



Pathways2Resilience

Climate resilience strategy

ADAPT2CYL

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1 Introduction

1.1 Local profile

Castilla y León faces the challenge of climate change adaptation from a territorially distinctive position within the European context. It is a region of large geographical extent, characterised by high geographic and functional diversity, a strong rural component, and an ageing and dispersed demographic structure. These characteristics structurally shape both exposure to climate impacts and the response capacity of the territory and its institutions.

The Regional Climate Resilience Strategy of Castilla y León is **built upon a previously prepared and validated Baseline Report**, which has made it possible to identify in detail the main climate risks, territorial vulnerabilities, existing capacities and relevant governance frameworks. On the basis of this shared diagnosis, the Strategy does not seek to reiterate the analysis, but rather to **guide strategic decision-making** by establishing a progressive and coherent framework for action to advance towards greater climate resilience.

In this context, climate change adaptation is conceived as a cross-cutting challenge that simultaneously affects productive systems, infrastructure, ecosystems, public services and social cohesion, and which requires integrated, multi-level and long-term responses.

Geographical scope

The geographic scope of this Strategy covers the entire territory of the Autonomous Community of Castilla y León, understanding the region as a broad, diverse and deeply heterogeneous territorial system. The geographical extent, dispersed settlement pattern and significant differences in institutional and technical capacities across territories decisively condition both exposure to climate risks and the feasibility of adaptive responses.

The Strategy assumes that it is **neither possible nor desirable to apply homogeneous solutions across the entire territory**, and that adaptation must be articulated through differentiated, scalable and adjustable approaches tailored to highly diverse local contexts. In this regard, the document establishes a common strategic framework at regional level, while explicitly leaving room for its adaptation to different territorial realities through subsequent instruments, in particular the Action Plan and the Investment Plan.

This approach makes it possible to balance the need for regional coherence with the flexibility required to respond to local specificities, avoiding both fragmentation of approaches and the imposition of unrealistic, uniform solutions.

Thematic or sectoral scope

The Regional Climate Resilience Strategy of Castilla y León adopts a selective, decision-oriented approach, focusing on those territorial systems whose climate vulnerability and strategic relevance most directly condition the overall resilience of the region.

Based on the baseline diagnosis, the Strategy prioritises a limited number of strategic areas for intervention, understood as critical systems that concentrate significant climate risks, high

levels of exposure and potential cascading effects on other sectors and territories. These include, in particular, agri-food and forest systems, water management, population health and wellbeing, and essential infrastructure and services.

Alongside these priority areas, the Strategy acknowledges the existence of other relevant sectors and dimensions whose level of climate risk or direct transformative capacity is comparatively lower or more dependent on decisions taken in other systems. In these cases, the Strategy opts to address them primarily through cross-cutting, enabling or accompanying measures, avoiding a proliferation of lines of action that would dilute the strategic focus.

This approach makes it possible to concentrate efforts on those areas with the greatest capacity to generate systemic resilience, while ensuring coherence and complementarity with existing sectoral policies, and laying the foundations for the subsequent development of clear, progressive and feasible adaptation pathways.

Key demographic and socio-economic data

The Strategy takes into account a limited set of demographic and socio-economic factors that directly condition climate vulnerability and, in particular, the capacity to implement adaptation policies in Castilla y León. These include population ageing, population decline across large rural areas and low territorial density, all of which affect both exposure to certain climate impacts and the availability of human and technical resources for public action.

These characteristics represent **structural constraints** on the deployment of adaptation measures that are intensive in terms of management, maintenance or local technical capacity, and require the design of responses that are viable in contexts of limited administrative capacity. The Strategy assumes these limitations as a central design element, orienting its proposals towards capacity-building, cooperation between levels of government, and the prioritisation of robust, replicable solutions with low long-term management costs.

Coordinating organisation

The participation of Castilla y León in Pathways2Resilience (P2R) is articulated through the ADAPT2CyL project, which is implemented via the **regional ADAPT2CyL Consortium**. This consortium brings together key actors from public administration, the local level, innovation and the business sector, specifically:

- Fundación Patrimonio Natural de Castilla y León, which leads coordination and contributes expertise in environmental planning, biodiversity conservation and sustainable development.
- Valladolid City Council, through the Agency for Innovation and Economic Development, contributing its experience in local policies on urban innovation, sustainability and resilience.
- Provincial Council of Valladolid, which plays a key role in structuring rural territories, fostering municipal cooperation and promoting adaptation strategies in rural areas.

- AEICE, the Efficient Habitat Cluster, representing the business and industrial sector and contributing knowledge in sustainable construction, renovation, digitalisation and energy efficiency of the built environment.

This structure responds to the need to address climate change adaptation as a cross-cutting challenge that exceeds the competences and capacities of any single actor.

While the consortium configuration provides a **platform for coordination and learning**, the Strategy recognises that this structure does not in itself constitute a permanent model of climate governance. Rather, the strategic process is conceived as an opportunity to identify the limitations of the current framework and to move towards more stable mechanisms of interdepartmental and multi-level coordination, which will need to be consolidated in subsequent implementation phases.

Deliverable development process

The Regional Climate Resilience Strategy of Castilla y León is conceived as a deliberate **intermediate phase** within a progressive process of planning and action, aligned with the Regional Resilience Journey methodology of the Pathways2Resilience programme. Following the preparation of the Baseline Report, the purpose of the Strategy is to translate the shared diagnosis into clear strategic guidance, without yet anticipating the level of detail inherent to implementation.

The document does not seek to provide an exhaustive catalogue of measures or to close off all decisions, but rather **to establish priorities, sequences of action and principles of intervention** to guide the subsequent development of the Action Plan and the Investment Plan. In this sense, the Strategy is conceived as a living document, subject to review and adjustment in light of the learning generated, the evolution of climatic and socio-economic conditions, and the progressive strengthening of the territory's institutional capacities.

1.2 Priorities

As already noted, this Strategy is built on the conclusions of the climate risk analysis developed in the Baseline Report, prepared and validated within the framework of the ADAPT2CYL project. This analysis made it possible to identify **a set of risks relevant to the territory**, arising from the projected evolution of climatic conditions and the vulnerability of the region's social, economic and environmental systems.



Increased flood risk



Increased risk of forest fires



Reduction in water resources



Increased impacts on human health



Loss of ecosystem services



Loss of productivity in agriculture and livestock farming



Impacts on tourism and cultural heritage



Impacts on infrastructure

However, moving from diagnosis to strategic planning requires the establishment of priorities. Climate change adaptation involves decision-making in a context of limited resources, multiple objectives and unequal institutional capacities; it is therefore neither viable nor effective to address all risks with the same intensity, at the same time and through the same instruments. In this respect, the Strategy explicitly acknowledges the **need to prioritise the identified risks**, not in order to exclude them, but to guide policy alignment, the definition of adaptation pathways and the subsequent allocation of efforts and resources.

This prioritisation exercise has been carried out in full respect of the formulation of the risks identified in the Baseline Report and is based on a qualitative assessment using the following criteria:

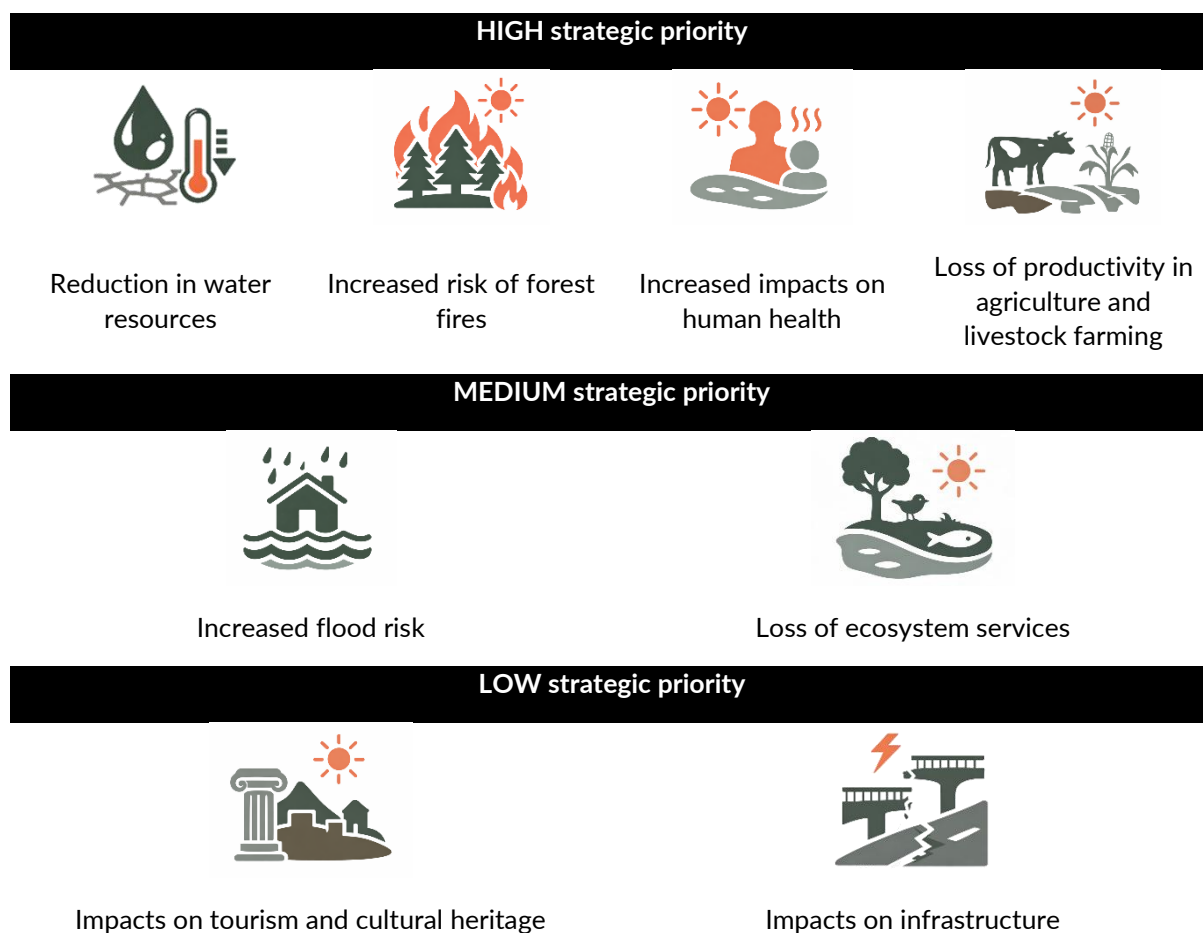
- Severity and scope of impacts, considering both the potential magnitude of damage and its territorial and social extent.
- Systemic nature of the risk, in terms of cascading effects on other sectors, systems or risks.
- Capacity for intervention through regional policies, taking into account the actual scope for action available to public administrations and the instruments at their disposal.
- Relevance for medium- and long-term territorial resilience, particularly in relation to the main structural challenges facing Castilla y León .

On the basis of these criteria, the climate risks analysed have been classified according to their degree of strategic priority, understood as their capacity to structure the alignment of priorities and decisions within the framework of this Strategy. This classification does not constitute an assessment of absolute importance, nor does it imply the exclusion of any risk; rather, it is an operational tool to guide strategic action.

As a result of this exercise, three levels of priority are distinguished:

- High strategic priority risks, which directly condition overall regional resilience and must play a central role in the alignment of policies and priorities.
- Medium strategic priority risks, which present significant impacts but whose management largely depends on decisions taken in other areas or has a more sectoral or territorial scope.
- Low strategic priority risks, which, although significant, are addressed mainly through specific measures or as secondary effects of other priority risks.

The application of these criteria leads to the following assessment of climate risks:



This hierarchy constitutes the starting point for the section on priorities and makes it possible to steer subsequent analysis towards those areas where the integration of climate change adaptation can generate the greatest systemic benefits for the territory. On this basis, the Strategy subsequently identifies the main priorities and opportunities for alignment across different levels of governance, taking into account their contribution to the management of the risks with the highest strategic priority, while maintaining coherence with the full set of identified risks.

Building on this hierarchy of climate risks, the following section analyses the **main priorities for action and alignment across different levels of governance**. This analysis does not seek to provide an exhaustive inventory of existing policies, competences or strategies, but rather to identify **those decisions, processes and investments that are particularly relevant for the management of the risks with the highest strategic priority**.

The adopted approach recognises that the capacity to intervene in climate risks varies significantly across governance levels and that territorial resilience can only be built through **coherent articulation between scales**, from the local to the European level. Accordingly, the following subsections focus on the most significant entry points for integrating climate change adaptation into ongoing decision-making processes, avoiding duplication and reinforcing coherence with existing frameworks.

This analysis provides the reference framework for the subsequent definition of the vision, strategic objectives and adaptation pathways, ensuring that the Strategy is grounded in realistic priorities and concrete opportunities for action.

Local level

In Castilla y León, the local level plays a key role in managing the most immediate climate impacts, but it does so in a context characterised by **high municipal heterogeneity, marked inequality in technical and financial capacities, and a high degree of territorial dispersion**. These characteristics decisively condition the ability to address in a homogeneous manner the priority climate risks identified in the Strategy.

With regard to these risks, local decisions are particularly relevant in areas such as the protection of health against heatwaves—through social services, support for vulnerable populations and the management of urban spaces—the prevention of forest fire risk at the wildland–urban interface, and land-use planning and urban growth management in areas exposed to flooding or thermal stress. However, municipalities' capacity to act in these areas is highly variable and, in many cases, limited.

The Strategy recognises this fundamental role of the local level, but assumes that **it cannot and should not replace municipal planning nor define detailed actions at this scale**. Its contribution is therefore oriented towards providing common frameworks, coherence criteria and support from higher levels, so that local decisions can be aligned with adaptation objectives without creating additional burdens that are difficult to absorb.

Regional level

The regional level constitutes the **operational core of this Strategy**. In Castilla y León, the risks of high strategic priority—reduction in water resources, forest fires, impacts on human health, and loss of productivity in agriculture and livestock farming—coincide with areas in which the Autonomous Community has **planning instruments, regulatory capacity and direct responsibility for the allocation of resources**.

In particular, water management, forest policy and fire prevention, support for and regulation of the agri-livestock system, and the organisation of public health services comprise a set of structural decisions that are already underway and that decisively shape the resilience of the territory. Recent experience with forest fires has also highlighted the need to strengthen preventive, integrated and long-term approaches, beyond emergency response.

The Strategy does not seek to replace or duplicate these sectoral policies, but rather **to act as an integrating framework** that makes it possible to explicitly incorporate climate change adaptation into their design and implementation. Its added value lies in improving coherence between areas of action that have traditionally operated in a relatively fragmented manner, reinforcing a shared vision of climate resilience at regional level.

National level

The national framework establishes key constraints for the management of priority climate risks in Castilla y León . Instruments such as hydrological planning, agricultural policy, public health regulations and civil protection systems largely define the scope for regional and local action, particularly in relation to structural and long-term risks.

The Strategy acknowledges that many of the factors influencing water resource availability, the viability of the agri-livestock system or the capacity to respond to large-scale forest fires **cannot be addressed exclusively at regional level**. In this context, alignment with national frameworks is not merely a matter of formal coherence, but a necessary condition for the effectiveness of adaptation measures.

Accordingly, the Strategy positions itself as an instrument that facilitates articulation between regional and national priorities, avoiding overlaps and strengthening Castilla y León 's capacity to integrate climate change adaptation within existing competences.

EU level

The European level represents a **fundamental strategic lever** for addressing the priority climate risks identified in Castilla y León , both in terms of policy direction and its role in mobilising funding and technical support. In areas such as water management, adaptation of the agri-food system, forest fire prevention and the protection of health against climate impacts, European priorities directly influence the options available at regional level.

In this context, the Strategy is conceived as an instrument **to align regional priorities with European agendas**, increasing the coherence of interventions and improving the eligibility of adaptation actions in future funding cycles. Rather than introducing new objectives, the adopted approach seeks to strengthen the integration of climate resilience into investment decisions that are already planned or in the process of being defined.

Private sector

The management of several of the priority climate risks identified in Castilla y León depends to a large extent on decisions taken outside the strictly public sphere. The private sector and other actors play a decisive role, particularly in the agri-livestock system, forest management, land use and the provision of essential infrastructure and services.

Productive practices, management models and investment decisions directly influence exposure and vulnerability to risks such as loss of agricultural productivity, increased forest fire risk or pressure on water resources. The Strategy recognises this reality and assumes that climate resilience cannot be built solely through regulation or direct public action.

In this respect, the Strategy's contribution is oriented towards **establishing reference frameworks and clear signals** that encourage the alignment of private decisions with adaptation objectives, promoting coherence and shared responsibility without replacing market mechanisms or existing initiatives.

2 Vision

The Vision constitutes the core of the Strategy. Based on the analysis of risks and the limits and opportunities identified in the previous chapters, this chapter establishes a **shared future framework** that guides decision-making in a context of climate uncertainty, unequal capacities, and potential tensions between objectives. The Vision does not describe specific measures but rather defines the type of territory towards which we wish to progress and the criteria that should guide strategic decisions over time.

To this end, the chapter is structured sequentially, starting with the definition of a co-created vision and a set of guiding principles that allow its translation into decision-making criteria. It then presents a theory of change and a set of future scenarios that clarify how progress is expected to be made from the current situation towards higher levels of resilience, acknowledging the uncertainty inherent in the adaptation process. Finally, the chapter outlines the key elements of the participatory process and the role of driving actors, to endow the Vision with legitimacy, coherence, and mobilization capacity for the subsequent phases of the Strategy.

2.1 Shared vision

What kind of region does Castilla y León want to be in the face of prioritized climate risks?

Castilla y León aspires to evolve into a climate-resilient region, capable of anticipating risks, reducing structural vulnerability, and protecting its population and territory from increasingly frequent and intense impacts.

This Vision is built upon the recognition of the region's actual conditions (its vast expanse, the diversity of rural and urban contexts, population dispersion, and limitations in capacity in specific areas), and from the conviction that adaptation cannot be addressed solely through emergency responses, but through sustained strategic decisions over time.

The Vision places **anticipation and prevention** at the core of regional climate resilience. This involves strengthening Castilla y León's ability to anticipate impacts from reduced water resources, increased forest fire risks, the effects of climate change on human health, and productivity losses in agriculture and livestock farming. In contrast to approaches focused exclusively on short-term responses, the region aims to integrate adaptation into planning, land management, and public and private decision-making, progressively reducing exposure and vulnerability before the impacts materialize.

At the same time, the Vision acknowledges that climate resilience in Castilla y León is inseparably linked to its **territorial and rural model**. The rural environment, agri-livestock and forestry systems, and associated ecosystems play a key role both in generating vulnerability and in building adaptation solutions. Moving towards a more resilient region requires strengthening the territory's capacity to sustainably manage its resources, prevent risks such as forest fires from a comprehensive landscape management perspective, and maintain the functionality of the productive and ecological systems that support territorial cohesion.

This Vision incorporates, across the board, the **protection of people and social cohesion**, recognizing that climate change impacts do not affect the population equally. In a region with an aging population and significant territorial inequalities, climate resilience involves reducing

the vulnerability of the most exposed groups, improving the capacity of public services to respond to extreme events, and ensuring that adaptation decisions contribute to greater territorial and social equity.

Finally, the Vision assumes that climate change adaptation is a **continuous process of learning and adjustment**, requiring coordination between governance levels, integration across sectoral policies, and the active involvement of public and private actors. Castilla y León moves towards climate resilience based on cooperation, decision-making coherence, and the ability to review and adapt its approaches as risks, territorial conditions, and available knowledge evolve.

2.1.1 Guiding principles

This Vision is then translated into a set of guiding principles that serve as decision-making criteria throughout the planning and implementation process. These principles are not generic statements of intent but rather an operational framework designed to guide decision-making in contexts of climate uncertainty, limited resources, and potential conflicts between alternatives.

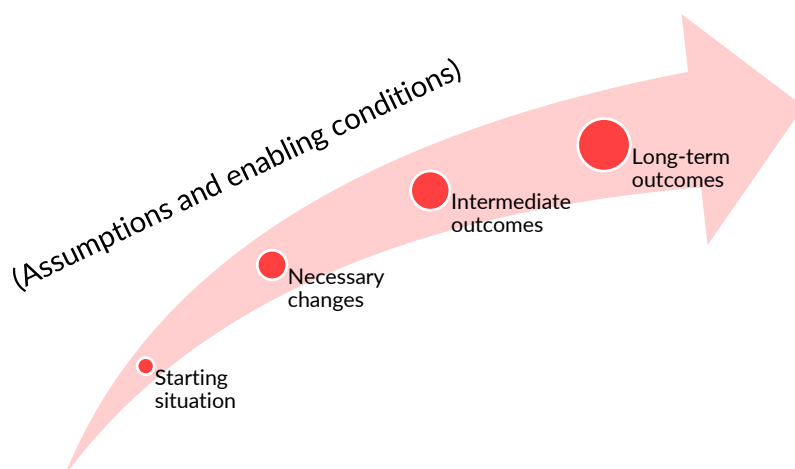
In particular, the guiding principles are designed to be used when it is necessary to prioritize between adaptation options, resolve tensions between sectoral or territorial objectives, and assess the consistency and robustness of the adaptation pathways developed in the subsequent chapters.

1 Anticipation and prevention	Adaptation decisions will prioritize those options that reduce exposure and vulnerability to the identified climate risks in advance, integrating adaptation into planning, land management, and sectoral policies, and avoiding approaches focused solely on emergency responses.	Does the option act before the impact occurs? Is it integrated into regular planning or management instruments?
2 Integration and coherence between policies and scales	Adaptation options will be evaluated based on their ability to generate coherence between sectors and governance levels, avoiding solutions that address one risk in isolation at the cost of increasing vulnerability in other areas or territories.	Have cross-sectoral effects been analyzed? Are there explicit coordination mechanisms?
3 Territorial and rural approach to resilience	Strategic decisions will incorporate a territorial approach, recognizing the role of rural areas and the agri-livestock and forestry systems in managing climate risks, and favoring solutions adapted to the local contexts and territorial dynamics of Castilla y León.	Does the option consider real territorial differences? Does it contribute to strengthening the resilience of the territory, not just a sector?
4 Protection of the population and reduction of inequalities	Adaptation options will be designed and prioritized with explicit consideration of their impact on health, well-being, and social vulnerability, with special attention to the most exposed groups and territories, avoiding disproportionate impacts or exacerbating existing inequalities.	Has it been analyzed who benefits and who bears the costs? Does it reduce existing vulnerabilities?

5 Feasibility and implementation capacity	Strategic decisions will take into account the real institutional, technical, and financial capacities, prioritizing feasible, scalable, and sustainable options over time, and avoiding proposals that cannot be effectively implemented in the context of Castilla y León.	Are there capacities to implement the option? Is it scalable and maintainable in the medium term?
6 Learning, monitoring, and continuous adjustment	Adaptation will be approached as a dynamic process, incorporating monitoring, evaluation, and learning mechanisms that allow for adjustments in decisions and pathways based on the evolution of risks, the results obtained, and the available knowledge.	Are there indicators or monitoring mechanisms? Are reviews or adjustments based on evidence foreseen?

2.1.2 Theory of change

In the context of Pathways2Resilience, the Theory of Change (ToC) serves as the **conceptual bridge between the Vision and action**, explicitly explaining **how progress is expected to be made from the current situation towards higher levels of climate resilience**. Rather than describing specific measures, the ToC articulates the underlying logic of change: what needs to be transformed, through which types of intermediate results, and under what conditions, for the Vision to materialize in a context of climate uncertainty and limited capacities.



In this sense, the ToC provides a framework for the subsequent design of adaptation pathways, helping to identify what **changes should occur first**, how these enable later transformations, and how they cumulatively contribute to reducing vulnerability and strengthening the resilience of both the territory and its population. Its function is not to predict the future, but **to guide strategic decision-making in changing scenarios**, maintaining coherence between the Vision, the guiding principles, and the actions that will be developed in subsequent phases of the Strategy.

In line with the IPCC approach used in the Baseline Report, the logic of change is based on progressively acting on: (i) **exposure**; (ii) **sensitivity**; and (iii) **adaptive capacity**, recognizing that the climate threat will increase and that resilience depends on reducing vulnerabilities and strengthening capacities.

Starting Situation	Necessary Changes	Intermediate Outcomes	Long-term Outcomes
 Decreased water resources			
Castilla y León has already experienced a recent sequence of dry years (2017–2023) and a reduction in water contributions in the Duero basin (below historical averages), with effects on water supply, agriculture, and ecosystems. The risk analysis has been addressed qualitatively due to the lack of downloadable, territorialized exposure and adaptive capacity indicators, limiting monitoring and prioritization.	• Shift from a primarily reactive drought management approach to anticipatory water stress management based on information and planning. • Reduce vulnerability by improving water use efficiency, dependence on single sources, and network losses, and increasing control capabilities (telemetry, meters, demand management). • Close information gaps through a regional indicator system that allows understanding exposure, sensitivity, and adaptive capacity by usage and territories.	• Operational risk monitoring system with water indicators (demand by usage, stress, losses, alternative sources, quality), interoperable and usable for prioritization. • Integration of water adaptation criteria into planning and investments (efficiency, savings, demand management, natural retention solutions where applicable). • Enhanced institutional capacity to activate phased, coordinated drought measures (pre-alert, alert, emergency), with coordination among competent actors.	• Sustained reduction of vulnerability in urban water supply and productive uses to droughts and reduced contributions. • Greater resilience of surface and groundwater bodies (including reduced pressures from over-exploitation in identified areas). • Lower socioeconomic impact of drought episodes due to increased efficiency, source diversification, and stronger governance.
 Increased forest fire risk			
The risk increases due to climatic conditions that promote fuel moisture loss (temperatures, precipitation, dry days), with a territorial pattern that concentrates high impacts in peripheral areas (especially the northwest: León and northern Zamora; also the south of Salamanca and Ávila, among others).	• Shift focus to prevention and land management (landscapes less vulnerable to fire), complementing extinction capabilities. • Integrate urban-forest interface criteria into local planning and management, especially in exposed municipalities. • Improve coordination and continuity between forest planning, civil protection, land	• Territorial prioritization of prevention in high-risk areas (discontinuities, fuel management, mosaics, interfaces). • Systematic incorporation of urban-forest interface criteria in exposed municipalities (regulations, maintenance, self-protection,	• Reduction in the impact of large fires (affected area, damage to population and infrastructure, environmental degradation) in high-risk areas. • Fire-resilient landscapes with lower recurrence of high-severity scenarios, thanks to sustained and

Starting Situation	Necessary Changes	Intermediate Outcomes	Long-term Outcomes
The baseline incorporates a regional map of "danger areas" and analyzes vulnerability considering proximity to exposed areas and population size, reflecting the critical role of the urban-forest interface.	management, and agricultural management to act on exposure and vulnerability.	operational coordination). • Improved preparedness and coordinated response (protocols, logistics, alerts), with strengthened capacity in areas with lower adaptive capacity.	integrated prevention.
 Increased impacts on human health			
The climate threat associated with extreme heat intensifies (high temperatures, warm nights, heatwave duration) and the risk is concentrated where there is: increased heat, exposed and vulnerable population (age, chronic conditions, socioeconomic vulnerability), and low adaptive capacity (access to health services, building energy efficiency, urban greenery). Provinces like Zamora (and patterns in areas of southern León) show critical combinations of aging population and access and urban condition limitations.	• Shift from ad-hoc responses to heatwaves to a sustained preventive approach (anticipation, identification of vulnerable groups, community preparedness). • Strengthen adaptive capacity by improving access to services, thermal comfort in housing, and urban greening/renaturalization. • Integrate climate health considerations into urban planning and social and health services with a territorial approach.	• Heat extreme alert/action protocols aligned with territorial vulnerability, with a special focus on the elderly population and municipalities with lower adaptive capacity. • Progressive improvement of adaptive capacity factors (building thermal efficiency, access to health centers, increased urban greenery) as risk-reducing levers. • Greater coordination between public health, social services, and urban planning to address exposure and sensitivity.	• Reduction in health impacts associated with extreme heat (morbidity, mortality, and critical episodes) and increased habitability in vulnerable urban and rural areas. • Greater community and healthcare system resilience to increasing thermal extremes.
 Loss of productivity in agriculture and livestock			
The risk shows uneven territorial distribution, with higher risk concentrated in provinces like Ávila,	• Move towards more resilient agri-livestock systems to water and thermal stress: adaptation of practices, efficiency,	• Increased adoption of adaptation practices and technologies (water efficiency, soil	• Reduction in productivity losses and greater stability in yields amid climate variability.

Starting Situation	Necessary Changes	Intermediate Outcomes	Long-term Outcomes
Soria, and Segovia, and comparatively lower levels in Palencia and León, linked to differences in adaptive capacity. The baseline incorporates an adaptive capacity analysis, among others, of elements like irrigable areas and management/usage structures (e.g., CUAS), reflecting that vulnerability is not homogeneous and depends on local conditions and capacities.	diversification, and risk management. - Strengthen territorial adaptive capacity (knowledge, advice, organization, access to technologies, and governance of water linked to agricultural use). - Align regional instruments and decisions with support frameworks (including coherence with agricultural policies), avoiding isolated, non-scalable measures.	management, varietal/animal selection, and climate risk management). - Strengthening collective and territorial capacities where risk is higher (management structures, advice, water-agriculture coordination). - Territorial prioritization of support and investment towards areas of greater risk and lower adaptive capacity.	Agri-livestock systems with lower sensitivity and greater adaptation capacity, contributing to the region's economic and territorial resilience.

2.1.3 Future scenario(s)

The Regional Climate Resilience Strategy of Castilla y León is developed in a context marked by high uncertainty. Although the main climate risks have been identified, **it is not possible to predict precisely how they will evolve or under what conditions they will need to be managed.** For this reason, and in line with the Pathways2Resilience approach, the Strategy incorporates a scenario exercise that allows for testing whether the Vision, Theory of Change, and proposed adaptation pathways are valid under different plausible futures.

Specifically, the scenarios have been constructed based on three critical variables:

- Intensity and frequency of climate impacts**
How strong will the climate impacts be (moderate, strong, very strong)?
- Institutional anticipation and coordination capacity**
How well will we be able to anticipate and coordinate (continue reacting / improve somewhat / work in an integrated way)?
- Territorial and social adaptive capacity**
How prepared will the people and territory be to adapt (stagnated capacities / partial improvement / clear improvement)?

These variables do not represent goals or predictions but rather dimensions of uncertainty that can evolve differently over time and directly influence the effectiveness of adaptation decisions.

Based on these three variables, three reference scenarios are proposed, describing plausible contexts in which the Strategy could be applied:

Scenario 1 – High Climate Pressure and Limited Capacities	In this scenario, the climate impacts associated with drought, wildfires, extreme heat, and the loss of agri-livestock productivity intensify notably and recurrently. At the same time, anticipation and coordination capacity advances in a limited way, maintaining predominantly reactive and sectoral approaches. The adaptive capacity of the territory and the population improves unevenly, with significant differences between territories. This scenario represents a high-pressure context, where the Strategy must be able to prioritize realistic, preventive, and scalable decisions, avoiding reliance on assumptions of rapid capacity improvement.
Scenario 2 – High Climate Pressure with Progressive Improvement of Capacities	This scenario assumes high and sustained climate pressure, similar to the previous scenario, but incorporates gradual improvements in anticipation, coordination, and adaptation capacity. Adaptation is progressively integrated into planning and management, institutional capacities are strengthened, and some territorial gaps are reduced, although limitations persist. This scenario reflects a transition trajectory, in which the Strategy contributes to progressively reducing vulnerability, without completely eliminating risks.
Scenario 3 – High Resilience in an Adverse Climate Context	In this scenario, climate impacts reach high levels, but Castilla y León has managed to consolidate high anticipation, coordination, and learning capacity, as well as significant improvement in the adaptive capacity of the territory and the population. Adaptation is systematically integrated into public and private decision-making, and territorial inequalities are reduced. This scenario illustrates the potential of sustained and coherent adaptation and serves as a reference to guide long-term strategic decisions, without assuming a favorable climate context.

2.2 Participatory process

The process has been developed through a progressive participatory approach, aimed at gathering contributions from key stakeholders and reinforcing the legitimacy of the adopted strategic approach. This process has accompanied the various phases of the ADAPT2CyL project, with the goal of contrasting the risk analysis, identifying shared priorities, and exploring the practical implications of climate change adaptation in the regional context.

The stakeholder engagement process has been primarily organized through in-person workshops and working sessions, complemented by continuous exchange spaces with specific actors. In total, several participatory events have been organized, both in-person and in hybrid formats, targeting different profiles of public and private actors, with a deliberately differentiated approach depending on the type of participant.

Participation of Public Administrations:

The involvement of public administrations in the ADAPT2CyL project has been organized through a specific transfer session and the maintenance of an open communication channel throughout the process of developing the Strategy.

The transfer session allowed the sharing of the main advances and results of the risk analysis, as well as contrasting the methodological approach of the Strategy with technical staff from different administrative areas. This exchange facilitated an initial institutional validation of the adopted approach and allowed climate change adaptation to be placed in relation to existing policies and processes.

Additionally, the open communication channel enabled the reception of technical and strategic contributions at various stages of the project, contributing to a continuous co-creation process, tailored to the capacities and availability of institutional actors during this phase.

Participation of the Private Sector and Other Stakeholders:

The participatory process also included specific workshops with the private sector, featuring a diverse representation of companies and organizations linked to sectors such as construction, urban development, infrastructure management, energy, and other relevant economic sectors. These workshops allowed for gathering contributions from an applied perspective, focusing on:

- Identifying perceived climate impacts on economic activities, Barriers and opportunities to integrate adaptation into business decision-making, The role of the private sector in reducing vulnerabilities and implementing adaptation solutions.

The involvement of the private sector helped strengthen the practical dimension of the Strategy and emphasized the importance of creating clear and coherent frameworks that facilitate the alignment of private decisions with climate resilience objectives.

Representativeness and Limits of the Process:

The participatory process included a qualitatively diverse representation of key stakeholders, including public administrations, the private sector, and intermediary organizations. However, the Strategy explicitly acknowledges that not all stakeholders have been equally represented in this phase, particularly certain social groups or local actors with less capacity for structured participation.

This limitation has been considered in the design of the Strategy, reinforcing an approach that prioritizes general frameworks, guiding principles, and flexible pathways, while leaving room to expand and deepen participation in subsequent implementation and monitoring phases.

Ongoing Participation and Next Steps:

Beyond the one-off events, the ADAPT2CyL project has maintained continuous exchange channels with specific key actors, facilitating consultation and contrasting progress throughout the process. The Strategy is also conceived as a living document, whose implementation and monitoring will offer new opportunities to expand and consolidate stakeholder participation in subsequent phases.

2.3 Local champions and ambassadors

At the time of the presentation of this Strategy, the following entities express their commitment to the Climate Resilience Vision of Castile and Leon:

- Castile-Leon Natural Heritage Foundation - As the coordinating body for the ADAPT2CyL project, undertakes to promote the integration of the Strategy into regional environmental planning and to promote its progressive implementation.
- Municipality of Valladolid - As a project partner and a signatory to the EU Mission on Adaptation to Climate Change, it is committed to advancing the territorialisation of adaptation pathways and to sharing learning at regional level.
- Provincial Council of Valladolid - As a project partner, it is committed to facilitating the Strategy's provincial landing and supporting municipalities, especially smaller ones, in integrating climate resilience criteria.
- AEICE Habitat Cluster Efficient - Undertakes to promote the involvement of the business and industrial fabric in the development of the Innovation Portfolio and in the integration of climate resilience criteria into productive decisions.

The Strategy also recognises the commitment of the municipalities in Castile and Leon that are signatories to the Covenant of Mayors for Climate and Energy, whose accession provides a solid basis for local implementation of adaptation actions, as well as alignment with European climate adaptation initiatives.

It is intended that in the formal approval process of the Strategy, the 204 entities mapped as stakeholders will be invited to become ambassadors of the Strategy.

3 Climate resilience objectives

3.1 Planning objectives

Building effective climate resilience requires starting with a shared **diagnosis of the main structural challenges** facing the territory and **translating that diagnosis into strategic objectives capable of guiding action**.

This section defines the objectives that will guide both the Climate Change Adaptation Strategy and the subsequent Action Plan and Investment Plan, in line with the approach proposed by P2R.

These objectives respond to a dual logic: on one hand, they aim to directly reduce the impacts derived from the identified climate risks; on the other hand, they seek to maximise the social, economic, and ecological co-benefits of adaptive action.

Challenge statement

Castilla y León faces a growing set of climate risks that directly affect the availability of water resources, the incidence of forest fires, public health, and the viability of agri-livestock systems, among others. As highlighted by the baseline analysis, these risks are not only determined by the evolution of climate threats but also by **territorial inequalities, heterogeneous adaptive capacities, and still fragmented governance**, which affect the effectiveness of existing responses.

The main strategic challenge for the region's climate resilience lies in the need **to transform how decisions are made and interventions** are planned in a context of uncertainty. Recent experience shows that predominantly reactive, sectoral, or isolated approaches are insufficient to sustainably reduce the vulnerability of the territory and population to increasingly frequent and intense climate impacts.

This challenge is further compounded by the territorial diversity of Castilla y León, characterized by a vast area, high population dispersion, and significant differences in institutional and social capacity across regions. In this context, the Strategy must be capable of **prioritizing areas where coherent and sustained strategic action can generate the greatest resilience benefits**, without losing sight of other relevant risks that, while having a lower strategic weight, still require complementary action.

At the same time, the Strategy must acknowledge that climate change adaptation is a **dynamic and progressive process**, shaped by the evolution of climate impacts and by the real capacity for anticipation, coordination, and learning within the regional system. This requires defining objectives that are valid across different future scenarios and that enable progress both in directly reducing vulnerabilities and in strengthening the governance frameworks, capacities, and resources necessary to sustain adaptation over time.

From this perspective, Castilla y León's strategic challenge is **to articulate an integrated and prioritized response** that allows decisive action on the most strategically relevant risks, while reinforcing the structural conditions that make effective and equitable adaptation possible across the entire territory.

Primary adaptation objectives

The primary objectives of the Strategy are focused on prioritising the **most strategically relevant risks identified in the baseline analysis**, whose evolution decisively influences the climate resilience of Castilla y León. These risks (related to the availability of water resources, forest fires, the impacts of climate change on human health, and agri-livestock productivity) require a specific and sustained strategic response, capable of generating significant changes in reducing vulnerabilities.

Other climate risks identified in the baseline analysis (such as flood risk, loss of ecosystem services, impacts on tourism and cultural heritage, or damage to infrastructure) present medium or low strategic priority in the current context of Castilla y León. Although the main focus is on the high-priority risks, the Strategy also incorporates two additional primary, integrative objectives, aimed at addressing these medium or low-priority risks, which, due to their territorial nature or the value of the assets affected, influence the overall resilience of Castilla y León.

In this context, the following primary adaptation objectives are established:

OP 1. Reduce structural water vulnerability

Progressively reduce the vulnerability of Castilla y León to the decrease in water resources and increased water stress, integrating climate change adaptation into water management, land planning, and key urban and productive uses.

This objective seeks to move from reactive drought management approaches to anticipatory and strategic water risk management, enhancing water use efficiency, planning capacity, and coherence between sectoral decisions. The reduction of water vulnerability is conceived as a gradual process that combines improvements in information, governance, and decision-making, with special attention to territorial inequalities and the uses most sensitive to climate change.

OP 2. Reduce the impact of forest fires

Reduce the severity and impacts associated with forest fires on the population, territory, and productive systems, strengthening prevention, landscape management, and anticipation approaches, in complementarity with extinction and emergency response capabilities.

This objective recognizes that the increasing risk of forest fires is one of Castilla y León's main climate challenges and that effective management requires sustained action on the structural factors that determine the territory's vulnerability. In this regard, the integration of climate change adaptation into forest, land, and local planning is prioritized, along with strengthening capabilities in particularly exposed areas, including the urban-forest interface.

OP 3. Protect the health and well-being of the population against climate impacts

Reduce the impacts of climate change on human health and the well-being of the population, particularly concerning the rise in extreme heat and other adverse climate events, paying special attention to the most vulnerable groups and territories.

This objective addresses adaptation from a preventive and territorialized perspective, strengthening the capacity of public health systems, social services, and urban planning to anticipate and manage climate risks. Health protection is seen as a central component of climate

resilience, integrating considerations of equity, population aging, and access to services in decision-making.

OP 4. Strengthen the resilience of the agri-livestock system to climate change

Increase the capacity of Castilla y León's agri-livestock system to adapt to climate variability and impacts, reducing productivity loss and reinforcing the sector's economic and territorial stability.

This objective focuses on reducing the sensitivity of the agri-livestock system to water stress, heat stress, and climate variability by promoting practices, management models, and capacities that favour progressive and territorially differentiated adaptation. The resilience of the sector is seen as a key element for territorial cohesion and the maintenance of economic activity in rural areas, in line with existing regulatory and support frameworks.

OP 5. Strengthen territorial and ecosystem resilience to climate risks

Reduce the vulnerability of the territory to territorial climate risks, such as flooding and loss of ecosystem services, by systematically integrating climate change adaptation into territorial planning, land management, and the conservation and restoration of ecosystems.

This objective recognizes the key role of natural systems and land management in regulating climate impacts and reducing risks, as well as their function as support for the overall climate resilience of Castilla y León. Its formulation responds to the need to address these risks strategically but proportionally, reinforcing preventive approaches and nature-based solutions, in coherence with existing sectoral and territorial frameworks.

OP 6. Protect strategic assets from climate change impacts

Reduce the vulnerability of Castilla y León's strategic assets (including critical infrastructures, tourism, and cultural heritage) to the impacts of climate change, integrating climate resilience criteria into their planning, design, maintenance, and management.

This objective aims to anticipate and minimize climate impacts on assets with high economic, social, and cultural value, whose damage could cause significant disruptions at the local and regional levels. Its approach prioritizes integrating adaptation into existing planning and investment processes, favouring coherent solutions and avoiding the creation of new vulnerabilities in the medium and long term.

Secondary resilience objectives

The secondary resilience objectives address those goals that, while not directly targeting a specific climate risk, **strengthen the structural conditions necessary for adaptation to be effective, sustained, and equitable**. These objectives act on transversal dimensions that influence the viability and impact of the primary objectives across the entire territory.

The formulation of secondary objectives allows for a broad view of climate resilience, aligned with regional development goals, public expenditure efficiency, and territorial cohesion. At the same time, it prevents diluting the strategic focus of the Strategy by recognizing that these areas **should act as enablers of the adaptation process**, not as isolated ends.

In this context, the following secondary objectives are established:

OS 1. Strengthen governance and multilevel coordination for adaptation

Consolidate a climate change adaptation governance model that enhances coordination between sectors and governance levels, systematically integrating climate resilience into public policies and strategic decision-making.

This objective recognizes that the effectiveness of adaptation largely depends on institutional coordination capacity, role clarity, and coherence between sectoral policies. The Strategy aims to move towards more integrated governance, facilitating anticipation, avoiding duplication, and enabling the management of priority climate risks from a transversal perspective, aligned with national and European frameworks.

OS 2. Strengthen capacities, information systems, and financial mechanisms for resilience

Progressively strengthen the technical and institutional capacities, information and monitoring systems, and financial mechanisms necessary for implementing climate change adaptation effectively, sustainably, and in an evaluable manner.

This objective serves as a structural pillar of the Strategy, aimed at ensuring that progress in climate resilience is feasible over time and adaptable to different future scenarios. It includes strengthening the knowledge base, improving the availability and use of data for decision-making, and integrating adaptation criteria into planning, investment, and public and private financing processes.

3.2 Economic rationale

The Climate Resilience Strategy for Castilla y León is supported by an economic justification based on **the reduction of recurrent costs, improved public expenditure efficiency, and the protection of essential assets and services against increasing climate impacts**. The climate risks identified in the baseline analysis are already generating significant economic impacts in the region, both in the form of direct costs associated with emergency management and persistent economic losses in key sectors.

The natural disasters that occurred in Spain during 2023, analysed through the Disaster Barometer prepared by Aon Foundation, illustrate the increasing economic cost of extreme events associated with climate change and provide a relevant reference for sizing their impact also on Castile and Leon. Overall, natural disasters in 2023 accounted for an estimated total cost of EUR 4.450 billion, compared with around EUR 2.900 billion the previous year (+ 53 %), showing an increasing trend in the frequency and intensity of direct and indirect economic impacts.

Of this total, the estimated impact on national gross domestic product (GDP) is €1.879 billion, broken down into direct uninsured damage, indirect effects and induced impacts on economic activity.

The agricultural sector was particularly affected, with insured compensation reaching more than €1.240 billion, especially due to climatic events such as drought that have a direct impact on crop productivity.

Although these data refer to the whole country, Castile-Leon, due to its production structure (with a significant weight of the agricultural sector, extensive non-irrigated areas and a strong presence of local economies linked to natural resources) it is particularly vulnerable to these phenomena and the associated costs. This evidence supports the need to invest early in climate resilience measures capable of reducing future economic losses, strengthening the stability of strategic productive sectors and alleviating pressure on regional public budgets.

- In 2023, the compensation paid by Agroseguro to farmers in Castile and Leon reached approximately €233 million, marking a historical record in the community and almost tripling the amounts for 2022. This figure directly reflects the effects of phenomena such as drought and other adverse climatic events on extensive arable crops, the main regional agricultural production base.
- In 2025, preliminary estimates also indicate that claims for storm and adverse events claims amounted to around €52.5 million in this community alone.
- Similarly, at sectoral level, the occurrence of events such as forest fires increased agricultural compensation to around €4 million in 2025, exceeding previous years' amounts.

These data, together with the national context where events such as the DANA (*high-altitude isolated depression*) of October 2024 have generated compensation payments by the Insurance Compensation Consortium exceeding €2.300 million, confirm that climate risks represent a significant financial burden for producers, public administrations and insurance systems, and that inaction against climate adaptation can translate into recurrent and increasing costs for the whole regional economy.

Currently, a significant portion of the economic effort to address these impacts is focused on reactive responses, such as drought management, forest fire extinguishing, healthcare during extreme heat episodes, or compensatory aid to the agri-livestock sector after adverse events. While these actions are necessary, they do not structurally reduce vulnerability, which leads to the repetition of similar costs year after year. This situation reflects the existence of an adaptation deficit, understood as the insufficient integration of climate resilience into planning, investment, and regular management.

From an economic perspective, **climate change adaptation constitutes a preventive investment aimed at correcting this inefficiency.** In areas such as water management, forest fire prevention, or territorial planning, integrating adaptation criteria allows for the reduction of the probability and magnitude of future impacts, avoiding recurring extraordinary expenses and improving the stability of public services. The Strategy prioritizes this approach by promoting decisions that reduce exposure and vulnerability before impacts occur, rather than merely repairing the consequences later.

Furthermore, many of the areas addressed by the Strategy exhibit clear characteristics of public goods or collective goods, whose benefits are not fully captured by individual actors. The prevention of fires, the conservation of ecosystem services, sustainable land management, and the generation of useful climate information for decision-making all provide broad, long-term benefits but require coordinated public intervention for effective provision. The economic justification for the Strategy is thus based on the need to correct market failures and ensure the adequate provision of these goods.

In key productive sectors for Castilla y León, such as agriculture and livestock, climate adaptation helps reduce economic volatility and dependence on extraordinary aid, strengthening the sector's productive stability and medium-term viability. Similarly, integrating climate resilience into the planning of infrastructure, tourism, and cultural heritage allows for the anticipation of risks and avoids investments that could generate new vulnerabilities or high future adaptation costs.

The Strategy also incorporates an economic and territorial dimension by acknowledging that climate impacts affect the territory and population unevenly. Rural areas, climate-dependent productive systems, and certain vulnerable groups bear a greater burden of impacts, which can translate into higher long-term social and economic costs. Investing in adaptation helps reduce these inequalities and strengthens territorial cohesion, aligning climate resilience with broader goals of well-being and regional development.

In summary, the Strategy presents a clear economic case for adaptation, understood as an investment that reduces recurrent costs associated with inaction, improves the efficiency of public and private expenditure, protects strategic assets and essential services, and strengthens the economic and social resilience of Castilla y León in the face of an increasingly challenging climate context.

Synthesis of the Economic and Financial Case for Adaptation

Overall, the Strategy is supported by a clear economic and financial case for adaptation, understood as an investment that:

- Reduces future costs associated with climate inaction;
- Improves the efficiency of public and private expenditure;
- Protects public services and strategic assets;
- Corrects market failures in the provision of collective goods;
- Contributes to long-term social and territorial objectives.

This framework justifies the need to move towards a progressive and coherent mobilisation of resources, which will be developed in greater detail in the associated action plan and investment plan of the Strategy.

PART 1

What is the scope of this strategy?

3.3 Just resilience considerations

Climate resilience in Castilla y León has a **clearly differentiated social and territorial dimension**, arising from the heterogeneity of the territory, demographic structure, and the uneven distribution of capacities to anticipate and manage the impacts of climate change. Integrating just resilience considerations into the Strategy means explicitly acknowledging these inequalities and guiding strategic decisions in a way that **does not reproduce or amplify existing vulnerabilities**.

The baseline analysis and the participatory process have highlighted that certain **population groups and territories** are more vulnerable:

- Aging population, especially in rural areas, more vulnerable to extreme heat episodes and with less access to prevention and care services.
- Rural and dispersed territories, with high dependence on climate-sensitive agri-livestock systems and lower institutional and technical capacity to implement adaptation measures.
- Small agricultural and livestock farms, with less economic margin to absorb recurrent losses and adapt their production systems.
- Municipalities highly exposed to forest fires, especially in urban-forest interface areas, where the impacts affect the population, natural heritage, and economic activity simultaneously.
- Groups with lower economic capacity, for whom climate impacts may translate into additional costs that are difficult to bear (health, energy, water).

These inequalities not only increase vulnerability to climate impacts but also condition the real capacity to benefit from adaptation measures if they are not designed taking into account the different starting situations.

Implications for the design of the strategy and the action plan

From a just resilience perspective, the Strategy assumes that **adaptation measures cannot be applied uniformly** across the territory nor rely solely on the individual response capacity of actors. Therefore, the prioritized objectives and actions include explicit criteria to:

- Prioritize territories and groups with greater vulnerability, especially in water management, forest fire prevention, and protection against extreme heat;
- Reduce barriers to access to adaptation, strengthening technical capacities, information, and institutional support in areas where adaptive capacity is lower;
- Avoid disproportionate burdens, ensuring that adaptation measures do not transfer excessive costs to actors with lower economic or technical capacity.

These criteria are especially relevant in decisions related to territorial planning, landscape management, adaptation of the agri-livestock system, and public health protection, areas where poor allocation of efforts can deepen existing inequalities.

Fair distribution of resources and efforts

From a just resilience perspective, the allocation of resources for adaptation must consider not only the magnitude of the risk but also the **capacity of territories and actors to bear the**

adaptation costs. The Strategy directs the design of the action plan and investment plan towards:

- A progressive distribution of resources, strengthening territories and groups with the greatest capacity gaps;
- The use of financing and support mechanisms that do not penalize the most vulnerable actors;
- Integration of equity criteria in the prioritization of actions, especially in areas such as water, fire prevention, and rural areas.

Just Resilience as a Cross-cutting Evaluation Criterion

Finally, just resilience is incorporated into the Strategy as a **cross-cutting evaluation criterion**, both for processes and outcomes. This means assessing not only whether actions reduce climate risk in aggregate terms, but also who benefits from them and to what extent, and whether they contribute to reducing or exacerbating territorial and social inequalities.

In this regard, the Strategy establishes a foundation for monitoring and evaluation mechanisms to include indicators related to territorial and social equity, reinforcing adaptation that is not only effective from a climatic perspective but also **just and socially sustainable**.

4 Adaptation pathways

Planning for climate change adaptation in contexts of high uncertainty requires approaches that **allow for progressive, flexible, and adjustable advances over time**, avoiding both inaction and rigid decisions that may prove ineffective or costly in future scenarios that differ from those anticipated. In this framework, the Strategy adopts the adaptation pathways approach, widely used in international climate planning and promoted by initiatives such as P2R, as well as by reference bodies in climate change adaptation.

Adaptation pathways allow for structuring the strategic response as a **sequence of decisions and adaptation options**, which can be activated, scaled, or adjusted based on the evolution of climate risks, institutional capacities, and the socioeconomic context. This approach is particularly suitable for Castilla y León, given the progressive nature of the identified climate impacts and the need to manage these risks without relying on a single future scenario.

Unlike approaches based on rigid plans or the pre-definition of fixed measures, **adaptation pathways facilitate planning oriented towards learning**, where decisions can be reviewed based on change signals, avoiding early blockages and keeping future options open. In this Strategy, the pathways do not replace the action plan but instead **establish the strategic framework that guides its design and prioritization**.

4.1 Main performance, assessment and evaluation criteria

To evaluate and compare the different adaptation pathways considered for each risk, the Strategy has applied a limited set of **performance criteria**, aligned with the objectives defined in Chapter 3 and the methodological guidelines of P2R. These criteria have been used qualitatively and comparatively, with the aim of identifying those pathways that offer the best balance between effectiveness, feasibility, and flexibility in the context of Castilla y León.

In particular, the following criteria have been considered:

- Contribution to reducing the priority risk, evaluating to what extent the pathway allows for the progressive reduction of vulnerability associated with each addressed climate risk.
- Robustness under different scenarios, understood as the pathway's ability to generate benefits in diverse climatic and socioeconomic contexts, without relying on a single future scenario.
- Flexibility and adaptability, assessing whether the pathway allows for modifying the pace, intensity, or sequence of decisions based on change signals or new information.
- Institutional and technical feasibility, considering the degree of alignment of the pathway with the current and foreseeable capacities of the administrations and actors involved in Castilla y León.
- Coherence with broader resilience objectives, including considerations of territorial equity, social cohesion, and efficiency in the use of public resources.

These criteria have been applied considering **boundary conditions and key assumptions**, such as the availability of adequate information, the capacity for coordination across governance levels, and the need to avoid undesirable negative impacts on specific territories or groups. The application of these criteria has allowed for identifying, for each risk, **alternative adaptation**

pathways, evaluating their relative performance, and selecting those considered as preferred, as presented in the following sections.

4.2 List of adaptation options, their characteristics and performance

In line with the adaptation pathways approach adopted by the Strategy, for each of the climate risks addressed, **alternative adaptation pathways** have been identified and evaluated, differing in sequence, activation timing, and the level of ambition of the considered adaptation options. These pathways represent plausible trajectories for managing risks over time, rather than fixed sets of measures, and allow for exploring different ways to advance towards the defined resilience objectives.

For each risk, **three types of alternative pathways** have been considered, representing contrasting management approaches over time: a reactive pathway, focused on responding to impacts; an anticipatory and progressive pathway, aimed at the gradual reduction of vulnerabilities; and, when relevant, an early transformative pathway, based on structural changes of greater scope.

Each of the alternative pathways has been evaluated qualitatively based on the performance criteria defined in section 4.1, with particular attention to its contribution to risk reduction, robustness under different climate scenarios, institutional feasibility, and adaptability over time. This comparative evaluation has allowed for identifying the main adaptation limits associated with each pathway, as well as possible negative effects or tensions that would need to be managed.

The table presented below summarizes, for each risk, the alternative pathways considered. This exercise does not seek to exhaust all possible trajectories but aims to transparently document the evaluation and selection process and serve as the basis for the further development of the preferred pathways and the associated Action Plan.

Pathway	Implementation sequence	Performance	Limits	Mitigation of negative effects
 Decreased water resources				
Reactive	Drought management → emergency measures → compensations	• Low in structural risk reduction; low economic efficiency	• Repetition of costs; does not reduce vulnerability	• Not applicable
Anticipatory and progressive	Information and planning → efficiency and sectoral coherence → structural adjustments	• High in risk reduction; high flexibility; good institutional feasibility	• Dependence on technical capacities and coordination	• Progressive strengthening of governance and capacities

Pathway	Implementation sequence	Performance	Limits	Mitigation of negative effects
Early transformational	Immediate structural changes → reconfiguration of uses	• High potential for risk reduction, but low short-term feasibility	• Social and territorial risks; high initial investment	• Apply only if impacts increase significantly
 Increased forest fire risk				
Reactive	Extinction → post-fire restoration	• Low in structural risk reduction; high recurrent cost	• Does not reduce fuel accumulation	• Not applicable
Anticipatory and progressive	Prevention → landscape management → strengthening local capacities	• High in risk reduction; good robustness	• Requires continuity over time	• Long-term governance and planning
Early transformational	Intense landscape reconfiguration from the initial phases	• High potential, low initial feasibility	• Territorial and social conflicts	• Gradual and localized implementation
 Increased impacts on human health				
Reactive	Healthcare → emergency response	• Low in prevention; pressure on services	• System saturation	• Not applicable
Anticipatory and progressive	Prevention → urban adaptation → strengthening social services	• Medium-high; improves social resilience	• Depends on local scale	• Intersectoral coordination
Early transformational	Intensive urban redesign	• High long-term potential	• High initial investment	• Progressive integration into planning
 Loss of productivity in agriculture and livestock				
Reactive	Compensatory aid → crisis management	• Low; does not reduce vulnerability	• Dependence on subsidies	• Not applicable
Anticipatory and progressive	Resilient practices → capacities → technical support	• Medium-high; good feasibility	• Uneven profitability	• Technical and financial support

Pathway	Implementation sequence	Performance	Limits	Mitigation of negative effects
Early transformational	Rapid shift in production models	• High potential	• Economic risk for small producers	• Gradual and voluntary application
  Flooding and loss of ecosystem services				
Reactive	Grey infrastructure → damage repair	• Low; local and temporary effects	• High cost	• Not applicable
Anticipatory and progressive	Territorial planning → NbS → ecosystem restoration	• High; multiple benefits	• Maturation time	• Medium-term planning
Early transformational	Immediate large-scale renaturalisation	• High potential	• Land use conflicts	• Participatory processes
  Impacts on infrastructure, tourism, and cultural heritage				
Reactive	Repair after damage	• Low; high costs	• Does not reduce exposure	• Not applicable
Anticipatory and progressive	Integration of climate into planning and investment	• Medium-high; good efficiency	• Dependent on regulation	• Regulatory adjustments
Early transformational	Comprehensive redesign of assets	• High potential	• Cost and complexity	• Selective implementation

4.3 List of preferred adaptation pathways and their performance

Based on the comparative evaluation of the alternative pathways presented in section 4.2, the Strategy identifies a set of preferred adaptation pathways for each of the climate risks addressed. These pathways do not represent unique or closed trajectories but rather robust strategic options, selected for their capacity to progressively reduce vulnerabilities, maintain flexibility in the face of uncertainty, and be feasible within the institutional and territorial context of Castilla y León.

Each preferred pathway is described below, with an emphasis on its operational logic, temporal sequence, and contribution to the Strategy's objectives, and including a summary evaluation of its performance against the criteria defined in section 4.1.

Preferred pathway for reducing water vulnerability

The preferred pathway for managing the decrease in water resources is based on anticipatory and progressive risk management, aimed at preventing water stress from translating into recurrent impacts on water supply, productive systems, and territorial cohesion. This pathway responds to the structural nature of water risk in Castilla y León and the need to operate under conditions of high climate uncertainty.

In the initial phase, the pathway prioritizes strengthening information, planning, and intersectoral coordination, systematically integrating the climate variable into water management and decisions affecting demand. In the medium term, the emphasis shifts to reducing structural vulnerabilities through improvements in efficiency of use, adaptation of management systems, and greater coherence between sectoral policies. In scenarios of persistent or increasing pressure on the resource, the pathway anticipates deeper adjustments, always conditioned by clear change signals and the system's capacity to absorb them.

Performance evaluation

This pathway performs well against the primary adaptation criteria by directly and sustainably contributing to the reduction of structural water vulnerability. It also shows high robustness under different climate scenarios, allowing the pace and intensity of decisions to be adjusted without relying on a single future scenario. Its progressive approach strengthens institutional feasibility and reduces the risk of premature irreversible decisions, making it the preferred pathway.

Preferred pathway for forest fire prevention and management

The preferred pathway for addressing the increased risk of forest fires focuses on shifting the emphasis from reactive response to structural prevention, recognizing that the recurrence and severity of fires are closely linked to territorial factors and landscape management.

In the first phase, the pathway strengthens the integration of prevention into forest, land, and local planning, as well as coordination among involved actors. In the medium term, landscape management is consolidated to reduce fuel accumulation and enhance ecosystem resilience, with particular attention to urban-forest interface areas. This approach is complemented by progressively strengthening local capacities and the governance mechanisms necessary to ensure the continuity of actions.

Performance evaluation

The pathway performs well in terms of risk reduction and shows good robustness against scenarios of increasing climate pressure by addressing the structural factors that determine vulnerability. Although it requires continuity over time and coordination among multiple actors, its preventive and progressive approach is more efficient and sustainable than alternatives focused solely on extinction, making it the preferred pathway.

Preferred pathway for human health protection against climate impacts

The preferred pathway for protecting human health against the impacts of climate change is based on a preventive and territorialized approach, aimed at anticipating the effects of extreme heat and other adverse climate events on the population, especially the most vulnerable groups.

In the initial phase, the pathway prioritizes the integration of climate adaptation into public health planning and coordination with social services. In the medium term, it strengthens urban adaptation and proximity services, with particular attention to municipalities with higher aging populations and lower response capacity. This approach helps reduce pressure on healthcare services and enhances the system's preventive capacity.

Performance evaluation

This pathway performs moderately well against the primary adaptation criteria by progressively reducing the exposure and vulnerability of the population. Its main strength lies in its institutional feasibility and contribution to equity, though its effectiveness largely depends on the local implementation capacity. Due to its preventive and adaptable nature, it is selected as the preferred pathway.

Preferred pathway for agri-livestock system resilience

The preferred pathway for the agri-livestock system aims to increase the sector's adaptive capacity to climate variability, reducing productivity losses and reinforcing the economic stability of rural areas.

In the initial phase, the pathway promotes the progressive adoption of more resilient practices and management models, supported by technical assistance and capacity-building. In the medium term, it strengthens the integration of adaptation into existing planning and support instruments, avoiding approaches based solely on compensatory aid after adverse events.

Performance evaluation

This pathway performs moderately well by reducing the agri-livestock system's sensitivity to climate impacts without imposing abrupt transformations. Its progressive approach improves economic and social viability, though specific support is needed to avoid unequal effects between farms. For these reasons, it is considered the preferred pathway for the sector.

Preferred pathway for territorial and ecosystem resilience

The preferred pathway for territorial and ecosystem resilience addresses climate risks such as flooding and the loss of ecosystem services in an integrated manner, recognizing the key role of the territory and natural systems in regulating climate impacts.

This pathway prioritizes the integration of adaptation into territorial planning and land management, as well as the progressive use of nature-based solutions and ecosystem restoration. Its development is gradual and relies on medium- to long-term planning, allowing for multiple benefits and avoiding reliance on rigid solutions.

Performance evaluation

This pathway shows high performance in terms of multiple benefits and territorial coherence, although its main limitation is the time required for some measures to fully deploy their effects. Its preventive nature and alignment with long-term resilience objectives justify its selection as the preferred pathway.

Preferred pathway for protecting strategic assets

The preferred pathway for infrastructure, tourism, and cultural heritage is based on the systematic integration of climate resilience criteria into the planning, design, and management of assets, avoiding approaches focused solely on post-damage repair.

This pathway promotes the anticipation of risks in investment and maintenance processes, reducing future exposure and avoiding the creation of new vulnerabilities. Its approach is progressive and supports the adaptation of existing regulatory and planning frameworks.

Performance evaluation

This pathway performs moderately well by improving economic efficiency and reducing medium- and long-term risks. Its main limitation lies in the need for regulatory adjustments and intersectoral coordination, but its coherence with the Strategy's objectives justifies its selection as the preferred pathway.

5 Innovation portfolio

This Strategy relies on two complementary instruments to advance the implementation of the defined adaptation pathways: the Action Plan and the Innovation Portfolio. Although both contribute to the realization of the Strategy, they serve differentiated functions and respond to different logics.

The Action Plan includes those actions that can be implemented immediately, with a sufficient degree of certainty about their effectiveness, feasibility, and impacts, and that allow for direct progress in reducing the priority climate risks. On the other hand, the Innovation Portfolio focuses on those areas where significant uncertainties (technical, institutional, social, or territorial) remain, and where it is necessary to test, experiment, and generate learning before scaling up decisions or investments with broader reach.

Thus, the Innovation Portfolio does not replace the Action Plan nor delay it; rather, it complements it by providing a structured framework to reduce key uncertainties, unblock future decisions, and feed into the progressive revision and adjustment of the adaptation pathways. This approach strengthens the adaptive nature of the Strategy and helps manage the complexity inherent in climate change adaptation in a context of high uncertainty.

5.1 Objectives and alignment with pathways

The primary objective of the Innovation Portfolio of the Strategy is to support the progressive and flexible implementation of the adaptation pathways defined in Chapter 4, addressing those issues for which the available knowledge or current capacities do not yet allow fully informed decision-making.

In this regard, the Portfolio is conceived as a strategic learning tool, aimed at reducing key uncertainties that condition the progress of preferred pathways and generating useful evidence for their adjustment and consolidation over time. The specific objectives of the Innovation Portfolio are as follows:

- **Reduce critical uncertainties associated with the adaptation pathways**, especially in areas such as anticipatory water management, structural forest fire prevention, adaptation of the agri-livestock system, and the integration of climate resilience into territorial and sectoral planning.
- **Test approaches and solutions in real contexts**, through pilot experiences or experimental actions that allow for evaluating their effectiveness, feasibility, and possible unintended effects before scaling them up.
- **Generate applicable learning for decision-making**, facilitating the incorporation of Portfolio results into the periodic revision of the adaptation pathways and the updating of the Action Plan.
- **Promote coherence between innovation and strategic objectives**, ensuring that the initiatives supported explicitly contribute to the adaptation and resilience objectives defined in the Strategy.

The alignment of the Innovation Portfolio with the adaptation pathways is explicit and selective. Not all elements of the pathways require innovation, but only those components where

uncertainty is greatest or where the effectiveness of solutions depends on local conditions, institutional capacities, or social acceptance. In these cases, the Portfolio serves as a testing and learning space, complementary to the actions outlined in the Action Plan.

Furthermore, the Innovation Portfolio supports the Vision of climate resilience in Castilla y León by strengthening a progressive adaptation approach, based on anticipation, flexibility, and continuous improvement. By enabling learning before making decisions and adjusting trajectories based on accumulated experience, the Portfolio contributes to a transition towards more resilient management models, avoiding both inaction and rigid decisions that are difficult to reverse.

5.2 Portfolio composition

The Innovation Portfolio of the Strategy consists of a limited set of priority innovation lines, aligned with the preferred adaptation pathways and aimed at reducing the uncertainties that condition their effective implementation in Castilla y León. These lines are not closed projects and are not designed to be activated simultaneously, but rather represent areas of experimentation and learning, whose development will depend on the availability of resources, institutional capacities, and the results obtained in previous phases.

The composition of the Portfolio seeks to balance different climate risks, territorial scales, and types of innovation, prioritizing those areas where learning can generate the greatest strategic value for future decision-making and the eventual integration of actions into the Action Plan.



Decreased water resources

- **Territorial laboratories for anticipatory water management**, aimed at testing, in selected basins or sub-basins, the integration of climate information, sectoral planning, and criteria for the early activation of measures against water stress.
- **New water governance models at the local scale**, enabling the testing of coordination and shared decision-making mechanisms between administrations, users, and sectors in contexts of scarcity.
- **Decision-support tools for sensitive uses**, designed to assess how to translate water availability scenarios into operational decisions without creating regulatory rigidity.

These innovation lines reduce uncertainty about how to move from strategic planning to effective anticipatory decisions in a diverse and dispersed territorial context.



Increased forest fire risk

- **Landscape management pilots for structural prevention**, focused on testing territorial configurations that reduce fire severity and enhance ecosystem resilience, particularly in high-risk areas.
- **Innovative co-responsibility models in the urban-forest interface**, aimed at testing new forms of responsibility-sharing between administrations, landowners, and local populations in terms of prevention and self-protection.

These lines seek to generate evidence on which preventive approaches are most effective and socially viable in the forestry context of Castilla y León.



Increased impacts on human health

- **Integrated climate adaptation pilots in municipalities vulnerable to heat**, combining actions on the urban environment, social services, and prevention protocols, with special attention to the aging population.
- **Experimental integration of the climate variable in social-health planning**, to explore how to anticipate health impacts without overburdening existing systems.

These innovations allow for testing combinations of measures and organizational models before scaling them up.

Loss of productivity in agriculture and livestock

- **Test beds for resilient agri-livestock practices**, conceived as pilot spaces to assess the technical, economic, and territorial feasibility of adaptive practices against water and thermal stress.
- **New support schemes for the agri-livestock transition**, aimed at testing mechanisms that support the sector's gradual adaptation beyond compensatory aid after adverse events.

These innovation lines address the uncertainty about which practices and models can be scaled in a just and sustainable way in the rural areas of Castilla y León.

Territorial, ecosystemic risks, and strategic assets

- **Pilot projects for nature-based solutions**, to reduce flood risk and restore ecosystem services, with evaluation of multiple benefits and response times.
- **Experimental integration of climate criteria in territorial planning**, aimed at testing how to effectively incorporate climate risk into territorial and urban planning instruments.
- **Early climate evaluation of investments in infrastructure, tourism, and cultural heritage**, through the testing of procedures that integrate climate resilience in the early stages of decision-making.

These lines allow for generating learning on how to protect strategic assets and reduce future vulnerabilities without compromising investment viability and territorial development.

The Innovation Portfolio will be structured in a flexible and evolutionary manner, allowing the different innovation lines to be activated progressively and not simultaneously. The continuity, expansion, or conclusion of each line will depend on the learning generated and its effective contribution to reducing relevant uncertainties for the adaptation pathways.

The results of the Portfolio will be used to inform the periodic revision of the adaptation pathways and the updating of the Action Plan, facilitating the transition from experimentation to larger-scale implementation when sufficient evidence is available on the effectiveness and feasibility of the solutions tested.

6 Regional capacity

6.1 Resilience Maturity Curve

The Strategy has incorporated the Resilience Maturity Curve (RMC) as a strategic reflection tool to identify those capacities that are critical for the effective implementation of the defined adaptation pathways. The RMC is not used as a classification or comparison exercise, but rather as a framework to prioritize institutional and technical strengthening efforts based on the specific needs of Castilla y León.

The application of this approach has highlighted that, while the Community has a solid foundation in climate and sectoral planning, the implementation of the Strategy requires prioritizing progress in a limited set of maturity areas, directly linked to managing uncertainty, the cross-cutting nature of adaptation, and the progressive learning approach adopted. Specifically, the following critical areas for improvement have been identified:

- **Cross-cutting integration of climate change adaptation into sectoral policies and decisions**, beyond specific instruments, so that adaptation pathways translate into coherent decisions in areas such as water, territory, rural development, health, and infrastructure.
- **Capacity to use climate knowledge and data in decision-making**, especially to support anticipatory approaches, define adjustment points in pathways, and guide both the Action Plan and the Innovation Portfolio.
- **Learning, monitoring, and adaptive adjustment capacity**, necessary to evaluate the performance of pathways, incorporate lessons learned from experimentation, and adapt decisions based on the evolution of risks and the context.

These areas of improvement are not isolated weaknesses, but rather key enabling conditions to advance in the Resilience Maturity Curve and ensure that the Strategy can be implemented effectively, flexibly, and sustained over time.

6.2 Role of key enabling conditions

As mentioned, the effective implementation of the Strategy depends not only on the definition of objectives, adaptation pathways, or innovation lines, but also on the existence of **adequate enabling conditions** (KECs) that allow these strategic elements to be translated into concrete decisions and actions. In this sense, the KECs are essential cross-cutting capacities to sustain the implementation of the Strategy.

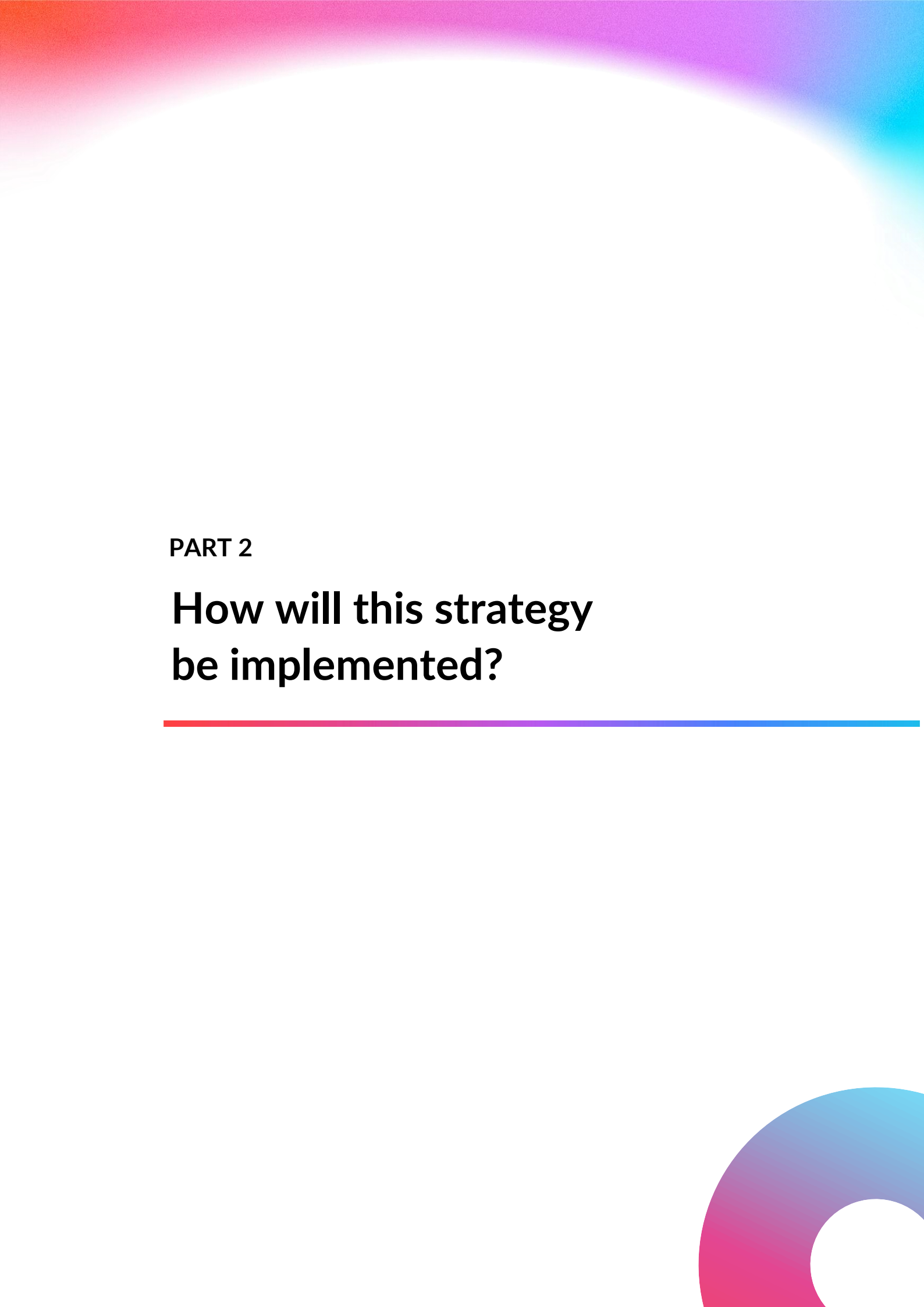
The analysis of the Resilience Maturity Curve has identified a limited set of **KECs whose improvement is critical for the progressive deployment of adaptation pathways** and the Innovation Portfolio.

For each of the selected KECs, their specific role in the implementation of the Strategy is described below, along with the main gaps that need to be addressed to strengthen their contribution. This approach allows for focusing capacity-building efforts on areas that provide the greatest strategic value for climate resilience in Castilla y León, avoiding unnecessary resource dispersion.

Knowledge and data	
Role in implementation	Climate and territorial knowledge and data are an essential enabling condition for the implementation of adaptation pathways, especially those based on anticipatory approaches. In Castilla y León, the effective use of climate information is key to defining adjustment points in adaptation pathways, guiding the progressive activation of adaptation options, and supporting both the Action Plan and the Innovation Portfolio. This KEC enables improved decision-making quality under uncertainty, avoiding reactive responses and facilitating the prioritization of actions based on the evolution of risk.
Gaps	There are still gaps in the operational integration of climate knowledge into sectoral and territorial decision-making processes, as well as in the interoperability and accessibility of existing data. In particular, it is necessary to advance in translating complex climate information into formats that can be used by public authorities and local actors, and to systematically incorporate scenarios and change signals into everyday planning and management.

Capabilities and skills	
Role in implementation	Technical and organizational capacities are crucial for the progressive and adjustable deployment of adaptation pathways over time. In the context of Castilla y León, these capacities allow for the integration of adaptation into existing sectoral policies, managing territorial complexity, and gradually scaling solutions that prove effective. This KEC is particularly relevant for the development of the Innovation Portfolio, as it facilitates experimentation, monitoring, and evaluation of pilot initiatives.
Gaps	Gaps have been identified in the availability and distribution of specialized technical capacities, particularly at the local scale and in specific sectoral areas. Additionally, there is a need to strengthen organizational capacities to work in a cross-cutting and adaptive manner, overcoming compartmentalized approaches and strengthening internal coordination and learning mechanisms within the involved administrations.

Participation and collaborative learning	
Role in implementation	Participation and collaborative learning act as enabling conditions for the effective implementation of adaptation pathways, especially for those risks that require co-responsibility and adaptation to diverse local contexts. In Castilla y León, this KEC allows for generating social legitimacy, incorporating territorial knowledge, and facilitating mutual learning among administrations, sectors, and local actors, thereby strengthening the adaptive nature of the Strategy.
Gaps	Although there are prior experiences with participation, gaps remain in consolidating stable mechanisms for continuous learning and in systematizing the lessons learned from experimentation. There is a need to move towards formats that enable not only occasional consultation but also regular exchange of experiences and the effective incorporation of collaborative learning outcomes into decision-making and the revision of adaptation pathways.



PART 2

How will this strategy be implemented?

7 Governance

7.1 Strategy implementation governance

The implementation of the Castilla y León Strategy is based on a **multilevel governance model**, designed to reflect the territorial diversity of the Community and ensure that the defined adaptation pathways can be translated into concrete decisions and actions at the local scale. This approach recognizes that climate resilience cannot be addressed uniformly in a territory characterized by high municipal heterogeneity, a significant rural component, and persistent depopulation processes.

In this framework, the **Government of Castilla y León** plays a strategic leadership role, ensuring the overall coherence of the Strategy, its alignment with existing regulatory and planning frameworks, and coordination between sectoral policies. However, the effective implementation of the Strategy requires **close collaboration with provincial and local levels**, enabling the territorialization of objectives and adaptation of actions to highly diverse contexts.

The **provincial councils** play a key role as **intermediary structures supporting municipalities**, especially in rural areas and those with lower technical and administrative capacities. Their function is essential in facilitating the dissemination of the Strategy, supporting the adaptation of pathways to the local scale, and strengthening implementation capacity in areas affected by depopulation.

In this regard, the **Provincial Government of Valladolid**, as a member of the ADAPT2CYL consortium, is advancing in adapting the regional Strategy to the provincial scale, exploring territorialization, coordination, and municipal support mechanisms with potential demonstration value. This provincial-level implementation exercise is conceived as a **pilot experience**, aimed at generating transferable lessons to the entire Community. The province of Valladolid also presents favorable conditions for this demonstrator approach, both due to the leading role of the city of Valladolid (a participant in the Mission Cities and with commitments in the Mission for Adaptation) and the coexistence of urban, peri-urban, and rural realities reflecting the territorial diversity of Castilla y León.

The **participation of municipalities** is a central element of the governance model for implementation. Given the proximity of local entities to climate impacts and the population, their involvement is essential to adapt the adaptation pathways to local realities, identify specific priorities, and ensure the effectiveness of actions. The Strategy promotes an implementation approach that recognizes the different municipal capacities and is supported by mechanisms of accompaniment, coordination, and shared learning, avoiding uniform approaches that do not respond to the territorial diversity.

The proposed governance model does not establish rigid hierarchies but is based on **vertical and horizontal coordination** between administrative levels, aimed at facilitating the progressive implementation of the Strategy and reinforcing coherence between regional, provincial, and local decisions. This approach allows for progress in the territorialization of climate change adaptation while laying the foundations for the gradual scaling of pilot experiences and the future involvement of all provincial councils in deploying the Strategy.

7.1.1 Governance of the innovation portfolio

The governance of the Innovation Portfolio is conceived as a **structured collaboration space between public and private actors**, aimed at facilitating experimentation, learning, and generating applied evidence for the implementation of the adaptation pathways defined in the Strategy. Unlike the overall governance of implementation, this area focuses on **co-creating solutions**, managing uncertainty, and transferring learnings, in alignment with the approach promoted by P2R.

The **ADAPT2CYL Consortium** forms the core of this governance, acting as a coordination and strategic alignment platform between the various involved actors. In this framework, public administrations, private sector agents, and the academic field provide differentiated capacities, which are articulated complementarily according to the nature of the innovation lines developed.

The **private sector** plays a relevant role in the Innovation Portfolio, not as a mere recipient of policies but as an **active participant in experimentation and solution validation**. In this context, the participation of **AEICE**, as a member of the ADAPT2CYL consortium, is particularly significant. AEICE acts as an **intermediary agent** with the capacity to effectively engage companies, professionals, and entities from the habitat, building, and other sectors linked to the territory, facilitating the connection between the Strategy's strategic objectives and the real dynamics of the productive fabric. Beyond its sectoral dimension, AEICE provides a transversal role in the governance of the Portfolio by facilitating spaces for dialogue, co-creation, and knowledge transfer between the private sector, administrations, and other actors. This function is key to ensuring that the innovations tested are technically and economically viable and to fostering their eventual scaling or integration into the Action Plan when sufficient evidence of their effectiveness is available.

The **academic and research sector** is integrated into the governance of the Portfolio as a support for knowledge-based decision-making. The Strategy includes the strengthening of collaboration mechanisms with universities, research centres, and independent experts, including the potential creation of a **technical-scientific advisory committee**, with the aim of providing evidence, evaluating results, and contributing to the continuous learning of the Portfolio. This approach allows for enriching strategic decisions with scientific and technical knowledge, while maintaining the applied and territorial orientation of the innovations.

Interaction between the various actors of the Portfolio is supported by **flexible coordination, alignment, and learning mechanisms**, which facilitate the adaptation of innovation lines based on the results obtained. These mechanisms include spaces for periodic exchange, joint monitoring of pilot experiences, and reflection processes aimed at extracting transferable lessons to other territorial or sectoral contexts.

Overall, the governance of the Innovation Portfolio strengthens Castilla y León's capacity to **experiment before scaling**, manage uncertainty proactively, and build stable alliances between the public sector, private sector, and the knowledge domain. This approach contributes to a more robust and adaptive implementation of the Strategy, aligned with the principles of continuous learning and collaboration promoted by P2R.

7.2 Strategy integration

This Strategy is conceived as an integrative framework, designed to interact coherently with the existing network of policies, plans, and decision-making processes at different governance levels. Its goal is not to create new parallel structures but to reinforce, guide, and coordinate existing initiatives, systematically incorporating climate change adaptation into public action and strategic decision-making.

Integration at the regional level

At the regional level, the Strategy is integrated with the main sectoral and territorial planning instruments of the Community, acting as a **cross-cutting reference framework** for incorporating climate resilience criteria. In particular, the Strategy reinforces coherence between policies related to water, the natural environment, rural development, health, territorial planning, and infrastructure, facilitating a shared understanding of climate risks and adaptation priorities.

This approach allows for overcoming fragmented sectoral treatments and advancing towards a **shared vision of adaptation**, aligned with regional development objectives and the climate commitments made by Castilla y León. At the same time, the Strategy provides a useful framework to guide the future revision of existing instruments, progressively incorporating the defined adaptation pathways.

Integration at the provincial and local level

Integrating the Strategy at the provincial and local level is essential to ensure its effectiveness in a territory characterized by high municipal diversity and depopulation dynamics. In this context, the provincial councils act as **key nodes for articulation**, facilitating the connection between the regional strategic framework and the reality of the municipalities, especially those with lower technical and administrative capacities.

The experience of adapting the Strategy to the provincial scale driven by the Provincial Government of Valladolid serves as an **example of operational integration**, aimed at adapting the adaptation pathways to specific territorial contexts and generating transferable lessons to other provinces. This approach promotes a gradual integration of the Strategy into local planning and management, respecting municipal autonomy and avoiding uniform approaches that do not respond to the diversity of the territory.

Integration with national and European frameworks

The Strategy aligns with national and European frameworks on climate change adaptation, contributing to the vertical coherence of public policies. In particular, it is integrated with the objectives and approaches promoted at the European level, such as **the European Missions on Cities and Climate Adaptation**, reinforcing the role of Castilla y León in the territorial implementation of these initiatives.

In this sense, the participation of the city of Valladolid in the Mission Cities and its commitments under the Mission for Adaptation strengthen the Community's capacity **to connect local action with European agendas**, generating synergies between innovation, financing, and learning. The

Strategy provides a regional framework that facilitates this connection and can amplify the impact of local initiatives aligned with European goals.

Synergies, barriers, and adjustment mechanisms

The integration of the Strategy with existing frameworks offers significant **synergies**, such as the optimization of resource use, coherence between investments, and improved effectiveness of public policies. However, potential barriers can also be identified, related to fragmentation of competencies, the diversity of territorial capacities, or the rigidity of certain planning instruments.

To address these barriers, the Strategy promotes an **approach of progressive and adaptive** integration, supported by multilevel coordination, learning derived from pilot experiences, and periodic revision of the adaptation pathways. This approach allows for adjusting interactions with existing frameworks without causing unnecessary disruptions, strengthening Castilla y León's capacity to move towards a coherent and sustained climate resilience over time.

7.3 Long-term governance

As already mentioned, this Strategy is conceived as a **dynamic and evolutionary framework**, whose effectiveness depends on its ability to adapt over time to the evolution of climate risks, the lessons learned from implementation, and changes in the institutional and socioeconomic context. Long-term governance is therefore not considered a closed model, but rather a **process of progressive consolidation**, aimed at ensuring the continuity, institutional ownership, and periodic updating of the Strategy.

In this framework, a series of **short-term steps (1–5 years)** are identified to lay the foundations for the governance of the Strategy, as well as **medium-term updating and adjustment mechanisms (beyond 5 years)** that will allow it to maintain its relevance and effectiveness over time. This approach is consistent with the adaptation pathways logic, continuous learning, and adaptive revision promoted by P2R.

Short-term action (next 1-5 years)	Update and adjustment actions (next 5 years+)
Consolidate a stable framework for interdepartmental coordination within the Government of Castilla y León for monitoring the Strategy.	Review and adapt coordination mechanisms based on the evolution of risks and accumulated learning, strengthening its cross-cutting nature.
Promote pilot experiences of territorialization of the Strategy at the provincial scale, taking the ongoing adaptation process in the province of Valladolid as a reference.	Gradually scale the lessons learned from provincial pilots to all provincial councils, adapting the model to different territorial realities.
Establish periodic monitoring and review mechanisms for the adaptation pathways, incorporating the results from the Action Plan and the Innovation Portfolio.	Update the adaptation pathways and strategic priorities based on new climate, social, and territorial evidence.

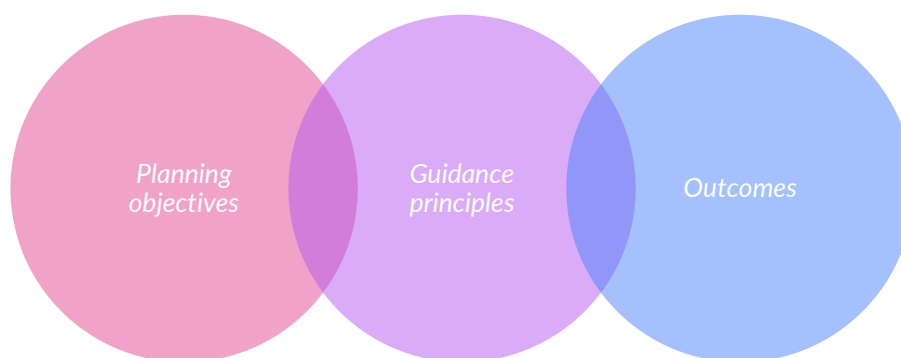
Strengthen collaboration spaces with the private sector, academia, and other key actors within the Innovation Portfolio.	Institutionalize stable mechanisms for technical-scientific advice and public-private collaboration to support strategic decision-making.
Progressively integrate the Strategy into existing planning and programming processes at the regional, provincial, and local levels.	Ensure coherence of the Strategy with future revisions of sectoral policies and with national and European climate change adaptation frameworks.
Define a communication and learning transfer approach aimed at facilitating the ownership of the Strategy by territorial actors.	Consolidate a culture of learning and adaptive revision that allows for the periodic updating of objectives, instruments, and implementation mechanisms.

This long-term governance approach ensures that the Strategy is not limited to a static framework, but remains alive, updated, and relevant over time. By combining early consolidation actions with explicit mechanisms for revision and adjustment, the Strategy strengthens its capacity to respond to climate uncertainty, incorporate learning, and sustain implementation beyond political or programmatic cycles.

8 Monitoring, evaluation and learning (MEL)

The monitoring, evaluation, and learning system of the Strategy aims to ensure that implementation progresses in a manner consistent with the defined Vision, strategic objectives, and established adaptation pathways. In line with the approach promoted by P2R, this system does not only focus on measuring outcomes but emphasizes adaptive learning, uncertainty management, and the continuous improvement of decision-making.

The monitoring system is structured into three complementary levels, allowing an assessment of what is being done, how decisions are being made, and what changes are expected over time.



Planning objectives

This level focuses on assessing to what extent the decisions, actions, and lines of work developed within the framework of the Strategy contribute to the defined primary and secondary objectives. This monitoring does not focus on final impacts but on strategic alignment and progress toward reducing the priority climate risks. The focus of this level of monitoring is based on:

- Periodic review of the degree of alignment between the actions of the Action Plan, the Innovation Portfolio, and the objectives of the Strategy;
- Qualitative analysis of progress in integrating climate change adaptation into sectoral and territorial policies;
- Identification of possible deviations or imbalances between priority risks and implementation efforts.

The metrics associated with this level include process and strategic orientation indicators, such as the incorporation of adaptation criteria into planning instruments, the progressive deployment of adaptation pathways, or the territorial coverage of actions. The information generated will be used to adjust priorities, reinforce lagging areas, and guide the updating of the Action Plan.

Guidance principles

This level focuses on evaluating whether these principles are being effectively used as decision-making criteria, especially in contexts of uncertainty, in situations of conflict between options, or in the evaluation of adaptation pathways. The focus of this evaluation level relies on:

- Reviewing relevant decision-making processes, identifying the traceability of principles in the selection of options and prioritization of actions;
- Gathering qualitative evidence on how principles have guided strategic decisions, adjustments to pathways, or the management of tensions between objectives;
- Joint reflection among involved actors on the coherence between adopted decisions and agreed principles.

The metrics associated with this level are primarily qualitative and based on documented evidence of the application of principles, consistency of decisions with these principles, and the capacity of the governance system to use them as a shared reference. This monitoring allows for reinforcing a culture of coherent and transparent decision-making, beyond merely meeting formal objectives.

Outcomes

Monitoring high-level outcomes, as defined in the Theory of Change, is aimed at identifying change signals that indicate whether the Strategy is contributing to improving the climate resilience of Castilla y León in the medium and long term. The focus at this level is based on:

- Observing trends and qualitative changes in areas such as anticipatory capacity, reduction of structural vulnerabilities, or improvement of territorial coherence;
- Using aggregated and existing indicators to contextualize the evolution of risks and capacities, without directly attributing all changes to the Strategy;
- Joint interpretation of these results in relation to adaptation pathways and considered scenarios.

The metrics associated with this level do not seek to measure final impacts in isolation, but to support strategic reflection on the direction of change and the need to adjust objectives, priorities, or implementation approaches.

8.1 Data collection

The data collection strategy is based on **leveraging existing sources**, selectively complemented to fill relevant gaps for decision-making. Priority is given to the use of data that provides strategic value and is accessible and comparable over time.

The main types of data considered include:

- Climate and risk information, from official sources and existing observation systems;
- Sectoral and territorial data related to the implementation of policies and actions;

- Qualitative evidence derived from the implementation of the Action Plan and the Innovation Portfolio.

The frequency of data collection will be appropriate and adapted to the type of information, combining periodic reviews (annual or biennial) with specific analyses linked to key decision-making moments. The Strategy foresees establishing collaborations with technical entities, academic institutions, and other actors to enhance the quality, reliability, and interpretation of data, avoiding the creation of unnecessary parallel systems.

8.2 Learning

Learning is a central element of the monitoring and evaluation system of the Strategy. The results of monitoring are integrated into the defined governance mechanisms, feeding into the review of adaptation pathways, the evolution of the Innovation Portfolio, and the updating of the Action Plan.

The learning process is structured through:

- Annual Resilience Forum: a periodic space for review and strategic reflection, where the different involved actors jointly analyze progress, challenges, and lessons learned from the implementation of the Strategy and its adaptation pathways.
- Strategic review of the Action Plan: a periodic process for reviewing the Action Plan, analyzing the progress and challenges of ongoing actions and making explicit decisions on their adjustment, strengthening, reordering, or replacement, depending on the evolution of climate risks and the lessons learned.
- Contrast mechanisms through intermediary agents: these facilitate the effective involvement of the private sector and other key actors in interpreting monitoring results, providing an applied and sectoral perspective that contributes to more informed decision-making and alignment with the territorial and productive reality of Castilla y León.

This approach ensures that the Strategy functions as a living framework, capable of adapting to the evolution of the climate and territorial context, and systematically incorporating lessons learned from experience. Thus, monitoring and evaluation are not conceived as control exercises, but as tools to improve the quality of decisions and reinforce the climate resilience of Castilla y León over time.

9 Stakeholder engagement

To deploy the designed Strategy, **active, continuous, and adaptive stakeholder involvement is necessary** to strengthen the legitimacy of decisions, improve their alignment with territorial realities, and foster collective learning.

Stakeholder involvement is therefore conceived not only as a participation mechanism but also as a **structural component of governance**, closely linked to the implementation, monitoring, and evaluation of the Strategy.

Stakeholder involvement in implementation and governance

Regional and territorial actors participate in the implementation of the Strategy through the multilevel governance mechanisms described in Chapter 7. In particular, provincial councils and municipalities act as key channels for territorial involvement, especially in rural areas and municipalities with lower administrative capacities.

Additionally, the Innovation Portfolio provides a specific space for co-creation and experimentation, where public administrations, the private sector, intermediary agents, academia, and other actors can actively participate in the design, development, and evaluation of innovative solutions. This approach allows for adapting stakeholder involvement to the nature of each innovation line and reinforces the connection between learning and decision-making.

Stakeholder participation in monitoring and evaluation

The Strategy foresees specific mechanisms for regional actors to participate in monitoring, evaluation, and learning, in line with the system described in Chapter 8. In particular, strategic review spaces, such as the annual Castilla y León climate resilience forum, facilitate stakeholder involvement in the joint analysis of progress, challenges, and learnings.

Moreover, the contrast mechanisms through intermediary agents allow for the structured inclusion of the private sector's and other key actors' perspectives in the interpretation of monitoring results, contributing to more informed decision-making that is better aligned with the territorial and productive reality. The participation of academia and independent experts strengthens this process, providing a technical and scientific perspective that complements institutional and local knowledge.

9.1 Strategy

Inclusion of vulnerable groups and territorial approach

The Strategy systematically incorporates the **inclusion of groups and territories most vulnerable** to the impacts of climate change, with particular attention to rural areas, municipalities affected by depopulation, and groups with greater exposure or lower adaptation capacity. This approach translates into adapting involvement mechanisms to local realities, using accessible formats and relying on proximity structures, such as local entities and territorial services.

The involvement of these groups is prioritized in decisions that directly affect their well-being, ensuring that their knowledge of the territory and specific needs inform the implementation and adjustment of the Strategy. This approach strengthens the just resilience approach and helps prevent climate change adaptation from reproducing or amplifying existing inequalities.

10 Next steps

This Strategy establishes the **strategic framework for advancing the climate resilience of Castilla y León**, but its scope is limited to defining a shared vision, objectives, adaptation pathways, and a governance and learning model. Its effective implementation requires, therefore, further developments and additional decisions that must be made progressively.

Among the main gaps identified are the need to concretize and prioritize actions through the Action Plan and the Investment Plan, strengthen technical and organizational capacities at the territorial scale, and consolidate stable monitoring and learning mechanisms that enable anticipatory management of climate uncertainty.

In this context, the **immediate next steps** focus on:

- Developing and launching the Action Plan, aligned with the defined adaptation pathways;
- The progressive activation of the Innovation Portfolio, as a space for experimentation and evidence generation;
- Advancing in the territorialization of the Strategy, supported by pilot experiences and the role of provincial councils and municipalities.

The Strategy is conceived as a dynamic document, subject to review and adjustment based on the evolution of climate risks, the territorial context, and the learnings derived from its implementation. These reviews will be integrated into the established monitoring and governance mechanisms, allowing for the updating of priorities and approaches when necessary.

In sum, this document marks the beginning of a **long-term adaptation process**, whose effectiveness will depend on Castilla y León's ability to transform this strategic framework into coherent decisions, investments, and actions over time.