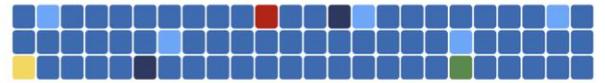


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1 Introduction

Please note that the introductory part of the document is part of an ongoing effort and will be expanded and supplemented by the taskforce with further updates in the coming months, according to the development of the rest of the chapters and the ongoing work on terminology consistency. Current effort is dedicated to the review of the glossary; therefore minor changes may appear which will cascade through the document.

Considering the needs of Public Authorities (PAs) to receive guidance and build capacity on how to mobilize finance for climate adaptation, the aim of this document within CLIMATEFIT is to describe the methodologies to be used by PAs for developing pipelines of investable projects across adaptation action. While it is designed as a tool to provide help and guidance to PAs across Europe tackling adaptation financing issues, for the purpose of the CLIMATEFIT project, facilitators are intended as the primary users of this document. Facilitators are the identified project partners in charge of supporting the CLIMATEFIT case studies in their transformational journey to climate resilience, tailoring and applying the methodology. In particular, in the case of the 4 leader territories, facilitators are supported by the fast-track mechanism to help them progress quickly in the process. The overall goal is co-designing 20 innovative Investment Strategies (IS), allowing to identify sources of finance, and developing 10 credible and scalable investment plans (IP) to help better negotiate and articulate financing streams and define investment concepts (IC). The outputs of this project are primarily directed towards PAs leadership (e.g. mayors) and FIEs, including financial analysts, in order to align their interests, financial needs financial resources.

This document is therefore tailored to PAs; all concepts and methodologies are introduced and explained in a level of detail that allow them, as well as other organisations involved in climate adaptation planning and implementation, to independently apply them in practice.

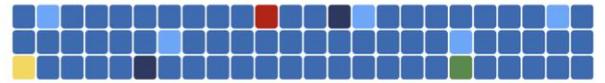
Given the common practice among Public Authorities (PAs) to adopt a single comprehensive document that often encompasses both the strategic and operational dimensions—blurring the lines between investment strategies and investment plans—within the CLIMATEFIT project, the Work Packages (WP2, WP3, and WP4), which are responsible for guiding and implementing the full process from strategy definition to the development of bankable project pipelines, have decided to establish a joint taskforce. The aim is to produce a unified manual that supports PAs in their planning efforts. This integrated approach promotes a smooth and flexible transition across the different phases of the process, while accommodating the varying levels of advancement among PAs and facilitating a coherent progression from strategy to planning.

The document therefore covers the key phases identified in Figure 1.



Figure 1 Definition of key stages to develop pipelines of bankable projects. Source: CLIMATEFIT glossary

The document encompasses the following deliverables, part of WP2, WP3 and WP4 (see Figure 2):



- Chapter 4.1: Investment Strategies Methodology [D2.3 by CMCC]
- Chapter 6: Investment Plans methodology [D3.1 by SEI OX]
- Chapter **Error! Reference source not found.**: Incentive Mechanisms [D3.2 by SEI HQ]).

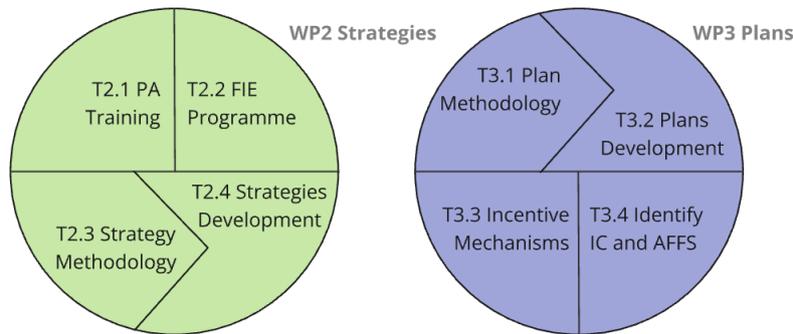


Figure 2 WPs tasks. Source: CLIMATEFIT

Using the results of WP1 and workshops in T2.1 and T2.2 and capitalizing on the analysis provided in the Financing Landscape, the **investment strategy methodology** aims at translating local adaptation strategy into investment strategies.

It provides a **pragmatic and hands-on guidance** to prioritise investment within adaptation strategies and projects that should consider in their design and implementation climate change risks and impacts. The methodology will help facilitators and PAs identify and articulate funding and financing sources (e.g., grants including EU funding instruments, national, regional and local budgets, loans and guarantees, private investments) and FIEs to finance pipelines of projects, also considering innovative strategies for mobilising financing for climate resilience.

The investment strategy serves as a map, **in the path from adaption strategies towards bankable adaptation projects**. It provides the PA with knowledge on investment and financial opportunities, which will then be selected and packaged into the investment plan.

To be complemented with a summary of the purpose of each stage, and its relationship to the project design and development process

The process is built over the main stages of investment strategy and investment plan, with a number of modules for each of them. It has been designed to provide a 'gold standard' of project development. However, it is acknowledged that in many cases, certain steps will not be required, or there will be limited resources available for project development. Therefore, the guidance is structured with individual modules, which should all reviewed and by discussing with stakeholders a decision needs to be made on which modules are important and therefore should be included. Each of them contains a range of approaches, from light touch to in-depth to allow flexibility to fit the different context and needs.

2 Other projects

2.1 P2R

[P2R's](#) (Pathways 2 Resilience) focus is providing an adaptation finance process that is aligned with a transformational adaptation planning cycle, known as the Regional Resilience Journey. It highlights how adaptation finance generating investment strategies for adaptation pathways – broad trajectories of resilience against particular risks or in sectors, over a long time period (e.g. 100 years for Sea Level Rise). This involves looking at the regional context, baseline climate costs, Regions then develop a strategic approach to diversifying and scaling sources and instruments, before then developing their pathways, and then the near-term actions in their pathway as part of an action plan.

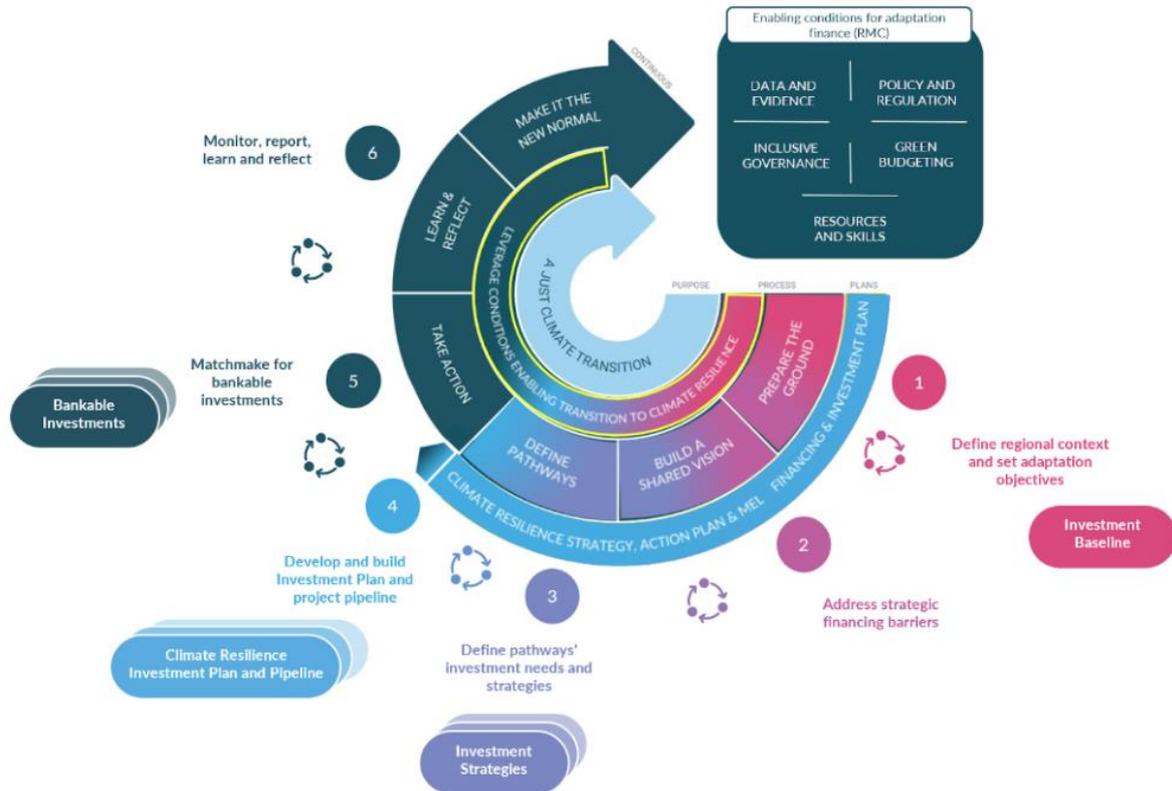
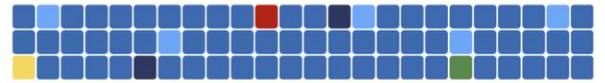


Figure 3 The Adaptation Investment Cycle phases supporting the Regional Resilience Journey. Source: P2R

Whilst much of this will be helpful framing for CLIMATEFIT, Pathways2Resilience has a different focus from CLIMATEFIT in several ways:

- Scale – The scale of the P2R approach is the regional scale – it focuses on the package of activities regions need to finance in a Climate Resilience Strategy and Action Plan.
- Scope
- Time period – Pathways2Resilience is focused on developing Investment Strategies for the entire pathway of a region. Whilst these will vary by sector or hazard, in general they are long term (for example to mid/end of the century), comprising multiple packages of adaptation options.
- Focus on transformational adaptation
- The later stages of focus on actions in the action plan cross over with CLIMATEFIT, in that they require an assessment of whether the projects meet the economic and financial appraisal criteria of the funders,

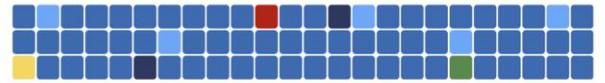
To support their work P2R has developed a catalogue of financial sources and instruments

- Which of those sources are accessible to CLIMATEFIT PAs? In theory, all sources and instruments are available or usable by regions in CLIMATEFIT. However, P2R is currently developing a guidance tool to help regions select sources and instruments depending on financing needs and other local / relevant criteria.
- Which of the financial instruments are theoretical and which have proven record?

2.2 REGILIENCE

[Regilience](#) (Regional Pathways to Climate Resilience) is a European project that aims at sharing the most promising cross-sectoral adaptation solutions, supporting cities and regions across Europe to become more resilient to climate change.

The project is committed to support the European Green Deal and the EU Mission "Adaptation to Climate Change" by fostering the adoption of regional climate resilience development pathways. It develops, compiles, shares and promotes tools and scientific knowledge to support European regions in identifying and addressing their climate-related risks. It works closely with other sister projects, such as ARSINOE,



IMPETUS and TransformAr to foster the capacity of 7 focus regions to manage the unavoidable impacts of climate change.

Regilience's work encompasses the design and implementation of a broad range of communication and dissemination activities within the target groups, the enabling actors and the broader community. More specifically it aims at:

- Understanding and addressing local and regional needs,
- Connecting people and ideas,
- Building local and regional capacity.
- Strengthening resilience in 7 focus regions
- Engaging with citizens and fostering their awareness
- Collaborating with other projects

Among the different tools and resources developed by the project, the [Funding Opportunities Guide](#) is a funding tool to raise awareness of available financial on European and national level dedicated to support regional climate resilience. It provides information on how to seek and attract funding, detailing European and national funding sources for adaptation. The tool can help PAs to provide answers to the following questions:

- Which of those funding opportunities are not tapped by CLIMATEFIT PAs yet?
- Which of those funding opportunities can be used as leverage for attracting private financing?

2.3 PIISA

[PIISA](#) (Piloting Innovation Insurance Solutions for Adaptation) is a 3-year Research and Innovation Action funded under the Horizon Europe programme, which will co-develop climate resilient insurance portfolios and develop solutions for sharing climate-related risk and losses data. The project focuses on sectors like agriculture, forestry, cities and citizens' well-being, tackling a host of climate enhanced hazards such as floods, droughts, forest fires, biotic risks, and various types of storms.

The final aim is to develop and deploy a range of insurance innovations to cover at least 50% of losses attributable to climate change effects in Europe. The project hopes to support households, firms, and public authorities to set up adaptation and create adaptation promoting conditions.

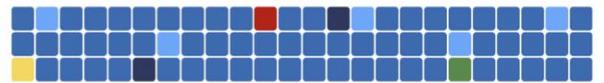
2.4 SOTERIA

[Soteria](#) (Solutions Testing for Regions through Insurance for Climate Adaptation) embodies a comprehensive and co-creative approach aimed at addressing the pressing challenges posed by climate change through innovative insurance strategies.

The project is dedicated to advancing insurance solutions for climate change adaptation across diverse European regions and communities, with the aim of increasing Europe's resilience and preparedness to face the unavoidable consequences of climate change.

The mission encompasses three tracks:

- Documenting best practices about data utilisation, emerging insurance models, and robust enabling frameworks.
- Testing innovative solutions, taking them from research levels to demonstration and testing. Some of them will be taken up to the level of pre-commercial procurement in at least three cases.
- Communities of Practice: placing emphasis on fostering communities of practice and insurance dialogues, to analyse the role of public modernisation and how to develop affordable insurance schemes that leave no one behind. The Communities of Practice will also support other regions interested in designing and/or adopting innovative insurance solutions.



3 Key challenges and enablers from the Adaptation Investment Landscape

Idea to summarise the barriers and enablers before going into detail with the development of the different stages. To be decided whether to keep here and further developed, or to be disregarded at this point of the document because in the IS phase there is the specific module on barriers and enablers.

3.1 Adaptation Finance Barriers

CLIMATEFIT has used the findings from D1.1 (the Adaptation Investment Landscape) to help inform the design of its Investment Strategy and Plan methodologies. The main barriers are summarised below:

- The main barrier for both PAs and Financing and Investment Entities (FIEs) is the lack of knowledge and expertise
- Also identified that the challenge of quantifying economic or monetary benefits of adaptation
- Regional differences in knowledge of climate risk and adaptation
- Conflicting priorities (i.e. beyond adaptation)
- A lack of capacity in PAs and staff constraints to apply for funding, as well as siloed governance
- Lack of regulation
- Limited visions of adaptation.

An important finding of the study was that there was a mismatch between PAs and FIEs. PAs and FIEs may experience some similar and some different barriers, but they are two different worlds when considering the objectives that PAs and FIEs have regarding climate financing – with public bodies being driven by policy frameworks, and the investments not being attractive to private sector financiers.

3.2 Adaptation Finance Enablers

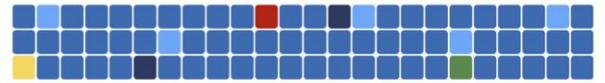
CLIMATEFIT has used the findings from D1.1 (the Adaptation Investment Landscape) to help inform the design of its Investment Strategy and Plan methodologies. The main barriers are summarised below: Here you can find a list of Adaptation Finance enablers:

- **Supportive policy and regulatory environment** – National strategies and legal frameworks must integrate adaptation to guide and attract investments.
- **Strong institutional frameworks and capacity** – Institutions need clear mandates, resources, and coordination mechanisms to manage adaptation finance effectively.
- **Climate knowledge co-production and use** – Decisions should be based on localized, user-informed climate data and risk assessments.
- **Financial planning and allocation tools** – Mainstreaming adaptation into public budgeting and investment planning ensures consistent resource allocation.
- **Multi-stakeholder partnerships** – Collaboration among public, private, and community actors boosts innovation and leverages funding.
- **Improved access to finance** – Streamlining access to climate funds and promoting blended finance mechanisms is key to increasing financial flows.

Therefore, all these enablers create a robust ecosystem for financing climate adaptation, especially for public authorities and local actors.

3.3 International Best Practices

Additionally, the 20 international best practices helped identify eleven general key success factors of innovative Adaptation Funding and Financing Solutions (AFFS) and six conditions to transfer the researched AFFS to other territories, including the EU.



Success factors / ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Collaborations between public and private partners	X	X	X		X		X	X	X		X	X			X	X	X		X	X	
Collaborations between public partners			X					X	X			X				X					
Community support		X			X	X		X	X		X	X		X	X				X		X
Legal compliance	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X		X	
Political support			X					X	X				X		X				X		
Public resources			X	X	X	X	X	X	X	X	X	X	X		X			X	X		
Private resources		X		X		X		X	X						X	X	X	X			
De-risking mechanisms	X	X		X			X	X				X				X					
Business case	X		X				X	X			X		X								
Accountability, transparency, reporting	X			X			X	X	X					X		X			X		
Financial incentives	X	X		X		X	X				X			X							
Multiple sources/instruments	X	X	X			X				X	X		X			X	X			X	
Long-term strategy	X	X	X			X		X	X			X	X					X	X	X	
Sustainable finance			X	X		X	X						X			X					
flexibility		X		X		X	X						X								

Figure 4 Enabling factors from CLIMATEFIT 20 international best practices. Source: CLIMATEFIT D1.1

The eleven key success factors are:

1. stakeholder involvement (collaborations between public and private partners, collaborations between public partners, community support),
2. legal compliance,
3. political support,
4. public resources,
5. private resources,
6. de-risking mechanisms,
7. a business case,
8. accountability/transparency/reporting,
9. financial incentives,
10. combining multiple sources/instruments,
11. having a long-term strategy or sustainable finance strategy, and
12. flexibility.

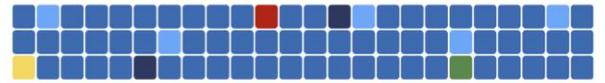
The transferability conditions are public resources, (re)payment capacity, objectives and governance structure, outreach and awareness, public or private champions, and using established or tested models or mechanisms.

4 Process overview

CLIMATEFIT is proposing a four-stage methodology, aligned with the project development cycle. This involves the development of the Adaptation Investment Landscape (AIL), the Investment Strategies (IS), the Investment Plans (IP) and Investment Concepts (IC).

Table 1 Process overview

Project stage	Adaptation Investment Landscape	Outline design	Detailed design	Procurement and Delivery
Economic appraisal		Longlist of options	Shortlist appraisal – detailed Cost Benefit Analysis (CBA)	
Financial appraisal and commercialisation		Investment Strategies	Investment Plan - Structuring of financial model	Investment Concepts



4.1 Role of the Local Resilience Taskforce

Local Resilience Taskforces (LRTs) are platforms to engage multiple stakeholders in social innovation processes contributing to improving the funding and financing of climate adaptation solutions. They provide a structure for regional and local stakeholders' engagement, laying the ground for social innovation approaches, adopted through the chronological steps of the project, from adaptation strategies, through adaptation plans to adaptation cases. The format of LRTs is also needed to apply the catalytic and systemic approach of resilience investment promoted by CLIMATEFIT and enables to boost the aggregation of several small [climate adaptation] project and make them more bankable. LRTs are the place where the co-design and collaborative planning of investment strategies (ISs), investment plans (IPs) and investment cases (ICs) will happen. According to the difference in maturity of adaptation finance matters within the PAs at each stage of the CLIMATEFIT methodology process, the LRT format and members are expected to evolve over time.

LRTs gather multiple stakeholders directly concerned by climate adaptation planning, funding and financing, and are characterised by the following features:

- Local and context dependent: LRTs are rooted in the local adaptation, legislative, and financial contexts and they aim to overcome barriers at the local level, taking into consideration also the political or legal constraints and existing collaborations with specific local entities.
- Multi-stakeholder groups with delimited membership: within CLIMATEFIT, LRTs are initiated by PAs supported by their facilitators, who are ones identifying and involving relevant stakeholders, defining the primary objectives, and coordinating the administrative matters. Stakeholders are engaged gradually, following the LRT engagement strategy.
- Encourage a collaborative approach of innovation: LRTs represent the arena where representatives from different entities (PAs, FIEs, companies, technical partners) adopt a social innovation approach. They interact, debate, and discuss to enhance their respective capacities/maturities, to guide internal decision-making processes toward the collective planning and design of investment strategies, investment plans and investment cases, for the successful concretisation of investment cases to co-develop and test adaptation solutions.
- Flexible and evolutive implementation: being experimental arenas, they are evolutive and their implementation will inform models and guidelines for replicability across European territories.

Within the LRTs, stakeholder engagement can take multiple forms, covering multiple activities allowing the participation of stakeholders into decision making. These range from more passive to more active activities and roles: information, consultation, dialogue, partnership and co-creation,

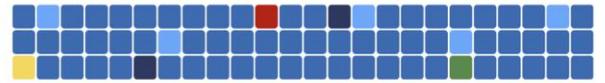
With respect to the process of creation of investment strategies and plans, the role of LRTs is envisaged as of support in the collective identification of pipelines of adaptation projects and of funding sources, in the collective estimation of needed resources and costs, and in the development and testing of the investment strategy and plan, as well the smooth translation of the former to the latter.

4.2 How the guidance was produced

The **investment strategy methodology** has been developed by reviewing the existing literature and the previous work from CLIMATEFIT WP1, WP2 and WP6, capitalizing on the knowledge developed and on insights from the first level trainings. Inputs from the participants to the task have been considered as starting points to identify the topics and the common elements that needs to be addressed by the methodology.

The methodology incorporates first feedback from facilitators and technical partners and will be further co-developed with facilitators and PAs, validated and tested thanks to the fast-track mechanism implementation in the 4 leader territories.

At this stage, after carrying out the IS piloting phase in the 4 project lead territories, we undertook a consultation and review of the overall process in order to capture main challenges and lesson learnt and



therefore update the methodology accordingly and make it as detailed as possible. This will allow us to develop the IS for the other territories and to better align WP3, which concerns the investment plan.

5 Phase 1: develop your investment strategy

Definitions
Investment strategy: set of strategic principles designed to help a public authority increase financing and investment in climate adaptation using a systemic and catalytic approach. The main goal of an investment strategy is to align interests and financial needs of public authorities with interests and financial resources of financing and investment entities. (CLIMATEFIT glossary)
Investment strategy methodology: document identifying a systemic and catalytic approach to support PAs in translating local adaptation strategies into investment strategies and mobilise resources, helping also FIEs finance pipelines of projects. Pragmatic and hands-on guidance to prioritise investments, identify and articulate funding and financing sources and consider innovative mechanisms. (CLIMATEFIT glossary)

Investment strategy positioning within PAs context

The investment strategy is a high-level document to identify adaptation options related to prioritised risks and sectors, with potential sources of financing. The investment strategy should be positioned within a bigger picture, that takes into consideration not only specific adaptation plans and strategies but all the different documents, projects and strategies that even if not specifically targeted to adaptation may be somehow related to it, or to its implementation. Examples include sustainable development strategies, recovery and resilience plans, climate action plans, integrated investment strategies, infrastructure maintenance and development strategies, green infrastructure development strategies, transport and mobility strategies, local budget cycles, existing financing arrangements, planned capital and revenue expenditures.

The differences in regulatory frameworks need to be taken into account as well, both across the different territories and within countries, as there are different mechanisms in terms of transfer of power between the regulatory levels (e.g., EU directives, national regulation, local regulation, regional and metropolitan).

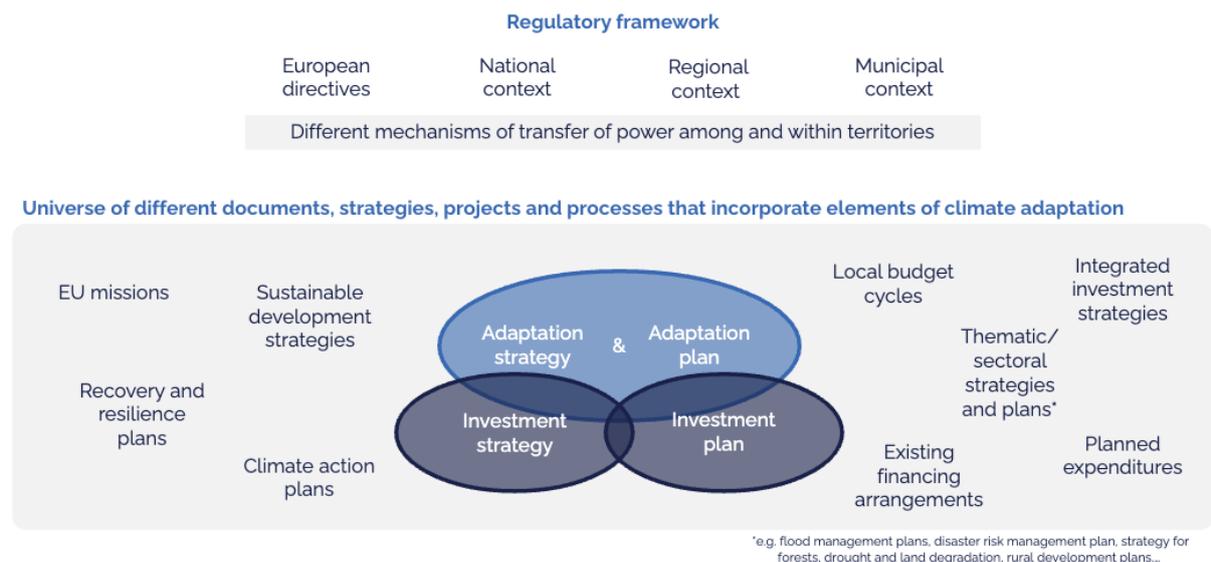


Figure 5 Investment strategy bigger picture. Source: CLIMATEFIT

The investment strategy can be placed in between adaptation strategies, in which the adaptation objectives and actions are identified, and the set-up of operational investment plans.

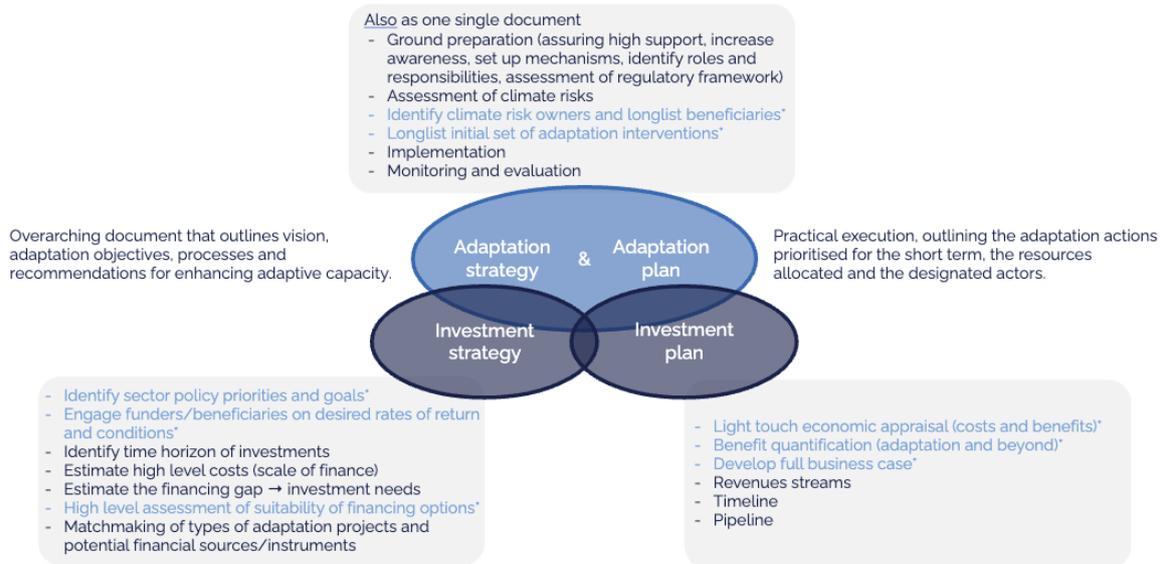
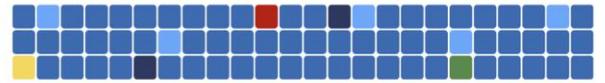


Figure 6 Investment strategy context. Source: CLIMATEFIT

Adaptation strategies and plans can already be defined before the investment strategy; however, this may not always be the case at local level and where it is not mandatory for PAs to have them. At the same time, the adaptation strategy itself, and the adaptation plan, may need to be adjusted and rescope during the process, based on feedback received during the progression of the investment strategy and its outputs, for example in terms of costs estimation and available funding/financing sources.

Structure of the investment strategy

The strategy outlined in the document is built on a careful selection of elements designed to address the complex considerations involved in financing climate adaptation. As briefly touched upon in the previous chapter, the choice of such elements is the result of the review of the existing literature and the work already performed in CLIMATEFIT WPs, and it aims to cover the critical aspects to be considered for the decisions on how to finance climate adaptation.

The investment strategy methodology needs to be comprehensive and include all the necessary steps, but at the same time it should be flexible enough so that the development of the investment strategies of PAs can be personalized based on the local context and the level of advancement.

To ensure both needs of **comprehensiveness** and **flexibility**, the key elements of the investment strategy methodology are presented with a **modular structure**, in which guidance is provided for each of them, as well as suggested approaches and resources. **Templates, tables and schemes** proposed in this document serve as visual help to gather and organise the crucial information for the different modules, and can be modified and adjusted according to the specificities of each territory/PA.

The single modules can be also considered independently, so that if PAs are more advanced and have already performed some of the steps, they can directly focus on the modules they are interested in and can easily find the information on the specific parts they still need to develop.

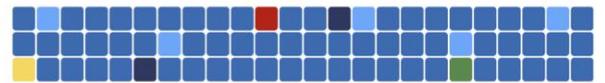


Figure 7 Modules of the investment strategy. Source: CLIMATEFIT

Each module is composed of the following six **sections**:

1. **Purpose of the module:** short explanation of the module, its aim and dependencies with the other modules.
2. **Inputs and prerequisites:** inputs useful for the development of the specific module.
3. **Skills and Expertise required:** knowledge and expertise, competence and skills to compile the module.
4. **Activities and efforts:** examples - non exhaustive – of activities and actions to be carried out to complete the module. The level of effort needed can vary according to level of advancement of each PA.
5. **Stakeholders to involve and the role of the LRTs :** list of actors and stakeholders (internal and external) that could be useful to involve or consult to retrieve information and get expertise to complete the modules, that they can also be considered for the development and creations of the LRTs. Considering that the naming and structure of departments, as well as the external actors, can vary across the different PAs, the proposed list is function based, and should be considered as illustrative and non-exhaustive. Such actors and functions can be involved in the development and implementation of the investment strategy with various roles, such as helping in identifying priorities, retrieving and validating information, providing feedback and granting approval.
6. **Outputs from the module:** documents, completed templates, descriptions of the analysis produced.
7. **Key issues to consider;** starting points, procedures, suggestions and templates to be used to complete the modules.
8. **Further reading / guidance and resources :** primary resources, catalogues, toolboxes that can be useful to complete the modules.

Furthermore, the Annex – Additional resources for investment strategies provides reference to extra links, documents and information, to possibly delve deeper into the specific modules.

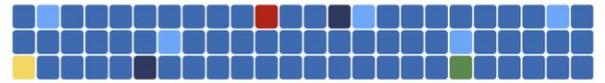
Workflow of the investment strategy

The investment strategy needs to be put together through a participatory process led by the facilitators, in close collaboration with the PAs, including all the necessary departments, and with the external stakeholders.

In the context of the CLIMATEFIT project and for the development of the investment strategy, the role of the PA is to provide context, content and data, validating the information, agreeing on the prioritization and providing approval. The role of facilitators consists instead in bringing the PA onboard and coordinating with the different actors to fill in the tools, representing the connection between the project and the public authority.

Given the specificities of each PA, a standardized, step by step process for the development of the strategy cannot be provided.

Furthermore, as the different modules do not necessarily need to follow a specific linear order, the proposed process is composed of two different sequences, as shown in Figure 8. One contains with elements more linked to the specific climate risks, related adaptation options and their costs and investment



needs, while the other is composed of elements more related to the general context, market environment and financial landscape. The two sequences may be developed in parallel.

Each module aims at collecting, structuring, and assembling different pieces of information. Therefore, during the actual creation of the strategy the need for feedback loops, iteration of steps and adaptation may arise, with new information affecting different modules, including those that had already been dealt with. As an example, when looking at financing sources and instruments or at the high-level costs and benefits it might be necessary to return to previous modules and adjust the scoping of the project. It is an iterative refinement process which focus on achieving the best possible balance across all the modules.

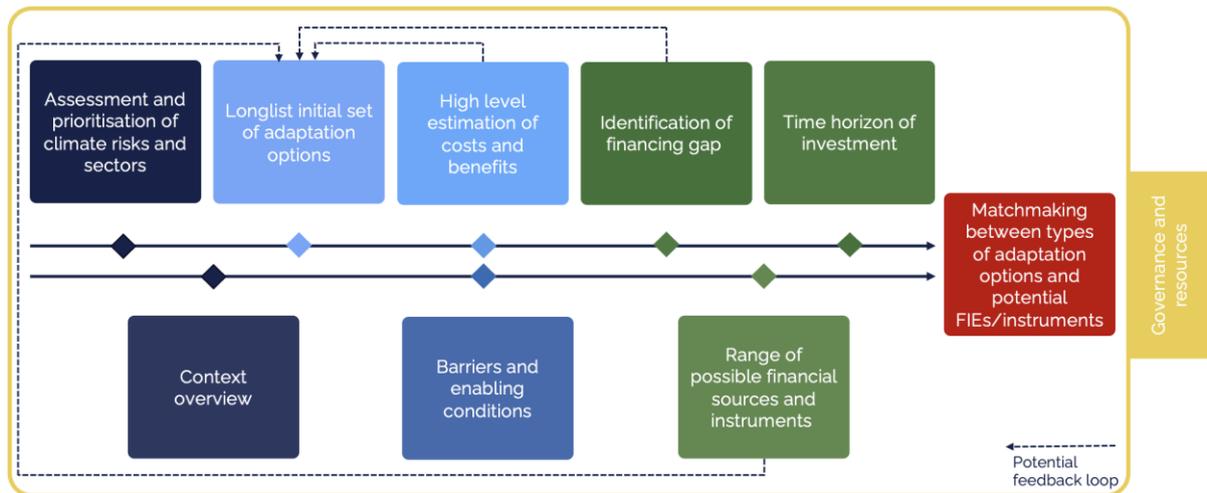


Figure 8 Proposal of timeline. Source: CLIMATEFIT

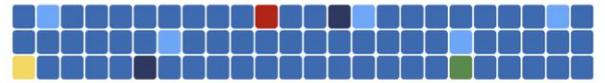
Outcome of the process

The final document should encompass all the different modules of the investment strategy, bearing in mind that not all the steps are mandatory. Furthermore, not all modules need to be completed from scratch through the process coordinated by the facilitators and the PA: whenever there is information and/or other documents already available, references to these data could be made to assemble all the elements relevant for the investment strategy.

At the end of the process, the investment strategies should provide the PAs with answers to the following three key sets of questions:

- What are the identified longlisted options, do they meet the adaptation objective?
- What are the high-level costs and benefits of the options? Are the options feasible from an economic and financial standpoint?
- Is there funding already available to implement such projects? What are the financial instruments that could be used to cover the financing gap?

The **focus** of the investment strategy should be **on the magnitudes, general timelines, types of instruments and sources to use**, while precise quantification will be part of the following phases.

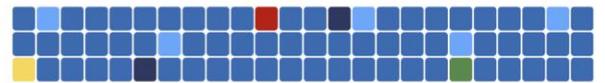


The following sections will provide description and guidance for each of the ten modules in



Figure 7.





5.1 Assess and prioritise climate risks and sectors

1. Purpose of the module

The first module consists in **identifying the climate risks by which the PAs is impacted**, recognizing **their level of urgency** and determining **which risks and sectors should be prioritised** by the investment strategy. In other words, the adaptation needs drive the prioritisation.

Definitions

Climate risk: the potential for consequences where something of value is at stake and where the outcome is uncertain, recognising the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure, and hazard. (CLIMATEFIT glossary)

The main barrier for both PAs and FIEs is the lack of knowledge and expertise about climate risk. Among PAs, there are regional differences in the level of climate risk awareness and knowledge about climate adaptation. Enhancing public knowledge about climate risks is often identified as a key driver of financing adaptation. (CLIMATEFIT D1.1).

2. Inputs and prerequisites

Understanding climate change adaptation, including the knowledge of EUCRA (European Climate Risk Assessment) and the risks identified. Comprehension of the impacts that can affect the territories. This module is highly related with the module on the longlist of adaptation options, as the prioritization of risks and sectors established here will serve as starting point for the identification of measures and projects.

3. Skills and Expertise required

Understanding of climate risks and hazards in the specific area of the PAs and knowledge of the climate risk assessments, adaptation strategies and other documents available at the local and/or national level.

4. Activities and efforts

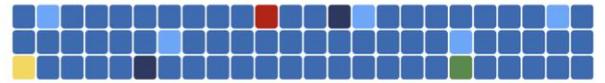
Efforts include the search for and review of climate risk assessment and strategies, starting from the local to the national level, and the potential consultation of climate risk experts.

5. Stakeholders to involve and the role of the LRTs

- Departments of environment and spatial planning
- Climate department,
- Energy and transition departments
- Technical departments (e.g., mobility, urban planning, green management, etc.),
- City manager
- Civil protection
- National environmental agency
- Consultants,
- Research institutes
- Meteorological institutes

6. Outputs from the module

The outputs of this module consist in the integration of the main characteristic of the climate risk analysed to start the analysis. Below you can find a template that can be a starting point for the analysis.



Template 1 to be filled in by PAs

Risk	Sector	Severity (e.g. High/Medium/Low)	Urgency (e.g. High/Medium/Low)	Prioritised (Yes/No)

7. Key issues to consider

PAs that already have developed adaptation strategies and/or plans, or that have performed climate risk assessments while developing other strategies, can start from those documents and extract the relevant data and information, selecting and prioritizing the areas for intervention.

In case such work has not been already performed at the local level, **PAs can start by resorting to adaptation strategies and plans developed at higher level (e.g., regional and national)**, to identify which risks are applicable to the specific territory and require adaptation interventions at local level.

There are several methodologies, instruments and standards that can provide guidance, tools and frameworks to help PAs in performing assessment of climate risks and/or prioritizing sectors of intervention. At a **minimum**, information should be drawn from the work performed in WP1 to develop D1.1, eventually complemented with content from local and regional adaptation plans/strategies/climate risk assessment already in place.

Once climate risks are identified, it is important to define the scope of the CLIMATEFIT adaptation investment strategy, by **determining the urgency of interventions in the different areas/sectors and prioritizing accordingly**.

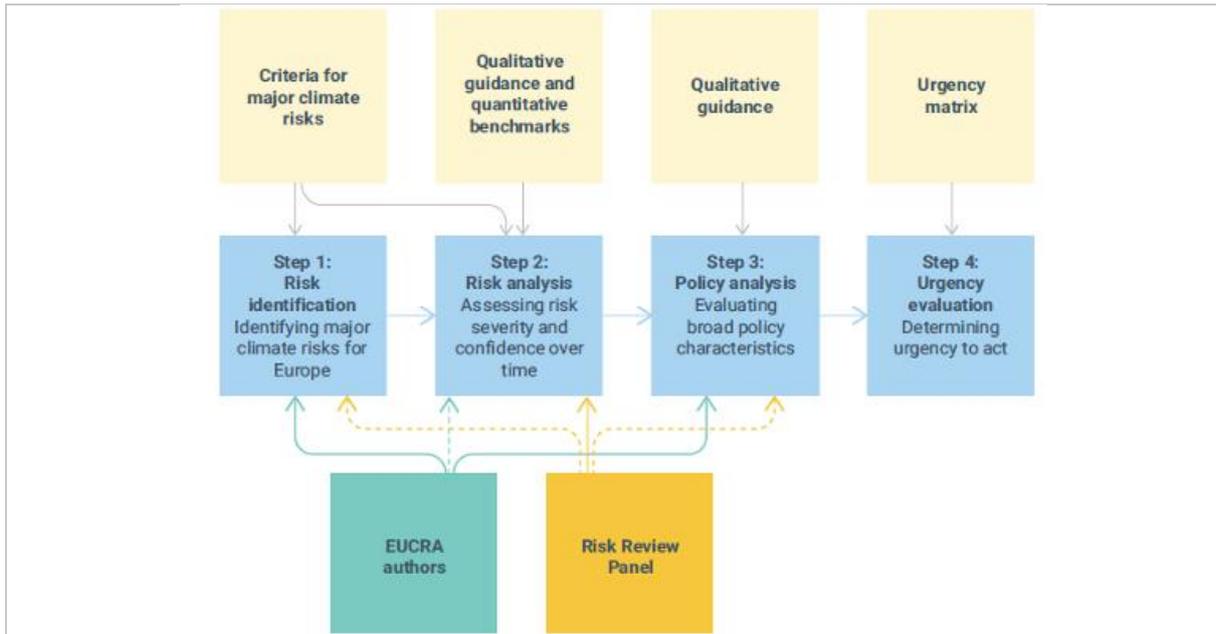
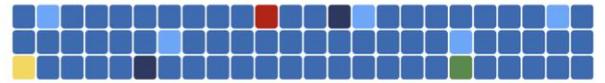
PAs need to identify the risks they want to address and within which sector or specific municipality areas. It is crucial to define at an early stage what PAs aim to finance in the context of the investment strategy by determining **the prioritized risks and sectors of intervention**, as from these selections it will depend which adaptation options will be selected and possible ways of financing them.

8. Further reading/ guidance and resources

Resources: EUCRA methodology

The European Climate Risk Assessment (EUCRA) applies the climate risk concept of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) and the risk assessment guidelines of ISO 31000 and ISO 14091 where feasible.

Based on existing scientific evidence, a structured risk selection, analysis and evaluation was carried out. The risk selection identified major climate risks for Europe based on common criteria, then the risk analysis classified them according to severity over time, based on potential for severe consequences and finally the risk evaluation phase evaluated the urgency for EU action considering risk severity over time, confidence in the risk severity assessment and the temporal aspects of potential adaptation actions jointly with risk ownership, policy readiness and the policy horizon.



Notes: The strength of the arrows indicates the importance of EUCRA authors versus the risk review panel in the different steps of the structured risk assessment (solid lines indicate lead role).

Figure 9 Structured risk assessment in EUCRA. Source: EEA

The risk selection identified major climate risks for Europe by an initial screening of the relevant scientific literature, guided by the following criteria:

- High magnitude of potential adverse consequences in the present or future
- High likelihood of severe consequences
- High irreversibility of consequences (e.g. due to crossing of tipping points)
- High potential for cascading effects beyond system borders, geographically and sectors
- Aggravating effect of climate change over time.

The risk analysis focused on assessing the risk severity for each major climate risk according to four classes (limited, substantial, critical and catastrophic), which was guided by quantitative benchmarks referring to economic impacts, effects on people and other impacts (land, ecosystems and iconic heritage assets).

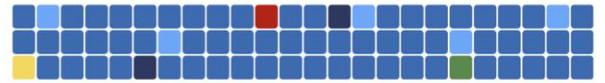
Risk severity	Description
Catastrophic	Very large and frequent damage, very large extent or very high pervasiveness, irreversible loss of system functionality, systemic risk.
Critical	Large and frequent damage, large extent and high pervasiveness, long-term disturbance of system functionality, cascading effects beyond system boundaries.
Substantial	Substantial losses, moderate extent or pervasiveness, temporary or moderate disturbance of system functionality.
Limited	Limited or rare losses, no significant disturbance of system functionality.

Figure 10 Risk severity classes in EUCRA. Source: EEA

The assessment of risk severity was performed for three different time periods: current (up to 2040), mid-century (2041-2060) and late century (2081-2100). For the late century two broad climate change scenarios are considered (low warming, up to 2°C, and high warming, 3-4°C).

The risk severity assessment was complemented by an assessment of confidence (high, medium, low) informed by the type, amount, quality and consistency of evidence as well as the level of agreement.

The policy analysis assessed the policy horizon, risk ownership and policy readiness according to broad categories. The policy horizon (short (up to 2040), medium (up to 2060), long (up to 2100)) indicates the future time horizon that needs to be considered in current adaptation decisions related to a particular risk. It considers two aspects: lead time and decision horizon. The lead time describes how long it takes to plan



and implement effective adaptation actions. The decision horizon describes the lock-in potential of current decisions related to climate-sensitive systems. Risk ownership describes where the lead responsibility to manage a major climate risk lies between the European level and Member State level. Policy readiness denotes to what extent a climate risk is being recognised and managed in Europe. The risk urgency evaluation determined the urgency and type of policy action according to 5 categories: urgent action needed, more action needed, further investigation, sustain current action, watching brief. Risk urgency evaluation algorithmically done based on outputs of the risk analysis and indicative policy analysis. The key element is a risk urgency matrix that considers risk severity, confidence policy readiness.

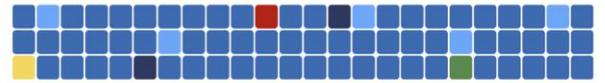
Urgency to act	Description
Urgent action needed	The combination of catastrophic risks and insufficient policy readiness calls for urgent new, stronger or different action in the coming years to reduce climate risks. Such actions include policymaking, implementation, capacity building or enabling the environment for adaptation, over and above those already planned.
More action needed	The severity of risk and the limited level of policy readiness calls for more action to be implemented. It is crucial to initiate processes that strengthen adaptation action to avoid critical impacts of climate change.
Further investigation	The available knowledge is insufficient to call for specific new action. Priority should be given to gathering additional evidence regarding the severity of the risk as well as policy readiness, e.g. through dedicated research, monitoring or policy evaluation.
Sustain current action	Current or planned levels of activity are appropriate, but continued implementation of these policies or plans is needed to ensure that the risk continues to be managed in future. A monitoring and evaluation process should be in place to evaluate policy effectiveness, with a view to continuous improvement.
Watching brief	The evidence in these areas should be kept under review, with continuous monitoring of risk levels, so that further action can be taken if necessary.

EUCRA has followed a systematic risk assessment process that has identified and assessed 36 major climate risks for Europe, grouped into five broad clusters: ecosystems, food, health, infrastructure, and economy and finance (see Figure below).

Almost all of the selected major risks can reach critical or even catastrophic levels during this century. In addition, the assessment identified three major climate risks specific to the EU outermost regions. More than half (21 out of the 36) major climate risks for Europe identified in this report need more action now, with eight of them being particularly urgent.

Urgent action is needed for risks from all policy clusters, indicating that policies need to increase in ambition, scope and implementation.

Many climate risks are characterised by long policy horizons, meaning that risk levels projected for the second half of this century are relevant to current adaptation decisions. Long policy horizons can be caused by long lead times for planning and implementing effective adaptation actions, such as in the case of complex coastal protection infrastructure. They can also be related to long decision horizons: current decisions can create lock-ins with long-term implications, such as for infrastructure built or forests planted today. In the case of long lead times or decision horizons, even climate risks that are not currently at critical levels could require urgent action to prevent very severe impacts in the future



Priorities for EU policy on climate adaptation



Climate risks by cluster

Ecosystems

- Coastal ecosystems
- Marine ecosystems
- Biodiversity/carbon sinks due to wildfires*
- Biodiversity/carbon sinks due to wildfires
- Species distribution shifts
- Ecosystems/society due to invasive species
- Soil health
- Aquatic and wetland ecosystems
- Biodiversity/carbon sinks due to droughts and pests
- Cascading impacts from forest disturbances

Infrastructure

- Pluvial and fluvial flooding
- Coastal flooding
- Damage to infrastructure and buildings
- Energy disruption due to heat and drought*
- Energy disruption due to heat and drought
- Energy disruption due to flooding
- Marine transport
- Land-based transport

Food

- Crop production*
- Crop production
- Fisheries and aquaculture
- Food security due to higher food prices
- Food security due to climate impacts outside Europe
- Livestock production

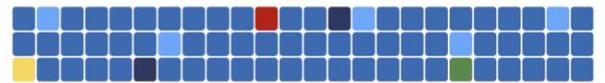
Economy and finance

- European solidarity mechanisms
- Public finances
- Property and insurance markets
- Population/economy due to water scarcity*
- Population/economy due to water scarcity
- Pharmaceutical supply chains
- Supply chains for raw materials and components
- Financial markets
- Winter tourism

Health

- Heat stress – general population
- Population/built environment due to wildfires*
- Population/built environment due to wildfires
- Wellbeing due to non-adapted buildings
- Heat stress – outdoor workers*
- Pathogens in coastal waters
- Health systems and infrastructure
- Infectious diseases
- Heat stress – outdoor workers

Figure 11 Urgency categories and main risks in EUCRA. Source: EEA



5.2 Get overview of context PAs operates in

1. Purpose of the module

The purpose of this module is to produce **an overview of the regulatory framework and the context of the PA**, starting by looking at the European level, and then analysing the national, regional and municipal level. It is important to understand which are the **frameworks, regulations and policies** that impact adaptation and investment decisions, as the investment strategy should be aligned.

2. Inputs and prerequisites

Understanding the sustainability scenario, conducting a context analysis, and identifying policy and regulatory mechanisms that are territorially relevant. It also includes an assessment of the political and regulatory landscape, in order to evaluate how PAs align with the broader context. This module is inherently connected to all other modules, as both the overall and local contexts are cross-cutting factors that shape, influence, and constrain all PA activities and strategic choices.

3. Skills and Expertise required

Knowledge of the regulatory framework, policy priorities, existing strategies and plan, from higher to local level. In addition, understanding of how the PA is structured in terms of departments, their activities and responsibilities. For technical support, below you can find a methodology helpful to understand the main adaptation policies.

4. Activities and efforts

Efforts include the search for and review of documents and frameworks from the European to the local level to ensure alignment, making also use of resource such as the Country Profiles platform, and the review of the organisational structure of the PA and roles of the departments.

5. Stakeholders to involve and the role of the LRTs

- Climate department
- Financial department
- City manager
- Regional development agency

6. Outputs from the module

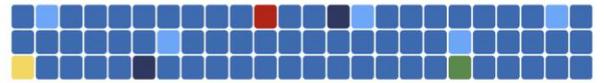
Comprehension of the regulatory and policy framework related to adaptation aspects.

7. Key issues to consider

A good starting point (and **minimum requirement**) is the result of deliverables D1.1 (especially Chapter 4) and D6.1 (Chapter 2.1), in which an overview of adaptation finance in the EU and of the adaptation policy context is provided, together with information on the specific territories.

It is important **to identify the existing documents and strategies, and ongoing projects and initiatives at local or national level that are related or contain elements of climate adaptation**, which need to be considered and could be used as reference.

Examples of such documents are **sustainable development strategies, recovery and resilience plans, climate action plans, local budget cycles, infrastructure development or remodelling strategies, transport strategies, green infrastructure strategies, integrated investment strategies.**



Adaptation financing strategies must be aligned with other financial plans, **integrating them with the broader financial landscape**. **Alignment with policy and investment priorities** can also strengthen the political support and encourage broader adoption of adaptation measures across department (IISD 2023). At the same time, from the point of view of investors, such alignment can provide reassurance and encourage buy-in.

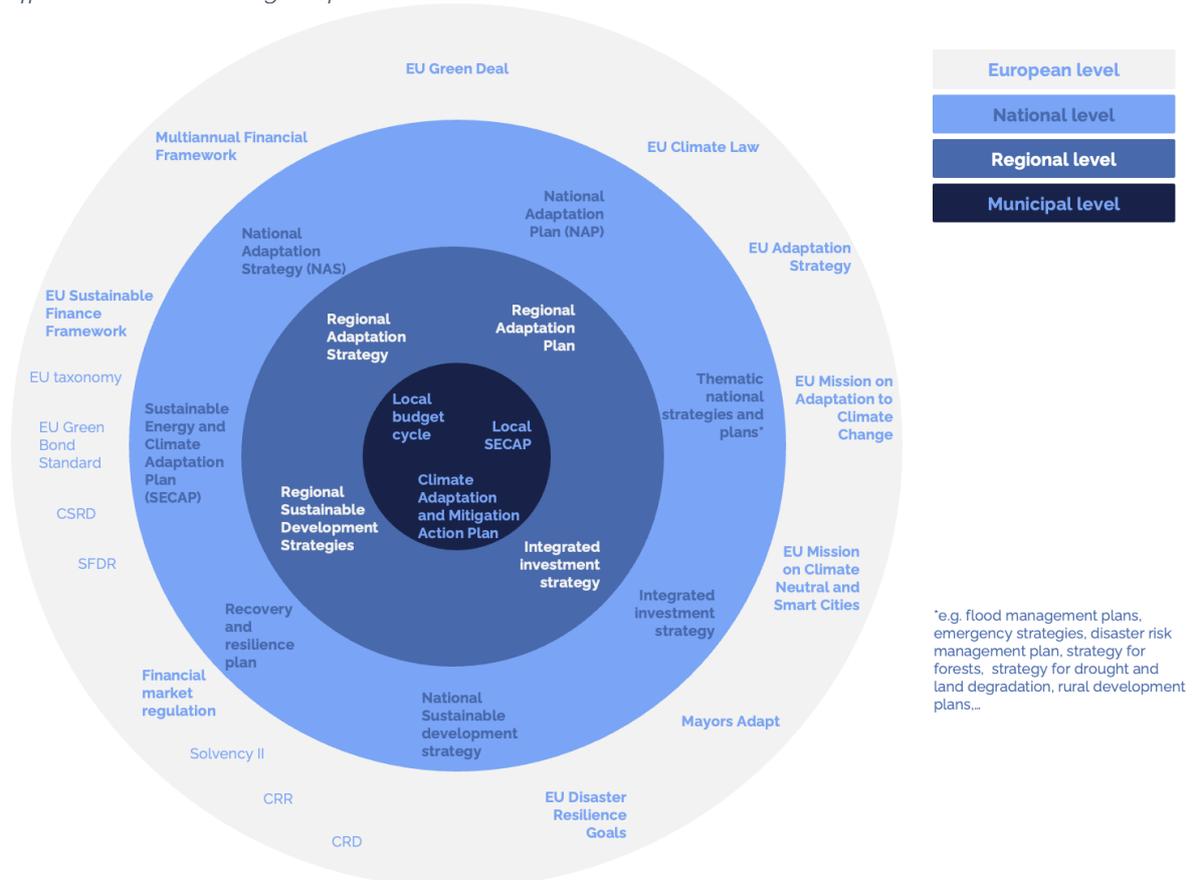
Furthermore, as there are different mechanisms of transfer of power across and within different territories, it is key to have **a clear understanding of the institutional arrangements, in particular the distribution of power on climate finance decisions between the national, regional, and municipal scale government, and the governance at the national level and how these translate at regional and municipal level**.

Local conditions and legal constraints need to be taken into consideration: what PAs have the authority and legal power to decide and implement, identifying constraints both in terms of projects and administration of budgets.

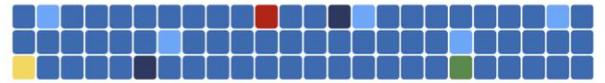
As an example, the fiscal power of local authorities varies greatly among European countries in terms of the types of taxes they can impose and of the discretion in the allocation of the revenues' streams.

Another example is the authorization from central governments to issue different types of financial instruments.

Template 2 Scheme to be adapted by each PA, to identify the relevant regulations and documents at the different levels containing adaptation elements



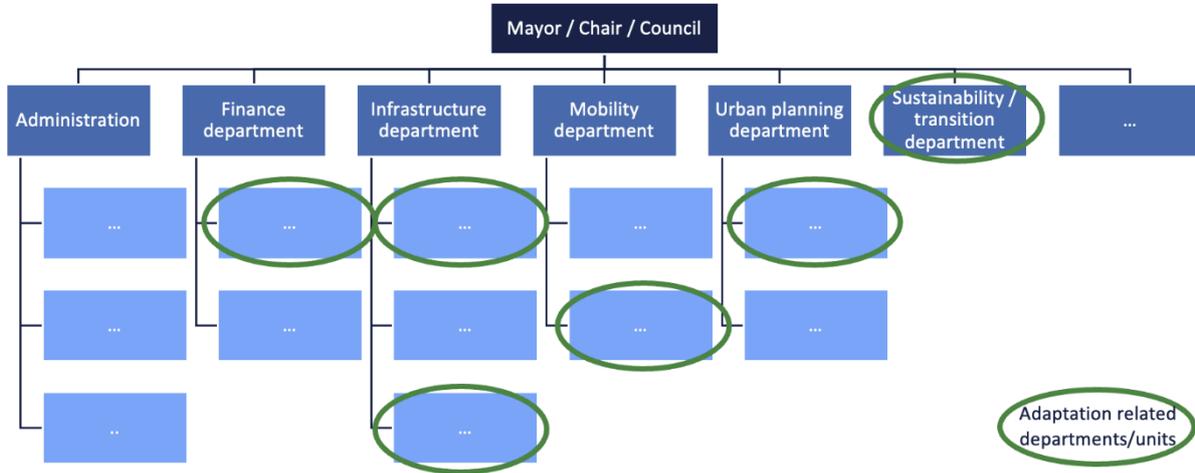
Within administrations themselves, there should be **communication and sharing of knowledge** and experiences, **to break the silo approach**. Adaptation challenges and adaptation finance should not be faced department by department but through a unified approach. PAs should **take stock of and evaluate their past experiences in terms of project implementation, funding and financing, across different sectors and departments**, and capture already **existing relationships with the private sector**. The goal is to have a



comprehensive overview, identify potential actors to involve, methods that are currently being employed or that have been successfully implemented in the past and that can be replicated.

A useful exercise is the **mapping of the different departments within the PA** that are already involved in adaptation or could potentially be involved, to start identifying relevant actors. This could be done by structuring an organisational chart or in a tabular form.

Template 3 Example of organisational chart, to be adapted and filled in by PAs



8. Further reading/ guidance and resources

Resources: [ClimateADAPT Country Profiles](#)

This interactive platform showcases the status of national adaptation actions reported for European countries. For each of them, information on national circumstances, legal policy frameworks, strategic plans, good practices and subnational context are presented, along with links to the public documentation.

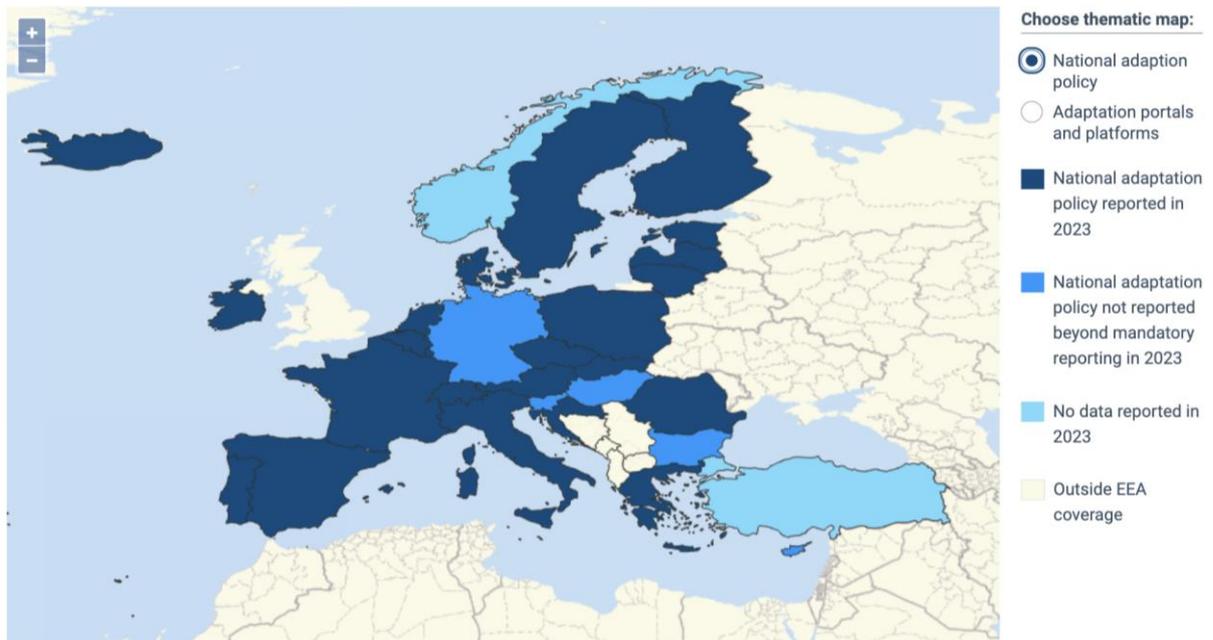
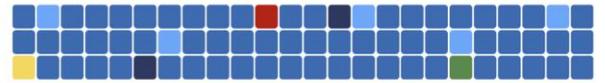


Figure 12 Screenshot from Country Profiles platform. Source: ClimateADAPT



5.3 Identify enabling conditions to overcome barriers

1. Purpose of the module

As barriers to climate adaptation planning and finance can be highly context specific, this module aims at **identifying the specific barriers** PAs experience in their territories and defining **actions to overcome them**.

2. Inputs and prerequisites

Comprehension of potential barriers that can affect PAs, by personal knowledge or internal discussions. This module is from a broad perspective connected with all the other modules, as the identification of barriers and actions to push past them is beneficial for the development of the investment strategy in general and might enlarge the spectrum of possibilities available to PAs.

3. Skills and Expertise required

Understanding of the main types of barriers to adaptation finance and of those directly affecting the PAs. Understanding potential solutions and remedial actions.

4. Activities and efforts

Efforts can include the review and expansion of work conducted in D1.1 and T2.1, consultations with internal departments and external stakeholder involved in the adaptation finance and implementation. In addition to discussions with internal and external stakeholders, the objective is to understand and identify the enabling factors and barriers, as well as local adaptation initiatives – especially regarding financing mechanisms – through the consultation of studies and papers at the national, local, and European levels.

5. Stakeholders to involve and the role of the LRTs

- Climate department
- Financial department
- City manager
- Regional development agency
- NGOs
- Local associations
- FIEs
- Climate agencies

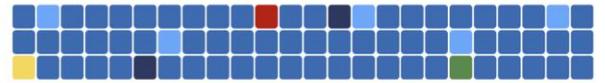
6. Outputs from the module

Identifying barriers, remedial actions and actors involved. At a **minimum**, the barriers identified in WP1 and set out in in D1.1. should be outlined, identifying potential remedial actions.

Template 4 to be filled in by PAs

Barrier	Remedial Action	Actors involved in the solution

It is also important to consider the different effects of remedial actions, that could address multiple barriers at the same time. There does not need to be a one-to-one correspondence between barriers and remedial actions.



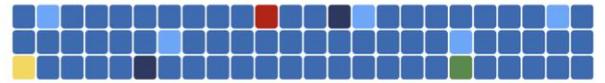
7. Key issues to consider

CLIMATEFIT D1.1 already provides a set of barriers from the point of view of the PAs, coming from the literature review and from interviews, but it is also useful to understand other potential barriers coming from the PAs consultations.

Barriers coming from the literature (Moser et al., 2019) are categorized in 5 thematic items:

- Establishing climate change risks as a matter of concern:
 - Conflict of interest. Climate risks are ignored because of expenditures, lost revenues and the absence of great near-term benefits due to the long-term nature of climate change.
 - Low priority. Lack of knowledge and interest in climate change from the PA.
 - Lack of champions and leadership. Lack of leadership from decision makers and chiefs of staff on climate change.
 - Disproportionate burden. Current issues such as education, housing, infrastructure are more pressing vulnerabilities.
- Establishing adaptation funding needs, costs and benefits:
 - Inappropriate funding scale. Climate risks do not respect jurisdictional boundaries, potentially creating a mismatch between potential solutions and the authority of the PA. This barrier also entails the question of responsibility and accountability for climate change impacts.
 - Siloed governance. Disconnection between departments, creating unclear responsibilities, leadership, and accountability.
 - Inability to make the economic case. Inability to assess the need for action, challenge of valuing risks and benefits, ability to value monetary and nonmonetary value.
- Proving the fiscal standing of the PA (adaptation funding seeker):
 - Chronic underfunding. Dependency on grants because of inability to effectively raise tax.
- Identifying and accessing adaptation funding sources:
 - Lack of capacity and staff constraints to apply to fundings. Limited staff limits the capacity to apply to fundings. The PA does not have dedicated personnel focused on adaptation.
 - Discontinuous funding: short term projects for adaptation, in contrast with very long-term funding plans needed for climate change.
 - Aversion to innovation. Deviation from traditional projects not always welcomed by the bureaucracy.
- Having or building capacity to research, use, and administer adaptation funds:
 - Funding biases: perception that there is only limited funding for adaptation implementation and planning.
 - Lack of knowledge about sources: difficulty to find relevant funding sources for adaptation.
 - Restrictions, conditions, eligibility criteria. Difficulties in meeting eligibility criteria for grants.
 - Lack of capacity of the PA to administer received funds.

Interviews conducted in the territories highlighted the presence of the following barriers:



	RO	SI	CZ	IT	ES*	PT	BEL	FR
Archetypical Barriers	Conflict of interest	X	X	X	X		X	X
	Low priority	X	X	X		X	X	X
	Lack of champions, leadership	X	X	X	X		X	X
	Disproportionate burden	X	X		X			X
	Inappropriate funding scale		X	X	X		X	X
	Siloed governance	X	X	X	X		X	X
	Inability to make economic case	X	X	X	X		X	X
	Chronic underfunding	X	X	X	X	X	X	X
	Lack of capacity and staff constraints to apply to fundings	X	X	X	X	X	X	X
	Discontinuous funding	X	X	X	X		X	X
	Aversion to innovation	X	X	X	X		X	X
	Funding biases	X	X		X		X	
	Lack of knowledge about sources	X	X	X	X	X	X	X
	Restrictions, conditions, eligibility criteria	X	X	X			X	
	Lack of capacity to administer funds		X	X	X		X	X
New barriers	Dichotomy between the perceived level of priority, the priority awareness and the means aligned	X			X	X		
	Regulatory framework discouraging private funding and/or public-private-partnership					X		
	Operational costs funding			X		X		
	Competition between sectors for policy priorities	X					X	
	Confusion between mitigation and adaptation	X		X				

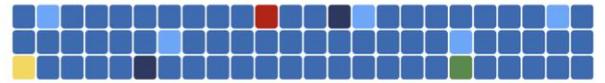
*Due to the limited availability of PAs in some territories [Diputacion Avila (ES), Barco Avila (ES), Navaluenga (ES), Maia Municipality (ES), Lovrenc na Pohorlju (SI)], this table provides an overview of the perceived level of readiness but are based on a limited sample of respondent and results have to be used with caution.

Figure 13 Results of interviews within CLIMATEFIT territories. Source: CLIMATEFIT Task 2.1 Workshop

CLIMATEFIT D1.1 also identified some key enablers of adaptation finance from the literature:

- Regulatory reform (industry, fiscal, financial, market and monetary) coupled with regulatory certainty, to address market fragmentation and reduce perceptions of high risk and uncertainty.
- Expanding the actor space, thinking beyond current incumbents and creating diversity in adaptation innovation by involving a range of different investors and partners and actively including the private sector.
- Private public partnership, blended finance, and de-risking of capital to overcome the trust deficit and mobilise additional finance.
- Levelling up adaptation, with scholars, policymakers, and practitioners progressing uniformly adaptation and mitigation.
- Bankable project pipelines improvements, increasing also the knowledge, skills, and capacity of both investors and governments.

Within the 20 international best practices analysed in CLIMATEFIT D1.1, barriers identified refer to insufficient public resources due to budget constraints and priorities in other sectors, to the lack of long-term (financial) strategies, to limits imposed by the legal frameworks and to the lack of resources and incentives of private landowners. The following factors have been explicitly identified as enablers of successful development of the projects:



Success factors / ID	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Collaborations between public and private partners	X	X	X		X		X	X	X		X	X			X	X	X		X	X
Collaborations between public partners			X					X	X			X				X				
Community support		X			X	X				X	X		X	X				X		X
Legal compliance	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X		X
Political support			X					X	X				X		X			X		
Public resources			X	X	X	X	X	X	X	X	X	X	X		X		X	X		X
Private resources		X		X		X		X	X						X	X	X	X		
De-risking mechanisms	X	X		X			X	X				X				X				
Business case	X		X				X				X		X							
Accountability, transparency, reporting	X		X			X	X	X						X		X		X		
Financial incentives	X	X		X		X	X				X			X						
Multiple sources/instruments	X	X	X			X				X	X		X			X	X			X
Long -term strategy	X	X	X			X		X	X			X	X					X	X	X
Sustainable finance			X	X		X	X						X			X				
flexibility		X		X		X	X						X							

Figure 14 Enabling factors from CLIMATEFIT 20 international best practices. Source: CLIMATEFIT D1.1

Key takeaways from best practices:

1. Good partnerships between public and private actors are important.
2. Successful multi-actor adaptation financing and funding solutions have a win-win for all partners involved.
3. Successful adaptation funding and financing solutions combine different financial instruments.
4. New approaches require significant resources.
5. Collaborations on a regional scale and/or between multiple public authorities may be necessary.

Figure 15 summarizes barriers to adaptation finance from both the demand and supply side.

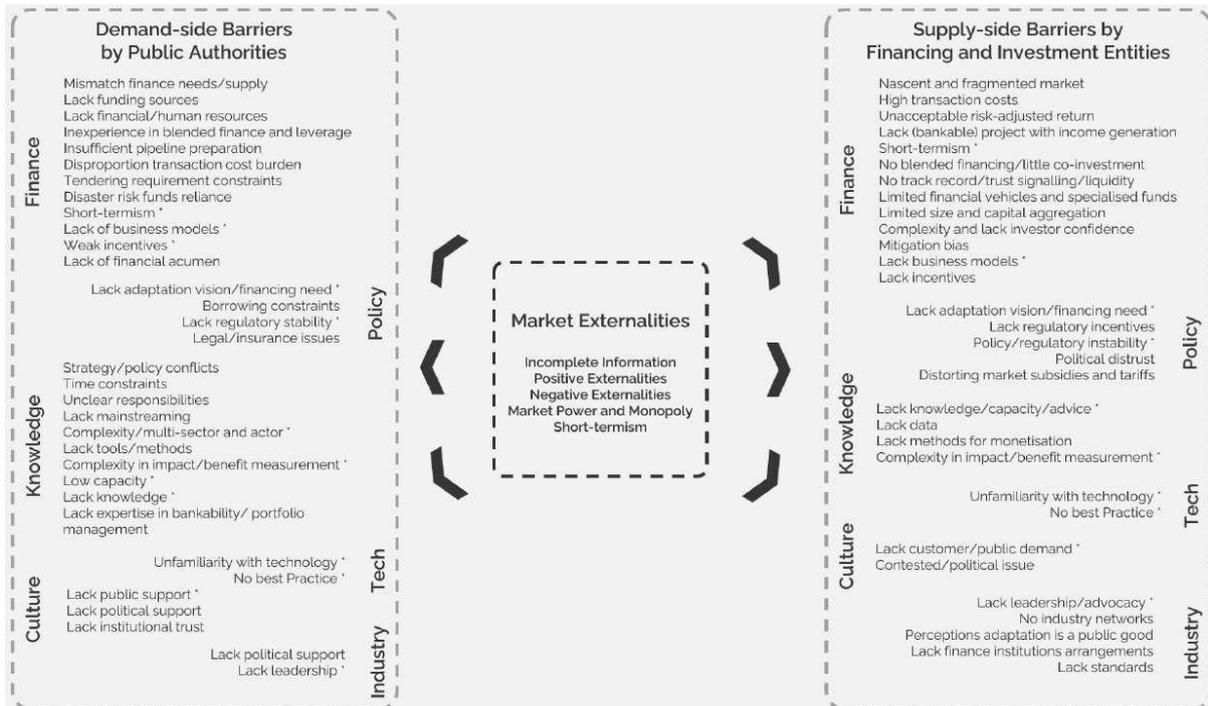
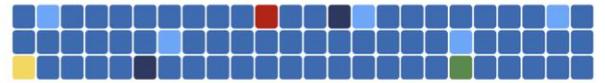


Figure 15 Barriers to adaptation finance (FIEs and public authorities). Source: Whittaker (2024), Are markets interested in financing urban climate change adaptation? [PhD dissertation] CBS-MSC

8. Further reading/ guidance and resources

Resources: Overcoming barriers to climate adaptation - CASCADE project

The report aims at providing resources for municipal officers and experts to deal with barriers to climate adaptation. The report gives a background to the topic by introducing the potential barriers to adaptation, it highlights the importance of stakeholder engagement, it provides guidance on how to identify barriers, key questions to ask and various resources to facilitate their overcoming.



5.4 Longlist of adaptation options, i.e. initial set

1. Purpose of the module

This module's purpose is to create a long list of the **adaptation options or adaptation projects that could be (potentially) relevance for the PA**, based on the assessment and prioritisation of climate risks (module 1). These could be **new projects or projects already in the pipeline of the PA**, eventually in collaboration with other actors. The PA will use this long list as initial set from which to select the options that will actually be implemented.

The output should be a kind of **"wish list/database of possible projects"**, with actions that can be measured and defined targets.

It is not possible to advise on an optimal number of adaptation options or projects that could fit all territories, as such number will depend on several factors: the size of the PA, the climate risks it faces, the specific constraints in terms of resources and capacity, and so on.

Definitions

Adaptation options: the array of strategies and measures that are available and appropriate for addressing climate adaptation. They include a wide range of actions that can be categorised as structural, institutional, ecological or behavioural. (CLIMATEFIT glossary)

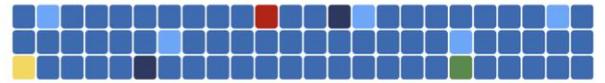
Adaptation options "range from actions that build adaptive capacity (e.g. knowledge creation and sharing of information, creating supportive institutional frameworks) or establish management systems and supportive mechanisms (e.g. better land management planning, insurance mechanisms) to adaptation actions implemented on the ground, e.g. physical or ecosystem-based measures" (Climate-ADAPT, n.d.). (CLIMATEFIT D1.1)

Adaptation projects: these are concrete, actionable initiatives, often with defined timelines, budgets, locations, and performance indicators. It is a project designed to respond to, avoid, moderate, repair, or adapt to negative impacts caused by climate change and to assist human and natural communities, households, and businesses in preparing for future climate-change-driven disruptions. These projects include implementing nature-based solutions and flood protections; upgrading stormwater drainage systems; making defensive upgrades to roads, bridges, railroads, and transit systems; preparing for and recovering from extreme weather events; undertaking preventive health care programs and providing medical care to treat illness or injury caused by the effects of climate change; relocating, elevating, or retrofitting sewage treatment plants and other infrastructure vulnerable to flooding; installing energy-efficient cooling systems and other weatherization and energy efficiency upgrades and retrofits in public and private buildings, including schools and public housing, designed to reduce the public health effects of more frequent heat waves and forest fire smoke; upgrading parts of the electrical grid to increase stability and resilience. (Law Insider) (CLIMATEFIT WP2 consultation).

It can be particularly useful—when aiming to overcome barriers—to start by clearly understanding the final objective. As they develop their strategies, Public Authorities (PAs) should define clear, measurable, and quantifiable goals. If PAs are able, even at this early stage, to formulate a high-level vision of the strategy's overall objectives, it will be easier for them to identify the necessary conditions to overcome existing barriers.

2. Inputs and prerequisites

This module is highly dependent on the module about the prioritization of climate risks and sector and will in turn serve as a starting point for the modules on the high-level estimation of costs and benefits and on the time horizon of investment.



3. Skills and Expertise required

Knowledge of adaptation measures suitable to face the different climate risks and understanding of local context to determine their implementation feasibility within the PA territory.

4. Activities and efforts

Efforts include the review of available climate adaptation options and measures, using for example the Green Deal Going Local Handbook (see Resource box), and exchanges and consultations with technical departments which would be involved in the implementation.

5. Stakeholders to involve and the role of the LRTs

- Climate department
- Technical departments (e.g., mobility, urban planning, green management, etc.)
- City manager
- Development agencies
- Think tanks

6. Outputs from the module

Identification of a longlist of adaptation options that are aligned with the climate risks identified before, following the EUCRA and the key sectors selected in the previous modules. The aim is to ensure consistency between the identified risks and the sectoral vulnerabilities, enabling the identification of effective adaptation responses. This process is supported by the integration of the table below, which serves as a reference framework to map and organize the adaptation options according to risk type, sectoral relevance, and potential implementation scale. The resulting longlist will provide a comprehensive foundation for analysis.

Template 5 to be filled in by PAs

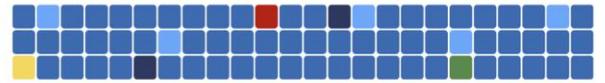
Risk	Sector	Adaptation option or Adaptation projects	Responsible department/unit	Time scale (short/mid/long term)	Ease of implementation (1-3)

Ease of implementation:

- 1: low hanging fruit (easy to implement)
- 2: medium effort
- 3: high effort (complex and time consuming to implement)

7. Key issues to consider

PAs should start by reviewing the adaptation strategies and plans at local level (and even at different scales, e.g. regional or national) to identify potential adaptation options, or if they already have specific adaptation projects planned, supported by concrete quantitative information. This allows for a more precise evaluation of the maturity and feasibility of proposed adaptation measures, and facilitates their integration into the investment strategy and future implementation plans. If those have not been already identified by adaptation strategies/climate action plans, PAs can start building knowledge by getting an overview of the different types of adaptation options available. There are several resources that can be exploited, identifying categories and providing examples. There is not a unique inventory, but several different catalogues of adaptation measures have been created by various European projects.



Moreover, it must be kept in mind that now there is no standardization of measures and no harmonization in the nomenclature and in the way they are described.

The P2R project highlighted how multiple approaches need to be explored when identifying adaptation options, because of the complexity of climate risks. A diverse range of interventions must be explored, from nature-based solutions to technological innovations and policy frameworks, engaging local stakeholders and global expertise and integrating existing policies and new initiatives. The process should consider synergies, minimize trade-offs, and align with local economic and political priorities.

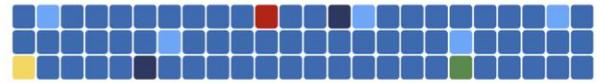
Internally, **PAs should also investigate within the different departments the ongoing and planned initiatives or single adaptation projects.** Such activities may also not directly have as main target climate adaptation, but they may bring **adaptation co-benefits**. Adaptation options or projects that could at the same time bring benefits to different sectors and risks also need to be taken in great consideration. A good case in point are projects to remodel the infrastructure, for example the transport infrastructure, which aim to improve mobility, or the sewage infrastructure, with the aim to reach areas previously not covered, but may have strong co-benefits in terms of mitigation and adaptation.

To summarize the different types of potential adaptation options, three main categories can be identified:

- Climate adaptation specific and standalone projects, which primary objective is adaptation itself.
- Climate resilient projects, which are not directly intended for adaptation purposes only but include climate adaptation features (or to which climate adaptation features could be added).
- Development projects that incorporate adaptation issues or that can benefit from such incorporation.

From this first overview, a list of options should be compiled, selecting the ones that can be considered and potentially implemented. A starting point could be to identify the “low hanging fruits”, defining first actions that can be implemented more easily and with less resources. Furthermore, the adaptation options should be longlisted based on risks, priorities and the local context identified on the previous modules of this methodology.

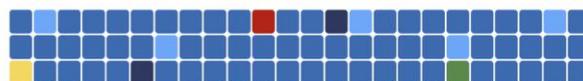
As mentioned in the beginning of this module, the optimal number of options and projects to consider can vary depending on the specificities of the territories. The longlist should therefore strike a balance between the exploration of different options to address the prioritized risks and their feasibility in terms of capacity of the PA. At a **minimum**, within CLIMATEFIT investment strategy, 20 adaptation options should be considered, including both specific projects that could be more easily identified and ideas of options.



CLIMATEFIT D1.1 already provides some examples of adaptation options:



Figure 16 Examples of adaptation finance opportunities within CLIMATEFIT research scope. Source: CLIMATEFIT D1.1, adapted from CCFLA (2022), *How to Increase Financing for Urban Climate Adaptation and Resilience 7 key actions for national governments to take. Policy Brief*



Additional examples of types of adaptation options are provided by the IPCC:

Category		Examples of options*
Structural/ physical	Engineered and built environment	Sea walls and coastal protection structures (5.5.2 and 24.4.3.5; Figure 5-5); flood levees and culverts (26.3.3); water storage and pump storage (Section 23.3.4); sewage works (3.5.2.3); improved drainage (24.4.5.5); beach nourishment (5.4.2.1); flood and cyclone shelters (11.7); building codes (Section 8.1.5); storm and waste water management (8.2.4.1); transport and road infrastructure adaptation (8.3.3.6); floating houses (8.3.3.4); adjusting power plants and electricity grids (10.2.2; Table 10-2)
	Technological	New crop and animal varieties (7.5.1.1.1, 7.5.1.1.3, 7.5.1.3; Box 9-3; Table 9-7); genetic techniques (27.3.4.2); traditional technologies and methods (7.5.2, 27.3.4.2, 28.2.6.1, and 29.6.2.1); efficient irrigation (10.3.6 and 22.4.5.7; Box 20-4); water saving technologies (24.4.1.5 and 26.3.3) including rainwater harvesting (8.3.3.4); conservation agriculture (9.4.3.1 and 22.4.5.7); food storage and preservation facilities (22.4.5.7); hazard mapping and monitoring technology (15.3.2.3 and 28.4.1); early warning systems (7.5.1.1, 8.1.4.2, 8.3.3.3, 11.7.3, 15.4.3.2, 18.6.4, 22.2.2.1, 22.3.5.3, and 22.4.5.2); building insulation (8.3.3.3); mechanical and passive cooling (8.3.3.3); renewable energy technologies (29.7.2); second-generation biofuels (27.3.6.2)
	Ecosystem-based ^a	Cross Chapter Box CC-EA, Ecological restoration (5.5.2, 5.5.7, 9.4.3.3, and 27.3.2.2; Box 15-1) including wetland and floodplain conservation and restoration; increasing biological diversity (26.4.3); afforestation and reforestation (Box 22-2); conservation and replanting mangrove forest (15.3.4 and 29.7.2); bushfire reduction and prescribed fire (Section 24.4.2.5; Box 26-2); green infrastructure (e.g., shade trees, green roofs) (8.2.4.5, 8.3.3, 11.7.4, and 23.7.4); controlling overfishing (28.2.5.1 and 30.6.1); fisheries co-management (9.4.3.4 and 27.3.3.1); assisted migration or managed translocation (4.4.2.4, 24.4.2.5, 24.4.3.5, and 25.6.2.3); ecological corridors (4.4.2.4); ex situ conservation and seed banks (4.4.2.5); community-based natural resource management (CBNRM) (22.4.5.6); adaptive land use management (Section 23.6.2)
	Services	Social safety nets and social protection (Box 13-2; 8.3, 17.5.1, and 22.4.5.2); food banks and distribution of food surplus (29.6.2.1); municipal services including water and sanitation (3.5.2.3 and 8.3.3.4); vaccination programs (11.7.1), essential public health services (11.7.2) including reproductive health services (11.9.2) and enhanced emergency medical services (8.3.3.8); international trade (9.3, 9.4, and 23.9.2)
Social	Educational	Awareness raising and integrating into education (11.7, 15.2, and 22.4.5.5); gender equity in education (Box 9-2); extension services (9.4.4); sharing local and traditional knowledge (12.3.4 and 28.4.1) including integrating into adaptation planning (29.6.2.1); participatory action research and social learning (22.4.5.3); community surveys (Section 8.4.2.2); knowledge-sharing and learning platforms (8.3.2.2, 8.4.2.4, 15.2.4.2, and 22.4.5.4); international conferences and research networks (8.4.2.5); communication through media (22.4.5.5)
	Informational	Hazard and vulnerability mapping (11.7.2, 8.4.1.5); early warning and response systems (15.4.2.3 and 22.4.5.2) including health early warning systems (11.7.3, 23.5.1, 24.4.6.5, and 26.6.3); systematic monitoring and remote sensing (15.4.2.1 and 28.6); climate services (2.3.3) including improved forecasts (27.3.4.2); downscaling climate scenarios (8.4.1.5); longitudinal data sets (26.6.2); integrating indigenous climate observations (22.4.5.4, 25.8.2.1, and 28.2.6.1); community-based adaptation plans (5.5.1.4 and 24.4.6.5) including community-driven slum upgrading (8.3.2.2) and participatory scenario development (22.4.4.5)
	Behavioral	Accommodation (5.5.2); household preparation and evacuation planning (23.7.3); retreat (5.5.2) and migration (29.6.2.4), which has its own implications for human health (11.7.4) and human security (12.4.2); soil and water conservation (23.6.2 and 27.3.4.2); livelihood diversification (7.5.1.1, 7.5.2, and 22.4.5.2); changing livestock and aquaculture practices (7.5.1.1); crop-switching (22.3.4.1); changing cropping practices, patterns, and planting dates (7.5.1.1.1, 23.4.1, 26.5.4, and 27.3.4.2; Table 24-2); silvicultural options (25.7.1.2); reliance on social networks (Section 29.6.2.2)
Institutional	Economic	Financial incentives including taxes and subsidies (Box 8-4; 8.4.3 and 17.5.6); insurance (8.4.2.3, 13.3.2.2, 15.2.4.6, 17.5.1, 26.7.4.3, and 29.6.2.2; Box 25-7) including index-based weather insurance schemes (9.4.2 and 22.4.5.2); catastrophe bonds (8.4.2.3 and 10.7.5.1); revolving funds (8.4.3.1); payments for ecosystem services (9.4.3.3 and 27.6.2; Table 27-7); water tariffs (8.3.3.4.1 and 17.5.3); savings groups (8.4.2.3 and 11.7.4; Box 9-4); microfinance (Box 8-3; 22.4.5.2); disaster contingency funds (22.4.5.2 and 26.7.4.3); cash transfers (Box 13-2)
	Laws and regulations	Land zoning laws (22.4.4.2 and 23.7.4); building standards (8.3.2.2, 10.7.5, and 22.4.5.7); easements (27.3.3.2); water regulations and agreements (26.3.4 and 27.3.1.2); laws to support disaster risk reduction (8.3.2.2); laws to encourage insurance purchasing (10.7.6.2); defining property rights and land tenure security (22.4.6 and 24.4.6.5); protected areas (4.4.2.2); marine protected areas (Box CC-CR Chapter 6; 23.6.5 and 27.3.3.2); fishing quotas (23.9.2); patent pools and technology transfer (15.4.3 and 17.5.5)
	Government policies and programs	National and regional adaptation plans (15.2 and 22.4.4.2; Box 23-3) including mainstreaming climate change; sub-national and local adaptation plans (15.2.1.3 and 22.4.4.4; Box 23-3); urban upgrading programs (8.3.2.2); municipal water management programs (8.3.3.4; Box 25-2); disaster planning and preparedness (11.7); city-level plans (8.3.3.3 and 27.3.5.2; Boxes 26-3 and 27-1), district-level plans (26.3.3), sector plans (26.5.4), which may include integrated water resource management (3.6.1 and 23.7.2), landscape and watershed management (4.4.2.3), integrated coastal zone management (2.4.3, 5.5.4.1, and 23.7.1), adaptive management (2.2.1.3 and 5.5.1.4; Box 5-2), ecosystem-based management (6.4.2.1), sustainable forest management (2.3.4), fisheries management (7.5.1.1.3 and 30.6.2.1), and community-based adaptation (5.5.4.1, 8.4, 15.2.2, 21.3.2, 22.4.4.5, 24.5.2, 29.6.2.2, and 29.6.2.3; Tables 5-4 and 8-4; FAQ 15.1)

Figure 17 IPCC Adaptation Needs and Options. Source: WGII AR5

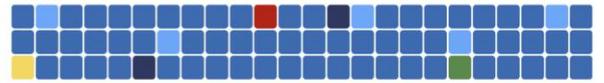
8. Further reading/ guidance and resources

Resources: [Green Deal Going Local Handbook](#)

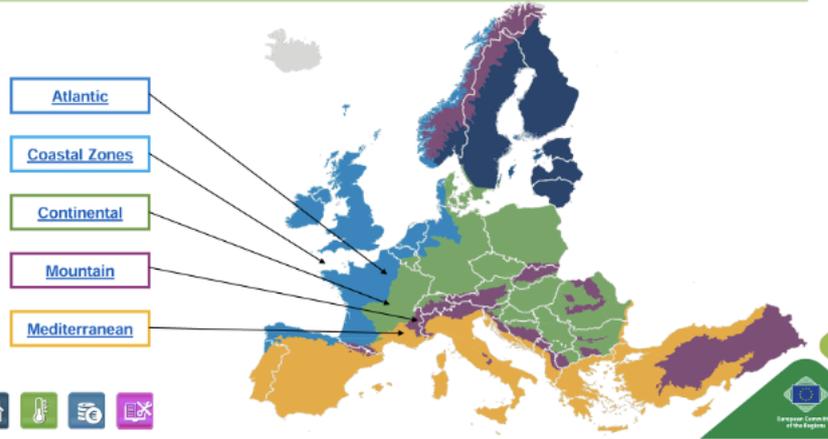
Step-by-step guidance for each European country at national level on adaptation, but also on renovation and biodiversity.

Five different climate areas are identified: Atlantic, coastal areas, continental, mediterranean and mountain. Information and best practices are provided for each country on targeted instruments based on geographical and institutional assets and vulnerabilities. Furthermore, for almost every country information is available in English and in the national language.

Example: extracts of the Green Deal Going Local Handbook for France, one of CLIMATEFIT 4 leader territories.



France – Choose a Climate Area



Continental Region

Discover how to...

... [manage higher temperatures](#)
 Average global temperatures have increased since the 19th century around the globe, raising the number of warm days and nights per year. Especially in the Continental region, temperatures are expected to rise largely, resulting in, for example, an increased demand for cooling and medical assistance for those affected by heat stress, dehydration and heat strokes.

... [protect forests](#)
 Especially in areas with many trees or grass/bushes in the countryside, forest fires can spread quickly. This can result in a decrease in the economic value of forests and neighbouring industries.

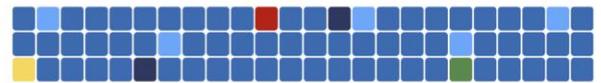
... [secure stable water levels of rivers](#)
 Periods of stronger precipitation are to be expected in the Continental region, which can in turn result in possible flooding and an increase in river flow. Being prepared for these events, especially when it comes to buildings and infrastructure, is crucial.

... [manage water supply](#)
 Higher temperatures accompanied by a decrease in summer precipitation can result in droughts and eventually lead to extreme heat and to competition for water resources.

Discover How to Manage Higher Temperatures

- [Improving thermal insulation](#)
- [Vertical greenery](#)
- [Increasing shaded areas](#)
- [Green / reflecting roofs](#) and areas
- [Improve irrigation systems in agriculture](#)
- [Increasing and revitalising green areas](#)
- [Parks and fountains](#) in cities
- [Vulnerability Assessment](#)
- [Heat-wave action plans](#)

Figure 18 Screenshots from Green Deal Going Local Handbook for France. Source: European Committee of the Regions



5.5 Estimate high level costs and benefits

1. Purpose of the module

This module consists in starting a **high-level estimation of costs and benefits for the defined longlist of adaptation options including externalities, revenues, and co-benefits**, since their magnitudes and characteristics are important factors to consider for the step of selection of financing sources and instruments.

This is because any investment proposition needs to **articulate costs and how the returns will work**, even if at a high level. Returns are normally made through user charges, fees or other income streams to repay the interest and capital.

Furthermore, it is also important to identify and distinguish the social benefits (e.g. community well-being and quality of life), environmental benefits (e.g. sustainability of ecosystems) and economic benefits (e.g. cost savings, economic growth and prosperity of business, individuals and communities) of adaptation options, as well as **who are the beneficiaries**.

This module should aim at obtaining an initial and general idea of the magnitude of cost and benefits, while a more detailed and fully-fledged cost benefit analysis will be conducted in the investment plan phase. In an optimal situation, these magnitudes should be quantified as much as possible, however the challenges of this step are acknowledged.

Definitions
<p>Costs of adaptation: <i>The cost of adaptation is the total expenditure dedicated to adaptation. Sometimes the cost of adaptation is defined as the total investment needs, which refers to the level of investment required to implement all the measures described in a given adaptation plan (national, subnational, sectoral or other). Actual spending consists of the expenditure mobilised for adaptation measures and tracked and categorised accordingly by governments, either annually or cumulatively since the beginning of the planning period. Planned expenditure is those budgets that governments have already committed to mobilising to comply with the adaptation plan but have not yet disbursed.</i></p> <p>EEA (2023) Assessing the costs and benefits of climate change adaptation</p>
<p>Benefits of adaptation: <i>The benefits of adaptation are commonly assessed by calculating avoided losses, i.e. considering the avoided direct and indirect damage to infrastructure and assets and the avoided deaths and well-being losses. They can also capture the effects on the local economy and the ancillary impacts of adaptation. These include reducing future risks, improving the productivity of unaffected resources and people, boosting innovation by seeking solutions amid new challenges, increasing the environmental benefits and improving ecosystem services.</i></p> <p>EEA (2023) Assessing the costs and benefits of climate change adaptation</p>

2. Inputs and prerequisites

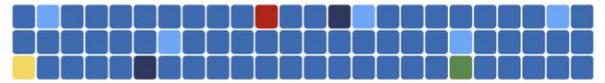
This module is highly dependent on the module about the longlist of adaptation options and will in turn serve as input for the modules on the identification of the financing gap and on the time horizon of investment.

3. Skills and Expertise required

Knowledge of cost and benefits of implementing adaptation options or contacts with internal and external stakeholders and experts who directly work on implementation of projects. Understanding of who are the beneficiaries of adaptation options and what could be the potential revenue streams.

4. Activities and efforts

Efforts include consultations with technical departments and experts in the implementation of adaptation options and review of documentation on existing similar options.



5. Stakeholders to involve and the role of the LRTs

- Climate department
- Technical departments (e.g., mobility, urban planning, green management, etc.)
- Financial department
- Local associations
- External contractors

6. Outputs from the module

The output of this phase is to carry out a cost-benefit analysis of the identified adaptation options. To support this process, the table below should be completed, associating each climate risk with its corresponding location, relevant adaptation option or project. This structured mapping will help provide a high-level estimation of expected costs, potential benefits, and the main beneficiaries.

As a minimum, cost estimations should be categorized into broad classes—for example: small-scale options (below X €), medium-scale (between X and Y €), and large-scale (above Y €). In more advanced contexts, more precise cost ranges or actual figures should be provided, when available.

Benefits should be assessed across three key dimensions: social, economic, and environmental, with a high-level evaluation of the positive impacts in each category.

If the longlist includes a high number of adaptation options (e.g. more than 20), and it is not feasible to estimate costs and benefits for all, a prioritization exercise should be conducted. However, care must be taken to ensure that all climate risks and relevant sectors identified in the first module are covered, and that the full range of adaptation solution types—such as Nature-based Solutions (NbS), organizational measures, and grey infrastructure—is adequately represented.

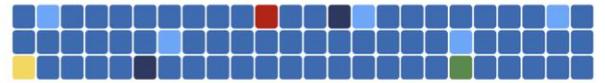
Template 6 Database of costs and benefits to be filled in by PAs

Risk	Location	Adaptation option or Adaptation project	Costs	Benefits	Beneficiaries

7. Key issues to consider

In this module only a **high level approach** to assess the order of magnitude of costs and benefits can be sufficient, while a more quantitative assessment and detailed analysis shall be conducted during the investment plan phase: this is why it is enough to understand the main adaptation costs regarding the adaptation options and projects and the potential benefits, as a starting point for the whole analysis that will be developed in the investment plan phase. Since there is not a standardized and unique catalogue of this kind of information at European level, PAs should try to gather them from different sources and, if it is possible, share the different sources in which the Cost-Benefit Analysis information where found.

As a general approach for this step data on costs and benefits can be obtained by organizing tailored roundtables and/or workshops with stakeholders and practitioners in climate change adaptation from the different PA departments. Thanks to their expertise and network they may already have data and information from previous and ongoing projects, initiatives, actions, and strategies within their domain. During these activities the longlist of the selected adaptation options will be circulated to allow the stakeholders to start assessing and gather the cost data needs. Such effort could be carried out in this manner, following the diagram presented in Figure 19:



- If the information is available within the PA thanks to the practitioners' expertise or can be retrieved through their network, then the data can be directly used
- If information is not internally available, costs and benefits can also be collected by looking at other projects implementing the same kind of adaptation option and performing literature reviews. This could be done preferably by looking for projects implemented in areas close to the local territory of each PA, so that in principle data should be more easily transferable. Alternatively, PAs can geographically expand their research make use of case studies and best practices collected at the European level.
- If it is not possible to collect data on the selected adaptation option, similar options can also be used as proxy in this phase. The same approach of starting from locally implemented project should be followed, resorting to wider geographical areas if more information is needed. Furthermore, since there may be high variability among different studies and projects because of the context specificity, putting together information from a variety of sources can also help to increase reliability.
- The information collected should be adapted as much as possible and rescaled, adjusting it according to the specific characteristics of the project and the territory (e.g. magnitude of the intervention, price level in case the information is obtained from another country). To this end, interactions and feedback loops among the different departments can also help in validating the information collected and obtain a more reliable estimate.

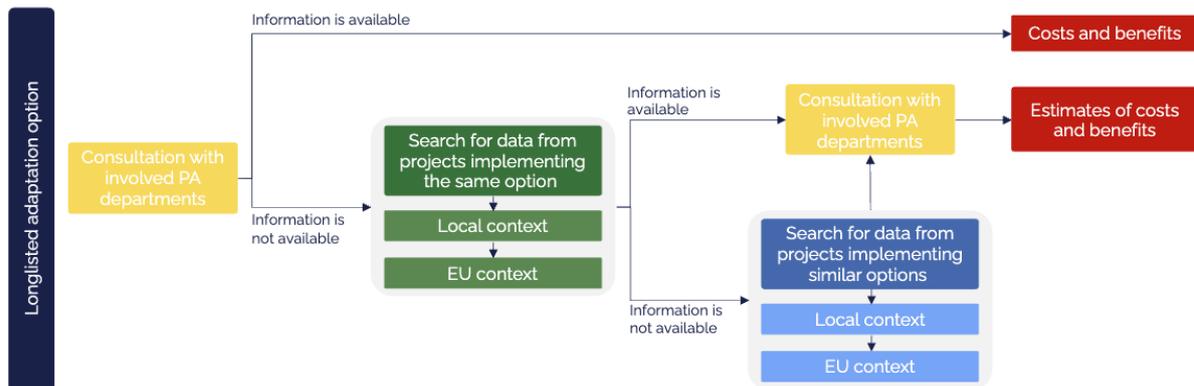


Figure 19 Process to obtain a first overview of costs and benefits of adaptation options. Source: CLIMATEFIT

Since conducting an extensive review of many different measures would be too resource- and time-consuming, it is important that the search is really targeted to the risks and longlisted options identified in the previous steps of the methodology. Collected data need to refer to the adaptation options themselves and not for example to the implementation of an entire project.

At this stage, estimates could also be presented as ranges following a high-level approach, with identification of more precise costs and benefits to be performed in the Investment Plan phase.

Finally, a common database could be constructed and filled in as work progresses. The idea is to gather and categorize (according to the risk addressed and the location of the intervention) all information collected by PAs on costs and benefits of adaptation options, so that the database becomes a knowledge-sharing platform available to everyone and from which PAs themselves can build on.

8. Further reading/ guidance and resources

Resources: [Climate-ADAPT case study explorer](#)

The catalogue showcases many implemented adaptation options and initiatives, providing also information on costs and benefits. Users can identify the more relevant cases by filtering according to adaptation sectors, climate change impacts, key type measures and adaptation approaches. The case studies can be also accessed through the ClimateADAPT resource catalogue.

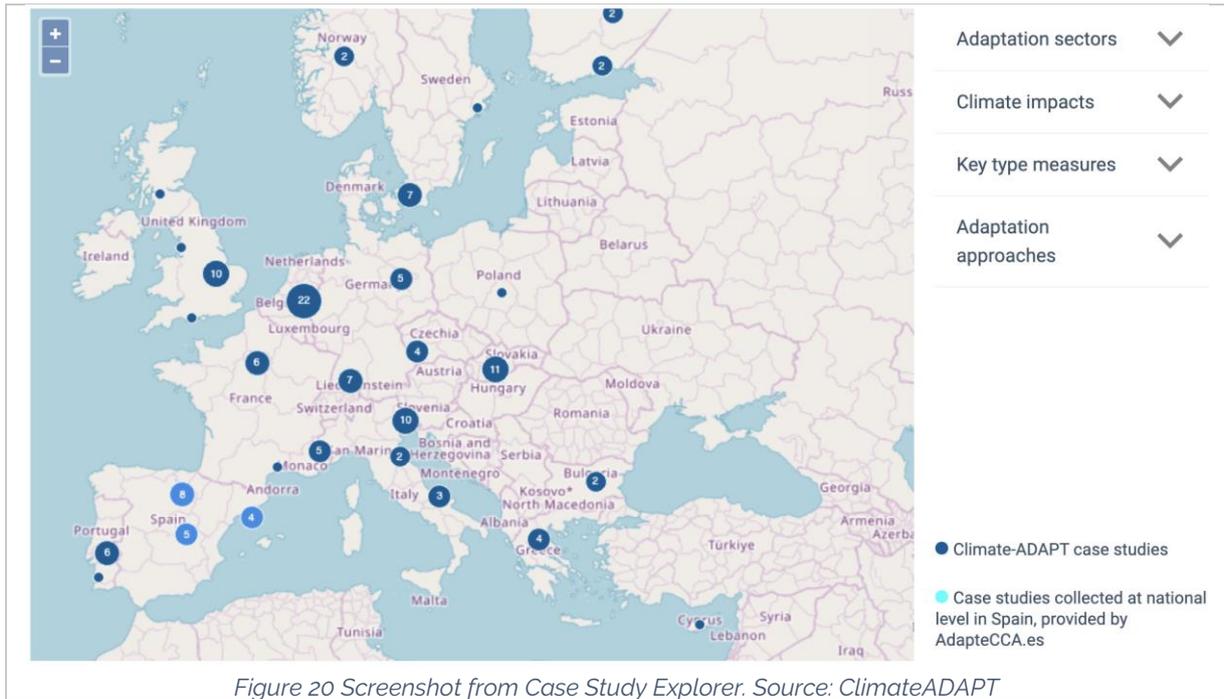
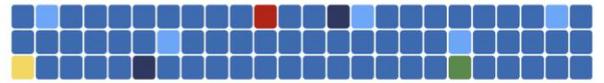
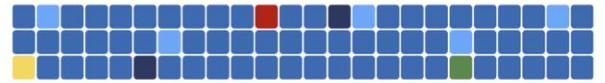


Figure 20 Screenshot from Case Study Explorer. Source: ClimateADAPT



5.6 Identify the financing gap

1. Purpose of the module

This module consists in **comparing** the broad estimate of the aggregated, **total costs and benefits with the resources** that the PAs have already available and their planned expenditure.

The **difference determines the gap** that will need to be filled with additional resources, either from public sources or private ones.

Definitions
Adaptation finance gap: The difference between the estimated costs of meeting a given adaptation target and the amount of finance available. Term commonly referring to national, continental, or global finance gaps. It can be applied to the local level. (CLIMATEFIT glossary)
Adaptation funding gap: The difference between the available capital for a given adaptation initiative or project and what is required to fully cover the costs of the same. Term commonly referring to sub-national finance gaps and used interchangeably with adaptation finance gap. (CLIMATEFIT glossary)

2. Inputs and prerequisites

This module is highly dependent on the module about the high-level estimation of costs and benefits and will in turn be instrumental for the development of the modules on the time horizon of investment and the identification of potential range of financing sources and instruments.

3. Skills and Expertise required

Knowledge of financial processes in general, and if in particular there are some related to climate adaptation. Knowledge of budget allocation within the PA and across the different departments, especially budget allocated for climate aspects, for example annual budget or initiatives in pipeline. If it is possible, will be useful to map and share specific adaptation projects and the relative costs. Some CLIMATEFIT partners have already defined budget allocations for specific adaptation options and have broken them down into individual adaptation projects. This allows for a more precise estimation of specific costs and financial needs. Additionally, there may be private sector or business-led initiatives that regularly finance adaptation actions. These actors could play a key role in supporting the funding of adaptation measures, potentially contributing significantly to the overall investment strategy.

4. Activities and efforts

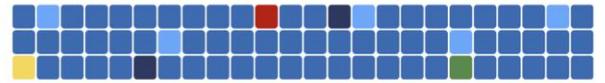
Efforts include consultations with and information retrieval from the financial department, review of allocation of funds and budget across the different units/departments.

5. Stakeholders to involve and the role of the LRTs

- Financial department
- Budget units
- Technical departments (e.g., mobility, urban planning, green management, etc.)
- City manager
- Specific units or departments focused on Sustainability

6. Outputs from the module

Identification of the quantitative difference (if possible) or at least a tentative estimation between the available resources (including budget allocated from the municipality for climate adaptation initiatives and possible other private initiatives) and the real need of the investments. If the budget does not cover the entire investment budget, the municipality will need investment to fill the gap.



7. Key issues to consider

Within the PA, **the different lines of budget that could be used for adaptation purposes** should be identified across the different departments, through exchanges of information. In this module, **the involvement of the finance department is crucial**.

PAs can cross reference information on the budget with the longlisted adaptation options and their estimated costs and benefits and investigate different channels (Table 2).

Table 2 Channels to be investigate within PAs

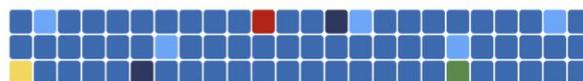
Channels
Specific funds and streams for adaptation measures already earmarked
Consultation with the specific departments who would be in charge of the implementation of the options
Consultation with the financial unit
Identification of already existing agreements with private entities

Tracking public expenditure on climate change adaptation is important for providing a baseline for identifying the financing gap, and for helping territories to prioritise and plan. Current expenditure on adaptation in the CLIMATEFIT territories is not well documented. Cost-benefit analyses, vulnerability or feasibility studies, and impact assessments, when conducted, are usually outsourced by PAs (CLIMATEFIT D1.1).

When planning climate adaptation investments, public authorities face the challenge of allocating resources efficiently to maximize benefits and minimize costs. A highly effective approach is to break down adaptation options into **adaptation projects, individual activities or operational components**. This disaggregated view allows for more precise assessment of both the costs and the benefits associated with each specific action, making it easier to identify the most impactful and sustainable measures. It also enhances the adaptability of the strategy to local needs and improves transparency and communication with stakeholders throughout the planning and decision-making process.

8. Further reading/ guidance and resources

Resources
Tracking Adaptation Finance: Advancing Methods to Capture Finance Flows in the Landscape. The report proposes methods to identify and track streams of adaptation finance. In the context of the investment strategy, this document and especially the table identifying the keywords by sector can be useful to identify workstreams and activities within PAs' departments that involve aspects of adaptation finance and whose resources may be therefore tagged for adaptation.



SECTOR / FIELD OF ACTIVITY	PROJECT TYPE
WATER AND WASTEWATER MANAGEMENT	<ul style="list-style-type: none"> • Improvement of drinking water availability • Catchment management planning • Protection of water supply against extreme weather events • Improvement of surface and urban stormwater drainage • Water loss reduction • Hydro-meteorological monitoring • Rainwater harvesting • Waste-water treatment relocation • Desalination plants, etc.
AGRICULTURE, FORESTRY, LAND USE, AND NATURAL RESOURCE MANAGEMENT	<ul style="list-style-type: none"> • Soil and water conservation • Climate-smart agriculture • Agricultural insurance

*Figure 21 Part of table on keyword list by sector for illustrative purpose. See full table in CPI document.
 Source: CPI*

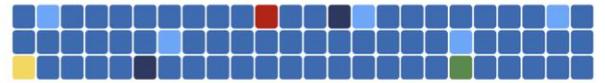
COST BENEFIT ANALYSIS OF CLIMATE ADAPTATION OPTIONS SUPPORTED BY THE ADAPT PLAN PROJECT - A Cost Benefit Analysis of Climate Adaptation Options, UNDP

The report applies a comprehensive Cost-Benefit Analysis (CBA) to evaluate the socio-economic viability of a proposed investment project, using the methodology recommended by the European Commission's guidelines for major investment projects (specifically, 2014/C 209/01). This approach moves beyond assessing the financial feasibility of the project alone, aiming instead to understand its long-term value to society as a whole. The analysis begins by establishing a clear comparison between two scenarios: one with the implementation of the project, and one without it (the so-called "do-nothing" or baseline scenario). This comparative framework helps to isolate the direct impacts of the project. The report then quantifies all the relevant economic costs and benefits. Costs include capital expenditures, as well as ongoing operational and maintenance expenses. On the benefit side, the analysis considers tangible advantages such as time savings, reduced environmental impacts (e.g., lower emissions), operational efficiencies, and improvements to quality of life or public safety.

To ensure comparability over time, all future costs and benefits are discounted to their present value, using a discount rate of 4% as recommended for Italy by EU guidance. This allows for the calculation of several key indicators, such as:

- Economic Net Present Value (ENPV): the overall net benefit of the project,
- Economic Internal Rate of Return (EIRR): the rate at which benefits equal costs,
- Benefit-Cost Ratio (B/C ratio): the proportion of benefits to costs.

Finally, the report conducts both a sensitivity analysis (to test how changes in key variables affect the results) and a risk analysis (to identify potential uncertainties and how they might influence the project's performance).



5.7 Define time horizon of investment

1. Purpose of the module

The outcome of this module should be a **high-level allocation of the investment needs into the different time horizons**, in order to obtain a general timeline. In other words, this means distinguishing the level of investment needed over different time periods.

2. Inputs and prerequisites

This module is highly dependent on the modules about the high-level estimation of costs and benefits and the one on the financing gap. In turn, it will serve to complete the modules on the identification of potential financing sources and instruments and the preliminary matchmaking.

3. Skills and Expertise required

Knowledge about the timescale of implementation of adaptation options and the time horizon for their financing.

4. Activities and efforts

Efforts include the review of the timescale for the implementation of and the investment needs for climate adaptation options, consulting with financial and technical departments.

5. Stakeholders to involve and the role of the LRTs

- Financial department
- Budget units
- Technical departments (e.g., mobility, urban planning, green management, etc.)
- Development agencies
- City manager

6. Outputs from the module

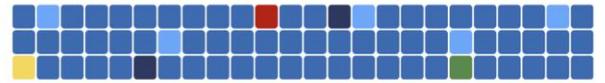
The output of the module is to identify the investment time horizon by allocating actions across the short, medium, and long term. The allocation of investments across these timeframes will be determined by Public Authorities (PAs) based on their investment needs and strategic objectives, aligned with the selected adaptation actions and projects. This process will be supported by the integration of the table below, which helps contextualize and structure the investment horizon.

Template 7 to be filled in by PAs

Adaptation option or Adaptation project	Short term (1-5 years)	Medium term (5-10 years)	Long term (> 10 years)

The table above is just a potential example of short, medium and long term regarding the time horizon of investment. Generally, there's not a framework that indicates a specific time horizon of investment, instead there are some voluntary recommendations that can help the analysis.

For example, the TCFD (Taskforce on Climate-related Financial Disclosure, now integrated in IFRS S2) ask to give a "description of what they consider to be the relevant short-, medium-, and long term time horizons, taking into consideration the useful life of the organization's assets or infrastructure and the fact that climate-related issues often manifest themselves over the medium and longer terms": the time horizons have to be aligned with the expectations, the needs and the projects of the specific municipality.



Another interesting reference can be the Corporate Sustainability Reporting Directive (CSRD) that substitutes the Non-financial declaration: "in line with the provisions of the ESRS (CSRD) standards, the organization defines the time horizons as follows: short term (0–3 years), medium term (3–10 years), long term (over 10 years), consistently with the useful life horizon of its assets and corporate strategic plans." However, if a municipality decides to choose specific time horizon, the rule is to comply with the regulatory scenario or explain why they decide to go ahead with another option. In most of the cases, the municipality have to decide the best investment time horizon, aligned with the adaptation initiatives in pipeline.

7. Key issues to consider

Starting from the identified adaptation options and investment needs, create a sort of **timeline to distinguish between short/medium/long term** to have a clear overview of the **magnitude of investments needed in each phase**.

This module also connects to module 1 on prioritising risks and sectors, and module 4 on longlisting adaptation options by looking in more detail at priorities for investment options and their shortlisting to create portfolios later on. It also helps in placing options in provisional order for implementation in the investment plan phase.

Generally, municipalities incur costs without immediate returns when investing in climate adaptation. Benefits typically emerge in the medium term, although this varies depending on the type of project. For instance, targeted adaptation measures—such as depaving or the construction of flood protection walls— can yield results relatively quickly, as they are straightforward to implement and highly effective. In contrast, larger-scale initiatives like urban regeneration or the creation of green spaces often require more time, resources, and coordination, with benefits typically materializing over the medium to long term. All of this will enable a stronger alignment with the Investment Planning phase foreseen in WP3.

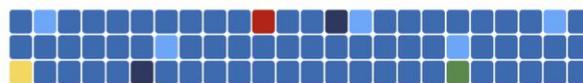
8. Further reading/ guidance and resources

Resources: Guidance for applying the Enabling Resilience Investment Framework (CSIRO 2022) and P2R

The guidance describes a process of generating and then screening options based on simple criteria (providing guiding questions to help the assessment such as timeframe, and interdependencies on other activities) and then prioritising and placing them in a provisional order for implementation (i.e. sequencing). In a next step, options are sorted into foundational and enabling options (learning, capacity building, or other institutional options); other options are funnelled into a phase 2 to build investment cases for funding and financing of infrastructure or assets.

P2R guidance similarly includes a step where options are prioritised and sequenced. One consideration is the timeframe of when the options need to be implemented and paid for (based on timing of risks), and of when benefits (including financial returns but also non-financial such as the value of information) are expected. P2R adopts the portfolio or 'building block' approach which categorises early actions into low/no regrets, climate smart design and adaptive planning (updated in the UK's CCRA3 Technical Report (2021) section 2.3). This framing focuses on the most urgent risks and the uncertainty of climate change.

CSIRO guidance and P2R use an 'adaptation pathways' approach to prioritise and sequence options into portfolios. Adaptation pathways are defined by the IPCC 2021 as "a series of adaptation choices involving trade-offs between short-term and long-term goals and values. These are processes of deliberation to identify solutions that are meaningful to people in the context of their daily lives and to avoid potential maladaptation". P2R recommends developing investment strategies for each pathway (one pathway is developed for each priority area or sector in connection to the region's strategic objectives. Adaptation pathways are developed as part of the adaptation planning process.



5.8 Identify the range of possible financial sources and instruments

1. Purpose of the module

This module aims at providing an **overview of scope, interests and insight into the different types of FIEs and instruments**. PAs could use this information in combination with the Investment Landscapes compiled in D1.1, to expand their horizon and understand which actors and FIEs are active in their territories and could potentially be engaged in adaptation projects.

Definitions

Financial/financing instruments: A contract that gives rise to a financial asset of one entity and a financial liability or equity instrument of another entity. (CLIMATEFIT glossary)

2. Inputs and prerequisites

This module is particularly dependent on the modules on the context, on barriers and enablers, on the financing gap and on the time horizon. It will serve as a starting point for the module on the preliminary matchmaking.

3. Skills and Expertise required

General understanding of types of financial source and instruments and their characteristics. Knowledge of the investment landscape within the PA's territory.

4. Activities and efforts

Efforts include the review of catalogues and documents about different types of instruments and entities providing them, starting with the P2R catalogue. The review and extension of the investment landscape developed in WP1 is also important, together with exchanges with experts on financial instruments and specific local frameworks and contexts.

5. Stakeholders to involve and the role of the LRTs

- Financial department
- Environmental and development agencies
- Universities
- FIEs
- Consultants and financial advisors
- City manager

6. Outputs from the module

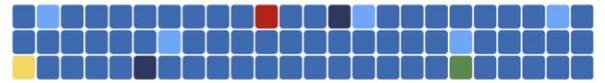
The first priority in this phase is to identify the potential financing sources for the selected adaptation measures. This includes both the funding instruments already known and accessible to stakeholders, as well as those of interest for future exploration. Mapping these sources is essential for understanding the financial landscape and determining the feasibility of implementing the proposed adaptation actions. To support this analysis, the table below should be completed by linking each adaptation measure with the corresponding financing sources, relevant instruments, and potential Financial Implementing Entities (FIEs) to be involved. This structured overview will help clarify funding opportunities and guide the engagement of key actors in the financing of adaptation initiatives.

Template 8 to be filled in by PAs

Type of financing sources

Instruments

Potential FIEs to be engaged



7. Key issues to consider

P2R Catalogue of sources and instruments is recognised by CLIMATEFIT as the primary resource to identify, categorise, evaluate and select the most appropriate sources and instruments.

PAs can start building general knowledge by getting an overview of the different types of funding/financing sources and instruments that are available. The template for the investment landscape developed in D1.1 already gives a first glance.



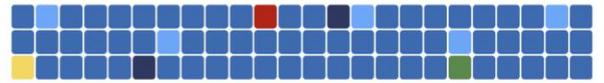
Figure 22 Template for the investment landscape, including possible sources and instruments for climate finance. Source CLIMATEFIT D1.1

There is a wide range of sources available to finance adaptation projects, which can as first step be categorized into public or private. Public finance can include diverse sources, from regional, subnational, and national government entities to European providers. On the other hand, there are private entities, ranging from commercial activities to different types of banks, asset managers, institutional investors private individuals.

Table 3 Range of financing sources and instruments – key elements to consider

Financial instruments	Financial returns	Financial entities who could provide them
Categories (e.g., grants, debts, equity, etc.) and subcategories (e.g., loans, green bonds, private equity, venture capital, etc.)	E.g., interests, capital repayment, dividends, etc.	Nature: <ul style="list-style-type: none"> - Public (e.g., European, national, local level, etc.), - Private (e.g., banks, asset owners, businesses, etc.), others Goals: financial, impact

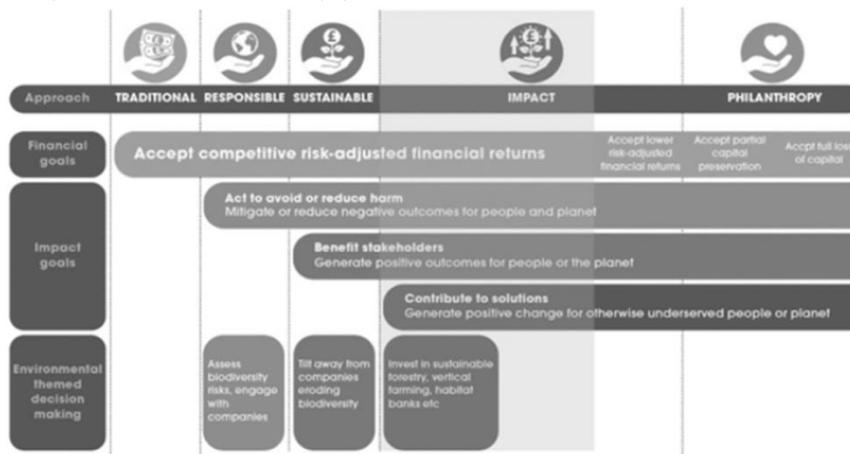
It is crucial to understand different types of investors and their interests in financing adaptation. WEF (2023) proposes a grouping of types of FIEs across a returns spectrum from market-based returns to quasi or blended returns and then to below market rate returns. Corporations, banks and institutional investors all require market rate returns whilst government, philanthropic organisations and NGOs will invest with below market returns.



Entity Type		Returns Spectrum
Real sector (corporations, private companies of all sizes)		Market-rate returns
Commercial banks		
Institutional investors (e.g. pension funds, insurance companies, sovereign wealth funds, other asset managers)		
Bilateral, multilateral, national development banks (private sector arms)		Quasi- or blended returns
Impact investors	Impact investors (seeking impacts & return)	
	Impact investors (not seeking market returns)	
Family offices/Philanthropies/ NGOs		Below market returns by design
Bilateral, multilateral, national development banks (public sector arms)		
Governments		

Figure 23 Types of private sector investors in adaptation. Source: WEF (2023)

Pensions for Purpose (2023) also proposes a spectrum of capital and environmental themed decision making by investors, which illustrates the non-financial goals that investors may seek for lower risk adjusted returns. These goals include impact-positive outcomes for shareholders, positive change for people or the planet and environmental goals such as biodiversity gains.

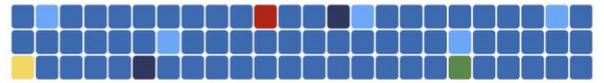


Source: Bridges Fund Management, Impact Management Project and Pensions for Purpose

Figure 24 Spectrum of investment. Source: Pension for Purpose (2023)

Moving from entities to products, financial instruments serve to capture monetary values from revenue streams and reduce risks, so that risk-adjusted returns can be made more attractive to FIEs, when focusing on private financing. There is a broad range of financial instruments available to finance adaptation. Funding instruments that do not foresee repayment of capital include includes funding programmes, grants or subsidies, national budgets, as well as taxes, fees, rents, fines, licences and permits collected directly by the PAs from private actors.

Van Raalte and Ranger (2023) describes financial instruments potentially suitable for projects and initiatives integrating nature-based solutions and provide information of the related financial return expected as well as the level of control an investor holds, since there could be cases in which investors only supply finance and cases in which they are directly involved in the implementation of the projects.



Category	Subcategory	Description	Financial Return	Investor Control (NO), (R), (DR), (ID), (OD)
Grant-Based	Grant	Non-repayable funds typically provided by governments, foundations, or organisations to support sustainable projects and initiatives.	Not applied	Typically low (NO) & (R)
	Redeemable Grant	A grant that may need to be repaid if certain conditions are not met or objectives are not achieved, or simply repaid after a certain period.	Principal (i.e. borrowed initial sum)	Typically low-medium (NO)
Debt-Based	Private Loans	Funds borrowed from a lender to be repaid with interest. Loan agreements can include customised environmental and social conditions.	Interest and principal	Typically high (DR)
	Mezzanine Loans	Funds borrowed from a lender to be repaid with interest over an agreed period and some form of equity participation (e.g., profit share).	Interest, principal and other	Typically high (DR)
	Private Notes	Debt instruments issued by entities to raise capital from investors, often with a specified interest rate and maturity date.	Interest and principal	Typically medium (Many noteholders (N))
	Green Bonds	Debt securities with a defined use of proceeds issued explicitly to finance or refinance projects or activities with positive environmental impacts.	Interest and principal	Typically low (Indirect relationship (IR))
	Social Bonds	Debt securities with a defined use of proceeds issued explicitly to finance or refinance social projects or activities that achieve positive social outcomes.	Interest and principal	Typically low (IR)
	Sustainability Bonds	Debt securities with conditions that are structurally linked to the issuer's achievement of SDG goals.	Interest and principal	Typically low (IR)
	Sustainability Linked Bonds	Debt securities with a defined use of proceeds issued explicitly to finance or re-finance a combination of green and social projects or activities.	Interest and principal	Typically low (IR)
	Blue Bonds	Debt securities to raise capital to finance marine and ocean-based projects that have positive environmental and economic benefits.	Interest and principal	Typically low (IR)
Equity-Based	Private Equity	Investments in private companies or projects in exchange for ownership stakes and potential returns on investment.	Dividends and value appreciation	Typically high (OD)
	Public Equity	Ownership shares in publicly traded companies, providing investors with ownership and potential dividends.	Dividends and value appreciation	Typically low (OD)
	ESG ETF	Exchange-traded funds (ETF) that focus on companies or projects meeting ESG criteria.	Dividends and value appreciation	Typically low (IR)
Derivative-Based	Carbon Credits	Tradable units representing reductions in greenhouse gases. Typically sold over the counter on the voluntary carbon market.	Value appreciation	Typically low/medium (No DR)

Source: Adapted from Van Raalte and Ranger, 2023

Notes: No Ownership (NO), Relationship (R), Direct Relationship (DR), Indirect Relationship (IR), Ownership Dependent (OD)

Figure 25 Different types of financial instruments used for nature-based solutions. Source: Van Raalte and Ranger (2023)

The lists proposed cannot be considered fully exhaustive, as financial instruments suitable to climate and nature-based solution projects and initiatives are continuously evolving and expanding. Furthermore, to determine which of these instruments are actually employable by the specific PA it is crucial to understand in the previous section about the context the specific regulatory framework, conditions and constraints.

Another consideration is the typical size of the investment that the different sources and instruments finance, as for example explicated by the NAP Global Network "Financing National Adaptation Plan (NAP) Processes" (2021) and also considered by P2R.

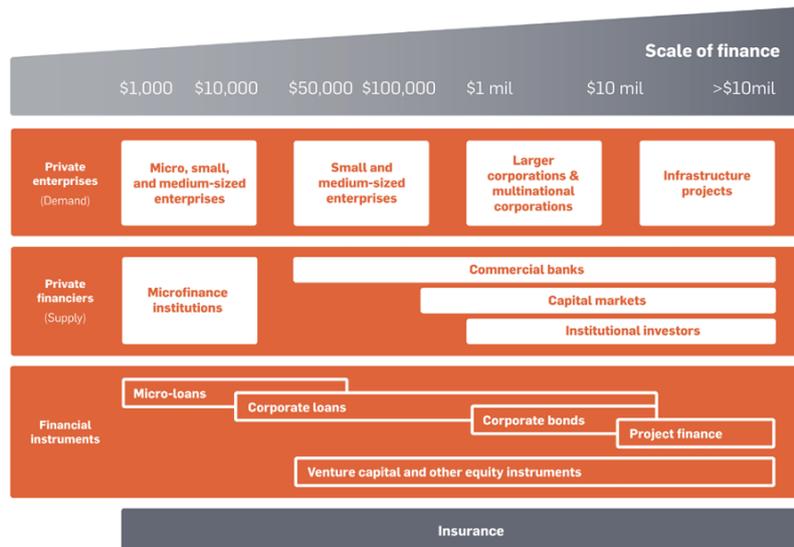
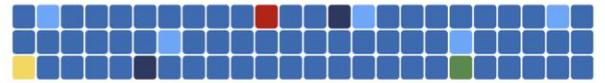


Figure 26 Overview: private sector actors, financial instruments and associated scales of finance. Source: NAP Global Framework (2021)

8. Further reading/ guidance and resources

Resources: P2R Catalogue of sources and instruments

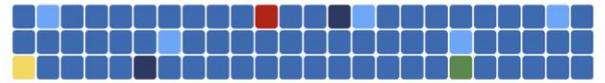
P2R aim is to equip and empower regions to evaluate and select the most appropriate sources and instruments for projects and actions in their Climate Resilience Strategies and Climate Resilience Investment Plans. The sources of finance are many, and the way in which they can help regions mobilise diverse. Sources may be merely suppliers of finance or be directly involved in project development and delivery. The catalogue is in the format of a searchable Excel database and will continue to be developed and revised throughout the lifetime of the project.

In the catalogue of sources, they are firstly classified in Public, Private and Third Sector, and then further distinguished in subcategories. For each source identified, the catalogue provides a concise description, information on interests and priorities, actors they usually engage with, advantages and drawbacks, instruments they tend to use and their typical funding size, as well as potential adaptation related activities and additional insights or examples if available.



Figure 27 Catalogue of sources. Source: P2R

The catalogue of instruments offers an overview of the mechanisms which enable the provision of finance.



A description of each instrument is given, together with the typical size of the investment, advantages and drawbacks, potential scalability and concessionality, level of time resources and expertise to deploy them, related financing strategies (what they could be used for, for example by PAs) and additional insights.

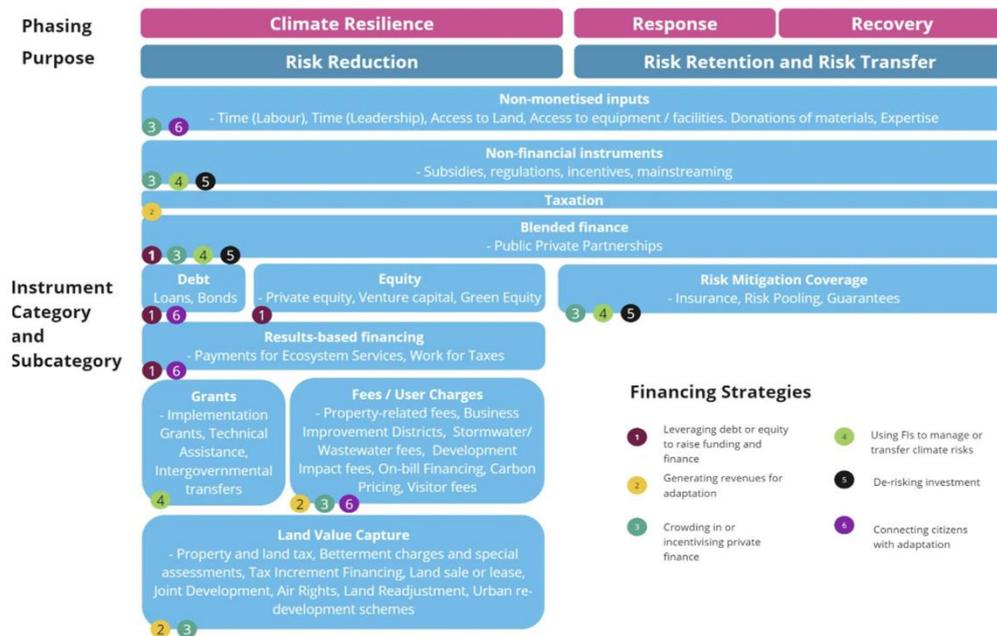


Figure 28 Catalogue of instruments. Source: P2R

The catalogue also includes case studies of public and private adaptation relevant to European regions.

Glasgow Resource Mobilisation Plan

Example of a mapping exercise of sources, actors and instruments. Even if not fully aligned with the catalogues described in the module, it can be used as inspiration by PAs.

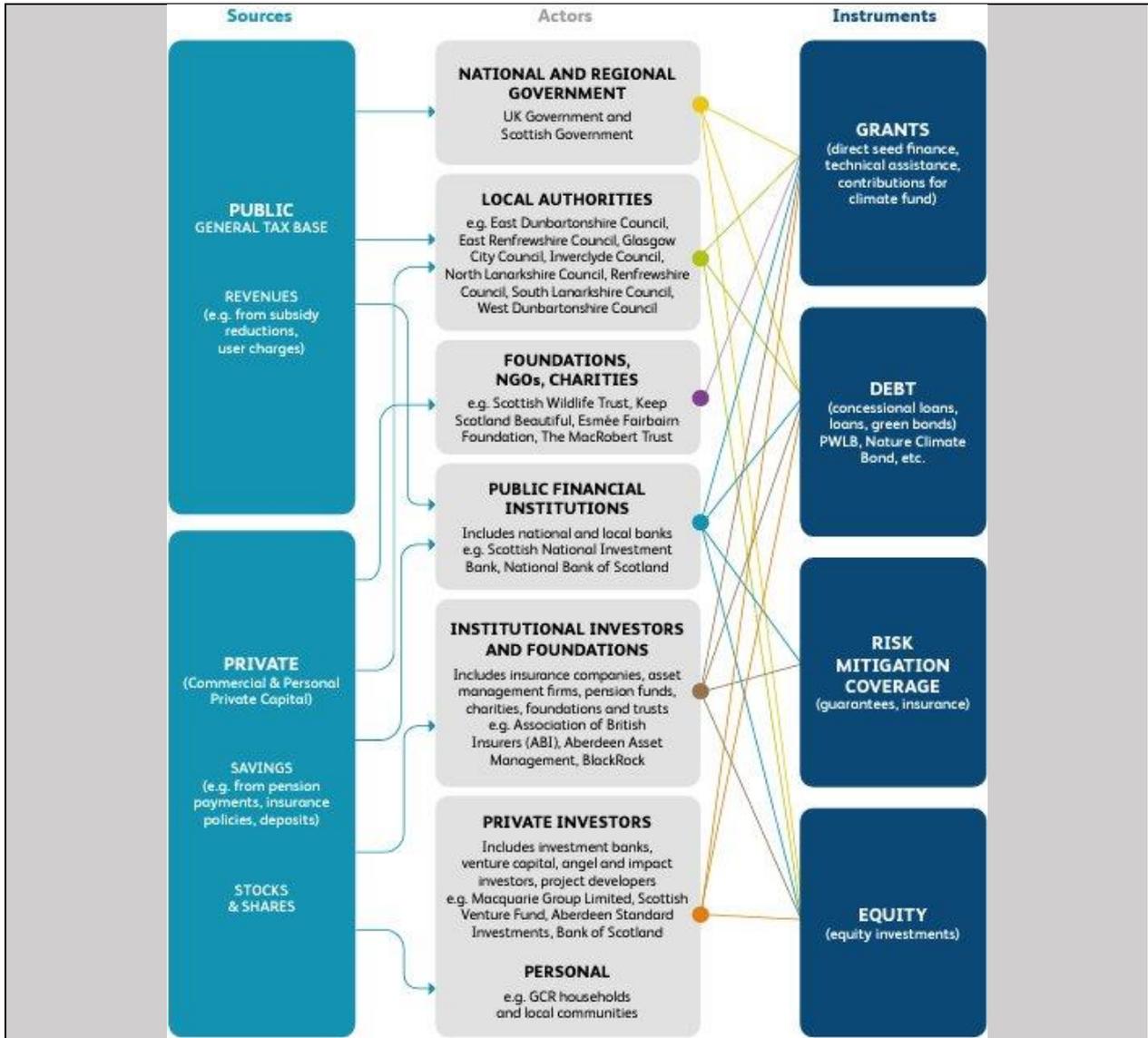
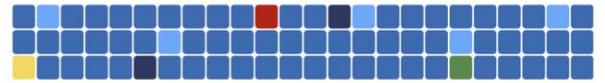
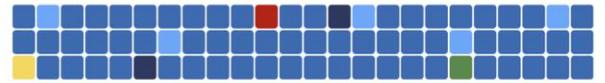


Figure 29 Mapping of sources, actors and instruments. Source: Glasgow resource mobilisation plan

OECD Climate [Adaptation Investment Framework](#)

For the decision and prioritisation of financial instruments, PAs should make use of both existing financial instruments they are familiar with and explore new, potentially innovative instruments that can be aligned with identified **adaptation options** and specific **adaptation projects**. For example, the OECD (2024) proposes a structured framework to guide governments in identifying and prioritizing financial instruments for climate adaptation. Central to this approach is the translation of adaptation priorities—often established through National Adaptation Plans—into robust financing strategies, such as adaptation investment plans. The framework emphasizes the strategic use of public tools (e.g., direct expenditure, procurement, PPPs), private mechanisms (e.g., green bonds, equity), and blended finance. Prioritization is guided by context-specific criteria including climate impact potential, socio-economic returns, scalability, and alignment with national policy goals. In this framework is provided a set of diagnostic questions designed to evaluate enabling conditions and match financial instruments with sectoral needs and risk profiles, thereby promoting an evidence-based, systemic selection process.



5.9 Match types of adaptation options with financial entities/instruments

1. Purpose of the module

All the work performed in the previous modules and the information collected should be put together to obtain a broad **overview of the longlisted options and the identified funding/financing possibilities**.

2. Inputs and prerequisites

Overall, this module builds on all the precedent modules, and it can be considered in some sense the final module of the investment strategy, which draws together all the efforts.

3. Skills and Expertise required

Knowledge of financial sources and instruments, knowledge of adaptation options. Ability to make connections and merge the information collected, considering both general and context specific aspects.

4. Activities and efforts

Efforts include the review of the information collected and the consideration of characteristics of adaptation options, projects and investments, weighting the different possibilities and combinations also with the help of the resources presented below.

5. Stakeholders to involve and the role of the LRTs

- Climate department
- Financial department
- City manager
- Consultants

6. Outputs from the module

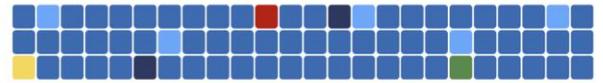
The priority is to carry out matchmaking between adaptation options or projects and relevant financing sources and instruments. This process will be supported by the table below.

Template g to be filled in by PAs

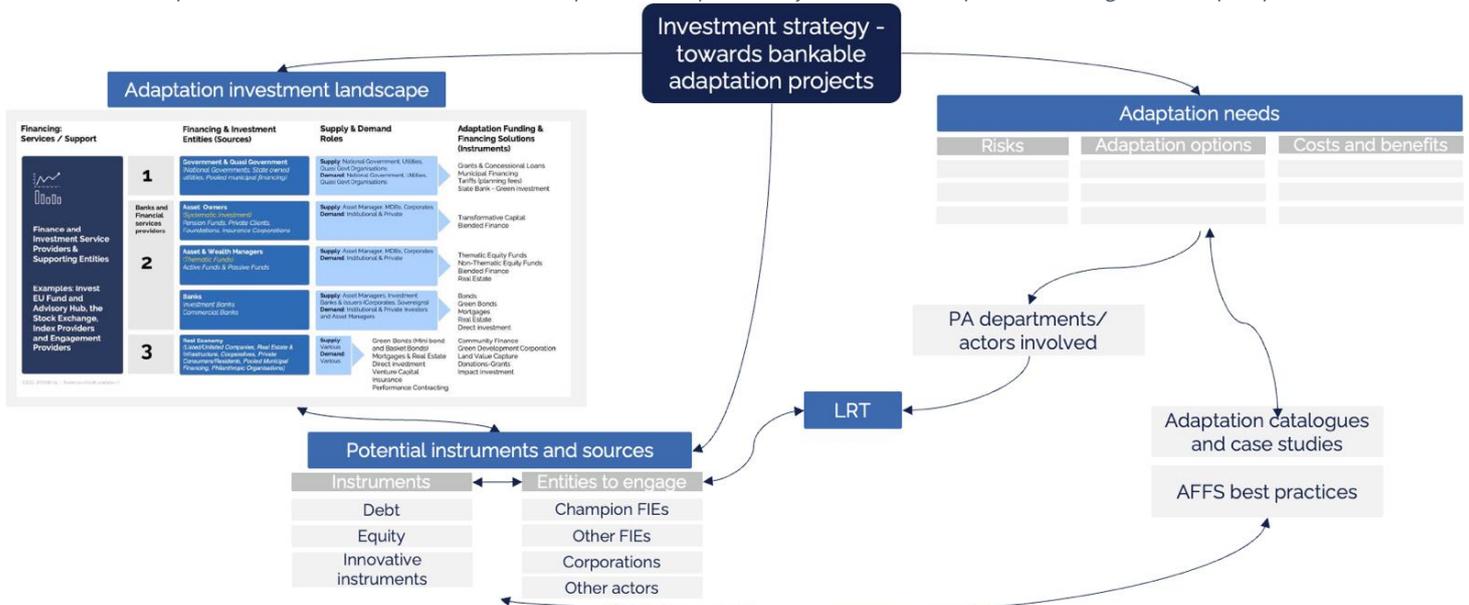
Adaptation option or Adaptation project	Financing sources	Instruments

7. Key issues to consider

The creation and use of an **investment compass** as the one showed below may be useful, since it connects information on investment landscape, FIES, adaptation needs and interventions, all very specific to the national and local context. Inputs to personalise this compass can come from the adaptation investment landscape of CLIMATEFI D1.1, the previous modules of the investment strategy and the CLIMATEFIT D1.1 best practices database.



Template 10 Generalized investment compass, to be filled in by PAs and modified according to their specificities



The high-level and preliminary matching should happen considering the **characteristics of the financial sources and instruments** (Section 6.8), the economic and financial indicators, and the **characteristics of the adaptation options** themselves (Sections 6.4 to 6.7), such as the size, costs and financing gap, the potential cash flows or revenues that the project could generate and the time horizon, Projects may also be bundled together, creating a package that may be more attractive for potential FIEs: for example, adaptation options able to generate revenues may be bundled with options that cannot, or different smaller options maybe be gathered to reach a critical size. At the same time, also different financing sources and instruments can be used for the same project, for example to cover different implementation phases. Some practical examples showing how different financial instruments have been used to finance climate adaptation projects are collected in the CLIMATEFIT D1.1 best practices database, as well as in the P2R catalogue of sources and instruments (case studies section).

8. Further reading/ guidance and resources

Resources

[Net Zero Cities Finance Guidance Tool](#)

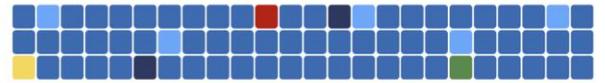
The tool helps cities in finding the best funding sources for their projects. By filling out a questionnaire, PAs can outline their financial needs and filter through a range of financing options that match their specific requirements.

[Climate Finance Decision Making Tree](#)

The framework defines a series of questions that the PAs need to consider to evaluate various financing possibilities, on the basis of the characteristics of the planned project and of the PA itself. Furthermore, each proposed financing tool proposed is described with advantages and disadvantages.

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Effective climate adaptation finance depends on the strategic alignment of specific adaptation projects with suitable financial instruments. The OECD (2024) highlights that the clearer and more concrete the adaptation initiative—whether infrastructural, ecological, or social—the easier it becomes to match it with an appropriate financing source. Financial tools vary in their risk appetite, return expectations, and eligibility criteria; thus, projects with defined outcomes, timelines, and co-benefits are more likely to attract support. For instance, highly concessional funding may suit non-revenue-generating social adaptation measures, whereas revenue-linked infrastructure projects may be matched with green bonds or blended finance schemes. The *Climate Adaptation Investment Framework* underscores that a structured pipeline of adaptation projects is essential to engage both public and private capital efficiently,



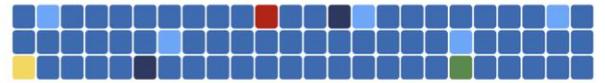
ensuring that funding mechanisms are tailored to the scale, nature, and expected impact of each intervention

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Successful climate adaptation financing hinges on the ability to align specific adaptation projects with the most appropriate financial instruments. As highlighted by both the OECD (2024) and Adaptation Scotland (2024), this "matchmaking" process requires a clear understanding of project characteristics—such as scale, risk profile, and potential returns—and how these align with the requirements of different funding sources. Public grants may suit community-based or non-revenue-generating initiatives, while revenue-linked or cost-saving projects may attract private or blended finance. The more concrete and well-defined the adaptation project—complete with measurable outcomes and co-benefits—the greater the likelihood of securing suitable financing. This reinforces the need for structured project pipelines and finance-ready business cases as essential tools to bridge adaptation needs and available capital.

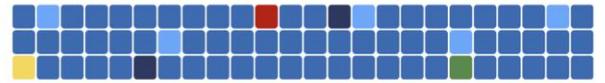
Glasgow Resource Mobilisation Plan

Matching adaptation interventions with sources of finance. Even if not fully aligned with the module, it can be used as inspiration by Pas.



Sources of public finance (indicative)	Government Capital Grants	Scottish Enterprise Innovation Grants	Clyde Mission Funding (capital funding – Grants)	Early Stage Growth Challenge Fund (grants, debt, equity)	The Climate Challenge Fund (grants and concessional debt)	Glasgow City Region City Deal (grants, debt and equity)	PWLB (concessional debt loans for capital expenditure)	Scottish Investment Bank (debt and equity)	Scottish National Investment Bank (debt and equity)	User charges (Scottish Water)	Tax Incremental Financing (TIF)	Non-Profit Distributing (NPD)
Funding/Finance instrument												
Grants	✓	✓	✓	✓	✓	✓						
Debt				✓	✓	✓	✓	✓	✓			
Equity								✓	✓			
Tax to raise debt (including user charges)										✓	✓	✓
Draft Adaptation Strategy Interventions												
1 Reform, reshape and expand governance mechanisms			✓			✓						
2 Develop the ability of organisations, businesses and communities to adapt		✓		✓	✓	✓						
3 Increase adaptation finance through leverage and innovation		✓	✓	✓	✓	✓		✓				
4 Enable and equip communities to participate in adaptation			✓			✓						
5 Embed reflection, monitoring, evaluation and learning into adaptation action						✓						
6 Adapt the Clyde Corridor for the twenty-second century	✓		✓			✓	✓	✓	✓			
7 Enhance early warning and preparedness for floods and heatwaves	✓	✓	✓									✓
8 Ensure our homes, offices, buildings and infrastructure are climate resilient	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
9 Deliver nature-based solutions for resilient, blue-green landscapes and neighbourhoods		✓	✓			✓	✓	✓	✓			
10 Establish Glasgow City Region as a global research and knowledge hub for adaptation		✓										
11 Begin the transition to a climate-resilient economy	✓	✓	✓	✓	✓	✓		✓	✓	✓		

Figure 30 Matching of adaptation interventions with sources of finance. Source: Glasgow resource mobilisation plan



5.10 Governance and resources

1. Purpose of the module

This module aims at **identifying all the relevant actors/entities** to be involved in the development of the investment strategy. It is key, throughout all the modules, to include both Pas **internal actors** (e.g. different departments) and **external actors**, reflecting on the role of each of them and taking into account the different **governance mechanisms** as well as the role of LRTs.

2. Inputs and prerequisites

This module is highly connected with all the other modules of the investment strategy, acting as an overarching component that helps pinpointing the important and appropriate contributors for each of them.

3. Skills and Expertise required

Understanding of how the PA is internally structured in terms of departments, their activities and responsibilities. Knowledge of the external stakeholders, their interests and activities carried out.

4. Activities and efforts

Efforts include exchanges and consultations with the stakeholders (internal and external) to identify roles, capacities and assign responsibilities, also by reviewing and potentially extending the analysis of the organisational structure of the PA.

5. Stakeholders to involve and the role of the LRTs

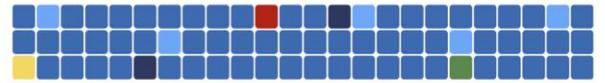
- Climate department
- Financial department
- Planning department
- Technical departments
- City manager

6. Outputs from the module

The output of this final module is to identify the actors and contributors that need to be involved in the future development of the investment strategy, with a breakdown by individual module.

Template 11 to be filled in by PAs

Modules	Internal actors	Contribution - internal	External actors	Contribution - external
1 Assessment and prioritisation of climate risks and sectors				
2 Context overview				
3 Barriers and enabling conditions				
4 Longlist initial set of adaptation options				
5 High level estimation of costs and benefits				
6 Identification of financing gap				
7 Time horizon of investment				
8 Range of possible financing sources and instruments				
9 Matchmaking between types of adaptation projects and potential FIEs/instruments				



7. Key issues to consider

The development of the investment strategy in PAs should not be carried out through singular approaches of the involved partners but a **choral effort**.

It is important to recognise that not a single actor/department can carry out all the modules. There should be allocation of tasks and **shared responsibility** among the different departments, according to their competences, the resources available and avoiding silo approaches. Governance mechanisms should be put in place to ensure active participation. Different types of profile are important, such as technical units, units responsible for climate adaptation, financial departments and decision makers.

Considering the importance of the human factor, for each of the modules of the investment strategy it can be useful to identify the different actors to involve and determine their role, contributions and responsibilities, to obtain a clear overview.

Once all the elements of the investment strategy are brought together and agreed among participants, the way forward will consist in proceeding with the development of the more detailed investment plan, in order to start filling in the financing gap.

8. Further reading/ guidance and resources

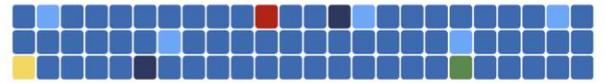
Resources

[Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets](#)

The document published by the IFC (International Finance Corporation) addresses precisely the issue of managing stakeholder engagement in projects, especially in emerging markets. Here is a summary of its main contents. The objective of the document is to provide practical guidelines for effectively involving stakeholders (stakeholders) in corporate projects, in order to improve social and environmental sustainability, reduce risks and build trust relationships.

[Stakeholder Engagement: A Road Map to Meaningful Engagement \(Fundación SERES\)](#)

This guide provides a practical framework for organizations—including public authorities—to develop effective stakeholder engagement strategies. It outlines key phases such as stakeholder identification, prioritization, dialogue planning, and long-term relationship building. The document emphasizes the strategic value of engagement in decision-making, risk management, and sustainable development.



6 Phase 2: Develop your Investment Plan

The section related to the development of the Investment Plan phase will be developed in detailed under Deliverable 3.1.

Annex – Additional resources for investment strategies

Module 1: Assess and prioritise climate risks and sectors
ISO standards (3100, 14091, 14092)
ClimateADAPT RAST – Step 2
EU Mission Adaptation to climate change - Guide to climate risk assessment
Climaax CRA Handbook
A changing climate for development, Climate Ready Clyde and Adaptation Scotland (Sniffer), Lindsay, R. S., England, K. and Beswick, A. (2019)
Principles of Climate Risk Management for Climate Proofing Projects, Paul Watkiss, Robert Wilby, and Charles Andrew Rodgers (2020)

ISO standards

ISO 31000 standard on risk management - Guidelines

ISO 14091 on adaptation to climate change - Guidelines on vulnerability, impacts and risk assessment

ISO 14092 on adaptation to climate change - Requirements and guidance on adaptation planning for local governments and communities

ClimateADAPT RAST - Step 2

2.1 Defining the core elements: choose guiding principles (e.g. just resilience), the methodology for technical risk analysis and the governance (e.g. ownership of data, communication of results and stakeholder engagement). The methodology depends on local conditions (available resources, data, stakeholder involvement, potential risks, desired outputs) and it should align with national procedures and assessments.

Aim of the methodology:

- Define the assessment's scope, objectives, timeframe, climate change scenarios and geographical coverage. The specific people, sectors and regions to be assessed should be clearly outlined.
- Identify past and current risks.
- Anticipate future risks and opportunities resulting from climate change.
- Evaluate identified risks.

It is essential to involve all stakeholders (experts, local actors, sector representatives, citizens, vulnerable groups) and determine how they will be engaged to ensure relevance, effectiveness and inclusion.

2.2 Identifying risks: consider vulnerability and broader impacts.

- Collect local data on climate risk: systematic inventory of risks on past climate, records of data for multiple hazards, information on exposure and vulnerability (based on local geographical and socio-economic features) and assessments at higher level, national or continental.
- Understand and consider vulnerability: identify vulnerable areas and most socially vulnerable groups (e.g. population density or age structure) with their needs, both in terms of general sensitivity to climate impacts and exposure of assets, also to prioritize adaptation efforts.
- Consider trans-regional and cascading impacts: collaboration is essential among local or regional authorities and neighbouring jurisdictions, as well as among sectors, to address shared risks and navigating different political, legal and institutional contexts.

2.3 Assessing climate risks: combine datasets on hazards, exposure and vulnerability, under current and future climatic and socio-economic conditions. Select multiple future climate scenarios to account for a range of possibilities (e.g., 'worst case', 'best case', 'mid-range') and consider factors like spatial scale, baseline period, projection timeline, the emission scenario and socio-economic scenario. Assessing climate risks likelihood helps in defining priority areas and establish adaptation objectives.

2.4 Defining key risks and adaptation objectives: identify priority areas based on the severity of impacts (who and what is most at risk), focusing on risks in the short, medium and/or long term, considering whether impacts are already occurring now and set to worsen due to climatic or non-climatic drivers, determining if critical infrastructure or with long lifespans are at risk.

EU Mission Adaptation to climate change - Guide to climate risk assessment

Guidance and examples in the form of matrices and tables.

Action 1. Preparing the ground: consider climate risk assessment scope in relation to regional or local authority's powers, methodological approach and its alignment with existing risk management processes, stakeholders involvement to ensure assessment's relevance, importance and legitimacy.

Action 2. Assessing climate vulnerabilities: identify and rate adaptive capacity of people, ecosystems, assets, and services and their (direct and indirect) sensitivities to climate-related hazards. Vulnerabilities ratings are obtained combining ratings of sensitivities and adaptive capacities.

Action 3. Identifying future scenarios: choose future scenarios to understand the extent to which climate-related hazards may change. Important to select more than one scenario to take account of uncertainties and identify near-term (2021-2040), medium-term (2041-2060) and/or long-term (2081-2100) scenarios. It may make most sense to use the same projections used by your national adaptation strategy or plan.

Action 4. Assessing future potential climate-related impacts: identify and rate the exposure to future climate-related hazards for each scenario. Ratings of potential climate-related impacts are obtained combining the ratings of vulnerabilities and exposure.

Action 5. Assessing climate risks (and opportunities): rate the likelihood of future potential climate-related impacts and combine them with the ratings of their magnitude to determine high climate risks and opportunities to focus on when subsequently identifying adaptation options.

Action 6. Communicating uncertainties: consider and communicate uncertainties related to data and knowledge used to determine the sensitivities, adaptive capacities, future scenarios, exposure to climate-related hazards, the likelihood of climate-related impacts, and the timing and spatial distribution of climate risks (and opportunities).

Climaax CRA Handbook

4-year Horizon Europe (2023-2026) project that provides financial, analytical, and practical support for regional climate risk assessments, contributing to harmonization and consolidation of climate risk assessment (CRA) practices by providing guidance, tools and datasets. It includes a standardized framework and a toolbox which hosts data, models and utilities and provides access to European and global open data archives integrated with local data and procedures.

Highlights of the CLIMAAX Framework and Toolbox:

- Relevant steps that are encouraged to be followed for a CRA with the possibility of including quantitative and qualitative aspects for maximizing output quality.
- Stakeholder engagement processes
- Selection of hazards that have substantial societal impact and will be affected by climate change.
- Selection of indicators for meteorological or hydrological hazards and societal or ecological impacts that can be used for designing and monitoring adaptation and risk management strategies.
- Use of climate and socio-economic scenarios relevant for impacts and risks that needs to be accounted for by regions and communities for adaptation/risk management strategies.

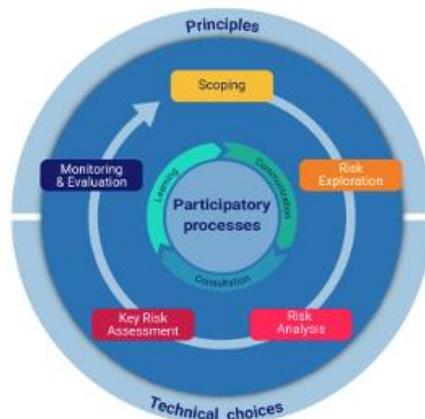
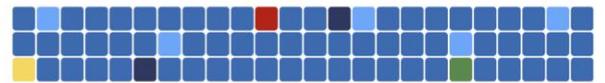


Figure 31 Climaax CRA Framework. Source: Climaax

The framework is composed of 5 participatory steps and ensures social justice and equity.

Scoping phase: define objectives, set the context, identify stakeholders and assign risk ownership.



Risk Exploration phase: identify most apparent hazards and risks or of significant concern to key stakeholders and the wider public, in terms of impacted sectors (activities, supply chains, processes, and infrastructure) and geographic areas at risk (such as ecosystems, landscapes, and communities). Crucial to select future scenarios that are relevant for the region and in accordance with the local planning and to rely as much as possible on factual evidence. Data and observations on the rate of change, frequency, intensity and duration of events should be complemented with stakeholders' perceptions and local knowledge. covering the multiple dimensions of risk (monetary and non-monetary impacts, cascading effects), the relevant aspects, such as impacted sectors, spatial extent, pervasiveness, irreversibility of consequences, and implications across sectors, regions, boundaries or generations. Reflecting on existing climate risk management strategies. Hazards or risks can then be prioritized.

Then, choice of the most suitable workflow, among the ones proposed to conduct a detailed quantitative analysis of climate risks, aiming to quantify specific risks concerning a particular region.

Also, choice of most appropriate scenario, from simpler SSP-RCP considerations to a more demanding and detailed process considering climate models, regional resolution/downscaling, global warming levels, low-likelihood high-impact outcomes or impact-oriented climate information.

Risk Analysis phase: application of the Toolbox to quantify risks, by setting up the environment, accessing data (pre calculated or own data), and calculating hazards. The workflows follow three main approaches:

- Exposed assets and/or population – risk as overlap between hazard information and exposure.
- Economic damage analysis – hazard, exposure, vulnerability data combination (damage functions)
- Indicators product - Risk as the product between hazard, exposure, and vulnerability.

Outputs of climate risk analysis: information on extent, duration, frequency and intensity of risk.

Key Risk Assessment phase: analytical step to evaluate and contextualise risk outcomes, providing additional insights into severity of risks and urgency, resulting in key and less urgent risks for further attention to be paid to understanding and eventually managing risks.

Monitoring and Evaluation phase: monitoring refers to the surveillance of climate hazards and their respective risks, taking into account both key and less urgent risks and observe them over time. Evaluation aims at (re-)evaluating the Climate Risk Assessment itself, including a comparison of factual and projected climate risk situations. Learning is of key significance. Crucial to select indicators linked to specific objectives, sectors as well as stakeholder's needs and that can be assessed quantitatively or qualitatively.

A changing climate for development, Climate Ready Clyde and Adaptation Scotland

The guidance sets out concepts and describe a range of options for assessing climate risk across different project business case and design stages.

Three stages of a climate risk assessment are identified:

- Step 1: setting ambitions and screening – high-level review of projects to identify potential climate risks early in the project
- Step 2: identifying climate risks through risk assessment – more detailed consideration of climate risks and identification of adaptation options
- Step 3: incorporating adaptation – embedding adaptation into the project design and delivery

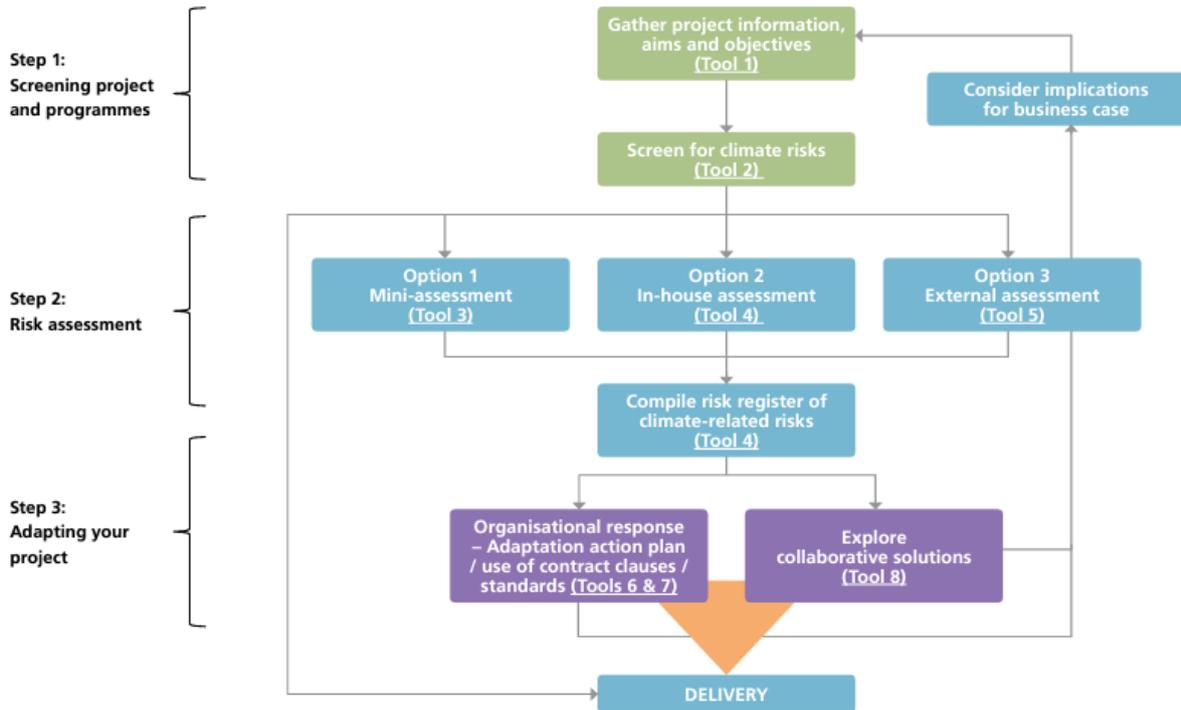
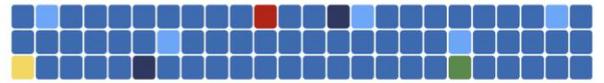


Figure 32 Flow chart of climate screening, risk assessment and incorporating adaptation for projects. Source: *A changing climate for development, Climate Ready Clyde and Adaptation Scotland (Sniffer)*, Lindsay, R. S., England, K. and Beswick, A. (2019)

Each step is further explained, and a comprehensive set of tools, templates and resources is provided, to support screening and risk assessment across project design and delivery cycles.

Principles of Climate Risk Management for Climate Proofing Projects

The document presents guiding principles for climate risk management and climate risk assessment for climate proofing projects within the Asian Development Bank. The focus is on climate risks to development projects, rather than on targeted climate adaptation projects, with the aim of enhancing both the climate risk management framework with a fit-for-purpose approach, and the quality of climate risk assessments. Guidance is provided throughout all the steps of the project development.

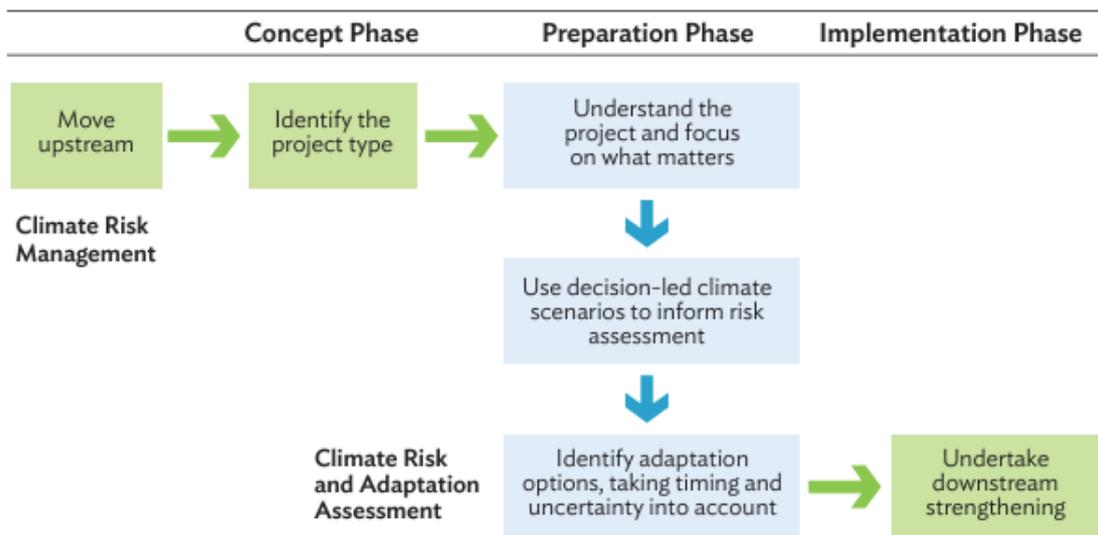
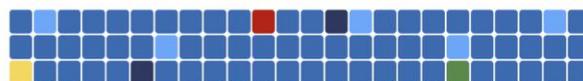


Figure 33 Proposed guiding principles of climate risk management for climate proofing projects. Source: *Principles of Climate Risk Management for Climate Proofing Projects*, Paul Watkiss, Robert Wilby and Charles Andrew Rodgers (2020)



Module 2: Get overview of context PAs operate in

[weADAPT](#)

[Climate Policy Initiative \(2024\) Report - Toolbox on Financing Nature-Based-Solutions](#)

weADAPT

User-led platform and network for climate change adaptation, which connects and brings together a global community of people and organizations working on adaptation research, policy and practice. Inside the platform, the users share experience, lessons, case studies, guidance and tools on the frontier of climate adaptation issues and actions.

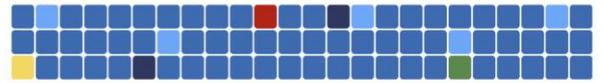
A map of case studies is also included, to locate who is doing what and where.

Climate Policy Initiative (2024) Report - Toolbox on Financing Nature-Based-Solutions

The report is a lists of case studies that overcame barriers to investments through blended finance. Observed key elements to surpass barriers are guarantees, support in capacity-building, public sector support, a constructive regulatory environment, as well as the determination of the value of interventions in monetary terms and the identification and engagement of stakeholders who will benefit from them.

Instrument	Key success factors	Main Barriers	How Barriers Were Addressed
Restoration Seed Capital Facility	<ul style="list-style-type: none"> Concessional capital Technical assistance 	Lack of concessional funding for new financial instruments for restoration projects	Ecosystem building by supporting new funds at different stages of development with aligned capital requirements.
Moringa Fund	<ul style="list-style-type: none"> Technical assistance 	SME processors lack access to funding, particularly non-debt and long-term funding	Equity committed to a long-term engagement, with TA to support smallholder agroforestry, helping to drive impact in the value chain.
Global Fund for Coral Reefs	<ul style="list-style-type: none"> Concessional capital Technical assistance 	Lack of pipeline creation support especially for early-stage initiatives for coral reef conservation	Concessional capital and TA support pipeline development.
Living Amazon Mechanism	<ul style="list-style-type: none"> Local engagement Identifies direct beneficiaries Concessional capital 	Lack of funding for cooperatives working with bioeconomy and challenging to source quality pipeline	Engaging offtakers as investors, with TA to support the ecosystem, building pipeline and de-risking investment.
RISCO	<ul style="list-style-type: none"> Identifies direct beneficiaries Concessional capital 	Challenges in creating revenue streams to ensure repayment for the financing of efforts for conservation or avoided destruction	Identification of insurance agencies as key beneficiaries of mangrove conservation and community enterprises as conservation allies.
Forest Resilience Bond	<ul style="list-style-type: none"> Identifies direct beneficiaries Concessional capital 	Challenges in creating revenue streams to ensure repayment for the financing of efforts for conservation or avoided destruction	Engagement of utility companies and corporations to provide cashflow to fund activities.
Qiandao Lake Water Fund	<ul style="list-style-type: none"> Identifies direct beneficiaries Concessional capital 		Creation of a social enterprise positioned to benefit from conservation investments.
Food Securities Fund	<ul style="list-style-type: none"> Identifies direct beneficiaries Leverages market partners 	Agri-SMEs face a working capital funding gap	Large agribusinesses purchasing products from SMEs engage in pipeline identification and provide partial first-loss guarantees, de-risking, and drive capital.
Galapagos Debt Conversion	<ul style="list-style-type: none"> Capital market approach Guarantees Concessional capital 	Creating a sustainable capital flow towards conservation activities in a high indebtedness context	Debt capital markets approach using guarantees to eliminate country risk and unlock capital for conservation.
Seychelles Blue Bond	<ul style="list-style-type: none"> Capital market approach Guarantees 	SME processors lack access to funding, particularly non-debt and long-term funding	Equity committed to a long-term engagement, with TA to support smallholder agroforestry, helping to drive impact in the value chain.
Asia Climate-Smart Landscape Fund	<ul style="list-style-type: none"> Guarantees 	Lack of mid-long-term capital for SMEs supportive of bioeconomy	Guarantee mitigates transaction risks, making investment into agri-SMEs more appealing.
AGR13 Fund	<ul style="list-style-type: none"> Guarantees Concessional capital Engages local partners Technical assistance 	Lack of capital for longer-term sustainable agriculture projects with conservation and restoration focus	Guarantees support tenor extension to better match projects' requirements, with TA to lower risk.

Figure 34 Case study analysis on barriers to investment for NbS. Source: Climate Policy Initiative (2024) Report - Toolbox on Financing Nature-Based-Solutions



Module 3: Overcome barriers and identify enabling conditions

[How cities can attract private finance for climate action - C40 Cities Climate Leadership Group, C40 Knowledge Hub](#)

How cities can attract private finance for climate action

The article provides suggestions and guidance on how to access funding financing from the private sector. Factors identified are strong policy signals, enabling policies, a bankable pipeline of projects, early collaboration with investors and the deployment of innovative financial instruments:

- Create fiscal conditions for private capital investment
- Improve governance and internal capacity to secure private-sector finance
- Strengthen regulations and standards to direct private capital to sustainable activities
- Use financial engineering techniques to create bankable options for private capital
- Work with higher levels of government to improve the enabling environment for private finance

Module 4: Longlist initial set of adaptation options

[ClimateADAPT RAST – Step 3](#)

[ClimateADAPT Adaptation Options](#)

[Key Type Measures](#)

ClimateADAPT RAST – Step 3

Guidelines on how to identify adaptation options are provided, together with some additional catalogue and inventories.

Guidelines: consider broad range of adaptation options, understand the types available and get good overview of the measures used and required.

After reviewing the available adaptation options, compile a catalogue of those that address the priorities and objectives from your climate risk assessment. Bear in mind the following:

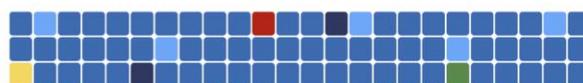
- Include a diverse range of options: different types of adaptation options can complement and strengthen each other, go beyond risk mitigation (e.g. flood defences) and also consider accepting losses (e.g. relocation from vulnerable areas) or seize new opportunities (e.g. improved agricultural conditions). Take into account trans-regional and cascade impacts.
- Ensure coherence and alignment with other initiatives, by identifying and considering policies or programmes already in place that may align with the adaptation goals, reducing the need for new actions. Consult national authority about compulsory, recommended, or relevant measures.
- Create factsheets for each option considered, with information on climate risks addressed, financial and other needs, practical implementation, who is responsible for, who is involved, and who benefits. They should be concise and informative, to support discussions and decision-making.

ClimateADAPT Adaptation Options

Climate-ADAPT adaptation options are categorised according to Key Type Measures (KTM) and the IPCC system which identifies three main categories (structural and physical options, social options and institutional options), further divided in sub-categories.

The implementation of measures must be coordinated at the proper spatial scale, fit to the specific local context and compliant with national and subnational regulations and plans. Even though implemented at the local scale, adaptation options often require coordination with higher levels of governance to ensure sustainable and harmonised spatial planning of the whole region.

Key Type Measures



KTM	Sub-KTM ¹⁷	Specifications
A: Governance and Institutional	A1: Policy instruments	<ul style="list-style-type: none"> Creation / revision of policies Creation / revision of (implementing) regulations
	A2: Management and planning	<ul style="list-style-type: none"> Mainstreaming adaptation into other sectors Creation / revision of technical rules, codes and standards
	A3: Coordination, cooperation and networks	<ul style="list-style-type: none"> Creation / revision of ministerial coordination formats Creation / revision of stakeholder networks
B: Economic and Finance	B1: Financing and incentive instruments	<ul style="list-style-type: none"> Creation / revision of incentive mechanisms Creation / revision of funding schemes
	B2: Insurance and risk sharing instruments	<ul style="list-style-type: none"> Creation / revision of insurance schemes and products Creation / revision of contingency funds for emergencies
C: Physical and Technological	C1: Grey options	<ul style="list-style-type: none"> New physical infrastructure(s) Rehabilitation, upgrade and / or replacement of physical infrastructure(s)
	C2: Technological options	<ul style="list-style-type: none"> Early warning systems Hazard / risk mapping Service / process applications
D: Nature Based Solutions and Ecosystem-based Approaches	D1: Green options	<ul style="list-style-type: none"> Creation of new / improvement of exiting green infrastructure Natural and / or semi-natural land-use
	D2: Blue options	<ul style="list-style-type: none"> Creation of new / improvement of existing blue infrastructure Natural and / or semi-natural water and marine areas management
E: Knowledge and Behavioural change	E1: Information and awareness raising	<ul style="list-style-type: none"> Research and innovation Communication and dissemination Decision support tools and databases
	E2: Capacity building, empowering and lifestyle practices ¹⁸	<ul style="list-style-type: none"> Identification and sharing of good practices Training and knowledge transfer Reporting on lifestyle practices and behaviours

Figure 35 Climate change adaptation key type measures. Source: ETC/CCA Technical Report 2020/2

Module 5: Estimate high level costs and benefits
Green Deal Going Local Handbook - Best practices
Climate Resilient City Tool
Climate Adaptation Costing in a Changing World , World Bank Group
Climate change adaptation and economics and investment decision making in the cities - 'How to guide' and case studies - European Investment Advisory Hub
Additional resources

Green Deal Going Local Handbook - Best practices

Links to the best practices identified in the Handbook can be used to collect information on costs and benefits, in order to obtain a high-level estimate.

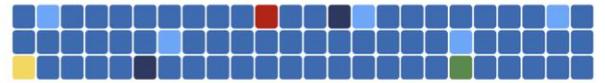
Climate Resilient City Tool

The tool aims at supporting the collaborative planning of climate adaptation measures for cities. Users can select the geographical area they are interested in, the adaptation options and obtain estimates of their effectiveness and [costs \(Dutch prices\)](#). 62 adaptation measures for ecosystem-based adaptation are included.

Climate Adaptation Costing in a Changing World - World Bank Group

The World Bank report (2024) (for the European Union) provides a comprehensive overview of methodologies, along with practical use cases, and further information sources to support the costing of adaptation measures. It emphasises the importance of selecting a method according to different needs and objectives of the study, whilst also considering the resources and information available and offering alternatives. For example, in low data contexts it illustrates how one might use information from other sources or studies, or in situations where time or expertise is not available, it illustrates "lighter touch" options. The report highlights the potential to apply the methods to follow-up studies or in other contexts (although further analysis of transferability is also required).

It introduces examples from existing studies in France, Spain, the U.K., Austria and Germany and new analyses for Croatia, Romania, Bulgaria and Sweden. It shows that public authorities can undertake climate change adaptation (CCA) costing at different levels of analysis to serve different policymaking objectives. Examples of adaptation costing are provided at the national, sectoral and programmatic levels. Accordingly, studies inform policy discussion, planning, and budgeting to help scale up CCA in the territories. They can



also play in to important multistakeholder dialogues and help to develop opportunities for private investment.

Most relevant for CLIMATEFIT territories' investment planning is the costing of adaptation at the programme, project or investment portfolio level (World Bank, p.99-121) At this level, more detail can be included, allowing for more specific costing of adaptation measures.

As above, costing methods depend on the policymaking objectives. Costing methods include:

Scientific modelling of granular climate change impacts and the costs and benefits of technical options for CCA. The types of models used include sector models and macroeconomic computable general equilibrium (CGE) models and Integrated assessment models (IAMs).(table 7, p.145). The advantages are that these studies are very comprehensive, including a range of future scenarios, are able to give longer-term results (e.g. to 2050), and thus are useful for building the economic case for adaptation. The drawbacks are that modelling studies take several years to complete and focus only on the technical options but not softer measures. Such methods consider both the costs and benefits and can be used in decision support¹.

Activity-based costing grounded in adaptation planning (and wider planning/programmes) and including nontechnical or soft options as well as enabling activities. The methods include "bottom-up" CCA costing approaches, extended cost-benefit assessment or methods that merge quantitative and qualitative information such as multi-criteria assessment. The advantages are that studies are relatively simpler to complete and are able to provide good information on near term actions. A drawback is that they are rarely able to deliver a full analysis of costs and benefits. The policy-first /bottom-up approach focuses on current priorities and interventions and can contribute at different levels of analysis:

- In national-level assessments of CCA costs. These tend to cover a wide range of sectors and hazards. They produce results on the annual CCA costs and costs per person, expressed as cost ranges. The report proposes extrapolation of these per capita costs may be used to generate indicative costs (i.e. plausible benchmarks) for different country contexts or for EU-wide assessment. For example, the EU assessment extrapolated using a cost range from around €34 per person per year in France to €64 in Austria and €110 in Slovakia as central values, to estimate overall EU costs in the range €15 billion to €64 billion per year until 2030. Some sub-national assessments that use this extrapolation approach are currently in preparation (PWA, 2024). A disadvantage is that the estimates depend heavily on the methodological approaches and key assumptions (many of them draw upon the scientific impact modelling results mentioned above). (p71-75)
- In sectoral or programmatic assessments or "investment portfolios". These generally focus on the impact of one specific hazard on sectors or assets. They are also built on existing work undertaken at country level and on best practices from other countries. As above, an alternative used in some sub-national assessments is through extrapolation (in preparation, PWA, 2024). An "investment portfolio" approach is important for considering the feasibility of long-listed measures in the context of current or increased budgets. It focuses on the specific costing of adaptation measures and enabling the identification of synergies and potential trade-offs among them.

Climate change adaptation and economics and investment decision making in the cities

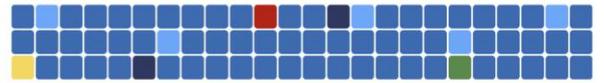
The document provides guidance for supporting municipal and local authorities through the use of adaptation economics, introducing the role of adaptation economics in investment decision making and describing the relevant decision tools and their features.

Light-touch approaches to economic appraisal are presented as a form of rapid assessment, either using existing information from previous projects or using simple models or functions to help identify options or provide indicative costs and benefits. These approaches aim to capture the main conceptual aspects of detailed approaches and may have a role in screening options.

Additional resources

There are also projects carried out at local level and/or sectoral level where information on costs and benefits can be found and to which PAs can resort. Unfortunately, the information may be reported in the national language and are very context specific (e.g. [Life ADA](#) project in Italy, with specific [costs and benefits](#) of options in the agricultural sector).

¹ Scientific modelling methods for costing adaptation are included here but are not directly related to the step preceding since they are not based on the longlists compiled. A main shortcoming is that these scientific/top-down approaches may lack information that is relevant for financial planning from a budgeting perspective.



As mentioned, for now there is not a unified catalogue/database with this type of information. However, the ongoing (2024-2027) Horizon Europe project "[Study on the macro-economic impacts of the climate transition](#)" aims, among other objectives, at quantifying the investment needs for adaptation to climate change across all EU Member States, identifying adaptation measures and their costing.

Module 6: Identify the financing gap

[Mainstreaming, accessing and institutionalising finance for climate change adaptation, OPM \(2017\)](#)

Mainstreaming, accessing and institutionalizing finance for climate change adaptation

OPM Report "Mainstreaming, accessing and institutionalising finance for climate change adaptation" provides an overview and comparison of approaches to tracking expenditures, including budgetary analyses, public expenditure reviews and budget tagging systems. It illustrates both objectives-based and benefits-based approaches for estimating the climate change relevance of projects. They work by flagging budget codes that are relevant to CCA/M on a government financial management IT system to show the full public expenditure.

Green budgeting approaches, including green budget tagging, can also support developing a baseline of expenditure as an input to establishing adaptation funding needs, costs, and benefits. Green budget tagging is used to help track existing and planned adaptation expenditure. While the approach has emerged in national context, they are also applicable to regions (OECD, 2022a). Several cities are participating in the C40 Climate Budgeting Programme for example.

Module 8: Identify the range of possible financial sources and instruments

[Net Zero Cities "City climate finance: landscape, barriers and best practices" \(2022\)](#)

[Regilience Funding Opportunities repository](#)

[NAP Global Network Inventory of innovative financial instruments for climate change adaptation](#)

[G20/OECD Report on approaches for financing and investing in climate-resilient infrastructure](#)

[Financial Instruments Library - Cities Climate Finance Leadership Alliance](#)

Covenant of Mayors [Financing Opportunities](#) and [Innovative Financing Schemes](#)

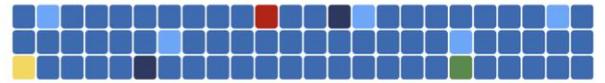
Net Zero Cities "City climate finance: landscape, barriers and best practices" (2022).

Additional types of financing opportunities from the private sector are described in this report.

Debt financing instruments include those transactions in which investors lend money with the promise that the principal together with interest will be returned on the maturity of the bonds.

- Green investment loans: loans used to finance or re-finance eligible Green Projects, which must align with the 4 core components of the Green Loan Principles (use of proceeds, process for project evaluation and selection, management of proceeds, reporting) and should provide clear environmental benefits, assessed and quantified, measured and reported to deter greenwashing.
- Municipal bonds: debt securities issued by a state, municipality, or governing bodies usually to raise capital for its infrastructure projects. Bonds are primary issued by the municipalities themselves and can then be traded in secondary markets. They are associated with low risk and often tax exempted, and therefore can be especially attractive to investors.
- Pooling municipal debt: a specifically authorized bank purchases municipal bonds issued by local governments, pools and then issues them in the market.
- Mini bonds: municipal bonds with a lower unit price, marketed directly to individuals without an underwriter serving as broker-dealer. The Municipality assigns a firm to process the sale transaction, maintain the records and execute maturity payments. Mini bonds connect the taxpayers to the public projects, thus engaging citizens, increasing citizens' access to municipal bonds, increasing the perceived equity of tax-exempt financing, and increasing social capital while funding capital projects. However, the role of mini bonds is often limited in scale as they are limited number of local investors and due to the high marketing costs.

There are also Institutional investors, such as insurance companies, commercial banks, pension funds, mutual funds, hedge funds and sovereign wealth funds, who buy, sell and manage stocks, bonds, and other investment securities on behalf of its clients, customers, members, or shareholders. The focus is on long



term and high-risk investments, they can finance projects that meet their financial criteria (Risk-return-ratio). The municipality has access to large capital and therefore needs to bundle its projects for financing.

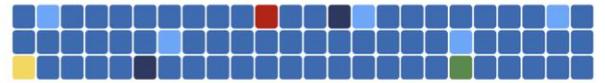
Relatively high transaction costs.

Equity financing include transactions in which investors buy a portion of equity in the listed public company or a non-listed entity in the form of shares. The company does not have repayment obligation but is obliged to share profits. Equity financing is usually used to finance high risk projects that are usually not financed by debt instruments.

- Private equity: investment in a company or an entity not publicly listed or traded with the intent to take total control of the company after the buyout, with the aim to streamline operations, increase revenues and sell it at a profit. Usually, multiple investors' assets are pooled and generate large capitals for investments. With the successful mainstreaming of ESG investing, private equity fund managers are compelled to produce new innovative products to meet the increasing demand for private equity in the ESG space. Private equity firms use both equity and debt in their investment. Private equity can play an important role in PPP infrastructure renewal projects.
- Venture capital funds entrepreneurs, start-ups and young businesses with high growth potential who lack access to debt instruments, by pooling resources from a few investors who are offered substantial portions of the company on limited partnerships basis against their investment. They usually provide funding to innovative, high risk, niche projects, and can be a tool to spur innovation.
- Green equity: process of investing equity capital in projects ensuring environmental sustainability. By providing both financial and environmental returns, it may be appealing to a wide target audience. Investors with a greater financial risk appetite may find it appealing if the environmental impact is significant, measurable and pre-determined.

Other innovative instruments:

- Carbon finance: financial instruments and mechanisms such as carbon credits, carbon offsets, and carbon taxes, that support projects aimed at reducing greenhouse gas emissions and abating or avoiding emissions of carbon. It is a way to obtain funding for low-carbon projects or innovative, high-risk, and niche initiatives that otherwise may not have access to traditional financing. Measuring, Reporting, and Verification (MRV) is an essential element to provide transparency and accountability, ensuring that the emissions reductions claimed are real, measurable, and additional. However, the high level of technicalities and the challenges around capacity to implement an effective governance structure can act as a barrier to accessing carbon finance.
- Energy Performance Contracting (EPC): an Energy Saving Company (ESCO) implements an energy efficiency or a renewable energy project and the energy savings or the energy produced funds the initial investment. The ESCo is reimbursed according to its demonstrated delivery of energy savings. When facilities lack capital, skills, manpower or technology information, EPC is the preferred option for infrastructure investments.
- Fee based financing: a private entity undertakes the project, including sourcing of financing, on behalf of the municipality for a mutually agreed fee. This can also be a vendor finance, where the private entity provides financing to private end users for investing in their products.
- Energy Efficiency Obligation Scheme (EEOs): the private entity achieves cost savings by reducing energy consumption, which are used to finance the investment. Entities are required to meet quantitative energy saving target by investing in eligible end-use energy-efficiency measures. A monitoring mechanism is set up to administer, verify and reports the savings.
- On-bill financing: municipalities borrow directly from utility companies and make repayment via energy bills. It is easy to set up and implemented for small-medium investments, saving also on administrative costs, but estimated savings should be able to repay the loan.
- Green mortgage: loan with lower interest rates to invest in energy-efficient certified buildings and refurbishment. Borrowers benefit from lower repayment instalments, lower energy bills, higher property value, and a reduced carbon footprint. It can be an important tool to promote retrofitting of private households and business establishments.
- Crowdfunding: model based on lending or reward in which investors support specific projects by freely pledging. Public entities can freely decide on the return on investments and benefit from community participation, but they owe responsibility to many small investors and assumes the risk they do not stick around for the full funding phase.



- Public-private partnerships (PPPs): long-term agreements between a public authority and one or more private entities to implement projects against payments by the contracting authority or users. They are used to improve efficiency and effectiveness of local public service delivery.

Regilience Funding Opportunities repository

Specifically on funding, the repository summarises information on European and national opportunities, with the aim to help the identification of potential funding sources.

For each type of funding opportunity, it provides information on the geographical areas they are applicable to, the types of instruments granted, on the entities that could exploit them, the sectors and the typical budget size.

NAP Global Network Inventory of innovative financial instruments for climate change adaptation

The inventory is intended to inform governments, project developers, and financiers about a range of financial instruments that have been used, or potentially could be used, to finance the implementation of climate change adaptation measures, enabling access to financial resources from financial institutions, private investors, institutional investors (such as pension funds), impact investors, foundations, and other philanthropists, and may be blended with traditional sources of financing.

It provides a description of different kinds of instruments at different stages of development, from more mature ones that are already widely established, to emerging and pilot instruments, also identifying the sectors in which they could potentially be implement and illustrating examples of how they have been used.

Financial Instruments Library - Cities Climate Finance Leadership Alliance

The library presents different financial instruments available for urban climate projects, allowing to select those relevant for adaptation climate objective only or for mitigation and adaptation.

G20/OECD Report on approaches for financing and investing in climate-resilient infrastructure

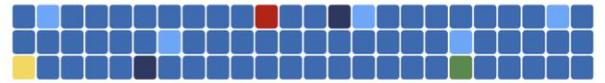
The report identifies approaches that can be taken to advance financing for climate-resilient infrastructure, recognizing that enhancing climate resilience is critical to achieve sustainable development. Specifically, on enhancing access to finance, a set of potential financing instruments that could be employed for climate adaptation are listed, as well as case studies and examples.

Outcome based instruments	Adaptation benefits mechanism	Debt-for-nature-swaps	Nature-based credits	Sustainability-linked bonds	Development policy lending/CAT DDO
Catalytic investments	Risk guarantees	Subordinate capital	Credit tranching/ bundling/ green securitisation	Pool investment funds	
Disaster risk	Climate resilient debt clauses	Parametric insurance	CAT bonds	Regional insurance pools	
Traditional investments	Technical assistance	Project preparation facility	Bonds (e.g., green and climate bonds)		
	Loans	Equity	Concessional debt (e.g., IDA)		

Figure 36 Some examples of adaptation and resilience financing stack. Source G20/OECD

Furthermore, the following recommendations are provided, keeping in mind that the specificities of each local context should be accounted for:

- Financial instruments like green and sustainability bonds can be leveraged to support financing of climate resilient infrastructure. At the same time, innovative instruments like catastrophe (“cat”)



bonds, outcome-based instruments, risk guarantees, and climate resilient debt clauses can attract investments.

- Blended finance mechanisms with climate-oriented objectives can be effective in supporting the development of climate resilient infrastructure.
- Public facilities with clear climate mandates (e.g. infrastructure-focussed banks, development banks, dedicated funds) can provide pathways to attract private sector financing.
- Tax incentives can be used by governments to encourage greater climate risk reduction and adaptation measures.
- Allowances from different mechanisms like emission trading could secure funding towards climate resilience.

Covenant of Mayors Financing Opportunities and Innovative Financing Schemes

The Financing Opportunities tool provides information on several funding programmes and alternative financing instruments, together with inspiring examples.

The leaflet on Innovative Financing Schemes describes schemes used by local authorities to finance adaptation projects and support citizens and companies, providing also case studies and recommendations.

Module 9: Match types of adaptation options with financial entities/instruments

[Financial Instruments case studies - Cities Climate Finance Leadership Alliance](#)

Financial Instruments case studies - Cities Climate Finance Leadership Alliance

The repository of case studies provides examples of successful financial instruments implementations in urban climate projects.

The CLIMATEFIT project aims to support EU territories in their just and transformational journey toward climate resilience by bridging the finance gap, providing critical insight and building the capacities of (i) Public Authorities (PAs) to identify, orchestrate and attract various public and private financing sources and (ii) Financing & Investment Entities (FIEs) to identify and access resilient investment opportunities. CLIMATEFIT opens a significant opportunity to foster innovative resilience investments in vulnerable EU territories and to boost competitiveness and EU leadership in a growing market. The project will build on a deep understanding of existing initiatives to sustain systemic and catalytic resilience investments by engaging its Technical Partners, PAs and FIEs in the co-creation of twenty innovative investment strategies, ten concrete and scalable investment plans and four bankable transformational investment cases, increasing the bankability of resilient project pipelines across a diversity of scales, financing gaps, contexts, barriers to financing, climate risks and vulnerabilities, biogeographical regions, adaptive capacities and maturity regarding climate change represented from its twenty case studies grouped in three clusters: Northwestern, Eastern and Southern.

