data that considers local characteristics, will be upscaled to the regional level, according to the Uusimaa Innovation Roadmap (Regions4Climate T6.1/D6.2). This tool delivers relevant information for CR.

Synergistic instruments from other sectors: Regulatory instruments from *land use and planning*, *flood risk management*, and *civil protection* are considered to have a positive effect on CR in the region. The survey notes that climate-related risks are considered in land use and planning legislation, and legislation on flood risk management defines flood risk areas and provides support to manage related risks. The civil protection legislation mentioned in the survey (EU legislation on a Union civil protection mechanism) enforces cooperation in civil protection between member states, provides national and regional risk assessments, and is considered to have a positive effect. Informational instruments with a positive effect include a *national map service on water issues*, which provides information on flood risk

zones, as well as a *practical guide to promote climate mitigation and adaptation* in specific sectors such as land use planning, zoning, and construction.

Conflicting instruments from other sectors: n/a

Instruments with potential: The survey respondent mentions that municipal level general plans are an instrument of potential, due to their significance in guiding land use. These could be used as tools to decrease exposure to coastal floods in construction but are currently, not being exploited for that purpose.

Table 10. Summary of Climate Adaptation concepts across Uusimaa's policy documents.

Types of adaptation	Concept	S3 (2020) (R)	RDP (2022) (R)	CCAP (MULTIPLE) (L)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Yes	Yes	Espoo CCAAP, Espoo SECAP, HKI CCAP,	Yes (CLIC)
	Pushing the frontiers of knowledge on adaptation			Espoo SECAP, Helsinki SECAP, KUUMA CCAP	Yes (VILKKU)
Faster adaptation (FA)	Effective and inclusive governance mechanisms		Yes	Espoo CCAAP, HKI CCAP, KUUMA CCAP	
	Trans-boundary cooperation	Yes		HKI CCAP	Yes (Civil protection mechanism)
	Piloting and testing solutions			Helsinki SECAP	
	Accelerating the rollout of adaptation solutions			Espoo SECAP, KUUMA CCAP	Yes
	Mobilising sustainable finance and resources and closing the climate protection gap			Espoo SECAP, HKI SECAP,	
	Leveraging the CCA and DRR synergies			KUUMA	Yes
Systemic adaptation (SysA)	Improving adaptation planning		Yes	Yes (all policy documents)	Yes (planning guides for adaptation)
	Promoting NbS for adaptation		Yes	Yes (all policy documents)	
	Ensuring the availability and sustainability of freshwater			Espoo SECAP, HKI CCAP, Helsinki SECAP, KUUMA CCAP	Yes (Centre for Economic Development, Transport and the Environment)
	Fostering local and just resilience/ Justice			Yes (Rec, Dis, Pro)	Yes

- Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.6.3 Uusimaa region recommendations

A. Recommendations relating to the modification and improvement of steering instruments:

1. Explore instruments related to emerging risks, such as urban heat.

- Many of the regulatory instruments mentioned relate to water/stormwater and flooding, particularly Helsinki's Flood Strategy (Helsinki SECAP). However, heat and hot weather are also emerging issues in the region (HKI CCAP). Regional RDPs and CCAPs could consider funding further studies related to heat and its impacts at the regional level, e.g., which is being done in Regions4Climate, and developing guidance for inclusion of heat in sectoral documents, e.g., spatial plans, building standards, etc. Burgas can be used as an example (see Burgas' faster adaptation section) as it is implementing climate proofing by requiring urban infrastructure and buildings to be more heat resistant. Heat mapping projects and strategies in the Burgas and Pärnu regions could also be used to reference good practice when it comes to dealing with emerging heat risks.
- To understand the socioeconomic ramifications of CR and adaptation measures, the Uusimaa Innovation Roadmap (Regions4Climate T6.1/D6.2) also refers to a tool that enables companies to evaluate their vulnerability to climate change (risk evaluation).

2. Diversify the use of financial instruments.

- According to the survey, local-level adaptation in Uusimaa is incentivised through specific insurances (for homeowners and farmers) and is otherwise funded by EU-funded projects and targeted local-level demonstration projects, such as those related to stormwater and flood protection. In order to address the insurance protection gap and manage their risks, authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#).
- If financing at the regional level is limited, regional authorities could consider increasing awareness and support for the local uptake of new types of funding instruments across the region, e.g. tax incentives or user charges for accelerating adaptation measures, direct budget allocation, public-private resilience partnerships (PPPs) to engage the private sector (see Tuscany's Regulatory instruments and Køge Bay's synergistic instruments as examples), and public procurement to provide further local level funding for planning and implementation of adaptation. Other options include green and climate bonds (see [Paris as a case](#)) and equity financing as ways to attract private capital. This is in alignment with Uusimaa's Just transition framework action plan (Regions4Climate D2.2) statement regarding supporting green construction and providing grants for green housing repairs, which are part of the wider green transition. The OECD's [full compendium](#)

[of financial instruments to support subnational climate action](#) can provide more options and ideas for financing.

3. Stronger use of informational instruments for local level knowledge generation.

- Local knowledge is also important to CR. Local communities have knowledge of how they are affected by climate change and how they have adapted to changes in the environment in the past. Knowledge of native plants, local impacts, community needs and structures, as well as people's experiences with coping or adaptation measures can help in improving adaptation planning. In order to mobilise this local level knowledge related to adaptation and resilience, local authorities could also incorporate community participation methods into multi-level governance practices or incentivise community-led resilience initiatives. As mentioned in the systemic adaptation section, the HKI CCAP references initiatives for citizens to increase their own crisis preparedness. Building on this to increase CR focused citizen initiatives and involvement would be ideal. Here, NGOs could be incentivised to take the lead and improve public outreach.
- Uusimaa's Just transition framework action plan (Regions4Climate D2.2) highlights the dangers from extremism and youth radicalisation by involving local citizens in policy creation and implementation this can simultaneously increase public knowledge of climate adaptation while involving individuals who otherwise would be estranged from a collective community practice. Uusimaa is ranked well in terms of general informational steering (score - 3/3, see table 4), but poorly in terms of engagement with the private sector (score - 1/4, see table 4, indicator 4.5) and civilians (score - 1/4, see table 4, indicator 4.6). These recommendations should help Uusimaa improve the involvement of private actors and citizens in information creation and the implementation of local knowledge and participation.

B. Recommendations relating to policies:

What is missing?

1. Build a cross-sectoral knowledge base for smarter and systemic adaptation.

- The upcoming regional CCAP should align with local CCAPs as well as the RDP and S3 strategies, all of which are developed by the Helsinki-Uusimaa Regional Council. For example, while the local CCAPs reflect smarter adaptation, the regional S3 focuses on open data and data management, but only in the context of industrial modernisation. However, the S3 regional policy could boost innovation in relation to climate adaptation if, for example, open data initiatives, piloting and testing, or research and development related to CCA were included. (See: Burgas' Water Management Information System and the dissemination of information to locals in terms of flooding and water quality). As the RDP and regional CCAP are currently being developed, it is a good window of opportunity to build in stronger linkages.
- Innovative dynamics include creating a test bed for innovation and other open innovation processes by providing direct support for experimentation, as recommended in the AAs. Providing platforms for "Creative sectors" as mentioned in the Uusimaa Innovation Roadmap (Regions4Climate

T6.1/D6.2) is an excellent example of combining climate action and sustainable transition through innovation, in all the economic sectors.

What could be strengthened or built on?

2. Bridging justice and climate change adaptation (CCA).

- While the S3 and the RDP do support procedural and distributive justice, they are not specifically applied to climate adaptation. For instance, the S3 states that health and wellbeing are at the heart of the city's strategic priorities, as well as urban development and well-functioning everyday life. Similarly, the RDP aims to strengthen equality through the supporting structures of a welfare society and investment in education, training, and upgrading digital skills for digital equality. These priorities could further be connected to CR, as health, wellbeing, and social equity are interconnected with CR.
- According to the Uusimaa Innovation Roadmap (Regions4Climate T6.1/D6.2), it is expected to incorporate "green skills" in all employment offers and adapt the education model to these new challenges, including adapting specific lifelong courses which will be relevant to support CCA.
- While Uusimaa scored well in terms of regulatory steering (score – 2/3, see table 2), the region scored low for recognition of socially just transition (score – 0/4, see table 2) within those policy steering instruments. By following these recommendations and working to mainstream adaptation across policy tools, the region will improve in this respect.

3. Orient transboundary cooperation towards accelerating CCA.

- Uusimaa's RDP aims to improve the region's responsiveness to cross-municipal phenomena and processes, while also supporting small and medium-sized municipalities that lack the resources to act independently. Collective action lays the foundation for new forms of regional governance to tackle CCA-related issues. Also, the S3 of Uusimaa promotes cooperation across regional borders to build stronger entities for broader impact by allocating funds to collaborative projects, cross-regional projects, and collaborative development work between Finland's six largest cities. However, the S3 description of collaboration does not explicitly mention collaboration on CCA. Consider orienting these collaborative efforts towards accelerating and scaling innovation around CCA in the region. Ideally, this will also be strengthened by the upcoming regional adaptation strategy.

4.7 Pärnumaa region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Estonia is a unitary state, where local self-government is at the level of municipalities. There are no governmental entities with legislative power at a regional level. Counties are administrative level units without any other significant independent competence. Thus, the analysis for Pärnumaa is carried out on the municipal and county levels, with the area under analysis being the city of Pärnu and the county of Pärnumaa, and for opportunities for collaboration and policy on a regional level.

For Pärnumaa region, the following documents were analysed for the policy analysis: the Pärnumaa Climate Plan 2030 (2023) (R) and the Pärnu Climate Plan 2030 (L) as CCAPs, the Development Strategy Pärnumaa 2035+ and Action Plan 2022-2027 (R) as RDP and the Estonian Research and Development, Innovation and Entrepreneurship Strategy 2021-2035 (N) as S3. The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.7.1 Cross-sectoral policy analysis

Smarter adaptation is supported by the national S3 and the regional and local CCAPs of Pärnumaa through their focus on *pushing the frontiers of knowledge*. The S3 highlights the importance of research, development, and innovation in increasing the wellbeing and cohesion of society in the face of several challenges, including climate change adaptation. This takes place through the transfer of knowledge between the research and business environment and other systems to generate innovations. In relation to research, the regional CCAP is much more specific and focuses on infrastructure data, e.g., obtaining statistics from network operators on power outages to mitigate risks and improve the supply of electricity systems. In the CCAP, the County also plans to revise its river related landslide risk assessment as a basis for DRR and monitor adaptation. For this, it recognises that further data and studies are needed. In its local level CCAP, the City of Pärnu focuses on investigating the impact of coastal activities on bank erosion and the application of digital tools to enhance resilience, e.g., improved climate assessments, forecasting systems, and risk management.

Faster adaptation is supported by both City and County CCAPs with mentions of *the rollout of adaptation solutions* (though no evidence for the *acceleration of the rollout*) related to land use and climate-proofing infrastructure, which also reinforces creating *CCA and DRR synergies*. Only the national S3 supports *new governance structures*. It achieves this through increased knowledge transfer between the research system, the business environment, and other societal systems, leveraging new knowledge, technologies, ideas, and creativity from various fields to drive societal benefit. The S3 specifically mentions increased resilience and adaptation to crisis situations and global changes as an aim. The RDP and the CCAPs support the *roll out of adaptation solutions* related to infrastructure, mainly building guidelines and flood management. The RDP focuses on mitigating climate risks in development projects, e.g., heat stress, stormwater management, landslide risk in relation to urban development, as well as raising awareness about various climate risks. Specific measures include the

reconstruction and upgrading of stormwater systems, the implementation of greener parking solutions, the enhancement of building insulation, and the revision of building standards. Both CCAPs prioritise climate-proofing buildings and infrastructures to extreme temperatures, with the County focusing on heat and ensuring sufficient drinking water during heat waves and both the County and City plans accounting for extreme temperatures for heat and cold and their consequences, e.g., slippery roads. The County CCAP also supports building capacity for municipal emergency response outside of Pärnu City. Some of these measures also contribute to leveraging *synergies between CCA and DRR*, fostering faster adaptation. In addition, the Pärnu City CCAP sets as objectives an increase in the preparedness of local and regional authorities for crisis and a decrease in the number of inhabitants in an area at risk for flooding. To increase general preparedness for climate risks (rated as base level), it intends to specifically build the knowledge and capacities of officials, social workers and social service providers in case of emergency response to severe weather events, participate in rescue exercises, and increase preparedness in critical services so that they can resume service in the event of disruption, e.g. power outage. Additionally, according to the regional CCAP, Pärnu County plans to construct and maintain its fire-fighting water sources and carry out crisis exercises.

Systemic adaptation is addressed in the RDP and the CCAPs of Pärnumaa through *improving adaptation planning, scaling up NbS (Nature-based Solutions), and fostering local and just resilience*. The perspectives on *improving adaptation strategies and plans* differ between the policy documents. In the RDP, awareness raising, preparedness, and accounting for climate risks in planning, design, construction, and management improve adaptation planning. The County CCAP mentions accounting for general risk in planning and developing crisis management, as well as landslide risk more specifically in building and landscaping. The City CCAP also focuses on accounting for landslide risks to mitigate them, and a plan for monitoring adaptation in general. Although the city administration, according to its plan, already disseminates extreme weather risks information, raises risk awareness among professionals, and provides guidance on climate risks, it also acknowledges the need to continue in this direction.

For the promotion of *scaling of NbS for adaptation*, examples such as sustainable green and blue infrastructure, green networks, protected areas, national parks, and marine areas, etc) are mentioned in the RDP and extensively in the City and County CCAP. In the RDP, sustainable green and blue infrastructure are listed as priorities. However, there is no discussion on scaling, particularly regarding adaptation. The City CCAP takes a more comprehensive approach to NbS. For example, it explicitly recognises the benefits of its natural environments (urban parks, forests, and coast) for adaptation, e.g., nature acts as a weather buffer and natural carbon sink. In addition, the City and County plan to restore wetlands and expand the wetland planning experience more widely, which represents a significant contribution to scaling up NbS for adaptation (City and County CCAPs). They also aim to increase the proportion of natural areas and are considering landscaping in developed plots and streetscapes, as well as developing a compensatory landscaping program for developers (City CCAP). The City and County CCAPs both mentions *ensuring fresh water supply* within the context of building resilience to disruptions to the water service as a critical service. The city aims to cooperate with service providers to ensure the continuation of services in the event of power disruption. The County wants to ensure clean drinking water during heat waves.

Dimensions of **justice** and **social equity** are found in both the City and County CCAPs, which support systematic adaptation through *fostering local and just resilience*. Taken together, the regional policy plans reflect all three types of justice, with each type appearing in at least one document. According to the City CCAP, public participatory processes are used in drafting and adopting the CCAP itself. This contributes to *procedural* justice. *Distributive* justice is also mentioned in the City CCAP, which includes a general statement that the city government is responsible for adapting society to risks, primarily through raising awareness and providing guidance. Both CCAPs are quite extensive about *recognitional* justice. The County CCAP highlights gaps, such as the lack of inclusive vulnerability and impact assessments for the most vulnerable groups within the local community, as well as the absence of plans to mitigate the vulnerability of these groups to climate change impacts, including the social effects of economic transformations. Bridging these gaps would contribute to both smarter and systemic adaptation. The City CCAP extensively acknowledges vulnerabilities, especially towards climate risks. It also highlights the knowledge of different groups e.g., healthcare professionals, social workers, and social service providers to adapt to these risks. These dimensions of *recognitional* justice support systemic adaptation and *foster local and just resilience*.

4.7.2 Policy and Steering Instrument Analysis

Regulatory instruments: The survey answers indicate that the national adaptation plan, regional SECAP, and municipal SECAP are the most influential legislative frameworks in the region. Other instruments identified in the survey include *national regulations* such as the proposed Climate Resilient Economy Act (not yet approved), the Emergency Act, the Nature Conservation Act, the Environmental Impact Assessment and Environmental Management Act, and the Planning Act, which considers floods and green networks in spatial planning. There is one national Green Network Planning Guide, with *guidelines* for integrating green infrastructure in planning processes. The *planning documents* include a national energy plan and a national CCA development plan, a regional development plan and municipal master plan, and the city climate plan. The survey answers did not mention any *agreements* or *intergovernmental mandates*. Furthermore, according to the Governance Recommendations (Regions4Climate D4.3), there is no alignment/coherence across different levels of governance, nor is there a legal framework regulating the coherence of CCA across these different levels of governance. In the medium term, following the current regulatory instruments, new climate and energy plans for the city and region will be developed, according to the Pärnumaa Innovation Roadmap (Regions4Climate T6.1/D6.2).

Financial instruments: To support adaptation, *incentivising instruments* used in the region include KredEx loans and project funding, as well as the potential use of regional green accelerator funding. In terms of *funding*, the survey answers indicate that there is a regional *budget allocated* for expenditure on flood detection systems and *funding obtained through European projects*. The municipalities of Pärnu County have jointly built a “Nature House” (Pernova Smart Park) in Pärnu, which is a centre for public education on climate issues but can also be seen as a *demonstration project* of sustainable construction and energy-efficient technologies in buildings. The survey answers did not mention any *penalising instruments* or *new innovative financial instruments*.

Informational instruments: In terms of *knowledge generation*, the survey answers refer to an innovation network tailored to provide knowledge and advice for entrepreneurs in the region, as well as Pernova Nature House which works as a platform for collaboration and public awareness in climate issues. The region is also part of the European initiative LEADER, which works with local action groups for the implementation of projects for rural development, including sustainability and climate-related projects. Pärnu County utilises Innovation Hubs (KOBAR) for cross-sectoral collaboration to develop and test public services. KOBAR, Pernova, and LEADER are considered among the most influential instruments guiding regional CR. While both the County and City CCAPs are aiming to set up formalised regional monitoring instruments, the survey answers did not mention any *monitoring or evaluation* instruments currently in operation.

Good Practice: Knowledge generation centres like Innovation Hubs (KOBAR) and PERNOVA Nature House create a space for stakeholders to engage and provides a springboard for potential PPPs.

Synergistic and conflicting instruments identified: this information was left unanswered in the survey

Instruments with potential: The survey respondent indicates community-led resilience initiatives as an instrument with potential, due to its capability of addressing the specific needs and vulnerabilities of local populations. Localised NbS frameworks are indicated as effective but need to be tailored to specific local and regional circumstances. Furthermore, the survey answers suggest that decentralised renewable energy cooperatives should become more resilient to disruption in centralised grids and that public-private partnerships should strengthen innovation and investment for resilience. Also, within the Innovation Roadmap (Regions4Climate D6.2), the EC4Rural project is highlighted, as it aims to establish Rural Energy Communities (REC), which will assist rural communities in achieving a clean energy transition. Although EC4Rural has a primary focus on climate mitigation, it also incorporates a DRR element. Local rural communities can produce electricity, providing an alternative to the national grid during a climate emergency. Additionally, there are opportunities to integrate best practices into other CCA policies.

Table 11. Summary of Climate Adaptation concepts across Pärnumaa's policy documents.

Types of adaptation	Concept	S3 (2021) (N)	RDP (2024) (R)	City CCAP (2022) (L)	County CCAP (2023) (R)
Smarter adaptation (SmA)	More and better climate-related risk and losses data			Yes	Yes
	Pushing the frontiers of knowledge on adaptation	Yes		Yes	Yes
Faster adaptation (FA)	Effective and inclusive governance mechanisms	Yes			
	Trans-boundary cooperation				
	Piloting and testing solutions				
	Accelerating the rollout of adaptation solutions		Yes	Yes	Yes

Systemic adaptation (SysA)	Mobilising sustainable finance and resources and closing the climate protection gap				
	Leveraging the CCA and DRR synergies		Yes	Yes	Yes
	Improving adaptation planning		Yes	Yes	Yes
	Promoting NbS for adaptation		Yes	Yes	
	Ensuring the availability and sustainability of freshwater			Yes	Yes
	Fostering local and just resilience/ Justice		Yes (Dis)	Yes (Pro, Dis, Rec)	Yes (Rec)

Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.7.3 Pärnumaa region recommendations

A. Recommendations relating to the modification and improvement of steering instruments:

1. Ensure coherence at the local and regional levels.

- Ensure that Pärnu City and Pärnu County adaptation and development documents are aligned and climate-proofed by coordination during the planning and monitoring processes. This could be done by establishing formal or informal working groups which can provide a platform for sharing of best practice and increase coherence across policy documents to identify incoherences/points where the CCAPs may undermine each other's climate goals and find best practice/complementary policies. For example, according to the Innovation Roadmaps (Regions4Climate D6.2), it is recommended that the governance model should be improved by establishing an Advisory Board, which will ensure that there is alignment between the Pärnu City and Pärnumaa region adaptation and development documents, and wider monitoring and planning of CR initiatives. The Board could also formally outline transboundary cooperation within the City/County CCAPs and RD.

2. Support for innovative resilience in strategies.

- According to the Pärnumaa Innovation Roadmap (Regions4Climate T6.1/D6.2) innovative resilience require sustainable urban planning, more focused on CR topics, reinforcing dedicated financial instruments for a more green and circular economy, which will allow the region to support low-carbon solutions to become a zero-emission county, and support natural protection by preserving and maintaining the green network, creating new green and recreational areas, and developing existing ones.
- Consider exploring whether provisions for scaling NbS, incentivising renewable energy cooperatives, and community-based resilience measures could be integrated into local and regional CCA planning documents. For example, Tuscany aims to establish a Consortium of private

stakeholders that will establish public-private partnerships (PPPs) to finance CR projects with NbS elements.

- Monitoring and evaluation mechanisms were not mentioned in the survey answers. However, the City and County CCAPs have the goal of establishing monitoring and risk assessments for specific policy areas, such as river flooding and coastal loss. Developing monitoring and evaluation mechanisms for CCA planning should be encouraged to strengthen and support learning and identification of gaps. Related to flooding, the data from the flood detection system could be used as input. For example, in the Uusimaa region, Espoo and Helsinki's SECAPs (Sustainable Energy and Climate Action Plan) established monitoring and data collection mechanisms that directly feed into CR implementation policy. For example, they commissioned a flood risk assessment and established elevation recommendations for different sections of the coastline. For further information, look at Uusimaa's informational instruments "good practice" section.

3. Stronger use of informational instruments for knowledge generation.

- Although the County mobilises knowledge through local networks (e.g., KOBAR, LEADER, and PERNOVA nature house), local and regional representatives could more actively utilise these networks, which include entrepreneurs, research institutes, and implementation actors, to incentivise innovation around climate adaptation and resilience, or in climate-proofing other areas of technological development.
- Consider participating in municipal networks that support adaptation and resilience, such as ICLEI, CoM, Resilient Cities, and sharing and learning. See Køge Bay's Information Instruments as an example.
- Local and indigenous knowledge is also important to CR. Local communities have knowledge of how they are affected by climate change and how they have adapted to changes in the environment in the past. Knowledge of native plants, local impacts, community needs and structures, as well as local people's experiences with coping or CCA measures, can help in improving CCA planning. To mobilise this local level knowledge related to CCA and CR, authorities could also incorporate community participation methods into multi-level governance practices or incentivise community-led resilience initiatives. Here, NGOs could be incentivised to take the lead, as greater private stakeholder engagement should be encouraged by the region.
- In addition, the implementation of more comprehensive digital tools will support decision-making through regular reporting and monitoring of climate change, with an impact on community literacy and awareness regarding this issue.

4. Diversify use of financial instruments.

- Pärnumaa is currently ranked low in terms of financial steering: financial instruments (score – 1/3, see table 3), and lacks a clear budget allocation for CCA planning or implementation. The purpose of the following recommendations is to rectify this by mainstreaming CCA into existing funding instruments or creating new dedicated funding specifically for CCA across the region. According to

the survey, Pärnumaa incentivises CCA and CR work using national and international loans and grants (Kredex loans, Environmental Investment Center (EIC/KIK), Leader, and a green accelerator programme). Consider communicating to funders the need to strengthen CCA dimensions of these funding programs to avoid maladaptation. To accelerate climate adaptation and resilience, Pärnumaa could explore developing dedicated regional or local funds, developing public demonstration projects, embedding climate-proofing criteria into all public investments, using tax incentives (e.g. rainwater tax) and financial penalties to encourage sustainable practices. The OECD's [compendium of financial instruments to support subnational climate action](#) (OECD, 2022) (dashboard database) can provide more options and ideas for financing.

- The City CCAP assigns the responsibility of repairing damages to the owner of the asset. In order to address the insurance protection gap and manage their risks, authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#).
- Also, the region could explore, together with national authorities, the replication of accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects. Other options include green and climate bonds (see [Paris as a case](#)) and equity financing.
- According to the survey, public-private resilience partnerships and decentralised renewable energy cooperatives could potentially provide for investment in CCA and CR related innovations and infrastructures. See Tuscany's region regulatory instruments and Køge Bay synergistic instruments as examples.
- Consider exploring intercommunal financing mechanisms or otherwise pooling regional funding to support community-led resilience initiatives that address the specific climate risk-related needs of communities across the region. The region could establish a formal mechanism, such as a participatory budget focused on CR, to pool funding for projects that require participation in and/or impact both Pärnu City and Pärnu County. This will help simultaneously achieve the goal of providing a way to find project funding and improve involvement in community initiatives (Pärnumaa Just transition framework action plan (Regions4Climate D2.2)).

B. Recommendations in terms of gaps and opportunities:

What is missing?

1. Build a cross-sectoral knowledge base for smarter adaptation.

- The Pärnumaa documents do not consider smarter adaptation comprehensively. The application of digital tools is considered in the City CCAP, but not in the County CCAP, which presents a gap, but also an opportunity to extend learning and sharing of practices across borders strategically. Similarly, the County CCAP focuses on improving data on very specific critical infrastructure risk and landslide risks. Although important, these risks could be placed within a wider context of DRR assessment and management. This would also help establish the links and provide the necessary

data for the adaptation monitoring programmes. Both the County and City CCAPs could also benefit from assessments related to the distributional effects, including costs and benefits, and vulnerabilities related to climate risks. Also, in cases where there have been damage or losses from climate impacts, these could be quantified to help evaluate the need for future CCA measures. The S3, although national, recognises on a general level the link between S3 innovation, CCA, and societal wellbeing. Making these connections in subnational documents could help support CCA, as the RDP has established a regional innovation system that sets up a formal PPP framework for knowledge creation and dissemination (e.g., innovation mapping, development of activities related to sectoral competence centres).

2. Strengthening the approach towards a faster implementation of adaptation policies and measures.

- The policy documents of Pärnumaa do not insufficiently focus on faster adaptation. Measures to rollout CCA solutions are discussed, but not the acceleration of the rollout of such solutions, which are needed for faster adaptations. Additionally, new governance structures that can help accelerate CCA are only discussed in the S3, although not in the context of CCA. The plan focuses on interdisciplinarity as a basis for S3 innovation, and this could be applied to other policy areas, such as those covered by the CCAPs and RDP. Linking S3 innovation topics to the RDP and CCAPs could also increase the application of piloting and testing solutions, thereby accelerating learning about CCA. Another learning method is transboundary cooperation, which is not mentioned in any of the documents but can be a rich source of information and experiences related to all three policy areas. For Pärnumaa, this can be cooperation with neighbouring counties, more broadly in Estonia, or internationally.

What could be strengthened or built upon?

3. Tailoring nature-based solutions for urban needs.

- The city CCAP mentions utilising compensatory landscaping to further increase the extent of natural ecosystems. The city should ensure that the compensatory actions are also in line with the city's needs related to CR. NbS can offer many needed benefits also in the city and allowing compensation in the context of urban development (e.g., sealed surfaces and densification) can increase climate risks. However, they need to be carefully planned with specific goals in mind.
- According to the Pärnumaa Just transition framework action plan (Regions4Climate D2.2) there is a long-term goal for the diversification of green spaces and to normalise consideration of climate change in planning and construction activities. This recommendation to mainstream NbS into landscaping and general urban planning will help achieve these goals.

4. More coordination and details related to rescue and hazard preparedness.

- Leveraging existing synergies between CCA and DRR accelerates CCA. Pärnu City and County both want to increase preparedness and response capacities related to severe weather. Pärnu County aims to organise crisis exercises, and Pärnu City aims to participate in rescue exercises. It

is unclear from the CCAPs which types of crises would be in focus, and which stakeholders would be involved in various preparedness and rescue activities, other than officials and social workers, both of which are key. Making specific links between prevention and response and involving a broader group of stakeholders could help to mitigate the overall risks.

5. Bridging justice and climate change adaptation (CCA).

- Pärnu's policy documents include several mentions of justice but lack a direct connection to CCA. The S3 focuses on removing barriers to participation in knowledge transfer, mutual learning, and cross-border cooperation. These objectives could support systemic adaptation if they were more explicitly connected to CCA, e.g., through cross-border cooperation to scale up adaptation. The RDP's goals are: 1) to develop leadership and participatory capacities in civil society (procedural justice), 2) to define a green economy as a socially inclusive and just economy, and 3) to ensure equal opportunities (eLearning, work, everyday life) (distributive justice). These goals represent a good starting point for increasing social equity in adaptation policymaking, but they need to be more clearly linked to the topic.
- Moreover, the RDP reflects a concern for recognitional justice, e.g., greater involvement of young people, youth organisations and associations in participation and the development of welfare and employment support services for people with special needs. Once again, these justice measures could foster systemic adaptation if supported by concrete measures.
- Lastly, a reference to the Pernova Smart Park, an excellence centre for environmental education located in Pärnu City, with a significant impact on supporting local and regional sectoral developments and increasing social equity, since it enables knowledge creation and knowledge transfer and supports social innovations for the community. Other planned activities, involving local media, may be crucial for fostering public engagement and connecting justice and climate adaptation, as referred to in the Pärnumaa Innovation Roadmap.
- The Pärnumaa Just transition framework action plan (Regions4Climate D2.2) calls for hiring a community specialist, which would help in bridging the gap between existing justice measures and CCA goals.

4.8 Burgas region analysis

Note, as outlined in the Governance recommendations (Regions4Climate D4.3), Bulgaria is a unitary state, where the regions lack administrative competencies and most implementation is on a municipal level; thus, for Burgas, the policy documents analysis is on the municipal level, as a regional equivalent is not available.

For the Burgas region, the following documents were analysed for the policy recommendations: Sustainable Energy and Climate Strategy and Action Plan 2021-2030 (L) as CCAP, the Integrated development plan for Burgas Municipality 2021-2027 (L) as LDP, and The Innovation Strategy for Smart Specialisation 2021-2027 (N) as S3.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies in order to steer CCA policy.

4.8.1 Cross-sectoral policy analysis

Smarter adaptation is reflected in the LDP and the CCAP of Burgas. Both plans *push the frontiers of knowledge* on adaptation, and the LDP *assesses risks and losses*. In the CCAP of Burgas, knowledge on adaptation is gained by creating an information database with climatic and meteorological data to support local decision-making and by implementing sensors to upgrade the water management information system. The LDP includes upgrading the municipality's information system for flood risk prevention and management, developing and implementing an integrated model for urban spatial adaptation against urban heat island effects to identify areas at risk in terms of adverse natural events. For example, the LDP identifies coastal sections at risk and includes a flood risk management plan. The LDP also includes an assessment of water scarcity and drought risk under the most pessimistic climate change scenario. Thus, the LDP both pushes the frontiers of knowledge and creates data related to risks and losses.

Faster adaptation is supported in Burgas' LDP and CCAP. *Accelerating the rollout of adaptation solutions*, creating *CCA and DRR synergies*, and *new governance structures* are outlined in at least one document. *New governance structures* are particularly relevant to the LDP, as they aim to raise awareness of climate change and influence public behaviour to mitigate and prevent its effects. The plan also contributes to *accelerating the roll out of adaptation solutions* related to land use and climate proofing infrastructure, e.g., measures to adapt buildings to heat stress, permeable pavement, grass vegetation, or the use of street surfacing materials with high albedo. Moreover, the NbS facilitates faster adaptation and promotes more systemic adaptation. According to the CCAP, Burgas will establish early warning systems for vulnerable groups which reflects *synergies between CCA and DRR*. A similar synergy is found in the LDP, which includes Burgas' implementation of the "Disaster Risk Reduction Programme 2017-2020", focusing on coastal sections at risk and the implementation of flood risk prevention and management measures. In the LDP, the municipality will also develop societal "guidance

for behaviour and action in case of disasters, accidents, and catastrophes". This contributes to creating *CCA and DRR synergies* but also *fostering local and just resilience* and systemic adaptation. Although *transboundary cooperation* is not explicitly mentioned in the local CCAP, the national S3 and local CCAP both support the use of various funding instruments, such as LIFE and Horizon Europe programs, which support transboundary cooperation.

All three policy documents support **systemic adaptation**. At least one of the documents *improves adaptation planning* and *fosters local and just resilience*. All three documents mention *scaling up NbS for adaptation* and *ensuring a fresh water supply*. The LDP and CCAP, specifically mention the use of new models, e.g. integrated model for urban spatial adaptation and urban heat island (LDP), and data for *improvement of adaptation strategies and plans*. The CCAP includes the creation of an integrated policy framework for beautification and disaster protection, and integrated CCA solutions for the urban environment, both improving *adaptation planning* and *fosters local and just resilience*. Another aspect of systemic planning is scaling NbS for adaptation and ensuring freshwater supply. NbS are mentioned in the LDP and the CCAP. The LDP is rather extensive on NbS and aims to create an NbS catalogue for risk mitigation, the development of green space, as well as the connectivity of the green infrastructure elements and green corridors. The measures are great examples of how NbS can be scaled up, considering e.g., connectivity. The CCAP aims to develop afforestation in urban areas to protect against heat islands and utilise green infrastructure to reduce particulate pollution, whereas the S3 only mentions green infrastructure. *Ensuring fresh water* is mentioned in all three documents, with more relevant measures in the LDP and the CCAP. The LDP focuses on restoring natural habitats (NbS) to ensure natural vegetation on soil, groundwater, and groundwater quality, contributing to systemic adaptation. As a complement to its water scarcity and drought risk assessments, water monitoring and intelligent management of resources, as well as innovative treatment of wastewater and recovery solutions of rainwater, are relevant measures from the CCAP to *ensure fresh water*.

Good Practice: Burgas integrates NbS into its local CCA strategy and outlines ways in which NbS solutions can be scaled up across sectors.

Finally, to *foster local and just resilience*, CCAP supports **social equity and justice** measures that reflect *recognitional, distributive, and procedural justice*. Regarding *recognitional justice*, Burgas acknowledges the contribution of diverse stakeholders (citizens, local and national authorities) and promotes collaborative and cross-sectoral efforts for transformative processes. Providing equal access to climate education opportunities, equitable capacity building for local adaptation, and ensuring universal access to climate information are goals that have been set to increase distributive justice. In support of procedural justice, the CCAP aims to build local capacity for effective climate adaptation through participatory mechanisms and foster multi-level stakeholder engagement in decision-making. Further, the municipality considers raising citizens' awareness of CCA, mainstreaming CCA in education, and setting up early warning systems for groups at risk from climate hazards and disasters, each contributing to adaptation.

4.8.2 Policy and Steering Instrument Analysis

Regulatory instruments: CR is mainly steered through municipal climate strategies and plans, via the CCAP and LDP, as well as sector-specific plans and strategies for mobility, sustainable tourism, waste management, air quality, and the operational program for the environment were also considered influential, as were national acts related to spatial planning and energy efficiency. There are actions plans related to rules for action in response to different types of disasters (flooding, fires, etc.), these are publicly available on Burgas' webpage regarding disaster response. Additional planning documents identified include a national strategy for adaptation to climate change and an action plan (published: 2019), a flood risk management plan for the Black Sea Basin (published: 2023), a municipal disaster protection plan (published 2023), and the master plan of Burgas (published:2024). Concerning agreements, Burgas City is a Signatory of the Green City Agreement, the CoM, as well as related to the EU Ocean and Water Mission. The survey answers did not include any *intergovernmental mandates* or *standards*.

A reference to the Sustainable Energy and Climate Strategy 2021-2030 in the Burgas Innovation Roadmap (Regions4Climate T6.1/D6.2), with a dedicated green infrastructure section.

Financial instruments: *Funding* for CR is mainly *project-based* and delivered through programs. The EU funding programmes of LIFE and Horizon and the funding supplied by the National Recovery and Resilience Plan and Operational Programme “Environment” were among the main steering instruments for CR. Additionally, there is a Development of the Regions programme that provides national funding. The region uses *penalising mechanisms* for infrastructure within their construction restrictions framework. In terms of *budget allocation*, the national government has financial resources used for restoration of public infrastructure and funds allocated for protection and maintenance measures to mitigate risks, e.g., maintaining permeability. Innovative financial instruments identified in the survey include an energy cooperative, a municipal program for startup development as well as *demonstration projects*, including the implementation of green and digitalisation projects focused on climate adaptation.

Informational instruments: The region identified governmental units, such as the Regional Council for Development, which monitors the regional spatial development strategy that includes CCA and DRR activities, and the Local Climate Resilience Unit (a multi-disciplinary advisory body that operates within the municipality) as important instruments for resilience-related *knowledge mobilisation* and coordination. Burgas also participates in international collaboration networks including, ICLEI, and the Covenant of Majors. The survey answers identify two instruments used for *knowledge generation, monitoring, and evaluation*: the municipal water management information system, which provides flood-related data and models, and a flood risk assessment generated for the Black Sea Region flood risk management plan. In terms of *public outreach*, survey answers mention a public consultation for the adoption of the climate and energy strategy. As mentioned, the CCAP plans to work towards establishing institutions that will foster local participation in climate action and implement educational initiatives. However, the survey does not mention any existing instruments for *engaging with indigenous and local knowledge* in CR.

Good Practice: The Water Management Information System, which provides a model for the integration of monitoring with local action and DRR.

According to the Burgas Innovation Roadmap (Regions4Climate T6.1/D6.2), data on climate change collected from modernised and upgraded monitoring stations and GIS tools will be crucial in supporting regulatory and informational instruments. In this context, the Climate Atlas will provide valuable information on catchment areas and flood-prone regions, which is relevant for urban spatial planning.

Synergistic instruments: The survey identified synergistic instruments, including legislative frameworks that align with CR goal. Notably, these include the national recovery and resilience plan in Bulgaria, which enhances energy efficiency and renewable energy use, as well as a municipal air quality program and a flood risk management plan. An informational instrument from another sector is the water management information system which supports CR in Burgas and provides access to data and monitoring of flood risk.

Conflicting instruments: According to the survey, the 2021-2023 General Spatial Plan (published: 2021) for Burgas is perceived to be an obstacle to CR because it does not sufficiently account for the local regulatory framework or the need for developing blue-green infrastructure. This is despite the LDP, which aims to intensify green investments and CCA projects.

Instruments with potential: The survey respondent has identified that the CCAP could be a more effective instrument for resilience if it considers the adaptive capacity of the existing green infrastructure and if it better utilises and expands NbS in the urban development context.

Table 12. Summary of Climate Adaptation concepts across Burgas' policy documents.

Types of adaptation	Concept	S3 (2022) (N)	LDP (2021) (L)	CCAP (2022) (L)	Steering Instruments
Smarter adaptation (SMA)	More and better climate-related risk and losses data		Yes		Yes (Municipal Water Management Information System)
	Pushing the frontiers of knowledge on adaptation		Yes	Yes	Yes (Local Climate Resilience Unit)
Faster adaptation (FA)	Effective and inclusive governance mechanisms		Yes	Yes	
	Trans-boundary cooperation				Yes
	Piloting and testing solutions				Yes (demonstration projects)
	Accelerating the rollout of adaptation solutions		Yes		

Systemic adaptation (SysA)	Mobilising sustainable finance and resources and closing the climate protection gap	Yes		Yes	Yes
	Leveraging the CCA and DRR synergies		Yes	Yes	Yes
	Improving adaptation planning		Yes	Yes	Yes (e.g: Black Sea Region flood risk management plan)
	Promoting NbS for adaptation	Yes	Yes	Yes	
	Ensuring the availability and sustainability of freshwater	Yes	Yes	Yes	Yes
	Fostering local and just resilience/ Justice		Yes (Rec)	Yes (Dis, Pro, Rec)	

- Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.8.3 Burgas region recommendations

A. Recommendations relating to steering instruments:

1. Mainstream NbS, CCA, and CR into sectoral policies.

- The Burgas Innovation Roadmap (Regions4Climate T6.1/D6.2) outlines plans to establish a supportive mechanism for the implementation of NbS by private property owners and businesses. Additionally, there are plans to develop a municipal catalogue of NbS aimed at mitigating the risks and threats posed by natural disasters. This initiative will also focus on the development and management of ecosystem services, among other efforts.
- As mentioned in the systemic adaptation section, Burgas implements NbS and scaling up plans into several of its projects and across sectors. Cross-departmental engagement can be used to develop or revise the General Spatial Plan and the CCAP to consider adaptation needs from a cross-sectoral perspective better, and adjustments within these strategies can be made in order to overcome contradictions and conflicting policies.
- This can be supported through the generation of knowledge related to the adaptive capacity of current blue-green infrastructure as well as the future needs for NbS to provide ecosystem services, e.g., regulation of flooding, heat, as well as other co-benefits. The impact of NbS could potentially be monitored and measured using the municipal water management information system and used to justify further investments into NbS.

2. Incentivise resilience and incorporating climate proofing into CCA strategies.



- Burgas has a diverse portfolio of local and national financial instruments. It includes innovative financial instruments from other sectors (urban development) and a municipal programme for startups, which also allow for measures that support adaptation. Adopting a horizontal, climate change-resilient approach involves supporting innovative practices, integrating tools, and facilitating knowledge exchange when developing climate action, as outlined in the Roadmap for Innovation. In this context, Burgas could consider embedding requirements related to climate proofing in its contractual agreements related to infrastructure and public services, as stated in its Regional Innovation Roadmap (Regions4Climate T6.1/D6.2). As funding for CCA in Burgas is primarily done by projects, a requirement to mainstream a climate proofing element into contractual agreements across sectors (e.g. urban planning, transportation, infrastructure projects) could result in an incentive for PPPs and private projects to engage in CR. Also, Burgas could explore, together with national authorities, the replication of accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects.
- Ensure that funding for demonstration projects and other public funding is being distributed in a way to ensure equitable outcomes by considering social vulnerability. This could be done by requiring PPPs and projects to have an impact assessment on meeting minimum justice requirements and address potential impacts on local communities.

3. Stronger use of local participatory methods for knowledge generation.

- Burgas' adaptation and resilience is steered through its local level plans. However, it could strengthen the mobilisation of local and indigenous knowledge to complement the generated knowledge through participation in international networks and Local Unit for Climate Resilience and Adaptation. Knowledge of traditional farming, fishing, and water resources management methods, safe locations, native plants, and community structures can help improve adaptation planning. In order to mobilise this local level knowledge related to adaptation and resilience, Burgas could incorporate community participation methods into local-level governance practices. Burgas could move from community consultation to more interactive and regular engagement with residents in various phases of adaptation planning and implementation, for example by requiring consultations throughout the duration of a project or creating permanent channels for community participation in strategic subjects. Burgas' Just transition framework action plan (Regions4Climate D2.2) highlights the need for an integrated approach to include all vulnerable groups in decision making and to increase the average citizen's level of participation in CCA. These recommendations aim to achieve these goals by providing citizens with a concrete framework to work through, thereby facilitating a high level of participation. Consider whether the Local Unit for Climate Resilience and Adaptation, which includes a wide range of stakeholders, could also engage more actively with residents. This echoes the planned approach outlined in the Innovation Roadmap (Regions4Climate D6.2), where the region will host communication outreach to the public and collaboration with educational institutions within schools and universities to establish educational programmes that support CCA. Burgas already scores quite well in engagement with academia and the research community (score – 3/4, see table 4), though implementing this recommendation will ensure engagement and involvement from academia in informed CCA policy.

B. Recommendations relating to policies:



What is missing?

1. Strengthening the approach towards a smarter and faster implementation of adaptation policies.

- To increase the speed of adaptation in the region, Burgas' municipality could consider how it works with innovation within the context of adaptation. As Burgas' S3 is a national document, consider adding a chapter on innovation in the development plan. Pärnu County can be looked to as an example of good practice of how this can be done. This would boost and consolidate the municipality's capacities for strategic smarter adaptation and CR. It would also lead naturally to the use of piloting and testing solutions and implementation of further land use and infrastructure-oriented climate adaptation solutions. One interesting example is the smart management of public buildings, which is an action mentioned in the Burgas Innovation Roadmap (Regions4Climate T6.1/D6.2). This echoes the goals set out in the Just transition framework action plan (Regions4Climate D2.2), where there is a call for improved and evenly distributed infrastructure.
- Also, while the national funding instruments are mentioned in the policy documents for funding CR, i.e., National Recovery and Resilience Plans, NDEF, and risk transfer methods, local funding is missing. To leverage private sector capital for CR, Burgas could consider green and climate bonds (see [Paris as a case](#)) and equity financing. Identifying mechanisms to address the climate protection gap through the development of risk transfer mechanisms would also accelerate adaptation. In order to address the insurance protection gap and manage their risks, authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#). Please see Uusimaa region's policy analysis, faster adaptation section, and its analysis of Espoo and Helsinki's SECAP's insurance schemes as an example. The OECD's [compendium of financial instruments to support subnational climate action](#) (OECD, 2022) (dashboard database) can provide more options and ideas for financing.

What could be strengthened or built upon?

2. Collaborate across borders for regional impact.

- To achieve a broader impact, consider organising a collaboration with the other 12 municipalities in Burgas Province to work on adaptation efforts in a more effective and consolidated manner. Consider the establishment of a Regional Climate Resilience Board, which would convene the local units as a key advisory body. This board would play a crucial role in crafting and executing comprehensive climate change adaptation policies and strengthening collaboration among the 12 municipalities. This could lead to the development of a "regional" development plan -with binding or non-binding guidelines, or just voluntary coordination among municipalities-, which could include adaptation or an adaptation plan or simply coordinated efforts. This could help avoid maladaptation that could occur if each municipality is working on its own. The region can build on its experience with the Black Sea Region flood risk management plan, as well as with international networks

(ICLEI, CoM) and funding instruments (Horizon). Also, the region could look to Pärnu County as an example of bottom-up and voluntary municipal cooperation.

- Additionally, the Burgas Innovation Roadmap (Regions4Climate T6.1/D6.2) highlights the need for ongoing capacity building of local experts in planning, implementation, and monitoring. It is recommended that this initiative be carried out at a regional or intermunicipal scale to optimise resource use.

3. Build policy coherence between Burgas' policy documents.

- Burgas policy documents reflect the different types of adaptation, as many measures quoted above contribute to different categories. The municipality should continue to create synergies to strengthen its strategy further. For instance, the national S3 mentions innovation for resource efficiency in the water sector. Burgas could build on this in its LDP and CCAP and link this to innovation related measures ensuring fresh water. For example, projects like RedMarLitter, outlined in the LDP, which track water pollution and waste streams, can be looked at as an example to follow.

4. Bridging justice and climate change adaptation (CCA).

- Both the *S3 and LDP* address innovation and citizens' participation but not directly connected to adaptation. For example, the national S3, stakeholder inclusion, and collaboration in innovation management and public-private participatory processes are set up. Also, in its LDP, the municipality plans to establish a citizen participation system in local government, recognises the need for equitable access to services, sports facilities, educational environments, and the labour market, and acknowledges vulnerability factors (age, disabilities, disadvantages, etc.) and at-risk groups related to development. The application of participatory processes to the CCA context and identification of local vulnerabilities in regard to various climate risks would help increase equity and justice in relation to climate impacts as well as climate adaptation measures and support systemic adaptation.

5. Invest in education for CR.

- To achieve transformative climate action, it is essential to strengthen education, as this area requires more attention based on the Innovation Roadmap (Regions4Climate T6.1/D6.2). One recommended action included in the Burgas Innovation Roadmap is to introduce the topic of climate change into educational programmes, by enhancing knowledge through demonstration-based learning using digital tools and nature-based solutions (NBS). Such initiatives should target children and young people, focusing on the significance of climate change, its negative impacts on daily life, and measures for prevention and mitigation.

4.9 Sitia region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Greece is a unitary state, where there is no legislative power at a sub-national level. Regional and municipal bodies, which are self-governed, are responsible for implementing regional and local policies, considering national and EU laws.

For Sitia, the following documents were analysed: the (Crete) Regional Plan for Climate Change Preparedness (R) as CCAP, the For the Crete of 2030 Plan (R) as RDP, and the Smart Specialisation Strategy for the region of Crete for the 2021-2027 programming period (R) as S3.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies in order to steer CCA policy.

4.9.1 Cross-sectoral policy analysis

The three policy documents (CCAP, RDP, and S3) for the region support **smarter adaptation**. For example, all three policies *push the frontiers of knowledge* on adaptation. In the S3, new technologies will help with monitoring climate change for sustainable coastal and marine tourism. The plan mentions monitoring and warning sensors, and the CCAP mentions other monitoring systems that are tailored for specific sectors (e.g., agriculture, forestry, tourism, transportation infrastructure), creating *CCA and DRR synergies*, supporting faster adaptation. In its RDP, the region studies flood protection works of a reservoir, contributing to *pushing the frontiers of knowledge* on adaptation. The reservoir aims to improve the irrigation network in the region and provide flood protection for the area. Additionally, Crete is implementing Smart Cities Systems to address pandemics and natural hazards and for the improvement of the administrative capacity of the municipality, for example, there is now a detection and monitoring system for wildfires. This can also foster faster adaptation, creating *CCA and DRR synergies*, and systemic adaptation via *improved adaptation planning* in the municipality. Moreover, the Cretan CCAP highlights the need for specialised studies on the impact of climate change. The studies will focus on the impacts on ecosystems, fisheries, and aquaculture sectors. The CCAP also dedicates a chapter to how initiatives can help the region achieve CCA goals. Through these studies, the region acknowledges the need to *push the frontiers of knowledge* on adaptation for these sectors. Crete is also one of the only regions of the project that used the European Platform “Climate-ADAPT” data, indicators, and methodological tools to prepare its CCAP. This platform *improves adaptation planning* and supports systemic adaptation.

The RDP and CCAP support **faster adaptation**, *accelerating the rollout of adaptation solutions* is mentioned in both plans. The CCAP develops measures related to *new governance structures, transboundary cooperation, piloting and testing solutions, closing the climate protection gap, and CCA and DRR synergies*. Crete’s CCAP is a comprehensive action plan that tackles many adaptation-related issues. Regarding *new governance structures*, the plan proposes new ways of mobilising support and

engagement, and of organising governance, i.e., involvement of civil society to monitor the implementation of policies, public information, and awareness raising to attract volunteers for reforestation activities, and horizontal and coordinated actions to manage human health emergencies caused by climate change. The CCAP contains measures that contribute to both *new governance structures* and *transboundary cooperation*: one is to transfer awareness and know-how between regions throughout Greece for the implementation of CCA plans, via utilising Greece's National Council for Adaptation to Climate Change as an advisory platform for the sharing of best practice. The region states that it works towards consistent knowledge sharing on an inter-regional level within Greece, and to engage with projects such as LIFE-IP AdaptInGR, which will improve the implementation of adaptation policy. The CCAP promotes *piloting and testing solutions* by participating in EU research projects for pilot implementation of CCA measures, sub-scaling regional climate models, and developing early warning systems for extreme events and pilot system monitoring and forecasting for severe weather events. This latter measure creates synergies between CCA and DRR as well.

The CCAP provides several measures related to land use and risk management to *accelerate the rollout of adaptation solutions*, via the creation of a guide with risk-related information and relocation information for farms, prevention and management of forest fires, adaptation of the energy infrastructure, actions to address impacts of climate change on river flooding, integration of climate change impacts into flood risk management planning, and bioclimatic infrastructure for public and private buildings. Additionally, incentives, grants, and fines, up to a ban on land use, will be implemented to limit the development of at-risk coastal areas. The RDP of Crete implements adaptation solutions for flooding risks, i.e., flood control interventions in the city of Heraklion, especially to construct and improve drainage and flood protection measures and infrastructure to reduce erosion risks and coastal retreat. The plan includes natural disaster damage restoration projects and forestry manipulations for fire protection. These land-use interventions contribute to *accelerating the rollout of adaptation solutions*. Crete is one of the only regions providing financial support mechanisms to *close the climate protection gap*. In Crete, grants will be allocated to professional livestock farmers, fishermen, and tourism sector professionals to compensate for income and material losses caused by extreme weather events (CCAP). Finally, additional *CCA and DRR synergies* are found in the plan for General Emergency Response and immediate/short-term management of the consequences of the "Dardanos" flood event (CCAP).

Good Practice: Measures that provide grants to livestock farmers affected by extreme weather events and will provide financial incentives for the transfer of livestock production from high risk to low-risk areas.

Crete's S3, RDP, and CCAP support **systemic adaptation**. *Ensuring fresh water* is mentioned in all three documents, while *improving adaptation planning* and *scaling up NbS for adaptation* are found in the RDP and CCAP. While *fostering local and just resilience* is only supported in the CCAP. In the CCAP, many measures contribute to *improving adaptation planning* through the promotion of regional planning based on vulnerability levels (for example, for forest management), the integration of CCA actions and measures into for the protection of vulnerable water bodies, and of climate change impacts in the water resources management planning, the development of an integrated management plan for coastal zone taking into account climate change and the adaptation of the agricultural sector to climate change. The measures also support the acceleration of adaptation solutions, as some include land-use

and infrastructure-related solutions. The CCAP and the RDP reflect a concern for NbS, and both have plans addressing forest restoration and reforestation. The RDP focuses on protection measures, regeneration of the land port area with a bioclimatic approach, and natural disaster damage restoration projects. The CCAP is dedicated to sustainable soil, water, and biodiversity management, restoring soil and wetlands to prevent erosion and protect from floods, increasing urban greening, and ensuring that ecosystem policy planning considers adaptation measures. All three policy documents consider *ensuring fresh water*, reflecting a priority for this topic in Crete. The S3 focuses on integrated water cycle management with innovations for water quality monitoring, tackling pollution, and rational management of water supply, irrigation, and sanitation systems. The RDP mentions stormwater runoff, flood improvement projects, and irrigation network improvement. The CCAP prioritises water savings through efficient and sustainable water management, irrigation water pricing policy, smart networks, and water meters.

Finally, the region's CCAP *fosters local and just resilience and social equity* in several ways. Local awareness raising is planned on the adaptation of biodiversity to climate change, as well as the impacts of climate change on the fisheries and aquaculture sector. Additionally, the region will adequately train health staff to deal with climate change-related diseases and prepare facilities to be able to accommodate increased climate related incidents.

Through these measures, the CCAP of Crete supports *procedural, distributive, and recognitional* justice. While pursuing smarter adaptation, the plan recognises the need to identify vulnerable populations for tailored interventions, e.g., strengthening infrastructure to support vulnerable groups and less-favoured areas during extreme weather events, and prioritises such populations in disaster recovery efforts, contributing to *recognitional* justice. *Distributive justice* measures also reinforce smarter adaptation by monitoring and addressing climate change impacts on vulnerable groups, as well as conducting thermal mapping for vulnerable urban areas where vulnerable populations reside. Other aspects of *distributive* justice support systemic adaptation, like developing early warning systems for vulnerable populations. The plan features a strong focus on social equity and justice in the labour market, by promoting socio-economic benefits through aquaculture development, combating social and labour exclusion for vulnerable groups, ensuring local employment in agricultural development, ensuring fair access to infrastructure and development opportunities to rural communities and inclusive energy and poverty reduction efforts. Crete commits to informing and engaging citizens in climate action, including social partners, citizens, and public bodies in ongoing consultations, monitoring and evaluating climate adaptation actions, and establishing educational programs to raise climate awareness. Moreover, *procedural* justice can also contribute to faster adaptation by establishing *new governance structures* that involve local communities and stakeholders in climate strategy, public consultation, and policy implementation. This approach also facilitates multilevel cooperation for effective climate adaptation, as well as communication and coordination among stakeholders for disaster preparedness. These measures contribute to sharing power and responsibility and include a wider population range in decision making.

4.9.2 Policy and Steering Instrument Analysis

Regulatory instruments: In Greece, CR is steered at the national level and implemented at the regional level. In Crete, the primary document for implementation is the Crete regional climate change adaptation plan (Governance Recommendations, D4.3). Additional relevant plans include the regional mitigation and adaptation strategy (publication: 2022) and a sustainable energy and climate action plan (published: 2011). Sitia also has a SECAP. The survey answers also mention the National Climate Law as a regulation with influence, and one national *standard* (found to be in alignment with the *NSRF 2021-2027*) for assessing the CR of infrastructure projects. Although the survey did not mention any *agreements* or *intergovernmental mandates*, the CCAP mentions Sitia being a member of Greek pan-regional bodies, although not actively. Additionally, knowledge sharing occurs between regions and specific LIFE projects that aim to enhance the implementation of adaptation strategies across regions.

Financial instruments: The region has a just transition fund, loans for renewable energy installation, and research funds at the national level for *incentivising* resilience. The CCAP also outlined how the region utilises EU funding programmes such as LIFE and Horizon, along with local organisations such as the Agriculture Cooperative Associations, to help finance adaptation goals. Project-related funding is sourced from European initiatives, including LIFE and Interreg, as well as the Greek NSRF 2021-2017 fund, which is supported by EU funding. The regional authority regularly allocates its budget to CR projects. There is one *penalising instrument* in place, in the form of a fine for not cutting wild grass in abandoned urban and peri-urban fields. This is for wildfire reduction, as wild grass can increase fire risk. The survey answers did not mention any *public demonstration projects* or *public procurement*. However, there are some pilot EU funded projects, outlined in the CCAP, which promote the implementation of CCA measures: e.g. rainwater recycling pilot projects and a project establishing an early warning system for extreme events. Still a clear public procurement model does not seem present in the region.

Informational instruments: Sitia has several cooperative networks for *knowledge mobilisation*, including a geopark network, a union of agricultural cooperatives, as well as a governmental network of communities and municipalities. The region also has networks of volunteers and local action groups for *public engagement* and *knowledge mobilisation*. The survey respondent indicates that the region *engages in generating local knowledge* in water management through initiatives such as flood exercises in terms of *knowledge generation*, the region collaborates with national academic institutions. However, according to Crete's DG for Development Planning's *Evaluation of the Strategic Planning of the Region of Crete 2024-2028*, the interconnection between research institutions and enterprises, as well as between enterprises in export sectors, is limited. *Monitoring and evaluation* instruments include climate stations implemented within the Regions4Climate project and flood stations from the Hellenic Marine Research Centre. *Public outreach* initiatives are done through regular public events, tourism activities, summer festivals, and cultural centres.

According to the Sitia Innovation Roadmap (Regions4Climate T6.1/D6.2), the environmental monitoring, including GHG+ and pollution coastal environment monitoring, will provide important information for future policy instruments.

Synergistic instruments from other sectors: The survey answers indicate that legal frameworks from the *civil protection sector* and the *transport sector* have a positive effect on CR. Policies from civil

protection ensure measures to reduce flood risks, while the transport sector includes policies ensuring that transportation infrastructure can operate in harsh weather conditions.

Conflicting instruments from other sectors: Legal frameworks from civil protection are also considered conflicting, due to fire prevention strategies and Anti-Nero fire prevention programs. According to Arbinolo et al. (2024), these national strategies methods have been criticised to be too focused on short-term wild-fire management while neglecting long-term impacts their methods have on the environment and do not consider measures that decrease the likelihood of wildfires in the future.

Instruments with potential: n/a

Table 13. Summary of Climate Adaptation concepts across Sitia's policy documents.

Types of adaptation	Concept	S3 (2021) (R)	RDP (2023) (R)	CCAP (2022) (R)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data			Yes	Yes (Climate stations (R4C) and Hellenic Marine Center)
	Pushing the frontiers of knowledge on adaptation	Yes (Creation of a "Host LAB")	Yes	Yes	Yes (Geopark network and local action groups)
Faster adaptation (FA)	Effective and inclusive governance mechanisms		Yes	Yes	Yes (Policy development involves national academic institutions)
	Trans-boundary cooperation			Yes	
	Piloting and testing solutions			Yes	Yes
	Accelerating the rollout of adaptation solutions				
	Mobilising sustainable finance and resources and closing the climate protection gap			Yes	Yes (Loan programme for renewable energy and research)
	Leveraging the CCA and DRR synergies			Yes (General Emergency Response Plan)	Yes
Systemic adaptation (SysA)	Improving adaptation planning			Yes (Revision of Forestry and Water vulnerability plans)	Yes
	Promoting NbS for adaptation		Yes	Yes	
	Ensuring the availability and	Yes	Yes	Yes	Yes

sustainability of freshwater				
Fostering local and just resilience			Yes (Pro, Dis, Rec)	Yes

- Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.9.3 Sitia region recommendations

A. Recommendations relating to modification and improvement of steering instruments:

1. More localisation and specialisation of CCA planning.

- As Sitia is a municipality and part of Eastern Crete, it might be useful to create a more localised adaptation and/or resilience plan for its specific needs, together with neighbouring municipalities, particularly for Lasithi regional unit. A specific focus could be on bridging the gap that national fire prevention strategies have created and putting into place a strategy for long term wildfire management, which does not result in misalignment with other instruments. This could include and build on the strong use of informational steering instruments, e.g., knowledge networks and research institutes, local action groups, as well as the use of indigenous and local knowledge. This can also be publicised to residents and tourists during public outreach events, such as summer festivals and tourism activities. The approach used in Sitia's implantation of Smart Cities Systems regarding pandemics, natural hazards, and monitoring wildfires can be expanded into other sectors where possible Enhance multi-level cooperation to ensure alignment between local, regional, and national sectoral policies, particularly in vulnerable sectors like regional forest management, aligning with the national forest strategy.
- This recommendation emphasises the need to strengthen local leadership in innovation processes for CR, as outlined in the Regions4Climate action assessment (T6.1/D6.2). Enhancing local leadership is vital for communities to develop tailored strategies that effectively address their environmental challenges, thereby promoting sustainable practices and long-term resilience against climate impacts.

2. Diversify the use of financial instruments.

- Add a climate-proofing element to existing funding instruments where possible. Ensure that the funding allocated to initiatives, through the Just Transition Fund and Renewable Energy loans, considers future climate conditions as well as equity issues in their criteria for funding allocation. This will help avoid maladaptation, as having a unified climate proofing scheme built into funding instruments is ideal. This would be especially relevant for the protection of the Geopark, as it is expected to have an independent structure with self-sustained funding that can be utilised for CR (Sitia Innovation Roadmap, in Regions4Climate T6.1/D6.2).

- Sitia's Just Transition Roadmap (Regions4Climate D2.2) states that there is a goal of achieving lower energy prices and this recommendation if implemented will help the region's residents via a renewable energy loan scheme which may enhance the local grid resilience.
- Also, evaluate the costs and benefits of existing penalising instruments, such as fines for not cutting wild grasses, to see if this model can be applied and replicated for other sectors and activities. It should also be studied whether there are ways to complement the wild grass cutting with nature-based methods, e.g., grazing animals, which would also bring other benefits to the area. Also consider incentivising alternatives, see Azores, Basque Country, Tuscany, and South Aquitaine for examples of what could be applied in Sitia. Specifically, the Basque Country established a penalising body that can identify instances where specific minimum adaptation objectives are not met.
- The private sector plays a critical role in accelerating climate resilience (CR) by providing financial resources, innovation, and implementation capacity. To leverage this potential, Sitia could look into green and climate bonds (see [Paris as a case](#)), equity financing, and public-private partnerships (PPPs) to attract private capital. Also, in order to address the insurance protection gap and manage their risks, the local authority can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#). Finally, Sitia could explore together with Cretan or national authorities about the possibility of replicating accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects. The OECD's [compendium of financial instruments to support subnational climate action](#) (dashboard database) (OECD, 2022) can provide more options and ideas for financing.

B. Recommendations relating to policies:

What is missing?

1. Build a comprehensive approach to smarter adaptation by assessing climate risks and loss.

- The CCAP refers to impact assessments for several sectors (e.g., agriculture, forestry, livestock, coastal erosion), which means that there are already attempts at the regional level to assess risks and losses related to climate change. To ensure smart adaptation, and in line with the CCAP's recommendation to implement "specialised studies on climate change impact" on ecosystems, fisheries, and aquaculture sectors, the region could further assess costs, benefits, vulnerabilities, and inequalities related to climate change impacts. These would support monitoring efforts mentioned in the S3 and RDP.
- Sitia scores well in terms of informational steering (score – 2/3, see table 4), though it scores moderately in terms of regional monitoring and evaluation system (score – 2/4, see table 4). This recommendation relating to assessments and wider monitoring policy will help the region to improve its ranking regarding this aspect.

2. Strengthening the approach towards faster implementation of adaptation policies.

- The region's CCAP is comprehensive and addresses most aspects of faster adaptation. The RDP focuses on accelerating the rollout of adaptation solutions, while the S3 does not specifically support faster implementation of adaptation measures. In order to better support acceleration in the region, the region should draw inspiration from the CCAP's extensive approach. Several EU funded projects, for example, LIFE projects like LIFE Adapt2Clima (CCA impact assessments) and other EU funded projects like EEA-AquaMan (Innovation in water management), provide a model of spearheading faster adaptation. While applying for further EU funded projects should be continued, the primary goal should be the development and dissemination of CCA models and strategies, identified in the CCAP, which can be utilised across sectors. Sitia possesses excellent financial steering in terms of direct financial instruments (score – 3/3, see table 3) and allocated funding (score 3/3, see table 3), though scoring only decently in terms of budget allocation for planning and implementation (score – 2/4, see table 4). By working towards established funding mechanisms for faster adaptation the region will be able to implement many of its CCA goals within its desired timeline.

3. Recognise the potential of cohesive NbS planning across the region.

- NbS is mentioned in two of the RDP and CCAP, but the scope of the proposed measures is limited to specific projects, and a broader approach does not currently exist. The CCAP outlines several specific policy areas where NbS are being implemented and aims to utilise NbS where applicable. For example, the region constructed rainwater storage structures to encourage wetland restoration, developed flood protection projects, and is currently preparing protection works for vulnerable coastal areas. However, a formalised NbS framework or tool, such as the green factor index, which includes thresholds for minimum NbS requirements and guides NbS design, could be helpful. The region may consider implementing NbS across larger areas and identify synergistic opportunities across sectors. Also, the region may seek to establish a mechanism to identify and scale up best practice, akin to Burgas' scaling up of NbS in its freshwater policy (outlined in the systemic adaptation section), which can be looked to as a model of scaling up of NbS strategies. Sitia's Just Transition Framework Action Plan (Regions4Climate D2.2) calls for local funding and support for green and biological farming. NbS solutions and funding could be utilised to achieve these goals.

4. Bridging social equity, justice and climate adaptation in the S3 and the RDP.

- Sitia's S3 and RDP contain broad statements on social equity and justice without direct connections and actions to climate adaptation. The S3 envisions a just and inclusive society and equal access to opportunities for all in a sustainable manner. The statements could contribute better to distributive and systemic justice if they were further detailed and connected to concrete actions to foster systemic or smarter adaptation. For example, the monitoring and warning plans, outlined in the faster adaptation section, could be used as a model for mainstreaming justice requirements into CCA policy. The RDP recognises the high risk of social and labour exclusion of vulnerable groups, but without clear commitments to solutions and actions that support systemic adaptation. There may be ways to merge the need to stimulate local employment in peripheral regions, such as Sitia, to avoid depopulation, with the need to adapt to climate change.

- The Sitia Innovation Roadmap (Regions4Climate T6.1/D6.2) emphasises the need to support the community and enhance public engagement, particularly for vulnerable groups, to address the gaps identified for innovation (Regions4Climate T6.1/D6.2). The roadmap outlines some plans for new services and structures designed to assist the population. Additionally, it calls for investments in education and awareness-raising initiatives to help people adapt to climate change and tackle the challenges of the labour market.

What could be strengthened or built upon?

5. Specify considerations on freshwater availability and quality and ensuring freshwater access.

- The irrigation network is a concern in Sitia's RDP. The plan mentions that the actions taken will increase irrigation capacity and prioritise distribution. The needs and areas that need to be prioritised are specified in several projects throughout the region, e.g. New Water Transmission Pipeline and Irrigation Network. Nature based solutions could be added to the project portfolio to supplement grey infrastructure plans. See recommendation #5.
- Maintaining supply for all citizens is essential, especially during extreme weather events. Balancing the vital needs of the population with agricultural irrigation would support systemic adaptation. Freshwater supply can also be maintained through financial steering instruments, e.g., progressive pricing increases as consumption increases. A water pricing policy is mentioned in the CCAP, but the plan does not specify what kind of water pricing policy they want to implement. The region needs to clarify this measure. Also, pricing should include aspects of recognitional justice to consider the needs of residents in its implementation.

4.10 Nordic Archipelago region (Åland and Southwest Finland) analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), the Nordic Archipelago includes areas in Sweden (Stockholm, Uppsala, Sörmland and Östergötland counties), Southwest Finland and autonomous Åland. Finland is a unitary state, where the regions are primarily responsible for enforcing national rules and regulations, though regions themselves lack legislative powers as legislative development and power rests at the national level in the Parliament. Åland is a fully autonomous self-governing region and possesses fully autonomous legislative power. Sweden is a unitary state, where the regions have competencies in implementing and monitoring policy. In Sweden regions and municipalities do not have legislative powers, but have executive competencies in certain areas, with environmental protection, emergency planning, and building planning being carried out at a municipal level,

Based on discussions with the Nordic Archipelago partner, we have focused the policy analysis on Southwest Finland and Åland as these are the areas with project activity and treated them separately as they have no formal or informal governance structures. The joint Nordic Archipelago steering instrument analysis (covering Åland and Southwest Finland) is based on the regional governance survey response filled out by VTT, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies in order to steer CCA policy. Note: the analysis for the Nordic Archipelago is split into two sub-levels of analysis, the first policy analysis focuses on Åland (Section 4.10.2), and the second section covers Southwest Finland (Section 4.10.3).

4.10.1 Policy and Steering Instrument Analysis

Regulatory instruments: The region has *regulations* on a national level, the Finnish Climate Act, and on a regional level, a planning and building law has been mentioned. In terms of *planning documents*, a regional strategy for sustainable construction is to be established, focusing on updating building codes to be more CR, along with an energy and climate strategy. The survey answers did not mention any *standards*, *agreements*, or *intergovernmental mandates*. However, Åland's CCAP outlines that the region is involved with both Sweden and Finland and other Baltic Sea partners regarding water protection, information, and research policy.

Financial instruments: *Incentivising instruments* in the region include national grants for giving up oil heating for a small house, as well as regional grants for energy installations and construction. The region according to the survey answers did not capture any instruments for penalising, budget allocation, project related funding, innovative financial instruments, public demonstration projects, or public procurement.

Informational instruments: In terms of *knowledge mobilisation*, the survey answers indicate a Sustainability themed network that generates dialogue around the sustainable development agenda in Åland. There is also a working group on *knowledge mobilisation* on infrastructure development. Further,

Drought mapping has been mentioned as an instrument of *knowledge generation*, and in terms of *monitoring and evaluation*, the survey indicates an active preparedness work involving evaluating risks and creating strategic plans for different situations. The survey did not mention any instruments for *engaging with indigenous and local populations on CCA* or *public outreach*. However, this is contrasted with Åland's CCAP, which outlines aims to involve vulnerable groups and local interests in the generation of knowledge for input into policymaking (see below).

Synergistic and conflicting instruments from other sectors: n/a

Instruments with potential: n/a

4.10.2 Åland

4.10.2.1 Cross-sectoral policy analysis

For Åland region, the following documents were analysed: the Climate Change in Åland (R) as CCAP, the Development and Sustainability Agenda for Åland (2016) (R) as RDP and the Åland's Innovation Strategy 2014-2020 (R) as S3.

The CCAP and some sections of Åland's S3 support **smarter adaptation**. The CCAP and S3 *push the frontiers of knowledge* on adaptation, and the CCAP *assesses risks and losses*. Regarding knowledge of adaptation, Åland's CCAP aims to use new technology to minimise extreme weather damage in the transport sector. It also plans to map and investigate construction projects considered vulnerable to climate change, creating synergies with *the accelerated rollout of infrastructure adaptation solutions* and enabling faster adaptation. Additionally, they plan to follow the development of infectious animal diseases related to adaptation. Relating to *pushing the frontiers of knowledge*, the S3 outlines several projects aimed to promote sustainable thinking for businesses in the region and educate employees on environmental risks.

In terms of *assessing risks and losses*, the CCAP states that a geographic information systems (GIS) open database will be created with data about local geological conditions and risk areas. This data will be used for land planning at the regional and municipal levels, helping to *improve adaptation* planning. Åland will also map areas at risk of flooding and take necessary measures such as leaving the areas undeveloped or determining local minimum elevation requirements for construction and development. Flood mapping strategies, as outlined in the Burgas and Uusimaa smarter adaptation sections, may be helpful for Åland to reference in the region's future plans. Such measures also support *the improvement of adaptation planning* and *accelerate the roll out of adaptation solutions* related to land use and climate-proofing infrastructure.

Faster adaptation measures are mainly developed in the CCAP of Åland, with some *sustainable finance* elements found in the S3. The CCAP tackles *new governance structures, trans-boundary cooperation, accelerating the roll -out of adaptation solutions*, and *CCA and DRR synergies*. Åland's CCAP supports the expansion of municipal collaboration and cooperation on planning and land use, contributing to *new governance structures*. These efforts contribute to the *acceleration of the roll out of adaptation solutions* related to land use.

In conjunction with *new governance structures*, the plan encourages *transboundary cooperation* through collaboration with other areas in the Baltic Sea, especially on drinking water protection from agricultural contamination, and with Sweden and Finland, particularly concerning available information and research. Åland creates *synergies between CCA and DRR*, via its efforts to carry out mapping of backup water sources. Finally, in terms of sustainable finance related to resilience, the S3 outlines that the region uses EU funds, specifically from React-EU funds, to carry out a green resilient recovery of the local economy in relation to negative impacts caused by COVID-19. No formal mechanism to close the climate protection gap were identified in the policy analysis.

Åland's CCAP and RDP support **systemic adaptation**. The CCAP features measures for *improving adaptation planning, scaling up NbS solutions, ensuring fresh water supply*, and *fostering local and just resilience*. According to the CCAP, the aim is to adopt an action plan for CCA measures through stakeholder involvement. Such a plan would also *improve adaptation planning*, as it supports the coherence and efficiency of the implementation. Regarding NbS, the CCAP details many measures, some of which involve scaling, e.g., preserving and expanding green spaces in urban areas, limiting hardened surfaces, increasing infiltration opportunities, and adapting agriculture to heavy rainfall and other climate-related risks. Åland's CCAP creates synergies between *ensuring fresh water* and *accelerating the roll -out of adaptation solutions* related to land use and climate-proofing infrastructure by implementing protective measures for drinking water sources (limiting urban sprawl) and managing land use following a sustainable community planning strategy. The RDP also *promotes NbS* scaling more generally by integrating biodiversity and the support for healthy ecosystems into development plans within the maritime sector. Finally, Åland's CCAP creates synergies between *ensuring fresh water* and *accelerating the roll-out of adaptation solutions* related to land use and climate-proofing infrastructure by implementing protective measures for drinking water sources (limiting urban sprawl), adapting public buildings for a warmer and more humid climate, and managing land use following a sustainable community planning strategy.

The CCAP, S3, and RDP foster **local and just resilience**. The CCAP achieves this through coordination and knowledge sharing, for example, by leveraging local knowledge across affected sectors, raising awareness about sun protection and critical days, and establishing working groups to gather local expertise for designing and implementing an action plan, among other initiatives. The CCAP also includes measures fostering *recognitional*, *distributive*, and *procedural* justice. Firstly, Åland recognises vulnerable groups to heatwaves, e.g. sick and elderly people, which supports *recognitional* justice. The CCAP also aims for gender equality, social equality, and equal access to participating in decision-making processes, which support *distributive* justice. Thirdly, Åland shows concern for *procedural* justice: they highlight that there is a local interest in increased coordination and meetings. The region recognises that working groups can serve as important sources of local expertise for the design and implementation of the action plan. These measures also relate to *new governance structures* and therefore support faster adaptation. The S3 includes general statements and goals, such as an educated gender-equal and inclusive society (*distributive* justice) and increasing participation and equity support welfare (*recognitional* justice). The RDP aims at decreasing economic vulnerability, especially of pensioners and families with children, and achieving gender equality and social equality (*recognitional* justice).

Table 14. Summary of Climate Adaptation concepts across Åland's policy documents.

Types of adaptation	Concept	S3 (2022) (R)	RDP (2016) (R)	CCAP (2014) (R)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data			Yes	Yes (risk assessment surveys)
	Pushing the frontiers of knowledge on adaptation	Yes		Yes	Yes (local working groups)
Faster adaptation (FA)	Effective and inclusive governance mechanisms			Yes	
	Trans-boundary cooperation			Yes	
	Piloting and testing solutions				
	Accelerating the rollout of adaptation solutions			Yes	
	Mobilising sustainable finance and resources and closing the climate protection gap	Yes			
	Leveraging the CCA and DRR synergies			Yes	
	Improving adaptation planning			Yes	
Systemic adaptation (SysA)	Promoting NbS for adaptation		Yes	Yes	
	Ensuring the availability and sustainability of freshwater			Yes	
	Fostering local and just resilience	Yes (Dis, Rec)	Yes (Rec)	Yes (Rec, Dis, Pro)	



- Note: (L) stands for local policy document, (R) stands for regional policy document, and (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.10.2.2 Åland recommendations

A. Recommendations relating to policies:

What is missing?

1. S3 and RDP documents have insufficient integration of CCA into policy.

- While Åland's CCAP supports all three categories of adaptation (smarter, faster, and systematic), the RDP does not consider smarter or faster adaptation, and the S3 does not address systemic adaptation beyond general statements. Better integration of these aspects of adaptation into other sectoral policies (e.g., RDP and S3) would support regional and cross-sectoral resilience.
- The Nordic Archipelago Innovation Roadmap (Regions4Climate T6.1/D6.2) emphasises the importance of integrating CR into multidimensional policies and regulations. It advocates for the development of cross-sectoral policies and instruments to address climate action needs effectively.
- The Nordic Archipelago's Just Transition Framework Action Plan (Regions4Climate D2.2) calls for the creation of a strategy for the identification and exploitation of cultivation opportunities. Mainstreaming CCA into policy strategies will help the region achieve these goals by creating a space in which piloting strategies can be standardised and reviewed.

What could be strengthened or built upon?

2. Accelerate transformations to CR through piloting and testing solutions.

- The CCAP does not tap into the potential of piloting and testing solutions for adaptation to achieve faster adaptation. Planning for pilots, testing and scaling of adaptation measures via EU or other transnational projects or partnering with local universities and the private sector for the development and piloting of technical solutions could help speed up learning, implementation, and replication. For example, cooperation across the archipelago region in the Baltic Sea Region or other areas with shared climate conditions and adaptation needs could be an example. Piloting and testing could also build on the knowledge mobilisation that takes place through the working group on physical (infra)structure development (fisisks-strukturutveckling). Such partnerships could also support smarter adaptation.
- The Nordic Archipelago Innovation Roadmap (Regions4Climate T6.1/D6.2) emphasises the importance of supporting experimentation by promoting green energy models and providing funding for pilot projects.

3. Link the existing justice related goals to adaptation and specific actions to support more effective implementation and results.



- While all three policy documents support justice, Åland's S3 and RDP's support for justice and social equity could be stronger. While these plans align with each other, they do not include the measures and actions needed to achieve these goals. The need for clarification and actions is also true for the CCAP. For instance, the plan mentions vulnerable groups to heatwaves but does not propose specific measures to ensure special care for those groups during extreme weather events. An action plan that is specific about these and other adaptation actions would increase the probability of implementation.
- The successful deployment of new data and knowledge from research organisations and universities, along with strengthened collaboration and knowledge exchange, is essential for transformative action, as mentioned on the Nordic Archipelago Innovation Roadmap (Regions4Climate T6.1/D6.2).

4.10.3 Southwest Finland

4.10.3.1 Cross-sectoral policy analysis

For Southwest Finland region, the following documents were analysed: the Southwest Finland's Climate Roadmap (R) and Turku Climate Plan 2029 (SECAP) (L) as CCAPs, the Regional Strategy of Southwest Finland 2040+ (R) as RDP and the Regional Strategy of Southwest Finland 2040+'s (Chapter 5) on smart specialisation(R) as the S3.

All the policy documents analysed support **smarter adaptation**. The local and regional CCAPs both are *pushing the frontiers of knowledge on adaptation*. The region aims to understand risks by increasing data on climate, including the strengthening of environmental monitoring and the allocation of sufficient resources to achieve that goal. Additionally, the Municipality of Turku carried out a climate risk assessment and plans to continue monitoring the local environment and conducting future impact and risk assessments using suitable indicators, based upon the model of the CoM. While the RDP/S3 does not mention climate-related assessments, it notes the legal requirement for the regional authority to carry out environmental impact assessments of its projects. Projects outlined in the RDP/S3 must prove that they have a net positive impact, weighing against several factors (impacts on the landscape, biodiversity, sociological impacts, etc.). However, the RDP/S3 also highlights that there is a lack of discussion on CCA within the region.

The CCAPs also support **faster adaptation** through support for *new governance structures*, *transboundary collaboration*, and *accelerating the roll out of adaptation solutions* measures (Turku CCAP) and *acceleration of the roll out of adaptation solutions* related to land use and climate-proofing infrastructure (both CCAPs). Turku's CCAP states that the impacts of climate risks will be identified, and adaptation measures will be developed district by district in collaboration with community associations and residents, creating *new governance structures*. Cooperation will also be scaled up to the regional level and beyond, e.g., sufficient resources will go to regional collaboration and will invite other municipalities to join the adaptation work. The resilience of agriculture and forestry to heat and drought is also underlined; the city wants to work on it and collaborate with partners. Both CCAPs support the *acceleration of the roll out of adaptation solutions* related to land use and climate-proofing

infrastructure. Turku's CCAP also emphasises prevention and preparation for urban flooding, recognising the need for increased cooling in buildings to be constructed and renovated. The Southwest Finland CCAP emphasises that extreme weather events heighten the need for enhanced building requirements and maintenance. They also prepare for climate change risks through a diverse forest structure and an increased proportion of mixed forests. The latter measure also supports *scaling up NbS for adaptation* and systemic adaptation. In terms of *leveraging the CCA and DRR synergies*, the Turku CCAP outlines an investment strategy to improve the electricity grid, promote self-sufficiency in cases of emergencies (storms, floods, and heat), including an initiative by the city to encourage critical infrastructure operators to build their own assessments and preparedness plans. There are also investments to increase the reliability of water and wastewater services.

All the policy documents support **systemic adaptation** through support for *improving adaptation strategies and planning, scaling up NbS for adaptation, ensuring fresh water supply, and fostering local and just resilience*. Southwest Finland's CCAP includes elements of annual monitoring and revision, which *improve adaptation planning*. In Turku, planning is improved through the straightforward assignment of responsibilities and provision of resources for stormwater management planning and implementation. In terms of *scaling up NbS solutions for adaptation*, the regional CCAP supports the development of blue green infrastructure networks in land use planning to addressing extreme weather events. This is also supported by the Turku CCAP, which discusses preservation of ecological corridors in land use planning, connectivity, securing the preservation of endangered species and natural habitats, halting green area fragmentation, and safeguarding ecosystems through the reduction of forest drainage. The RDP/S3 outlines how it will implement NbS into its agricultural policy and water management, with a preference for natural drainage methods where possible.

Regarding *ensuring fresh water*, the City of Turku prepares the water services together with partners to minimise and prevent harm caused by prolonged periods of drought, improving the reliability of service. Moreover, the Turku CCAP aims to achieve a good state in water bodies and groundwater by preparing for and preventing urban flooding through NbS for stormwater management, and by building up natural barriers such as forests, wetlands, and green spaces in urban areas. Focuses are different in the SW Finland CCAP: preservation and increase of green structure for CCA and water management, improving water quality and management on agricultural land to adapt, and managing nutrient load in water bodies.

On the topic of *fostering local and just resilience*, both the RDP/S3 and the CCAP of Turku have relevant mentions of **social equity and justice**. The Turku CCAP supports communications to the local community, including those who are partially susceptible to the harm caused by heat and drought, as well as the measures to prepare for them. The resilience of agriculture and forestry to heat and drought is also underlined; the city wants to work on it and collaborate with partners. It also considers *recognition* and *procedural* aspects of justice, identifies vulnerability and exposure factors (social, health, and financial), and the crucial role of local organisations to be able to anticipate exposures and risks. Turku plans to collaborate with community associations and residents for adaptation measures, building synergies between *new governance structures* (faster adaptation) and *procedural* justice. The RDP/S3, on the other hand, requires impact assessments on future projects that must consider both local community impacts and gender equality impacts, which contain a *distributive justice* element.

Table 15. Summary of Climate Adaptation concepts across Southwest Finland's policy documents.

Types of adaptation	Concept	S3/RDP (2021) (R)	CCAP (Southwest Finland-2023 (R), Turku City-2022 (L))	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Yes		N/A
	Pushing the frontiers of knowledge on adaptation		Yes	N/A
Faster adaptation (FA)	Effective and inclusive governance mechanisms			N/A
	Trans-boundary cooperation		Yes	N/A
	Piloting and testing solutions			N/A
	Accelerating the rollout of adaptation solutions		Yes	N/A
	Mobilising sustainable finance and resources and closing the climate protection gap			N/A
	Leveraging the CCA and DRR synergies		Yes	N/A
	Improving adaptation planning		Yes	N/A
Systemic adaptation (SysA)	Promoting NbS for adaptation	Yes	Yes	N/A
	Ensuring the availability and sustainability of freshwater	Yes	Yes	N/A
	Fostering local and just resilience/ Justice	Yes (Dis)	Yes (Rec, Pro, Dis)	N/A

- Note: (L) stands for local policy document, (R) stands for regional policy document, and (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognition, procedural, and distributive justice, respectively.

4.10.3.2 Southwest Finland recommendations

A. What is missing?

1. RDP/S3 policy document needs to better integrate CCA.

- While the Southwest Finland's RDP/S3 includes general statements on CCA, it does not provide specific plans or projects for integrating, piloting, or funding adaptation. The one exception is a plan to integrate NbS into agricultural policy and water management. The region is also in the process of developing an open surveillance and monitoring model for water drainage and tracking soil nutrient levels. The region could consider revising these plans to identify common cross-sectoral resilience goals to enhance policy coherence and accelerate CR. Once the region has established good practice in regard to agricultural policy and water management it can expand its implantation and monitoring models and apply them to other aspects of CCA and across sectors (forestry, climate proofing infrastructure, etc.).
- The Nordic Archipelago Innovation Roadmap (Regions4Climate T6.1/D6.2) emphasises the importance of integrating CR into multidimensional policies and regulations. It advocates for the development of cross-sectoral policies and instruments to address climate action needs effectively.

2. Accelerate transformations to CR through piloting and testing solutions.

- Regarding faster adaptation, the regional policies do not include the piloting and evaluation of adaptation solutions, which are crucial for accelerating CCA coherently and efficiently. While the Turku CCAP includes a comprehensive strategy and many examples of pilot testing for climate mitigation, there are no concrete examples regarding CCA. The Turku CCAP, in its self-assessment, outlines that Turku is moving forward on reviewing CCA knowledge and integrating those findings into future strategies. An example of a comprehensive piloting strategy can be found in the Sitia region's faster adaptation section, where the region utilised EU funded projects to fill in its piloting solutions gap.
- The Nordic Archipelago Innovation Roadmap (Regions4Climate T6.1/D6.2) emphasises the importance of supporting experimentation by promoting green energy models and providing funding for pilot projects.

3. Build a framework to address the climate protection gap.

- While the region highlights the need for planning to consider climate impacts across sectors in the RDP/S3 and investments into DRR and other CCA projects within the region, the region could diversify its financial instruments for CR. The region could explore green and climate bonds (see [Paris as a case](#)), equity financing, and public-private partnerships (PPPs) as ways to attract private capital. In order to address the insurance protection gap and manage their risks, authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#). Also, the region could explore, together with national authorities, the replication of accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for

nature-related projects. Sitia's faster adaptation section can be referenced as an example of closing the climate protection gap, as the region established grants allocated to protecting SMEs and workers in the livestock, fishing, and tourism sectors from losses due to extreme weather events. The OECD's [compendium of financial instruments to support subnational climate action](#) (dashboard database) (OECD, 2022) can provide more options and ideas for financing.

What could be strengthened or built upon?

5. Link the existing goals related to justice to adaptation and specific actions to support more effective implementation and results.

- Southwest Finland mentions social equity and justice though not directly linked to adaptation. For example, the RDP/S3 plan highlights inclusion, environment, and sustainable development as foundational principles. It sets the goal of equal opportunities to participate across various entities and phases in the development of the region. First, Implementation would be strengthened by specific actions describing how these goals will be achieved and measured. Second, Adaptation efforts would be reinforced if explicitly linked to environment and sustainable development. Thus, the region should seek to mainstream adaptation into its S3 strategies and integrate it with the region's inclusive justice approach.

6. Bridging justice and climate change adaptation (CCA).

- While Turku's CCAP and the RDP/S3 include sections that address justice issues, the regional CCAP of SW Finland lacks this. Recognition justice is absent from the RDP/S3. It could be improved by considering how different societal groups may be unequally affected by development trends and, ideally, by adaptation impacts or solutions. Turku's CCAP also lacks distributive justice. This could be addressed by assessing access to green areas and their benefits across the city. Procedural justice (missing in Southwest Finland's CCAP) is also missing. Both Uusimaa and Burgas foster local and just resilience; their sections can serve as examples, as those regions have outlined regional participatory mechanisms and foster multi-level stakeholder engagement in CCA decision-making.
- The successful deployment of new data and knowledge from research organisations and universities, along with strengthened collaboration and knowledge exchange, is essential for transformative action, as highlighted in the Nordic Archipelago Innovation Roadmap (Regions4Climate T6.1/D6.2).

4.11 Troodos region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Cyprus is a unitary state, where only the national level of government has legislative powers. The Troodos region is not a formal regional entity within the administrative structure of Cyprus; it is comprised of local community councils. CR policy is steered at the national level; thus, most of the analysis for Troodos is carried out on the national level, with a focus on local community councils/rural councils.

For the Troodos region, the following documents were analysed for the policy recommendations: the Climate Change Action Plan (N) as CCAP, the Summary of the National Strategy for Development of the Troodos Mountain communities (R) as RDP, and the Cyprus Smart Specialisation Strategy 2030 (N) as S3. Note that a new Climate Change Action Plan is being developed and is currently waiting for approval by the government of Cyprus, with a draft already published.

The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.11.1 Cross-sectoral policy analysis

The national S3 and CCAP of Troodos support **smarter adaptation** by *assessing risks and losses* and *pushing the frontiers of knowledge*. The S3 contains measures *assessing risks and losses*, for example, using advanced remote sensing to generate data to monitor climate change and environmental conditions to prevent disasters and reduce risk in Cyprus. The national-level CCAP also plans for climate change vulnerability studies across several sectors, which are updated every six years. These sectors include water resources, soils, coastal zones, biodiversity, forests, agriculture, fisheries & aquaculture, tourism, energy, infrastructure, and public health. Both plans also improve knowledge of adaptation. The vulnerability studies enable more proactive action against climate-related risks (CCAP), while the use of satellite data models contributes to protecting cultural heritage sites and identifying human pressures on the environment (S3). Moreover, the CCAP also measures biodiversity protection by creating an electronic and web-based database where data on endemic, rare, and vulnerable species are monitored, which is still in development. Promoting research on biodiversity and climate change in general is also planned.

The RDP and the national CCAP collectively promote **faster adaptation** through measures supporting new governance structures, accelerating the roll out of adaptation solutions, closing the climate protection gap, and creating CCA and DRR synergies. In a section on natural environment protection, the RDP mentions local community participation in decision-making and mentions participatory management plans related to risk mitigation (biodiversity, agriculture, etc.). Inclusive decision-making can be considered a governance structure. The CCAP focuses on three aspects of faster adaptation. It supports accelerating the roll out of adaptation solutions related to land use and climate-proofing infrastructure, which aims to mitigate the risk of wildfires and ensure more protection from extreme heat

and flooding events, e.g. restoration of fireproofed buildings and strengthening prevention, and the adaptation of tourism infrastructure and construction standards based on vulnerability evaluation. Second, it supports closing the climate protection gap by recognising that insurance organisations will face increased challenges due to climate change risks, specifically related to the tourism industry. Third, the plan creates synergies between CCA and DRR by implementing and strengthening the early warning system, through a web-based platform, as well as opening care centres to the at-risk populations.

All three types of policy documents (CCAP, RDP, and S3) support **systemic adaptation**. The RDP and CCAP address *fostering local and just resilience* and sections on *ensuring freshwater availability and sustainability*, while the CCAP supports *scaling up NbS for adaptation*. All three documents *improve adaptation planning*. First, the S3 recognises the need to take preventive measures in terms of the preservation of biodiversity, natural hazard risk reduction, and increasing the viability of agricultural systems, among other topics. Second, the CCAP supports the integration of CCA into various policy domains: urban planning, maritime policy, coastal management, and land use planning. Third, the RDP focuses on redefining water institutions' missions towards sustainable water management and irrigation efficiency. This measure simultaneously contributes to *ensuring freshwater supply*. Freshwater supply is also a concern in the CCAP in the context of both irrigation, urban areas, and industry, as well as mitigating water losses and using water supply meters. The CCAP also supports *NbS for adaptation* using resilient species, the protection of wetlands, rivers, and coastal areas ecosystems, the protection of endangered species and habitats, and the strengthening of ecological corridors.

The CCAP and RDP explicitly support local and just resilience, respectively, and consider *recognitional justice and procedural justice*. The CCAP recognises vulnerable groups (children, the elderly) and institutions (schools, care institutions) to climate-related risks like extreme temperatures. *Procedural justice* is addressed in the RDP's aim to increase participation of the local community in decision making regarding CCA and environmental protection measures. *Distributive justice* measures were not identified in the analysis of the policy documents.

4.11.2 Policy and Steering Instrument Analysis

Regulatory instruments: The most influential instruments in CR according to the survey respondent are *national planning documents* including a strategy for development of the mountain communities (RDP), an adaptation strategy (CCAP) and a forestry related strategy. Other regulatory instruments identified in the survey include *national regulations* for energy and energy efficiency in buildings, *national standards* for spatial planning in rural areas, a national flood risk management plan, a national drought management plan and a statement of forest policy. The survey answers did not mention any *agreements or intergovernmental mandates*.

Financial instruments: *Incentivising instruments* in the region include nationally managed support schemes for energy efficiency upgrades of community buildings, drywall rehabilitation and development, energy efficiency upgrades in businesses, forest fire protection zones, and distributing fire hoses in local communities. The region's financial instruments are primarily based upon project-funding, though the Renewable Energy Sources and Energy Conservation Fund does provide subsidies

to support climate mitigation goals. There is a grant scheme for the promotion of climate change adaptation in rural councils, which provide funding for management of high temperatures via implementing NbS into projects. Note, community councils (Κοινοτικά Συμβούλια), here referred to as *rural councils*, are rural governing bodies elected by smaller settlements that are not large enough to be qualified as an urban municipality. *Budget allocation* for CR projects is possible upon request by the local community council to the Ministry of Interior, which has currently been used for the maintenance of firefighting trucks and fire hydrants. The region has also participated in *EU-funded projects* for CR. A project that helps local communities in the region develop identities based on their traditional agricultural products, such as apples, roses, and lavender, has been considered an innovative funding instrument, as it enables them to brand their products and attract tourism. The survey did not mention any *penalising instruments*, *public demonstration projects* or *public procurement*.

Informational instruments: The region is currently developing its joint sustainable energy and climate action plan and plans to become a part of the CoM network, which will be an instrument for *knowledge mobilisation*. Projects promoting traditional agricultural products have the potential also to promote local and indigenous knowledge. Survey answers did not indicate any instruments for *knowledge generation*, *monitoring and evaluation*, or *public outreach*. As outlined in the policy assessment related to smarter adaptation, the CCAP and S3 mentioned that Cyprus aims to establish stronger risk assessments and information-sharing platforms, which promote research on biodiversity and CCA. According to the Troodos Innovation Roadmap (Regions4Climate T6.1/D6.2), monitoring and evaluating the actions planned for CR will be essential in providing important information regarding their efficiency and impact within the region.

Synergistic and conflicting instruments from other sectors: no answers given

Instruments with potential: no answers given

Table 16. Summary of Climate Adaptation concepts across Trodoo's policy documents.

Types of adaptation	Concept	S3 (2023) (N)	RDP (2019) (R)	CCAP (2017) (N)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data	Yes		Yes	Yes (aims towards establishing stronger risk assessments)
	Pushing the frontiers of knowledge on adaptation	Yes		Yes	Yes (integrating local knowledge into CCA strategy)
Faster adaptation (FA)	Effective and inclusive governance mechanisms		Yes		Yes
	Trans-boundary cooperation				
	Piloting and testing solutions				
	Accelerating the rollout of adaptation solutions			Yes	
	Mobilising sustainable finance and resources			Yes (acknowledges climate risks and a	Yes (support schemes for fire protection zones

	and closing the climate protection gap			need for a climate protection gap plan)	and building rehabilitation) (grant scheme for CCA in rural councils)
	Leveraging the CCA and DRR synergies			Yes	
Systemic adaptation (SysA)	Improving adaptation planning	Yes	Yes		Yes (developing SECAP)
	Promoting NbS for adaptation			Yes	
	Ensuring the availability and sustainability of freshwater			Yes	Yes (national drought management plan)
	Fostering local and just resilience/ Justice		Yes (Rec, Pro)	Yes (Rec, Pro)	Yes (promotion of traditional agricultural goods)

- Note: (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.11.3 Troodos region recommendations

A. Recommendations relating to modification and improvement of steering instruments:

1. Mainstream adaptation.

- Build on the existing national support for the local development strategy for the *community in Troodos*. As there is no separate local adaptation strategy for Troodos communities, ensure that the local development strategy is climate resilient and accounts for future climate conditions, especially in terms of wildfire management and drought management. Ensure that projects, for example, those mentioned in the financial instruments section promoting traditional agriculture branding and tourism, considering traditional knowledge and practices, also consider future climate changes, such as hotter and drier weather. The local development strategy supports such activities, continues to be active in applying for the grants for rural councils, as well as CR projects from the Ministry of Interior for actions in line with this integrated strategy, alongside continued active participation in EU projects. In terms of funding, Troodos could consider exploring PPP models or collaborating with the national government to explore such options. See the Tuscany region's financial instruments section for reference. Also, Troodos could explore the possibility of working with the national government in replicating accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects.
- The Troodos Innovation Roadmap (Regions4Climate T6.1/D6.2) states the upgrading of the current clustering of local community councils into rural municipalities. This transformation presents a significant opportunity to introduce governance improvements. The establishment of the "Board Troodos" development agency by the end of 2025 will be a key milestone. These initiatives will inform key stakeholders about climate change and support decision-making aimed at transforming Troodos into a climate-neutral, regenerative tourism destination.

- As the RDP does not promote smarter adaptation, and the national CCAP does not support smarter adaptation in the mountain regions, future projects in the Troodos region should consider including CCA initial assessment activities to encourage smart and climate-proof regional development to understand how climate change could impact regional development in various sectors. Such assessments are on the horizon, and a vulnerability and initial risk assessment will be published covering several CCA elements by the end of 2025.

2. Stronger use of informational instruments for knowledge generation.

- Although few knowledge generation instruments were mentioned in the survey, the activity level of the Troodos Mountain community suggests that it has a strong existing capacity for knowledge generation. This is evident in Regions4Climate.
- According to the RDP, Troodos aims to become part of the CoM. This would increase opportunities for networking and knowledge transfer and is recommended if Troodos has the capacity to do so. This would also help support transboundary cooperation, which supports faster adaptation.
- Although local and indigenous knowledge was not mentioned in the survey, it is also indicated as something that the Troodos community is engaging in through its projects. For example, promoting traditional agriculture can also be considered an initiative that mobilises and generates knowledge. Consider working with this project to identify whether local and traditional knowledge exists specifically related to how they are affected by climate change and how they have adapted to changes in the environment in the past. Knowledge of traditional farming and water resources management methods, safe locations, native plants, and community structures can help improve adaptation planning.
- Troodos still needs to build up robust informational steering instruments (score – 1/3, see table 4) to achieve its CR goals, particularly by involving the private sector (score – 0/4, see table 4) or citizens (score – 0/4, see table 4),

B. What is missing?

1. Providing actions and resources for faster adaptation.

- The strategies are relatively weak in replicating adaptation measures and CR for faster adaptation. The S3 does not mention faster adaptation, and all three documents overlook transboundary cooperation and piloting and testing solutions, even though the Troodos region is actively working on transboundary cooperation and piloting solutions in Regions4Climate. Including such activities in policy documents could strengthen and systematise CR activities in the region. The region should focus on implementing more actions and securing resources to facilitate faster adaptation. For inspiration on transboundary cooperation, look to Sitia's and Uusimaa's faster adaptation section. Troodos' Just transition framework action plan (Regions4Climate D2.2) states that the region desires more cooperation between Mediterranean countries regarding topics ranging from water and fire management to regenerative tourism.

- The region already has many financial support mechanisms as outlined in the financial instruments section. At the same time, the CCAP also highlights the dangers that climate change presents for the insurance sector, as well as the health care and tourism sectors. Considering this recognition and dilemma, there is a growing demand for financing risk mitigation. Troodos' action plan also calls for a one-stop shop for incentives for citizens of Troodos regarding CCA action and more dissemination of information on those incentives to ensure they are effective on a regional level. Options include developing dedicated regional or local funds, utilizing intercommunal financing mechanisms, developing public demonstration projects, embedding climate-proofing criteria into public investments, using tax incentives (e.g. rainwater tax) and financial penalties to encourage sustainable practices. Participatory budgeting can also be used to support targeted adaptation with existing public finances. In order to address the issue of insurance, authorities can purchase insurance to insure public assets, negotiating for better premiums for mitigation actions. Insurance related mechanisms are also being further developed and piloted to manage risk and incentivize other actors also to mitigate risks, e.g. through the [LIFE DERRIS project](#) and [PIISA project](#). The OECD's [compendium of financial instruments to support subnational climate action](#) (dashboard database) (OECD, 2022) can provide more options and ideas for financing. These recommendations are significant for Troodos as while the region scored relatively well in its financial instruments (score – 2/3, see table 3), it lacks solid allocated funding for CCA (score – 1/3, see table 3), and lacks a mechanism for identifying financial needs (score – 0/3, see table 3)

2. Recognise the potential of cohesive NbS planning across the region.

- The CCAP is the only document considering NbS. However, as the CCAP focuses on wetlands, rivers, and coastal areas ecosystems, perhaps the regional RDP could also consider how NbS could support adaptation and regional development in the mountain region of Troodos. As the RDP is created at the national level, consider how the Troodos region's active bodies could influence it. Further, scaling up such solutions across the region provides support for faster adaptation. Please see Tuscany's Faster adaptation and Systemic adaptation sections for examples of NbS integration into CCA strategies. For example, Tuscany, as part of its RDP, recognises and integrates NbS into its strategy where possible. The region is involved in projects that introduce NbS into risk management strategies.
- The Troodos Innovation Roadmap (Regions4Climate T6.1/D6.2) highlights the importance of testing sustainable solutions for wildlife restoration after wildfires and for the protection of forests in the Troodos region. It strongly recommends the use of nature-based solutions to create a more comprehensive approach to adaptation. This must involve providing direct support for experimentation, treating the region as a testing ground for innovative solutions, and leveraging the resources and knowledge of the regional innovation ecosystem, all while ensuring strong public engagement.

What could be strengthened or built upon?

3. Mainstream horizontal adaptation policies.



- While the RDP mentions horizontal adapted policies -horizontal adaptation being defined as policy coherence across different sectors within the same governance structure-, especially for mountain territories, the plan does not clearly show what these policies could be to support local CR. However, mainstreaming adaptation across policies is also recommended. Please see Sitia's Faster Adaptation section for a short description of how they promote piloting and testing solutions by participating in EU-funded research projects for pilot implementation of CCA measures, sub-scaling regional climate models, and developing early warning systems for extreme events, and pilot system monitoring and forecasting for severe weather events. This demonstrates how they mainstream adaptation through their project-funded model, creating opportunities for piloting and DRR. It is clear that Troodos is piloting CR throughout its projects, but including adaptation in their RDP could strengthen regional CR. Troodos' Just Transition Framework Action Plan (Regions4Climate D2.2) aims to enhance coordination and cooperation among all service providers in the region, while also establishing a mobility plan and a clear policy vision for CR. These goals are more likely to be achieved if these recommendations and other regions' good practices are looked at as examples.

4. Bridging justice and climate change adaptation (CCA).

- Troodos' policy documents mention social equity and justice, but they do not connect extensively with dimensions of adaptation. For instance, the S3 includes a general statement of recognitional justice: to consider health, safety, and employment opportunities as a basis for a just and inclusive society. However, this document does not link the statement to concrete actions and thus does not support systemic adaptation. Recognitional justice is also touched on by the RDP, in that it aims to improve living conditions (territorial solidarity and justice) related to the social infrastructure sector (health, education, care, and cultural creation). In these two examples, and elsewhere, connections and the interconnection between health, education, and justice with CCA could be established to ensure systemic adaptation. As mentioned in the cross-sectoral policy analysis section, the need for recognitional and procedural justice is recognised in the RDP and CCAP, though concrete measures are needed to support these aims. Distributive justice is missing in all three documents. This could be strengthened through studies of how climate change impacts affect various societal groups or geographic areas across the region.

5. More support for education on climate topics.

- It is anticipated that Troodos will invest in qualifications and skills in critical areas of expertise in the short term. This dimension was addressed in the Troodos Innovation Roadmap (Regions4Climate T6.1/D6.2), with a focus on vocational education that will provide dedicated programmes on green skills and sustainable and responsible destination branding.

4.12 Castilla y León region analysis

As outlined in the Governance recommendations (Regions4Climate D4.3), Spain is a unitary decentralised state which is *de facto* federalist; with regions having legislative powers and are primarily responsible for the enforcement of national rules and regulations. Thus, the analysis for Castilla y León is carried out on the regional level, as it is on that level where policies are both created and actualised.

For Castilla y León (CyL) region, the following documents were analysed: the Regional Strategy against Climate Change in Castilla y León 2009 - 2012 – 2020 (R) as CCAP, Programme of Castilla y León FEDER 2021-2027 (R) as RDP and the Research and innovation strategy for smart specialisation (RIS3) of Castilla y León 2021-2027 (R) as S3. Note that Castilla y León is currently developing a new Climate Resilience Strategy, along with CCA Action and Investment Plans, as the current CCAP is outdated. Due to the CCAPs age, the analysis in the regional analysis and recommendations will be limited in detail and scope when compared to the other R4C regional results. The steering instrument analysis is based on the regional governance survey responses, as well as input from the D4.3 Governance recommendations, D6.1 Common Innovation Framework (CIF), and D6.2 Regional Innovation Roadmaps, where certain mechanisms, CR related projects, observations, opportunities, and policy tools were identified as relevant for the regional governing bodies to steer CCA policy.

4.12.1 Cross-sectoral policy analysis

While data driven development is supported by all three types of policies, only the CCAP supports it in terms of **smarter adaptation**. The CCAP has initiatives that focus on *pushing the frontiers of knowledge* on adaptation, such as assessments of climate change's impact on forests and creating new bodies (ITACYL) to develop new technologies, research, and facilitate the transfer of scientific advances regarding the agricultural sector. Note that the D4.3 Governance recommendations ranked CyL poorly regarding a lack of understanding of CCA policy, a lack of integrated planning frameworks, and poor collaboration between scientific stakeholders and the regional authorities. Monitoring, indicators, and quantitative hydroclimatic diagnosis methodologies, outlined in the policy documents, will also contribute to this goal.

All three policy documents support **faster adaptation**, but varying degrees. They do so through issues related to *new governance structures*, *transboundary cooperation*, *accelerating the roll out of adaptation solutions*, *closing the climate protection gap*, and creating *CCA and DRR synergies*. Firstly, actions will be promoted to develop shared systems for assessing and managing natural hazards, contributing both to *new governance structures* and *CCA and DRR synergies*. In its CCAP, the region aims to foster cross-border cooperation to address the territory's needs, given its high exposure to natural risks exacerbated by climate change. Additionally, it seeks to cooperate and share climate-related technological best practices. We know from Regions4Climate, that CyL is involved in transboundary projects to accelerate knowledge transfer related to resilience. The S3 also mentions transboundary cooperation, but mainly in an aspirational sense and has no clear targets. The RDP includes measures to *accelerate the roll out of adaptation solutions*. They achieve this by reducing fire risks through improved forest management, enhanced civil protection services, and efficient firefighting infrastructure, as well as by extending the naturalisation of educational centres to other public buildings. The RDP also

specifies how the actions will be funded: through a grant for the renaturalisation of educational centres and other public buildings -via increasing soil permeability and landscape restoration-, and public procurement for the actions related to risk prevention. Such funding mechanisms contribute to *closing the climate protection gap*. The CCAP plans to conduct a vulnerability assessment of the insurance sector throughout the region, aiming to identify areas where climate change is impacting specific insurance plans.

Systemic adaptation is mentioned in all three types of documents in Castilla y León. NbS and *ensuring fresh water* are supported by the RDP and S3. Only the RDP supports *improving adaptation planning*. The CCAP plans to develop regionalised climate change scenarios and CCA strategies, to assess vulnerabilities, observe impacts, and evaluate the effectiveness of adaptation measures, *improving adaptation planning*. NbS are integrated into the three documents, but unequally. The S3 recognises nature's role in integrating ecological and cultural values for future development and mentions green infrastructure. The CCAP states that over the next 25 years, over 445,000 hectares of deforested land will be reforested. As mentioned above, the RDP promotes the renaturalisation of educational centres and other public buildings, with interventions for soil recovery, permeability, and landscape restoration. Castilla's S3 shows interest in increasing the sustainability of agricultural activities, among others, and in reducing inputs and preserving water and environmental resources. The RDP is more precise regarding freshwater, proposing water efficiency measures (infrastructure updates, smart meters) to achieve water savings. Thus, both policy documents (S3 and RDP) provided a basis for *ensuring fresh water* supply.

The CCAP of Castilla y León mentions **social equity and justice** and thus *fosters local and just resilience*. The plan reflects a concern for *distributive* justice, i.e., vulnerability in the territorial and socioeconomic context will be considered when choosing adaptation options. Such awareness contributes to systemic adaptation by *fostering local and just resilience*. The CCAP recognises the potential effects of climate change on human health (*recognition* justice). However, specific and clear mechanisms for public engagement and involvement in regional CCA were not found, indicating a lack of procedural justice on the regional level.

4.12.2 Policy and Steering Instrument Analysis

Regulatory instruments: The region's adaptation is steered primarily at the regional level, with the forthcoming climate adaptation plan being the primary regulatory steering instrument. While regulatory power is primarily based on a regional level, there are *regulations* on a national level concerning climate change and energy transition, water management laws, spatial planning laws, energy sustainability laws, and agricultural policies. Planning documents include a regional operational programme and the Spanish Just Transition Strategy. Other regulatory instruments identified in the survey include *national regulations* on risk evaluation and flooding, standards and guidelines for natural heritage management in adaptation and forestry policy. Other *planning documents* include a recovery plan for transformation and resilience, as well as a regional plan for flooding. *Agreements* identified in the survey include the National Climate Council and the sectoral conference of the environment, as well as a sustainable development strategy. By 2030, a new climate adaptation plan will be created according to the Castilla

y León Innovation Roadmap (Regions4Climate T6.1/D6.2), featuring updated guidelines for the strategic path.

Financial instruments: *Budget allocation* include funds allocated for a regional program of disaster risk reduction and adaptation. The region also benefits from *project related funding* through European projects, including grants for climate change adaptation through ERDF. An *innovative financial instrument* identified in the survey is green bonds issued by the region to finance sustainable projects, including climate resilient infrastructure, as well as energy efficiency and renewable energy. The region has also made *demonstration projects* of ecosystem restoration financed by public funds. The survey answers did not mention any *penalising instruments*.

Good Practice: The unitisation of green bonds is an excellent example of encouraging investment in CCA and CR projects

Informational instruments: There are several local action groups at a regional level that work as platforms for *knowledge mobilisation*. The survey also indicates a network of municipalities for sustainability (REDCyL), a regional cluster of agricultural cooperatives (URCACYL), and a regional network of local action groups for knowledge mobilisation. The region has participated in LIFE projects that have focused on *engaging with indigenous and local knowledge* on adaptation and resilience, such as LIFE Soria ForestAdapt. In terms of *monitoring and evaluation*, the survey identifies the annual environmental sustainability report (ISACYL) and an environmental education portal as an example of *public outreach*.

Synergistic instruments from other sectors: *Regulatory steering instruments* from the energy sector, urban planning, and agriculture sector are considered to have a positive impact on CR. The energy transition promotes a decreased dependence on fossil fuels, while urban planning laws and guidelines for spatial planning include the protection of high nature value areas. The Common Agriculture Policy is also considered positive due to the promotion of sustainable agricultural practices. In terms of informational instruments, the survey indicates a geographic information system that provides visual information on protected areas and prevention of risks such as floods and forest fires. There is also an automatic hydrogen information system that provides information on the state of reservoirs and aquifers, alerts about periods of extreme droughts, and raises awareness in general.

Conflicting instruments from other sectors: While the energy sector, urban planning, and agriculture sectors have synergistic elements, the survey identified instances where these sectors are conflicting with other instruments. Specific policies from the land use sector promote excessive urban sprawl and land development, which can undermine CR if not considered. According to the survey response, the Common Agricultural Policy is perceived as having a negative impact due to prioritising “economic sustainability and land development” over climate adaptation and long-term sustainable development. Additionally, the energy sector is perceived as not adequately considering environmental concerns, such as biodiversity and NbS, in the development of renewable energy infrastructure. Financial instruments such as grants for the promotion of renewable energies and energy efficiency are considered negative for the same reason. The survey responses also mention the energy information platform, which does not sufficiently consider the negative impacts that renewable energies might have on biodiversity.

Instruments with potential: The survey mentions the revision of the Regional Climate Change Strategy, which is underway, but could have potential to provide a framework for aligning the development of adaptation policies while considering the environmental sustainability of the region. As noted in the regional results introduction, the region is a member of the ADAPT2CYL project, which aims at developing a CR Strategy for the region.

Table 17. Summary of Climate Adaptation concepts across CyL's policy documents.

Types of adaptation	Concept	S3 (2021) (R)	RDP (2022) (R)	CCAP (2009) (R)	Steering Instruments
Smarter adaptation (SmA)	More and better climate-related risk and losses data			Yes	Yes (ISACYL)
	Pushing the frontiers of knowledge on adaptation	Yes	Yes	Yes	Yes (via LIFE projects, e.g. ForestAdapt)
Faster adaptation (FA)	Effective and inclusive governance mechanisms				
	Trans-boundary cooperation	Yes	Yes		
	Piloting and testing solutions				
	Accelerating the rollout of adaptation solutions		Yes		
	Mobilising sustainable finance and resources and closing the climate protection gap		Yes		Yes (Green bonds)
	Leveraging the CCA and DRR synergies		Yes		Yes (Extreme weather drought info system)
Systemic adaptation (SysA)	Improving adaptation planning			Yes	
	Promoting NbS for adaptation	Yes	Yes	Yes	
	Ensuring the availability and sustainability of freshwater	Yes	Yes		
	Fostering local and just resilience / Justice			Yes (Dis, Rec)	Yes (REDCyL and URCACYL)

Note: (L) stands for local policy document, (R) stands for regional policy document, (N) stands for national policy document. (Rec), (Pro), and (Dis) refer to recognitional, procedural, and distributive justice, respectively.

4.12.3 Castilla y León region recommendations

A. Recommendations relating to modification and improvement of steering instruments:

1. Climate-proof local policies across the region.

- Although utilising the Common Agricultural Policy may be difficult, CyL can utilise its strong knowledge mobilisation and knowledge sharing capacities, e.g., REDCyL, URCACYL, its regional

network of Local Action Groups, as well as the Environmental Education Portal to influence local level policies and implementation around energy, urban development, and to climate proof its agricultural sector. Knowledge generated through regional participation in projects, e.g., ForestAdapt, Regions4Climate, and ADAPT2CYL, and its in-house capacities to generate risk visualisations using GIS data, can be shared through these networks to influence and steer adaptation

- In specific areas that are still perceived as having an implementation gap, e.g., accounting for biodiversity in the context of renewable energy. CyL could use this as an opportunity to develop a project case and search for regional/technical partners, as well as regional energy sector partners. The region should look to create an EU consortium to apply for future funding to address these gaps.
- The revision of the Region's Climate Change Strategy is indeed an opportunity to make connections with other sectoral policies and gain support across the region. Broad stakeholder involvement in this process can help to increase the social acceptability of the strategy and address gaps in procedural justice. For example, CyL's Just transition framework action plan (Regions4Climate D2.2) aims to establish public bodies that foster CCA territorial development, promote greater citizen participation in environmental planning, and facilitate cooperation networks among farmers, scientists, and administrators.
- According to the Castilla Y León Innovation Roadmap (Regions4Climate T6.1/D6.2), a systemic transformation requires more focus on governance, where climate action should integrate multidimensional policies and regulations, reinforcing collaboration within the regional innovation ecosystem.

2. Financial instruments require expansion and dedicated funding.

- The region has a mix of project-based funding and long-term budgetary funding for CR activities. Also, CyL's use of green bonds at the regional level for financing sustainable projects shows that it has systematically considered public investments against sustainability criteria. Although green bonds can fund climate-resilient infrastructure, ensure that climate-resilience (climate-proofing) is a criterion across all regional investments, even when the main aim is elsewhere, e.g., energy efficiency or renewable energy. In addition to green and climate bonds (see [Paris as a case](#)), equity financing, and public-private partnerships (PPPs) can also be used to attract private capital.
- CyL could consider diversifying financial instruments by exploring the potential of applying penalising/incentivising instruments (e.g., taxes for undesired activities or tax breaks for desired activities) to influence actors further. Note: D4.3 Governance calls for CyL to establish financial instruments (subsidies, tax benefits) rather than relying heavily upon project-based funding. For example, Burgas implements penalising instruments where urban construction projects that were not sufficiently built to reduce the urban heat effect were fined. The OECD's [compendium of financial instruments to support subnational climate action](#) (dashboard database) (OECD, 2022) can provide more options and ideas for financing.

- Direct support for experimentation is also a dimension that needs more attention from the regional authorities. The Castilla y León Innovation Roadmap (Regions4Climate T6.1/D6.2) aims to consolidate innovative models that explore sustainable greenhouse production, under the IP demonstration, which can be replicated in other provinces outside the R4C project. CyL could explore, together with national authorities the possibility of replicating accelerator pilots and [programmes](#) to help regional and local authorities secure private finance for nature-related projects.
- CyL scores decently in terms of financial steering instruments (score – 2/3, see table 3) but lacks a strong framework for allocated funding (score – 1/3, see table 3) and needs to improve its budget allocation for CCA planning (score – 0/3, see table 3). These recommendations aim to enhance the effectiveness and coherence of financial instruments across the region, enabling more robust allocated funding for CCA.

B. Recommendations relating to policies:

What is missing?

1. Build a cross-sectoral knowledge base for smarter adaptation.

- Smarter adaptation is only partially mentioned in CyL's policy documents. Assessing risks and losses is overlooked in all documents. The S3 focuses on data availability by creating a Data Technical office that will provide open public data. However, it does not specify the types of data. Including data on adaptation, specifically existing data collection, and sharing tools would be key to pushing the frontiers of knowledge on adaptation. The RDP of CyL sets the goal for hydraulic infrastructures to channel the generated information through a monitored telecontrol system, improving the efficiency of operational decisions, among other benefits. This measure does not guarantee that efficiency gains will serve smarter adaptation, but it could if planned in that manner. The region must integrate other elements to guarantee cross-sectoral knowledge for smarter adaptation. Sitia's smarter adaptation section may be helpful as a model, as the region there was able to narrowly tailor monitoring mechanisms for specific sectors (e.g., agriculture, forestry, tourism, transportation infrastructure) so that CCA goals were met across different sectors.
- CyL's Informational steering is relatively poor (score – 1/3, see table 4). However, its engagement within networks is scored well (score – 3/4, see table 4). There is an opportunity for the region to leverage its strengths to build wider support for its informational steering instruments.

2. Prioritise piloting and testing to accelerate learning for faster adaptation.

- The CCAP weakly supports faster adaptation, and piloting and testing solutions are not mentioned in any of the documents. Piloting and testing can provide opportunities for learning and a foundation for scaling up and replicating adaptation actions for accelerating regional adaptation. Building on projects such as Regions4Climate or other regional LIFE projects, as well as the technologies planned with research organisations (mentioned in the Smarter Adaptations section), with piloting, scaling, and replication plans in mind, can change the pace of adaptation. Further, CyL has great existing CyL platforms for knowledge mobilisation (see Informational instruments), including the

network of municipalities for sustainability (REDCyL), regional cluster of agricultural cooperatives (URCACYL), and regional network of local action groups for knowledge mobilisation, which it can utilise for replication of pilot results. However, successful upscaling requires systematic plans to do so. Cross-sectoral policies can support this.

What could be strengthened or built upon?

3. Recognise the potential of cohesive NbS planning.

- Castilla y León's policy documents reflect a concern for NbS. Unfortunately, the implementation of NbS has not been planned cohesively. The region should consider the potential of such solutions for larger areas. An example of good practice in this area is Burgas and its implementation of NbS requirements into its rules regarding future infrastructure projects.

4. Link the social equity and justice measures to CCA policy and specific actions.

- The S3 includes a general statement for procedural justice, i.e., facilitating citizen participation, collaboration, and knowledge management in innovation. In the RDP, the region aims to define the selection criteria for operational principles of equality, inclusion, and non-discrimination. Besides this recognitional justice measure, the plan includes distributional justice actions to adapt schoolyards and spaces for equitable accessibility. However, while these different measures do not directly support climate adaptation, they could if planned for this purpose. Also, the CCAP includes a statement on the potential effects of climate change on health and society, but it does not specify whether data are produced or how these effects are studied. Studies that also considered the distribution of the health impacts across different groups of society would further support equitable adaptation planning in the region and support smarter and more systemic adaptation.
- Finally, the need for strategic focus and investment in qualifications and skills in key areas of expertise that may enable CR, as featured in the Castilla y León Innovation Roadmap (Regions4Climate T6.1/D6.2), which states knowledge production and knowledge transfer among the local and regional stakeholders, including new education programmes and entrepreneurship support.
- CyL scores moderately in terms of its recognition of socially just transition to CR within its regional policy instruments (score – 2/4, see table 2), and this recommendation hopes to improve CyL's standing in this regard.

5. Conclusions

This deliverable synthesizes policy and steering instrument recommendations from 12 European regions participating in the Regions4Climate project. The steering instrument analysis showed the variety of legislative, informational and financial instruments used across Europe at the subnational level, while the policy analysis revealed opportunities to better align between innovation, development and adaptation plans. The analysis identifies shared challenges including fragmented governance, limited financing mechanisms, underutilization of, and challenges in scaling nature-based solutions (NbS), insufficient monitoring systems, and weak links between innovation and adaptation. To bridge existing gaps, the recommendations below, informed by regional analyses and successful practices from leading regions, provide strategic guidance to advance socially just, innovation-driven adaptation across Europe.

Shared Recommendations

1. Broaden climate risks assessment, monitor losses, and inform adaptation planning

Robust data systems are essential for climate-smart decision-making. Many regions currently have fragmented or narrowly focused risk assessments in their regional or local adaptation plans, often overlooking key ecosystems, population groups, or emerging hazards, such as heat. It is unclear whether these assessments are missing or included in other plans. However, presenting a brief but comprehensive overview of the climate-related risk assessments from all sectors in one document provides a comprehensive overview and helps identify gaps for the region.

In addition, risk assessment data can be enhanced with vulnerability data to support the development of equitable adaptation strategies, as well as loss data to capture the economic impacts of hazard events. By consolidating and standardizing these datasets, regions can assess the economic impacts of climate events, guide investments in adaptation (e.g., the [Copenhagen model](#)), and inform early warning systems. Loss data also aids in post-event evaluation and supports local authorities' insurance claims (see the [pilot project](#) in Norway).

A comprehensive data strategy can help bridge gaps between local and regional planning, foster cross-sectoral coordination, and improve the monitoring of adaptation effectiveness. Enhancing data access, sharing and use across sectors, while leveraging the best available technologies, can form the foundation for innovation pilots. These innovations, supported by regional smart specialisation plans, can help ensure that all sectors within a region are climate proofed.

2. Leverage local and indigenous knowledge in climate adaptation planning and decision-making

Local, traditional and Indigenous communities possess valuable knowledge about their environment and historical adaptation practices, which can significantly improve climate resilience strategies - especially in land, water, and resource management areas. However, engagement with this community-based knowledge remains limited in many regions. Developing frameworks and methods for ongoing community involvement beyond one-time consultations, and involving civil society (e.g., NGOs), can ensure that policymaking is more inclusive, informed by local knowledge and responsive to local needs. This will enhance the relevance, inclusivity, effectiveness, and ownership of climate actions.

While digital tools can help diversify communication channels and reach specific populations, they should not be as the sole means of engagement. Encouraging continuous community involvement and supporting this through collaboration with NGOs and research institutes will improve the overall impact of adaptation policies, building stronger public ownership of climate actions.

3. Build a cross-sectoral knowledge base and diversify informational instruments

Strengthening climate resilience requires integrating diverse sources of knowledge, including science-based expertise, practitioner knowledge, as well as local and traditional insights. This plurality of perspectives can ensure a more comprehensive understanding of the problems. Leveraging these knowledges in the development of solutions also ensures broader alignment with and ownership of the solutions and systematic adaptation strategies. This knowledge base can be developed and knowledge can be distributed through public-private partnerships or collaborations around research and innovation, community collaboration, e.g. around monitoring, and various actor networks, e.g. municipal or expert networks.

4. Enhance education and public awareness to support informed climate adaptation

Building climate resilience requires more than just policies and infrastructure - it depends on informed citizens, professionals, and decision-makers. Many regions struggle to clearly communicate the distinction between climate adaptation and broader green transition goals. Clear and targeted messaging about climate risks, adaptation benefits, and just transition opportunities can strengthen public engagement, foster collaboration, and encourage autonomous adaptation actions by other stakeholders.

Engaging with existing networks and research institutions can help extend the reach of these campaigns. Cross-sectoral collaboration in awareness-raising campaigns, public platforms, and educational programs, from school curricula to vocational training, can close this gap. For instance, professional training is a valuable tool for embedding climate adaptation into everyday understanding and practice.

5. Mobilize private sector investment in climate resilience

The private sector is crucial for accelerating climate resilience by providing financial resources, innovation, and implementation capacity. To unlock this potential, public authorities should create

incentives and reduce investment risks. Instruments like green and climate bonds (e.g., the [Paris model](#)), equity financing, and public-private partnerships (PPPs) can attract private capital. Authorities can also address the insurance protection gap and manage risks by purchasing insurance to cover public assets, negotiating better premiums for mitigation efforts. Additionally, insurance mechanisms are being further developed and piloted to manage risk and incentivize other actors to mitigate risks, such as through the [LIFE DERRIS](#) project and [PIISA project](#). Accelerator pilots and [programmes](#) can also support regional and local authorities in securing private finance for nature-related projects.

6. Align climate adaptation policies and governance across local, regional, and national levels

Effective climate adaptation depends on strong alignment between local, regional, and national policies, as well as coherent multi-level governance. This coordination should not only cover adaptation strategies but also extend to related sectoral and innovation plans, especially in climate-sensitive areas such as forest management in drought-prone regions. Regional adaptation strategies, whether formal or informal, can help guide and coordinate actions across levels. Cooperation models such as regional adaptation alliances, advisory boards, networks of local action groups, or forums can support joint decision-making and information exchange. Shared structures, such as centralised information systems, also help foster consistency, accountability, and locally tailored resilience efforts. Clear communication between governance levels, such as regional actors sharing specific challenges with national and local authorities, can lead to more relevant and effective policies. Greater professional awareness of adaptation is also needed across all sectors and governance levels. For example, vague language, unclear roles, or weak enforcement in national or regional policies can undermine local implementation, particularly in top-down systems. Where regional mandates for climate adaptation are limited, informal cooperation, such as targeted information sharing and collaboration within existing legal boundaries, can still play a valuable role.

7. Integrate Climate Adaptation and Resilience Systematically into Sectoral Policies

To strengthen climate resilience, adaptation needs must be systematically incorporated into all relevant sectoral policies - such as energy, transport, agriculture, tourism, spatial planning, and social welfare. This requires moving beyond isolated initiatives and fostering intersectoral coordination. Coordination can be enhanced through regional monitoring and evaluation tools that support iterative review of shared goals and actions, as well as through databases provide evidence for multiple sectoral actors. Active engagement of stakeholders and collaboration across departments can help identify misalignments and potential opportunities for joint action in the planning process. Raising awareness about climate risks and the benefits of adaptation within each sector is essential to gain support and commitment. Leveraging existing regional partnerships between municipalities, private sector actors, and research institutions can also help tailor adaptation strategies to local vulnerabilities in each region. Clear policy tools - such as regulations, spatial planning tools, financial incentives or penalties - can help guide decision-making, manage trade-offs, and promote coherence across sectors.

Integrating adaptation and resilience into Regional development plans (RDPs) and Smart strategies (S3s) also offer regions the opportunity to take a more holistic approach and ensure that regional

development is resilient. For example S3s can serve as a platform for innovation to enhance regional resilience by leveraging research institutions and the private sector, exploring new forms of collaboration, and using experimentation as a core working method. In some regions, these strategies are already connected, with a few even combining them into a single document. However, most strategies lack detail or strong links to adaptation.

Alignment of strategies help prevent fragmented efforts or conflicts between sectoral or development agendas. Without an integrated approach, opportunities for synergy are missed, gaps remain unaddressed, and siloed sectoral planning can undermine long-term regional adaptation goals.

8. Diversify, expand, and integrate financial instruments for climate resilience

Many regions face challenges with limited and unreliable funding streams for climate resilience. To accelerate adaptation efforts, it is essential for regions to diversify and expand their financial instruments beyond traditional project-based funding. This includes establishing dedicated regional or local funds, utilising intercommunal financing mechanisms, developing public demonstration projects, embedding climate-proofing criteria into all public investments, and introducing tax incentives (e.g. rainwater tax) and financial penalties to encourage sustainable practices. Participatory budgeting can also be an effective tool to support targeted adaptation through existing public finances, helping ensure that funding strategies are both socially equitable and aligned with long-term resilience objectives.

Equally important is ensuring that these financial strategies are fair and in line with the long-term resilience goals. Sharing good practices between municipalities and collaborating with financial institutions will also help integrate adaptation into investment planning and governance. The [OECD's compendium of financial instruments to support subnational climate action](#) (dashboard database includes adaptation and mitigation instruments) (OECD, 2022), the NAP Global Network's Inventory of [Innovative Financial Instruments for Climate Change Adaptation](#), [Network Nature](#) OPPLA's [Guide to the NbS Finance Landscape in Europe](#) and CLIMATEFIT project's [best practices for finance](#) provide additional financing options and ideas.

9. Establish structured piloting to enable learning and scale up effective adaptation

Piloting is recognized as a key driver of innovation in sectors beyond adaptation, but it can also play a vital role in accelerating climate resilience. By testing solutions in real-world settings, regions can learn from practical experience, refine solutions, assess outcomes, and avoid maladaptation. Well-designed pilots, with built-in monitoring, evaluation, and learning mechanisms, can provide valuable evidence for scaling successful practices across different contexts. Piloting also serves as an effective tool to raise awareness and build support for sustained adaptation efforts and may even uncover new business opportunities.

Integrating adaptation and resilience-focused pilots not just into adaptation plans, but also into regional development or smart specialization strategies, through collaboration with the private sector, research institutions, and both new and existing stakeholders, can foster learning and innovation and accelerate progress toward climate resilience. Collaboration in EU-funded projects can provide the necessary funding and momentum for context-specific, effective adaptation actions, test new partnerships, and

push beyond what any single entity could achieve alone. While many regions pilot interventions through EU funding, these efforts are not always aligned with their broader strategies. Piloting can help bridge these strategic gaps.

10. Scale up and coordinate nature-based solutions (NbS) across ecosystems and governance levels

Nature-based solutions (NbS) planning should strategically harness the full potential of both blue and green infrastructure, maximizing their social and ecological benefits. Efforts to scale up NbS require funding to incentivize uptake, as well as tools that can help design NbS in context, ensuring that solutions are planned at the right scale and with the necessary attributes. Effective coordination across governance levels is also crucial.

NbS-related actions include protecting and restoring ecosystems like wetlands, peatlands, forests, and coastal/marine areas, alongside promoting green infrastructure in urban environments, like green spaces and vegetation within the built environment, and supporting sustainable agricultural practices. While NbS are commonly included in strategies, scaling up is frequently underdeveloped. Incorporating NbS into key regional strategies (e.g., S3/RDP) can increase awareness, improve funding opportunities, and enhance scalability across regions. Innovative hybrid solutions that combine blue/green infrastructure with grey infrastructure—such as greywater systems or renewable energy—can integrate NbS into other sectors and generate additional co-benefits, including biodiversity, health improvements, and disaster risk mitigation.

Incentives for NbS, like rainwater taxes or built-in criteria in spatial plans, along with evidence-based offsetting and compensation guidelines, can support NbS scaling. Scaling up NbS refers to extending, expanding or replicating them, either spatially through corridors or across watersheds, or through replication of smaller-scale NbS across a larger area. The latter may offer co-benefits to different groups in society and be used to target specific issues, but could involve trade-offs in the overall impact. Extending NbS across ownership or jurisdictional boundaries requires collaborative planning, governance and long-term maintenance. Cross-border initiatives for shared ecosystems, like watersheds and coastlines, are essential, as is mobilizing both public and private investment to ensure widespread implementation and long-term resilience. Additionally, ensuring that marginalised and climate-vulnerable groups benefit from NbS should be a priority in design and planning.

11. Strengthen regional monitoring and evaluation systems to track adaptation progress and inform policy adjustments

Monitoring and evaluation (M&E) are essential for effective climate governance, yet many regions fail to fully exploit existing knowledge and data to assess the impact of adaptation measures. By establishing structured M&E systems at the local and/or regional level, regions can track progress, identify gaps, and make necessary adjustments to strategies. This ensures that adaptation planning remains flexible and evidence driven.

Evaluation also provides the foundation for scaling up successful pilots. For regions without formal mandates on adaptation, less formal collaborative models that can be used for evaluating other policy

areas, such as cross-border mobility can be adapted to monitor climate resilience. These models can help foster cross-regional learning and promote continuous improvement in adaptation efforts.

12. Integrate justice principles and actions into regional and local strategies to enhance fairness and inclusivity

Although strategies—such as adaptation, regional development, and smart specialisation—address justice-related concerns, they often lack the necessary details on who, what, why, and how these issues will be tackled, beyond general inclusion and community engagement. Providing context-specific details can help identify synergies across plans, as many of the vulnerability-related issues cut across sectors, such as labor inclusion, social welfare and peripheral areas. Addressing justice issues requires cross-sectoral solutions and co-creation with specific societal groups. Collaborative efforts and pooled resources can also help tackle these issues from multiple angles, such as integrating education, health services and resilience-focused actions. Incorporating the different dimensions of justice into regional and local level planning can help ensure more equitable resilience outcomes. To make adaptation efforts both effective and equitable, it is essential to meaningfully engage vulnerable and marginalized groups throughout the planning and implementation phases. This includes recognizing diverse knowledge systems, removing barriers to participation, and ensuring that adaptation resources are fairly distributed to those most at risk from climate impacts. Translating local and regional authorities' understanding of justice and equity into actionable, targeted measures will help make resilience strategies accessible and beneficial to all. Regions and local authorities should also consider addressing past injustices and whether compensation is warranted.

13. Foster transboundary collaboration to enhance learning

Strengthening transboundary cooperation and strategic partnerships between neighbouring regions and municipalities boosts shared learning and knowledge exchange, which is critical for effectively addressing climate risks. Active participation in regional networks or associations of subnational authorities accelerates the dissemination of best practices and innovative solutions. Learning from case studies in comparable contexts can further speed up the adoption of effective adaptation measures in other regions.

Successful climate adaptation often requires cross-border collaboration to address interconnected challenges. By leveraging both formal and informal joint governance structures, cross-border cooperation can optimize resource use, align strategies, and coordinate action. This collaborative learning approach not only helps scale up climate adaptation efforts but also reduces fragmented or conflicting responses.

Although all the R4C regions are involved in European cooperation projects, regional strategies should emphasize the value of transboundary partnerships and continuous learning as essential drivers for advancing resilience and climate action.

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Annex

a. Survey

*Note: The survey is available on the [Regions4Climate Zenodo repository](#) with the DOI: **10.5281/zenodo.16312907**.*

The Regions4Climate project brings together 44 partners from 13 different European countries to demonstrate innovations that enhance societal resilience to the impacts of climate change. Based on cross-sectoral strategies created by and for people, the project partners will collaboratively develop and implement novel social, technological, digital, business, governance, and environmental solutions to reinforce adaptive capacity and minimise vulnerability to climate impacts.

As a part of Regions4Climate (WP4), the University of Helsinki and SEI Tallinn are assessing the governance contexts, including the related policy instruments for CR. For these assessments, we are mapping out governance contexts with regards to how climate resilience and adaptation is organized across different levels of governance and across different policy sectors, planned and steered, and who is participating in it. The purpose of this is to analyse the effectiveness of existing governance arrangements for climate resilience and provide recommendations on possible improvements, considering regional differences.

We are also mapping out policy and other steering instruments related to equitable climate resilience at regional level. This survey will be used to create a baseline understanding of the different influential instruments in use in each region. This, together with the desk analysis of actual policies form the basis for discussions to be held during stakeholder workshops in Autumn 2024/Spring 2025. These discussions will be organised as a part of Regions4Climate's Just Transitions Roadmapping process (WP2). These discussions will be about the alignment of existing policy and steering instruments for regions' ambitions related to equitable resilience, as well as potential opportunities within this context. These will form the basis recommendations related to policy instruments at the regional level.

Please feel free to contact Alexandra.Malmstrom@helsinki.fi or Heidi.Tuhkanen@sei.org if you have any questions during the survey response process.

Glossary for terms used in the survey

Authority-controlled means that the instrument is initiated and coordinated by an official public authority/government body, in contrast to e.g., a guiding strategy for regional development that is put forth by a non-governmental organisation. Being a public authority does not require having legislative powers.

Climate resilience is defined as the enhancement “of the capacity of society and the natural systems we rely on to persist, adapt and transform, in anticipation of and response to disruption and crises” (Lager et al., 2023, p. 4). This is in line with the understanding of adaptation from small incremental measures to larger transformative societal changes.

Equity refers to the concept of fairness and justice within a various context. It includes ensuring that all individuals have access to the same opportunities, resources and treatment, accounting for their specific needs and capacities. Some examples of legal frameworks or policies that explicitly support equity could include regulations that require specific standards of participation or engagement of vulnerable groups; accessibility-related regulations for public buildings, or sectoral or cross-sectoral plans that specifically include a focus on vulnerable groups, etc.

Legal frameworks and policies are documents put forward by authorities **or other organisations**, e.g., NGOs or agencies, to steer climate resilience-related action in the region, e.g., permitting, prohibiting, commanding or setting the intentions. See Table 1 for sub-categories. Note: we are intentionally interested in official policy instruments that come from authorities (e.g., legal frameworks, regulations, strategies, plans), but also less formal ones (strategies, plans, roadmaps) that are initiated by other types of active organisations.

Regional development policies support the present and future wellbeing of the societies and usually focus on economic conditions but also can touch on other topics of importance to the region and determine its future development. Examples include one or multiple regions’ Development Strategies, Regional Plans for Economic Development, Regional Development Plans/Strategies, Action Plans, Regional Programmes. These development policies are not usually sector specific and do not refer to RIS3 Smart Specialisation Strategies or Innovation Plans.

In this survey, we acknowledge the regional differences in terms of administrative division. Thus, in this survey we use the following terms to define the levels of governance:

- *national*
- *regional (refers to any level below national and above municipal as per the administrative division. This can include autonomous regions, counties and county associations, groups of municipalities)*
- *local (i.e., municipal)*

Region: [Region name]

Respondents: (please add all the names of the people and their organisations (if different) who have contributed to filling in the survey)

Click or tap here to enter text.

Legal frameworks and policies

Through work in the Regions4Climate project, we have established that the following legal frameworks and policies² that are relevant for climate resilience³ for your region at multiple levels⁴ (See Table 1).

Q1. Review Table 1 and add any missing instruments, their hyperlink, their levels, and whether they are controlled by a public authority (and highlight in **red** any incorrect instruments). You do not need to fill out more than the **10 main ones** that influence climate resilience in your region. Please, be specific so that we can find more information about these instruments if needed.

² See Glossary for definition

³ See Glossary for definition

⁴ These instruments have been collected through the Regions4Climate Grant Agreement, WP2 T2.1, T2.4, WP6 T6.1, as well as the Regions4Climate project Annual Meeting in Sitia 04/2024.

Table 18. Legal Frameworks and policy instruments for climate resilience.

Types of legal frameworks and policies <u>guiding climate resilience in your region</u>	Name of legal framework or policy	Hyperlink	Level (N=National, R=Regional, L=Local)	Authority controlled (Yes/No)⁵
Regulations/legislation (e.g., flood risk regulation, building regulation, climate law)				
Standards or guidelines (e.g., spatial planning, infrastructure performance)				
Planning documents (e.g., Strategic planning, adaptation planning)				
Agreements & Intergovernmental mandates (e.g., mandate to cooperate with other same level (trans-boundary) or different level government in relevant policy area; PPP agreements in relevant policy area)				

⁵ See Glossary for definition

Q2. Is adaptation and climate resilience steered in the region primarily through (choose one from the drop-down menu):

Local (municipal) climate strategies / plans

Q2a: If National Climate Law was selected above, does the law set requirements for the region to adapt / develop a strategy?

☐ Yes ☐ No

Q3: Is climate resilience integrated into main policy sectors or is it a stand-alone policy sector?

☐ stand-alone

☐ integrated

☐ mixed (if so, please elaborate): Click or tap here to enter text.

Q3a: If integrated / mainstreamed into other policy sectors (e.g., energy sector, coastal protection sector, land use, etc.), at what administrative / governance levels (mark all applicable)?

☐ national

☐ regional

☐ local

Q4: Are the climate resilience objectives aligned/coherent across different levels of governance?

☐ Yes ☐ No

If yes, at which levels:

☐ national

☐ regional

☐ local

Q5: Related to the previous question, is there a legal framework that regulates the coherence and alignment of adaptation across levels of governance?

☐ Yes ☐ No



Q6. Are tasks assigned and conferred to the appropriate levels to align with the mandates and competencies?

☐ Yes ☐ No

Q7: Is there a legal division / assignment of responsibilities to adapt across levels?

☐ Yes ☐ No

Q7a: If yes, is it defined at:

☐ national level

☐ regional level

☐ local level

Q8: Are there specialized institutions / organizations that coordinate adaptation and climate resilience or is adaptation coordination added as a function to existing organizations?

☐ specialized

☐ added as a function to an existing organization

☐ no organization is responsible for coordination

Q9. Are there legal frameworks and policies in other sectors (e.g., energy sector, coastal protection sector, land use, etc.) that impact (positively support or negatively impact) climate resilience and adaptation progress or action in your region?

☐ Yes ☐ No

Q9a: If yes, please name the 3 most influential ones each and explain how they positively or negatively impact regional adaptation and resilience?

Legal framework or policy from other sector that has <u>negative</u> influence on adaptation and resilience in region	Description of or reason for negative influence
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.

Click or tap here to enter text.	Click or tap here to enter text.
Legal framework or policy from other sector that has <u>positively</u> influence/support adaptation and resilience in region	Description of or reason for positive influence/support
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.

Q9b. Are there legal frameworks or policies (from any other sector) that explicitly support equity⁶ across policy sectors, including adaptation and resilience?

☐ Yes ☐ No

If yes, which ones? (name up to 3 legal frameworks or policies, their level (N, R, L) and links to more information about them here:

Legal framework or policy	Link	Level (N=National, R=Regional, L=Local)
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

Q10. Would you consider the following document the most influential regional development policy⁷ (policy, strategy, plan) and hyperlink for your region?

⁶ See Glossary for definition

⁷ See Glossary for definition

☐ Yes ☐ No

If not, please enter the correct regional development policy and its link on the line below the given policy.

Regional development policy	Hyperlink

Climate resilience funding and financial instruments

Q11. Is there dedicated funding for adaptation?

- ☐ This funding is continuous and secured for the whole policy cycle (planning, implementation, monitoring & evaluation, re-planning)
- ☐ This funding is available for planning and implementation
- ☐ This funding is available for planning only
- ☐ This funding is project-based or for limited time only
- ☐ There is no dedicated funding
- ☐ Other (Please explain):

Click or tap here to enter text.

Q12. Table 2 is a table of financial instruments relevant for climate resilience for your region. Please fill out Table 2 to add instruments, their hyperlink or further details, and their levels, and whether they are controlled by a public authority. You do not need to fill out more than the **10 main ones** that influence climate resilience in your region. Please be specific so that we can find more information about these instruments if needed.

Table 19. Financial instruments for climate resilience.

Type of funding or financial instrument <u>guiding climate resilience in your region</u>	Name of instrument	Hyperlink or further details	Level (I=International, N=National, R=Regional, L=Local)	Authority controlled (Yes/No)⁸
Incentivising (e.g. grants or subsidies, green bonds or loans, insurance, direct expenditure for implementation of policy measures, tax incentives/tax breaks, research funding)				
Penalising (e.g. deterrent taxes, user charges)				
Budget allocation/Direct programming expenditure on goods & services (e.g. for planning and implementation of adaptation/DRR strategies, awareness raising, early warning systems, relocation costs, flood protection, restoration, etc.)				
Project related funding with co-financing requirements (e.g. LIFE Programme, Interreg, etc.)				

⁸ See Glossary for definition

Project related funding with <u>no</u> co-financing requirements (e.g. National level project funding, Horizon Europe)				
New innovative financial instruments (e.g. new business models that the region is involved in establishing, labelling)				
Demonstration projects on publicly controlled land/buildings/facilities/processes paid 100% by sub-national level public funding				
Public procurement (e.g. embedding requirements into contractual agreements related to infrastructure and public services)				
Other				

Q13. Are there financial instruments from other sectors, (e.g., energy sector, coastal protection sector, land use, etc.) that impact (positively support or negatively impact) climate adaptation and resilience in your region?

☐ Yes ☐ No

Q14a: If yes, please name the 3 most influential ones and explain how they positively or negatively influence regional adaptation and resilience?

Financial instrument from other sector that has <u>negative</u> influence on adaptation and resilience in region	Description of or reason for negative influence
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.

Financial instrument from other sector that has <u>positive</u> influence/support adaptation and resilience in region	Description of or reason for positive influence/support
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.

Informational instruments (Awareness raising & guidance)

Through work in the Regions4Climate project, we have established that the following informational instruments are relevant for climate resilience for your region at multiple levels (See Table 3).

Q15. Review and fill out Table 3 with any missing instruments, their hyperlink or further details, their levels, and whether they are controlled by a public authority (and highlight in **red** any incorrect instruments). You do not need to fill out more than the **15 main ones** influence climate resilience in your region. Please be specific so that we can find more information about these instruments if needed.

Table 20. Informational instruments for climate resilience

Type of informational instruments guiding climate resilience in your region	Name of instrument	Hyperlink or further details	Level (I=International N=National, R=Regional, L=Local)	Authority controlled (Yes/No)⁹
Knowledge mobilisation (Building formal and informal relationships between research producers and users) and knowledge sharing networks (Covenant of Mayors, ICLEI, regional networks supporting resilience)				

⁹ See Glossary for definition

Engaging with indigenous and local knowledge on adaptation/resilience				
Knowledge generation (projections, scenario development and assessments used specifically for regional resilience planning e.g. regional risk assessments)	•			
Monitoring and evaluation				
Public outreach				

Q16. Which of the instruments above provide guidance, coordination and information dissemination at:

Description	Policy instrument from Table 3
across all levels of governance and sectors (national & regional)	Click or tap here to enter text.
at the regional level across sectors	Click or tap here to enter text.
from national to regional only (vertical)	Click or tap here to enter text.
at the national level across sectors & policy domains (horizontal)	Click or tap here to enter text.
Other (Please explain):	Click or tap here to enter text.

Q17. Are there Informational instruments in other sectors (e.g., energy sector, coastal protection sector, land use, etc.) that positively support or negatively impact climate adaptation and resilience in your region?

☐ Yes ☐ No

Q17a. If yes, please name the 3 most influential ones and explain how they negatively influence regional adaptation and resilience?

Informational policy instrument from other sector that has <u>negative</u> influence on adaptation and resilience in region	Description of or reason for negative influence
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.

Informational policy instrument from other sector that has <u>positively</u> influence/support adaptation and resilience in region	Description of or reason for positive influence/support
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.

Instruments: General

Q19. What are the 10 most influential instruments guiding regional climate resilience? Please refer to any of the instruments listed in Tables 1, 2 and 3. “Most influential” means having the most influence on action in the region/at the regional level.

10 main instruments guiding regional climate resilience

(you can write in the name of the instrument in the tables above, e.g. Region X Climate Adaptation Strategy)

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Click or tap here to enter text.

Q20. Are there instruments that are not currently considered influential, but that have in your opinion potential to guiding regional resilience if strengthened? Please refer to any of the instruments listed in Tables 1, 2 and 3.

Instruments with potential	Level (N=national, R=regional, L=local)	Key coordinating actor	Reason for potential

Actors

Q21. Which actors are engaged in climate resilience in the region? Please, mark all applicable:

- ☐ public sector
- ☐ private sector
- ☐ third sector (NGOs, non-profit organisations, associations, civil society)
- ☐ boundary organizations (bridging science & policy)
- ☐ networks (e.g., ICLEI, C40, etc)
- ☐ private citizens and households

Q22. Is the private sector required to or incentivized to participate in adaptation?

- ☐ Yes ☐ No

Q22a. If Yes, the participation of private sector is (check all that apply)

- ☐ voluntary
- ☐ financially incentivised
- ☐ through PPPs
- ☐ legally required by a climate/adaptation/resilience framework

b. Steering instrument related scoring

The following tables are taken from the most up-to-date *Regional Resilience Maturity Model and Framework (RRMM)*. Note that this is not an exhaustive list of all indicators of the *RRMM*, only the indicators used in the D4.4 Policy Recommendations analysis. To review all indicators and their application to all the regions within R4C please consult Deliverables D4.1. *RRMM*, and D4.2. *Climate resilience maturity assessment*.

Table 21. Regulatory steering or general scoring about policy instruments scoring source, taken from List of indicators of Dimension 2 - Plans and policy instruments.

	Indicator	Description	Scoring system	Source
2.4	Policy instruments supporting climate regional resilience-building	What type of policy instruments are in place to support climate resilience-building at regional level? The policy instruments considered for the assessment of this indicator can vary depending on the region. Types of policy instruments include (as defined in Bukowska et al. 2023 based on Hood and Margetts 2007, Henstra 2016, Lesnikowski et al. 2019): 1. Nodality (information-based instruments, dependent on voluntary compliance) 2. Authority (use of state power to command, prohibit, or permit behavior, e.g. regulation/policies) 3. Treasure (use of public funds to (dis)incentivise, produce or permit behavior) 4. Organisation (direct delivery of programmes and services and government operations) Policy instruments are considered as "supporting" climate resilience-building if they are explicitly aligned with climate resilience ambitions and targets.	4 - All four types of policy instruments are utilised to support climate resilience-building and alignment of policy instruments is continually assessed. 3 - Three types of policy instruments are in place to support climate resilience-building. Other types of existing policy instruments have been identified where alignment needs to be improved. Processes for alignment of identified policy instruments are in place. 2 - Two types of policy instruments are in place to support climate resilience-building. Other types of existing policy instruments have been identified where alignment needs to be improved. 1 - One type of policy instrument mainly is in place to support climate resilience-building. 0 - No policy instruments are in place to support climate resilience-building.	Content creation with project partners Gram-Hanssen et al., 2023 Content creation with project partners Bukowska et al. 2023, Hood and Margetts 2007, Henstra 2016, Lesnikowski et al. 2019
2.7	Alignment of existing policy instruments with regional ambitions for a socially just transition to climate resilience	Do the regional policy instruments currently in place explicitly mention socially just transition to climate resilience at regional level? This indicator assesses whether regional policy instruments incorporate considerations for socially just transition to climate resilience. The evaluated policy instruments may vary depending on the region, and they can encompass various types of instruments. Policy instruments consider a socially just transition to climate resilience if they acknowledge social structures or norms that create unequal conditions and vulnerabilities to climate risks, they focus on the fair distribution of climate impacts and adaptation benefits across society, they ensure equitable participation of all stakeholders in decision-making processes, and they recognize harm and injustice, attribute	4 - Policy instruments explicitly and thoroughly address all aspects, highlighted in the description, of a socially just transition to climate resilience. 3 - Policy instruments address most aspects of a socially just transition. 2 - Policy instruments acknowledge some aspects of a socially just transition but do so unevenly. 1 - Policy instruments mention elements of a socially just transition only superficially 0 - Policy instruments do not explicitly address or only vaguely reference a socially just transition to climate resilience.	Content creation with project partners Bukowska et al. 2023, Hood and Margetts 2007, Henstra 2016, Lesnikowski et al. 2019

		responsibility, and develop measures for compensation or restoration.		
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Table 22. Financial instruments scoring source, taken from List of indicators of Dimension 6 - Financial capabilities.

	Indicator	Description	Scoring system	Source
6.1	Identification of financial needs	Does the region adequately understand its financial needs for climate resilience? This indicator measures whether the region has mapped and defined financial needs in order to foster climate resilience planning and implementation. This includes understanding the financial context in general, including available financial resources. Depending on the region, this includes financial needs for implementation of climate adaptation projects or financial needs at other levels such as municipalities, if the region's main role is of supporting municipalities in their climate adaptation action.	4 - All the points below + The region is working on approaches to accelerate the implementation of financial structures for climate adaptation, such as catalytic financing. 3 - All the points below + The region has a comprehensive mapping of financing and funding sources, methods and instruments, including regional investors and insurance opportunities. 2 - Regional financial and investment needs are quantified, including challenges across sectors and stakeholders. The region has knowledge of economic loss due to climate events (currently and in the future), including analysis of the economic impacts of non-action on the region. 1 - Some regional financial and investment needs are known and quantified, but there is a gap in mapping financial challenges across sectors and stakeholders. 0 - Regional financial and investment needs (adaptation finance gap) are not mapped.	Content creation with project partners
6.3	Budget allocation and distribution at local level	Does the region allocate and distribute funding at the local level? Regions can play a pivotal role in distributing and allocating funding from national and European level to lower levels of government in order to start processes of climate resilience. The regions need to be taken into consideration: - Regional distributive capacity - Climate change vulnerability of municipalities - Equitable distribution among the municipalities - Transparency of public government budget distribution (disclosure)	4 - The region funding allocation to the local level is continuous (i.e. secured over time) and equitable (i.e. takes into account municipalities' needs and vulnerability). 3 - The region allocates budget to the local level administration in its territory on a continuous basis (i.e. secured over time), covering a large number of municipalities of various sizes. Local level needs and vulnerability are partially taken into account. 2 - The region allocates budget to the local level administration in its territory on a continuous basis (i.e. secured over time), but only to a small number of municipalities and without effective consideration of their vulnerability and needs. 1 - The region allocates budget at the local level on an ad-hoc basis, for example when a disaster occurs 0 - The region does not allocate funding at local level	Content creation with project partners

6.4	Budget allocation for planning	Does the region allocate appropriate financial resources for climate resilience planning? A dedicated budget for planning is needed, including funding to support the mainstreaming/integration of climate change adaptation plans into regional policies and interventions. Targeted funding for research, development and demonstration projects and infrastructures is also needed.	4 - All points below + Appropriate budget is allocated to support the mainstreaming/integration of climate change adaptation action into regional policies 3 - Point below + Appropriate budget is allocated to the scaling up of resilience projects and activities at regional level 2 - Appropriate budget is allocated to climate resilience planning on the base of projects and as part of a larger strategy at regional level 1 - Limited budget is allocated to climate resilience planning on the basis of specific research or demonstration projects 0 - No funding is allocated to climate resilience planning at regional level	Content creation with project partners
6.5	Budget allocation for implementation	Does the region allocate appropriate financial resources for climate resilience implementation? A dedicated budget to cover the costs of implementation is needed. In order to allocate budget for implementation climate change adaptation and mitigation measures need to be first identified. Depending on the regional context, implementation may include: - On-the-ground realisation of resilience-enhancing interventions included in regional plans and strategies - Realisation of resilience innovation and demonstration projects, incl. testing of resilience solutions - Realisation of disaster risk reduction and prevention projects (a dedicated budget needs to be allocated to support the population affected by extreme events or disasters such as those related to climate change) - Stakeholders engagement/co-creation	4 - Financial resources are allocated with explicit consideration of planned resilience enhancing interventions and most vulnerable territories 3 - Appropriate budget is allocated to climate resilience implementation, and climate adaptation and mitigation measures are identified as a first action 2 - Appropriate budget is allocated to climate resilience implementation for people and territories affected by climate-related disasters 1 - Project-based funding is allocated to climate resilience implementation 0 - No funding is allocated to climate resilience implementation	Content creation with project partners

Table 23. Informational instruments scoring source, taken from List of indicators of Dimension 1 - Regional governance and institutional capacity; List of indicators of Dimension 7 - Vulnerability and risk assessment; List of indicators of Dimension 4 - Participatory governance and stakeholder engagement.

	Indicator	Description	Scoring system	Source
1.6	Engagement in networks	How does the region engage in and coordinate with networks? Engaging in and coordinating with networks offers regions opportunities to promote initiatives, exchange experiences, and learn from others. Effective engagement involves creating internal structures and processes for managing network involvement, including coordinating with various stakeholders like academia, the private sector, and civil society. This can involve participating in	4 - Point below + Internal structures and processes within the regional government are established (for example creation of ad-hoc positions) to coordinate and manage the region's engagement in networks. 3 - The region participates proactively in regional, national and international networks. 2 - The region participates occasionally in networks.	Content creation with project partners

		regional, national, and international networks, as well as global alliances and projects that focus on building resilience and reducing vulnerability in alignment with global climate justice principles.	1 - The region shows interest in participating in networks, understanding its advantages. 0 - The region does not engage in networks and there is little knowledge of the advantages of doing so.	
1.7	Region's monitoring and evaluation system	How mature is the region's Monitoring, Reporting and Evaluation system (MRE)? The region needs to have a monitoring, reporting and evaluation system (MRE) in place, in order to track its progress towards local climate resilience policy targets.	4 - An advanced and well-established monitoring and evaluation system is in place, offering a thorough and sophisticated assessment of progress towards climate resilient policy targets. Continuous and comprehensive data collection; robust metrics or indicators, high level of capacities for evaluation, and adaptation of policies based on findings. 3 - MRE system is in place, providing a more comprehensive assessment of progress towards climate resilient policy targets. Continuous and comprehensive data collection; robust metrics or indicators; some capacity for in-depth analysis and evaluation. 2 - A basic monitoring and evaluation system is in place, allowing for some assessment of progress towards climate resilient policy targets. Regular data collection, but not exhaustive, basic metrics or indicators are measured/ assessed, limited capacity for in-depth analysis. 1 - Initial steps have been taken to develop a monitoring and evaluation system, but it is not fully functional or comprehensive. Limited data collection initiatives; basic metrics/indicators are identified; limited capacity for regular assessment. 0 - No established monitoring and evaluation system in place to assess and track progress towards climate resilient policy targets.	Content creation with project partners
7.4	Alignment of vulnerability and risk assessments with justice and equity principles	Does the region collect data from hazard, risk and vulnerability assessments in its territory? This indicator aims to assess if the region collect data from Municipalities or Nations and other relevant institutions in order to monitor hazards, risks and vulnerability on its territory. The level of maturity increases as the region improves its ability to assess and track risks and vulnerability on its own territory, making use of innovative tools and robust partnerships. Depending on the hazard, the region should be able to retrieve the information from other governance level (National, EU).	4 - Levels below + Data of risk assessments are publicly available as open data to be used via standard protocols 3 - Informed consideration from the vulnerability and risk assessment are thoroughly integrated in existing policies and regional planning instruments 2 - Risk assessments' data and results are regularly used to support decision-making 1 - Risk assessments' data and results are sporadically used to support decision-making 0 - Results of vulnerability and risk assessments are not available to regional authorities and other key actors	Content creation with project partners

4.5	Engagement with the private sector	Does the region engage effectively with the private sector to support climate resilience planning and implementation? This indicator aims to assess the region's engagement with the private sector. The definition of which actors constitute the relevant "private sector" depends on the region: it could include private companies, businesses, industrial associations, sectoral associations etc. Involvement of the private sector is considered key for climate resilience implementation for several reasons. However, it is important that a balance between public and private interests is guaranteed. Forms of engagement with the private sector include: - encourage the private sector to channel resources towards the implementation of climate resilience actions - establishment of private-public partnerships when needed to ensure implementation and continuity of climate resilience actions	4 - The region strongly engages the private sector for the implementation of its climate resilience ambitions. It regulates its relations with the private sector (e.g., Public-private partnerships) explicitly addressing issues of equity and just transition and maintaining the public interests at the centre. These are explicitly considered for example in the decision of which private partners it supports and engages with. 3 - The region has regulations, programmes, policies, initiatives in place to establish, formalise and monitor forms of engagement with the private sector for the implementation of its climate resilience ambitions and policies 2 - The region has regular engagements with the private sector, however they are not formally regulated 1 - The region has sporadic collaboration with private sector. 0 - The region has no collaboration with private sector	Content creation with project partners
4.6	Engagement with organised civil society and citizens	Does the region engage effectively with organised civil society and citizens to support climate resilience planning and implementation? This indicator assesses how effectively the region engages with both organized civil society groups and citizens in climate resilience planning and implementation. It evaluates the region's collaboration with diverse stakeholders, including activist groups, community-led initiatives, associations, and environmental organizations, considering how well these efforts coordinate with local levels to ensure an inclusive and equitable approach. Additionally, the indicator examines the region's commitment to fostering community involvement in policymaking through participatory processes such as workshops, events, and other engagement initiatives, ensuring that input from various segments of the population shapes climate resilience policies.	4 - The region institutionalised partnership with civil society groups and provides regularly financial and technological support to civil society groups and community initiatives to contribute to climate resilience-building. The region effectively coordinates with the local level to engage citizens in climate resilience efforts, with a systematic mapping of the interests of all relevant groups, with attention to age, socioeconomic status, gender, and other demographic characteristics. 3 - The regional government, in partnership with local/municipal governments, provides financial and technological support to civil society groups and community initiatives to contribute to climate resilience-building. Citizens are actively engaged in participatory processes on a regular basis. 2 - Networks, platforms and/or physical spaces are provided and/or promoted by the regional government that allow civil society and community organisations to coordinate, receive support and contribute to climate resilience-building processes. 1 - Existing community initiatives and groups of citizens are partially mapped, with a limited involvement of local/municipal governments and existing networks. 0 - The region has no engagement with either citizens or organized civil society groups	Content creation with project partners
4.7	Engagement with academia and research community	Does the region engage effectively with academia and the research community to support climate resilience planning and implementation? This indicator aims to measure the establishment of formal partnerships and collaboration processes between the region and local academic/scientific entities.	4 - Formal partnerships and formalised collaboration processes are established between the region and academic/scientific entities and a technical-scientific committee is established to support the regional government in monitoring the climate resilience implementation process 3 - Formal partnerships and formalised collaboration processes are established	Content creation with project partners

	Regular involvement of universities and research institutions in climate resilience and adaptation planning is considered, encompassing consultation on specific topics/projects, participation in thematic working groups, and support in agenda-setting. Additionally, this Indicator assesses the ongoing engagement of universities and research institutions in the implementation of climate resilience actions, which includes their participation in specific projects and interventions. Furthermore, it recommends the formation of a technical-scientific committee comprising representatives from academia and research. This committee should be designed to assist the regional government in monitoring the climate resilience implementation process, ensuring necessary adjustments to planned climate resilience actions and interventions.	between the region and academic/scientific entities 2 - Universities and research institutions are involved on a regular basis in climate resilience and adaptation planning and implementation 1 - Universities and research institutions are involved ad-hoc in climate resilience and adaptation planning 0 - The region has no engagement with academia and/or research institutions
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c. Datasets

1. Survey results per region

- The survey results used in the analysis for this deliverable can be found on the [Regions4Climate Zenodo repository](#); DOI: [10.5281/zenodo.17541771](#).

2. List of policy documents analysed for the policy analysis

- The survey results used in the analysis for this deliverable can be found on the [Regions4Climate Zenodo repository](#), [10.5281/zenodo.17550825](#).