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DEPARTMENT OF INTERNATIONAL & EUROPEAN ECONOMIC STUDIES

The Adaptation Investment Cycle: The Missing link for bridging the regional adaptation gap in Europe

Phoebe Koundouri
Maria Chourdaki
Konstantinos Dellis
Kit England

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Phoebe Koundouri (pkoundouri@aueb.gr)[1,2,3,4], Maria Chourdaki (m.chourdaki@athenarc.gr)[1,4], Konstantinos Dellis (kdellis@aueb.gr)[1,4], Kit England (kitengland@fastmail.com)[5]

[1]*School of Economics, Department IEES, and AE4RIA.ReSEES Research Laboratory, Athens University of Economics and Business, 76, Patission Str., 10434, Athens, Greece*

[2] *Department of Earth Sciences and Peterhouse, University of Cambridge, The Old Schools, Trinity Ln, Cambridge CB2 1TN, UK;*

[3] *AE4RIA.SDU ATHENA Information Technology Research Center, 52 Aigialeias, Marousi, 15125, Athens, Greece;*

[4] *UN Sustainable Development Solutions Network (SDSN) Global Climate Hub, Athens, Greece*

[5] *Paul Watkiss Associates, Oxford, UK*

Abstract

Europe, as the fastest warming continent, faces elevated climate risks coupled with a climate adaptation finance gap, defined as the difference between the costs of achieving an adaptation target and the amount of finance available for adaptation (UNEP, 2024). The EU needs to invest almost €70 billion per year in climate adaptation up to 2050 (Monteleone et al., 2026). However, current funding relies heavily on public sources, highlighting the urgent need for private sector involvement (CPI, 2023). Regions and cities in the EU face barriers in their effort to muster financial resources to translate adaptation strategies into tangible projects to promote climate and socioeconomic resilience. The Adaptation Investment Cycle (AIC), developed in the HEU Pathways2Resilience project, is a six-step process designed to help regions overcome barriers to financing climate adaptation by

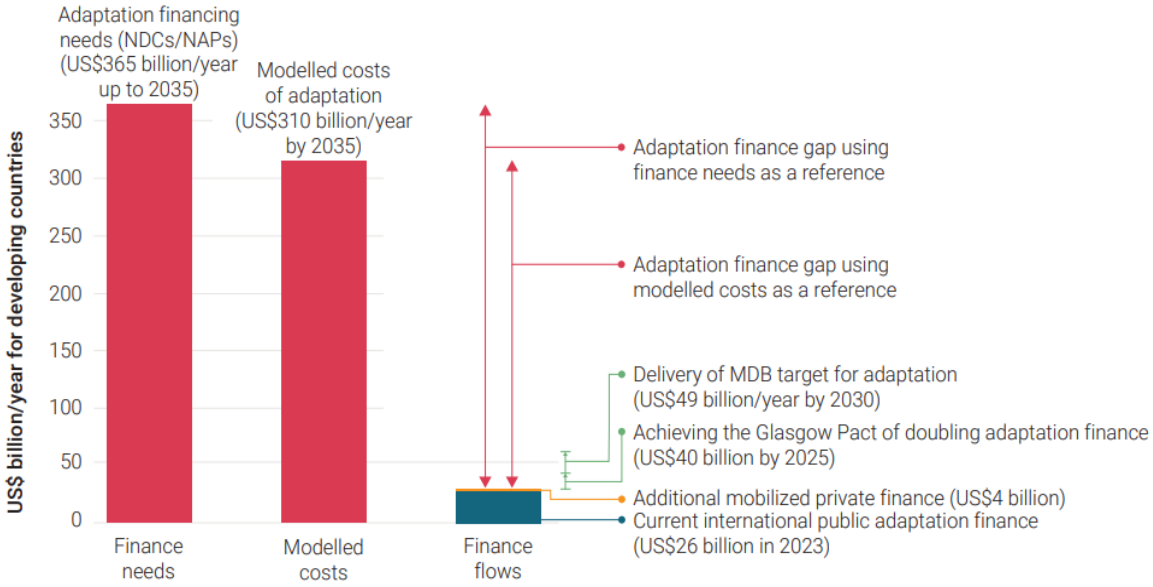
offering a step-by-step approach that builds local capacity and bridges gaps between planning and implementation. This paper maps the steps of the AIC to common adaptation finance barriers - economic, financial, awareness, behavioral, and institutional-, highlights their impact on raising and leveraging capital to strengthen regional resilience and assesses innovative financial sources and instruments tailored to regional needs. Finally, we emphasize concise frameworks for sub-national adaptation finance and contribute to the literature on regional resilience.

Key words: climate finance; climate adaptation; adaptation finance barriers; Adaptation Investment Cycle (AIC); public sector; investors

1. Introduction

Despite financial flows for climate accelerating over the past decade, adaptation finance challenges remain significant, as the adaptation finance gap persists (UNEP, 2025). By 2035, developing countries alone could face adaptation costs of US$310–365 billion per year, roughly 12–14 times higher than current international public adaptation finance of US$26 billion per year (Figure 1). Meanwhile, private adaptation finance remains marginal at US$3.5–5.7 billion per year, representing just 1–2 % of estimated needs, despite the fact that the private sector could realistically cover 15–20 % of priority adaptation investments, particularly in agriculture, water, and infrastructure (UNEP, 2025). Recent estimates from the European Commission place the annual adaptation investment needs for Europe at almost 70 billion, with about €30 billion dedicated to infrastructure, €21 billion for ecosystems and €12 billion for food security (European Commission, 2026). The total global social and economic costs of inaction under business-as-usual warming could reach at least US$1,266 trillion (Buchner et al., 2023), highlighting the massive gap between current investments and the scale of the impacts of climate challenge (CPI, 2024).

Figure 1. Comparison of adaptation financing needs, costs and international public adaptation finance flows in developing countries (constant 2023 prices).



Source: *Watkiss, P., Butera, B., Canales, N., Chapagain, D., & Pauw, P. (2025). Adaptation finance gap, Chapter 4, in Adaptation Gap Report 2025: Running on empty (p.14).*

Adaptation finance is underpinned by a multitude of barriers. These barriers collectively hinder the effective mobilization of financial resources for sub-national authorities (cities and regions) which are at the forefront of adaptation actions. Even when financial resources are secured, barriers persist that impede the effective leveraging of these funds for successful adaptation projects (Koundouri et al., 2023). To this day most adaptation projects tend to be developed reactively and are of incremental nature. Financing anticipatory and transformational adaptation is harder, as it involves more challenges, due to uncertainty and lower rates of return, most of them discounted from the not so near future. It is therefore likely that the public sector will be required to pay for most of the near- and long-term planned, anticipatory adaptation actions (Watkiss & Frontier Economics, 2022).

European subnational adaptation strategies place limited emphasis on addressing financing barriers, which constrains access to the financial resources required to implement effective adaptation measures. While multiple funding mechanisms exist at both EU and national levels, their accessibility remains limited for many regional and local actors, particularly smaller municipalities and local

communities, due to persistent knowledge gaps, governance shortcomings, administrative complexity, restrictive eligibility criteria, and bureaucratic hurdles. Furthermore, inequitable access to climate change adaptation strategies can exacerbate existing social vulnerabilities and enhance disparities in the impacts of climate change (Zahnow et al., 2025). Many scholars and practitioners argue that the development of succinct regional resilience investment plans catalyse adaptation actions by addressing most of the key challenges associated with adaptation finance (England et al., 2026).

This paper suggests a shift beyond the typical focus on incremental risk management, building on the EU Mission on Adaptation to Climate Change under Horizon Europe (HEU), which aims to make European regions, cities, and local authorities climate-resilient by 2030, with a key objective of supporting 150+ regions and communities in accelerating their transformation toward resilience. In line with this goal, it presents the Adaptation Investment Cycle (henceforth AIC) developed for the Pathways2Resilience (P2R) HEU project, launched to help achieve this target by creating 150 climate-resilient regions and local authorities by 2030. The AIC develops the financial aspects of a Climate Resilience Strategy from the identification of adaptation needs and barriers to finance all the way to the implementation and monitoring of efficient adaptation projects. We conceptually link the specific tasks of the AIC to the most common adaptation finance barriers based on the relevant literature and the feedback from the first Cohort of P2R regions.

The second section of the paper summarizes and classifies barriers to adaptation finance, while section 3 presents the analytical framework of the AIC and its mapping to these barriers. Section 4 presents three succinct cases of common adaptation finance barriers and the relevance of specific AIC tasks. Section 5 concludes.

2. Classification of Barriers to Adaptation Finance

Klein et al. (2014) provide the definition of barriers to adaptation finance as the "*factors that make it harder to plan and implement adaptation actions. Adaptation constraints restrict the variety and effectiveness of options for actors to secure their existing objectives, or for a natural system to change in ways that maintain productivity or functioning. These constraints commonly include lack of resources (e.g., funding, technology, or knowledge) institutional characteristics that impede action or lack of connectivity and environmental quality for ecosystems".* Adger, et al. (2007) note that adaptation is constrained by a range of interrelated barriers, including technological limitations, financial restrictions, cognitive and behavioral gaps, socio-cultural factors, knowledge and information deficits and institutional or policy fragmentation.

Thus, these barriers often impede the translation of high adaptive capacity into tangible adaptive actions. Although barriers are often discussed in the literature as discrete determinants of adaptive capacity, they rarely act in isolation (Klein et al., 2014). Multiple barriers can significantly reduce the range of adaptation options and lock the mobilisation of funding and finance for adaptation.

We identify five broad categories of barriers following Koundouri et al. (2023) and Watkiss and Frontier Economics (2022).

2.1 Economic / Market Barriers

2.1.1 Public good characteristics / Positive externalities

Adaptation actions by default encompass public good characteristics. This implies that the social and economic benefits from adaptation exceed the financial ones and accrue to more than one entity (firm, individual, group), making it hard to appropriate them privately. Private investors typically ignore these non-market benefits and focus only on incremental cash flows, leading to rational, but significant underinvestment by the private sector in these areas. This mechanism also contributes to a moral hazard issue as private actors expect the public sector to bear most of the cost (Khan, M. R., & Munira, S., 2021; Bisaro, A., & Hinkel, J., 2018).

The non-market costs and benefits of adaptation measures, such as ecosystem protection, natural and social capital, health interventions, and land-use changes are under-researched (Adger et al., 2007). As a result, it is extremely difficult to determine the return on investment for non-market public goods, making it even harder to attract private sector investment. Non-market sectors are therefore a low priority for the private sector unless specifically incentivized by the government (Kállay & Takács, 2023).

For example, ecosystem-based adaptation is very attractive from a social welfare (public) perspective because of the large environmental benefits arising from positive externalities (e.g., GHG emission reductions, benefits to well-being through the enhancement of ecosystem services). However, such adaptation investment is less attractive financially from a private sector point of view (ECONADAPT, 2017), meaning financial returns do not reflect the full value of undertaking the activity (Druce et al., 2016). Positive externalities might also appear in the form of technology spillovers, where a project generates lessons that are useful to other actors but do not provide additional revenues to the investor (UNEP, 2016).

2.1.2 Fiscal limitations

Despite the escalating risks posed by climate change, adaptation continues to be deprioritized within public budgets, particularly in comparison with sectors traditionally viewed as more urgent or politically salient, such as defence and energy security. Public budgets are already overstretched as many governments face high debt burdens and increased scrutiny on debt sustainability, which limits their fiscal space for (inter alia) long-term adaptation investments (European Commission, 2026). This poses a significant challenge as public finance remains the dominant source of adaptation funding, with estimates suggesting at around 98% of tracked adaptation finance originates from public actors (CPI, 2023). The adverse effect is exacerbated by the reluctance of the private sector to engage in adaptation funding as a result of many other barriers discussed in this section (see for example 2.1.1, 2.2.1 and 2.2.3).

Having said that, domestic adaptation finance is hard to track and rarely integrated into formal government systems. Public financial management frameworks often lack climate tagging, meaning that adaptation spending is not systematically planned or budgeted (CPI, 2024).

2.1.3 Misaligned incentives

In the context of adaptation, markets tend to under-allocate resources because prices do not fully reflect climate risks, long-term benefits, or social welfare gains. It is also the case that the broad range of benefits do not accrue to the entity undertaking the costs for the adaptation actions As a result, private actors lack sufficient financial incentives to invest at socially optimal levels (Cimato and Mullan, 2010). In addition, perverse incentives encourage actions that increase the impacts of climate change reflecting issues of moral hazard. For example, settlements may be (re)built in areas where there is a high risk of flooding by investors (exposure units) who expect to receive compensation from a public agency (as operator) in the case of a disaster (Eisenack and Stecker, 2011).

2.2 Financial / Bankability Barriers

Many adaptation measures do not create direct revenue streams (either positive revenues or cost savings), and their magnitude is highly uncertain. This has a dual negative effect on finance adaptation. In reactive projects benefits require time to materialize and generate revenue streams, whereas, investments designed to prevent costs in the future (anticipatory adaptation) are hard to fund publicly, due to uncertainty, discounting and coordination required in public projects or privately (Watkiss & Frontier Economics, 2022). More specifically, uncertainty about future climate-related outcomes, acts as a challenging financial adaptation barrier because it prevents decision makers from agreeing on a common valuation of future costs and on a shared discount rate (Koundouri et al., 2024).

These challenges converge in the issue of bankability, that is, the extent to which a project can attract investment by meeting a set of criteria defined by the party providing the financing. A bankable

adaptation project is credible, technically feasible, and capable of generating predictable cash flows or measurable impacts that meet investor criteria, extending beyond pure profitability to include resilience gains and alignment with climate goals (Ellis and Pillay, 2017 ;Watkiss & Frontier Economics, 2022). However, adaptation projects frequently fall short of these standards. Low bankability stems from several structural characteristics of adaptation. Projects are often highly site- and context-specific, making them difficult to standardize or replicate. Their benefits can be complex to quantify, particularly when they involve avoided losses rather than direct revenues.

Bankability is further constrained by limited technical and financial expertise among both project developers and potential financiers. Adaptation markets and funding streams remain relatively nascent, with insufficient market depth and institutional capacity to support large-scale investment. The lack of precedent also contributes to the perception of adaptation projects as experimental or high-risk. Given that adaptation is inherently cross-cutting spanning sectors, governance levels, and institutions coordination failures are particularly common, further undermining project viability and investment readiness (Watkiss & Frontier Economics, 2022).

2.2.1 Low or no revenues from adaptation

Many adaptation projects often do not generate sufficient cash flows to justify capital investments (UNEP FI, 2019). For institutional investors, adaptation projects that cannot clearly guarantee a commercial return are not appealing, creating financial gaps that act as major barriers to adaptation investment (IGCC, 2017). Revenues from climate-risk reduction are currently difficult to identify and capture. Because the benefits of adaptation are often “avoided costs” or risk-reduction rather than direct sales, value-capture mechanisms are challenging to apply, and the dispersed nature of the benefits makes them hard to monetize. The lack of a clear, scalable business model, including predictable revenue streams, is also identified as a core barrier to private investment in adaptation, reinforcing the need for new systemic financing frameworks (Mortimer et al., 2020).

2.2.2 High upfront costs

Adaptation projects often require substantial upfront investments while benefits accrue only over the long term, making them hard to justify and unattractive to investors seeking short-term returns (Adaptation Fund, 2022). Adaptation infrastructure in particular demands large initial capital expenditures (CapEx) for resilient assets like flood barriers or irrigation, but returns are delayed, uncertain, and often non-monetary (e.g., avoided losses), unlike mitigation's clearer revenue streams. This creates high perceived risks and long payback periods, making projects unattractive without subsidies or de-risking, thus stalling replication and economies of scale. (Dougherty-Choux et al., 2015). Because these costs must be incurred before any climate-risk reduction benefits materialise, they create cash-flow constraints and risk–return concerns that limit both private-sector participation and public-sector willingness to fund projects (Micale et al., 2018). Standard economic appraisal uses discount rates that diminish the present value of future benefits (see 2.2.3), making the large upfront investment appear financially unattractive at the present.

2.2.3 Timing of benefits

The timing of clear, immediate monetary benefits constitutes a major barrier to adaptation finance, since most adaptation measures require substantial upfront investment (as discussed in 2.2.2), while their benefits (primarily avoided damages) may not materialize for decades (e.g. climate-proof infrastructure). Consequently, proactive measures may appear excessive within short appraisal horizons, even if they are efficient over an 80–100-year timeframe (Haasnoot et al., 2020). This temporal mismatch, combined with uncertainty about future climate pathways, creates disincentives for investors and discourages early action and biases decisions toward short-term, inflexible solutions that risk future lock-in or costly retrofits. Even when societal returns are strong, a focus on immediate cash flows and discounted financial returns can undervalue long-term benefits. As a result, projects that are economically justified may appear financially unattractive, leading to underinvestment, while uncertainty about future climate impacts may also raise concerns about overinvestment. This

divergence discourages both public and private actors from committing sufficient resources to adaptation.

2.3 Information, Knowledge and Awareness Barriers

Information and knowledge gaps regarding the urgency of adaptation effectiveness and the full range of benefits from adaptation actions impede the scaling of financial flows for adaptation and reflect a sizeable market failure, as well as reduce the ability of sub-national and local actors to navigate complex funding systems (Venner et al., 2024).

2.3.1 Imperfect information on risks

Among regional authorities and stakeholders there is low perceived urgency of adaptation leading to inaction and exacerbating climate risks. Due to lack of information, actors, e.g. investors, farmers, or businesses, are unaware of the risks and impacts that climate change exacerbates, as well as the measures available to mitigate these risks (Fayolle et al. 2019). Unavailability, inaccessibility, or uneven distribution of information among relevant actors disempowers them from making adaptation decisions and investing accordingly, in particular in developing economies (Stoll et al., 2021).
Studies from the UK show that exposure to floods does not automatically raise concern, indicating that direct climate events are not a reliable predictor of adaptive attitudes (Wolf & Moser, 2011). Moreover, in many cases increased insurance coverage may lead policyholders to make fewer preparedness efforts, thereby increasing the risks they face (Hudson & Thieken, 2022).

There is also a lack (or poor evaluation) of information on the economic implications of climate hazards in terms of economic activity and employment. Weather- and climate-related extremes caused economic losses of assets estimated at EUR 738 billion during 1980–2023 in the European Union, with over EUR 162 billion (22%) occurring between 2021 and 2023 (EEA, 2024). These

immediate and long-run damages can be prevented in the future through disaster risk reduction measures and adaptation actions.

2.3.2 Information gaps on adaptation benefits and effectiveness

Missing or poorly documented evidence on the effectiveness of adaptation actions, the needs they address, and the benefits they deliver hampers the flow of finance. Economic appraisal of adaptation projects supports this process by demonstrating that a project delivers significant societal benefits and is affordable for public funders, while also showing private funders that it can generate appropriate financial returns and capture value. The process can often be quite technical, particularly when it involves assessing economic benefits that are externalities or non-market in nature. In such cases, the monetization process can be complex, as it requires placing a value on elements that are not directly traded in markets, such as the valuation of ecosystem services. Furthermore, it is challenging to establish a counterfactual—quantifying what the losses would have been without the intervention (OECD, 2025)

Insufficient climate-risk data and evidence gaps create uncertainty around future adaptation benefits, making it difficult to build investment-ready business cases. While cost-benefit analyses of adaptation measures are feasible (Stoll et al., 2021), a persistent mismatch remains between the recognised urgency to adapt and the actual flow of investment to adaptation projects (Mortimer, 2020). This disconnect hampers the ability of cities and regions to identify and effectively access available funding mechanisms. Finally, without data on precise impacts of adaptation actions, it is very difficult to leverage innovative financial instruments like green bonds or performance-based grants, thus limiting financial options for many adaptation projects (Watkiss & Frontier Economics, 2022).

2.3.3. Lack of information on financial opportunities for adaptation

Funding and financing opportunities are often siloed and scattered, making the identification of financial solutions largely a matter of chance, particularly for smaller or lower-capacity jurisdictions

(Moser et al., 2019) Anjanappa et al. (2024) emphasise that limited awareness and fragmented financing mechanisms create mismatches between available instruments and actual local needs. The proliferation of tools, such as green or climate bonds, resilience bonds, and insurance schemes often requires regions to choose among options without first clarifying their underlying financial challenges. Large projects may overshadow grassroots initiatives, rigid funding models limit local adaptability, and funders' aversion to innovative instruments further constrains experimentation. Collectively, this fragmentation contributes to a convoluted financing landscape that hampers effective climate-adaptation investment.

A recent survey from the Adaptation Mission (European Commission, 2023) highlights that national and regional grants dominate the landscape of financing options for adaptation. Cohesion Policy funds also proliferate as they are well known, readily accessible to regional authorities, and closely aligned with existing public budgetary structures in many signatory regions. Among EU programmes, HEU and LIFE generate considerable interest for future engagement, although its current uptake remains comparatively limited. In contrast, financing from the European Investment Bank (EIB) and from private or commercial banks remains limited, indicating very low levels of familiarity and experience with these more complex financing mechanisms. This dominant use of public financing means that authorities have less incentive to explore market-based instruments, especially when dedicated adaptation budgets and teams are already aligned with EU-level programmes. Finally, the limited track record of bank-funded adaptation projects reduces peer learning opportunities, reinforcing the perception that such sources are either unsuitable or too complex for regional climate-adaptation needs.

2.4 Governance, Regulatory and Institutional Barriers

2.4.1 Regulatory Complexity and Red Tape

Bureaucratic barriers, including complex application and approval processes, significantly hinder access to climate finance, delaying project implementation (Anjanappa et al., 2024). Governance barriers (also called institutional barriers) are identified by several sources (Frontier et al., 2013; HMG, 2013). These can constrain action, creating challenges or slow planning and implementation. The public sector also faces multiple challenges that hinder the translation of planning into effective action. Risk assessments often fail to directly inform adaptation measures, remaining largely as paperwork without triggering concrete implementation. The inherent complexity and high uncertainty of adaptation require diverse tools, frameworks, and interdisciplinary knowledge, which can overwhelm public bodies (Yule et al., 2023).

Furthermore, lack of transparency and corruption significantly undermine the effectiveness and equity of climate finance by diverting resources from vulnerable populations and urgent needs, and allowing politically connected entities to capture funds. Weak governance systems, coupled with insufficient monitoring and evaluation mechanisms, create accountability gaps that make it difficult to track fund use, contributing to inequitable distribution and eroding trust among stakeholders. Marginalized groups and smaller local entities are particularly affected, often being excluded from benefits, which further entrenches social and economic inequalities (Anjanappa et al., 2024).

Regulatory barriers can also generate *multiplicative complexity,* when overlapping or poorly aligned regulations interact, creating friction and increasing compliance burdens for project developers (Watkiss & Frontier Economics, 2022). Incoherence between environmental regulation, public funding mechanisms, and incentive structures further elevates transaction costs. This lack of regulatory alignment makes it particularly difficult to finance innovative and nature-based adaptation projects, as unresolved regulatory and eligibility issues increase the likelihood of delays and financial losses (FUKR, 2022).

2.4.2 Lack of multilevel governance cooperation

Regional authorities face significant challenges in coordinating across governance levels when attracting and leveraging financial resources for adaptation actions. This creates an added layer of regulatory complexity and limits the capacity of regions or municipalities to act quickly while leveraging local knowledge. Unclear governance structures can reduce investor confidence, and limited public sector capacity at regional or local levels can hinder the development and delivery of business plans. Fragmented regulatory frameworks at EU, national, regional, and local levels create inconsistencies that undermine effective adaptation strategies. For instance, EU regions may develop strong adaptation strategies that are weakened by discrepancies in national regulations and their implementation. Policy incoherence, where sectoral policies work at cross-purposes, further disrupts coordination and prevents efficient resource allocation.

Frontier et al. (2013) and HMG (2013) also identify the potential for co-ordination failures where sectors are fragmented and many parties are involved in adaptation actions. It is noted that adaptation frequently involves cross-cutting themes, and thus multiple actors and institutions with different objectives, jurisdictional authority and levels of power and resources, making it more difficult to align governance and get agreement (Watkiss et al., 2015). Highly detailed and restrictive eligibility criteria, narrow legal definitions, and variations in procedural frameworks across funding instruments impose substantial administrative burdens, reducing the capacity of local authorities to identify, access, and manage appropriate finance (Moser et al., 2019; Doshi & Garschagen, 2020).

2.4.3 Lack of skills and technical capacity

Low technical and institutional capacity among regional stakeholders and financiers is a core barrier to scaling up adaptation and resilience finance. Understanding climate risks at a level suitable for financial decision-making requires expertise often lacking in financial regulatory agencies and institutions, due to the novelty and complexity of climate issues, which span science, economics,

management, and policy. This capacity gap hinders regulators and financial institutions from integrating climate considerations into risk assessment and policymaking (UNEP, 2019).

The public sector faces difficulties in integrating scenario-based evidence into traditional decision-making frameworks that prioritize credibility, legitimacy, and salience, often resulting in limited influence on actual policy actions (Rickards et al., 2014), as well as providing evidence that need to be addressed to make a stronger case for investment.

According to an OECD survey (2021) the most frequently cited barriers to expanding green-budgeting-related adaptation finance are lack of methodologies, resources and skilled capacity. More specifically, the two biggest impediments for adaptation implementation, reflecting both technical gaps (e.g., tools for assessing environmental effects) and the financial and human capacity needed to apply them. A shortage of technical expertise and staff time is also highlighted, with many countries reporting that they do not have enough trained personnel to develop and operate green-budgeting tools.

2.5 Behavioural, Social and Cultural Barriers

Psychological, cultural, social norms and organizational factors that shape perceptions, decision-making, and actions among stakeholders also impose barriers for adaptation finance. Unlike economic or technical barriers, behavioral challenges are deeply rooted in human cognition and social dynamics, making them complex and context specific (England et al., 2026). Even when individuals are motivated, the combination of social, institutional or other obstacles, such as insufficient policy support, limit the ability to translate pro-environmental intentions into adaptive actions, leading to entrenched behaviours, which eventually act as behavioural barriers to adaptation.

2.5.1 Perceived urgency of adaptation

Individual behavior can impede climate adaptation, as decision-makers may be reluctant to implement measures that involve changes to existing practices, investments, or governance structures, often due to a preference for preserving the status quo on top of a miscalculation of risks due to lack of consistent data, as outlined in 2.3.1. In the presence of uncertainty, people's behavior is more likely driven by perceived rather than actual risk. Risk perception can be influenced by factors such as memory and emotions, which may cause individuals to overestimate the likelihood of low-probability events.

Also, evidence suggests that behaviour patterns often include inaction, procrastination, which may lead to high costs in the long run, and are inconsistent with classic economic models of utility maximisation. Instead, there is a tendency for people to demonstrate inertia, procrastinate and have implicitly high discount rates, i.e. to place very little weight on the future consequences of their decisions, which can be detrimental for adaptation (Cimato and Mullan, 2010).

2.5.2 Social and Cultural lock-ins

Social dynamics, including trust deficits between communities and governing bodies, can further complicate collective action on adaptation initiatives (Koundouri et al., 2023), while factors such as the diversity of values, perceptions of risk, cultural attachments, and social structures can constrain adaptation efforts. Societal and cultural priorities may hinder or facilitate adaptation depending on how they influence decision-making and societal goals. Moreover, financing public-goods projects is entangled with social-dilemma dynamics; collective funding requires cooperation, yet individuals often prioritize personal pay-offs over the shared benefit, undermining the pool of resources needed for adaptation (Koundouri et al., 2023).

In some regions, cultural attitudes towards risk and nature may conflict with scientific approaches to adaptation. For example, traditional reliance on reactive measures rather than proactive planning can delay the implementation of effective adaptation strategies (England et al., 2026). A lack of focused

climate education, strong cultural-worldview filters and limited direct immersion in natural environments impede the acquisition of the knowledge and skills needed for effective adaptation (Wolf & Moser, 2011). Also, the cultural and symbolic attachment to physical places, which are often undervalued in decision-making processes can have devastating cultural and social repercussions for communities strongly anchored to those locations. The current metrics tend to undervalue these cultural and symbolic losses, thus acting as a social barrier because they do not sufficiently influence adaptation decisions (Adger et al., 2009).

2.5.3 Low willingness to pay for adaptation

Households and businesses play a crucial role in financing efforts to reduce climate risks and capture potential savings from climate action. However, many stakeholders, particularly households, are accustomed to these costs being covered by governments. This expectation can lead to a lower willingness to pay directly for adaptation or mitigation measures, potentially limiting the level of private investment. To better understand public support for such investments, researchers have applied valuation methods to assess attitudes. Study has shown that the lowest willingness-to-pay (WTP) for urban-adaptation measures is recorded for traffic-noise with a mean WTP (MWTP) of only €42 across the 80 valuation studies (Halkos et al., 2024). These approaches help quantify the extent to which individuals are prepared to contribute financially to climate-related initiatives. In some cases, there may be a willingness to pay through tax revenues (i.e households and businesses are happy for the government to invest in adaptation using tax revenues), but the incentives are not strong enough for them to want to invest directly (Watkiss & Frontier Economics, 2022).

3. The P2R Adaptation Investment Cycle and barriers to adaptation finance

3.1 Adaptation Investment Planning and the AIC

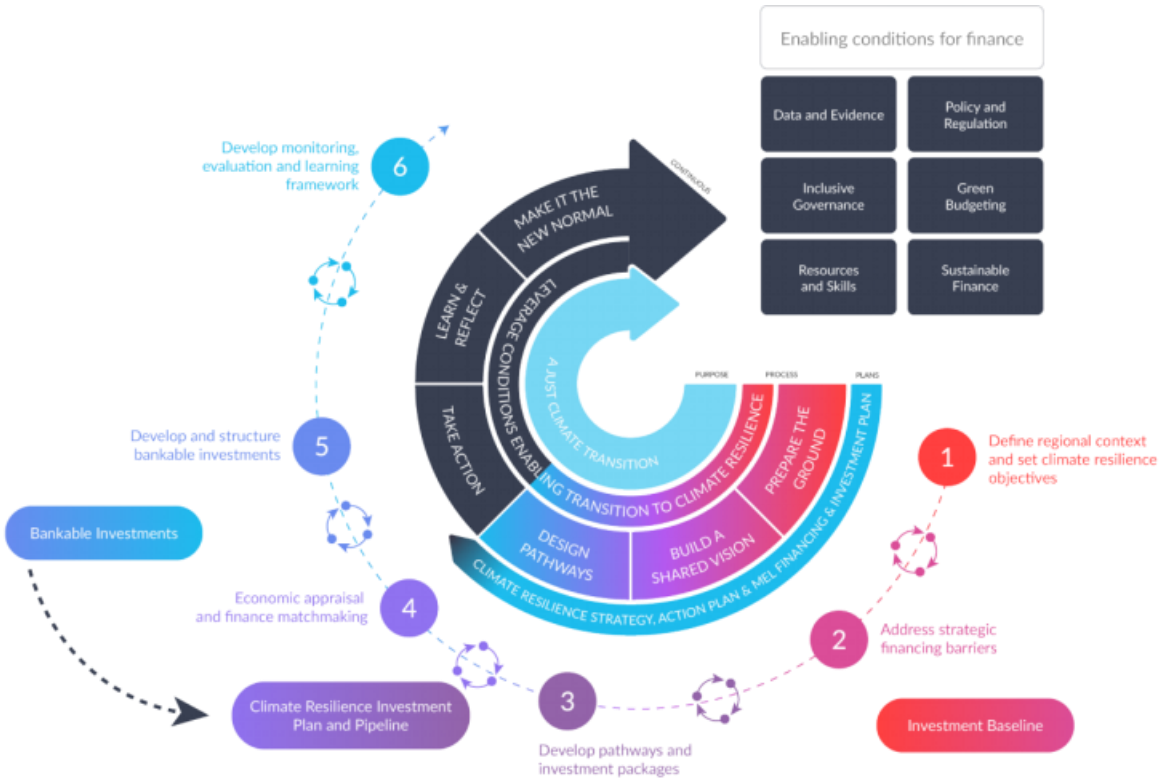
In order to encourage flows of adaptation finance, *Adaptation Investment Plans (AIPs)* have emerged as outcomes of processes which connect high level visions of countries and translate them into discrete projects and programmes for financing (Asian Development Bank, 2023; Hernández &

Ceinos, 2025; IISD, 2022). AIPs can act as the missing link for bridging the adaptation finance gap in European regions as they enhance regional capacity by bundling adaptation objectives into investment packages and sequence adaptation actions based on both urgency and economic feasibility. According to the UNFCCC (2022, p. 15) "regional planning for adaptation allows project developers to mobilize limited resources that would have otherwise been difficult to mobilize, which in turn stimulates confidence among actors and further creates the sense of shared responsibility and solidarity".

In this context, *Pathways2Resilience (P2R)* Horizon EU project is seeking to increase the resilience of at least 100 (+50) European regions and communities through transformative visions and adaptation pathways. It applies a region-wide, place-based approach and offers a rich capacity-building portfolio that includes training sessions, online materials, and detailed guidance documents, while mainstreaming regions' financial and economic considerations into the Regional Resilience Journey (RRJ) and working to address the adaptation finance gap through a tailored process known as the Adaptation Investment Cycle (AIC) (see Figure 2), ultimately delivering a Climate Resilience Investment Plan aligned with the Climate Resilience Strategy and Action Plan (Koundouri et al., 2023).

The AIC acts as the P2R adaptation investment framework and is a flexible step-by-step financial planning framework consisting of six phases and eighteen tasks in total (see Figure 3). This approach translates regions' high-level visions into pipelines of bankable projects, focuses on addressing systemic barriers to adaptation finance, places strong emphasis on the financial and economic rationale from the very first step, and departs from the traditionally science-driven adaptation cycle in which economics and finance are often deferred until step four, when options are assessed. The AIC works in parallel with the RRJ and the formation of the action plan, ensuring that regional climate adaptation actions and the choice of adaptation pathways are not only well-designed, but also reflects economic and financial viability, on top of urgency for cities and regions (England et al., 2026).

Figure 2. The Pathways2Resilience Adaptation Investment Cycle.



Source: *England et al., 2026.*

The AIC tasks provide a blueprint in principle, while encouraging regions to have different entry points, acknowledging existing regional financial planning and offering touchpoints for adaptation investment. It also considers local contexts, barriers, and challenges in shaping pathways and expanding the portfolio of financing solutions, while ensuring that all population groups are considered and accounting for both future costs and the costs of inaction from the onset.

Each AIC task provides step-by-step guidance on its significance for the Investment Plan and adaptation financing, highlighting the elements to prioritize. Each task also includes guidance materials and examples from other regions to inspire learning and support effective implementation, helping to overcome barriers and develop a bankable, viable Investment Plan. AIC serves as a tool for regional resilience by combining flexibility, integration, adaptability, and justice and equity.

3.2 Mapping AIC Tasks to adaptation finance Barriers

The AIC stands at the intersection of the elevated need for adaptation action and the proliferation of the mentioned barriers to adaptation finance. Through its distinct phases and tasks it equips regional authorities with the capacity to address most of the aforementioned barriers. Having said that, the development of a succinct adaptation (or resilience) investment plan as a direct outcome from the AIC constitutes a key catalyst for scaling financial resources as it structures, prioritizes and sequences regional adaptation actions and integrates assessments on their financial viability alongside the adaptation strategy. More specifically, AIC addresses Economic/Market barriers by identifying both the economic and social benefits of adaptation while encouraging the development of a strong economic rationale. For Financial/Bankability barriers, it promotes the diversification of funding sources and ensures that bankability considerations are prioritized from the outset.

Regarding Information, Knowledge and Awareness barriers, it guides regional planners to directly address systemic financial barriers, ensuring informed and effective decision-making. When it comes to Governance, Regulatory and Institutional barriers, it streamlines processes to acknowledge regional priorities and governance structures, as well as it is embedded in innovation agendas and introduces financial innovations to support adaptation efforts. Finally, to overcome Behavioural, Social and Cultural barriers it co-creates value propositions with all relevant stakeholders, fostering collaboration and shared understanding.

To dive deeper, this study specifically shows which barriers to adaptation finance each of the 18 AIC Tasks can address, in order to support regions in developing their Climate Investment Plan (Table 1).

Table 1. Stages, descriptions, and tasks of the P2R Adaptation Investment Cycle, along with the associated finance barriers it addresses.

Tasks	Types of barriers addressed
1.1 Identify policy and financing context	• Fiscal limitations • Lack of information on financial opportunities for adaptation • Regulatory complexity and red tape • Lack of multilevel governance cooperation
1.2 Gather baseline economic and financial evidence	• Imperfect information on risks • Perceived urgency of adaptation • Information gaps on adaptation benefits and effectiveness
1.3 Develop adaptation objectives and economic rationale	• Public good characteristics / Positive externalities • Imperfect information on risks • Lack of multilevel governance cooperation
2.1 Identify current and desired sources and instruments	• Low or no revenues from adaptation • High upfront costs • Lack of information on financial opportunities for adaptation
2.2 Identify finance barriers	• ***cross-cutting***
2.3 Improve access to finance	• Fiscal limitations • Lack of information on financial opportunities for adaptation • Regulatory complexity and red tape • Low willingness to pay for adaptation

3.1 Longlist adaptation options and assess benefits	• Timing of benefits • Information gaps on adaptation benefits and effectiveness • Social and cultural lock-ins
3.2 Prioritise and sequence adaptation options into pathways	• Imperfect information on risks • Perceived urgency of adaptation
3.3 Turn pathways into investment packages	• High upfront costs • Low or no revenues from adaptation
4.1 Identify economic, fiscal and financial benefits	• Low or no revenues from adaptation • Information gaps on adaptation benefits and effectiveness • Low willingness to pay for adaptation
4.2 Assess economic and financial returns	• Low or no revenues from adaptation • Timing of benefits • Information gaps on adaptation benefits and effectiveness
4.3 Matchmaking actions with funding and financing opportunities	• Misaligned incentives • Low or no revenues from adaptation • Lack of information on financial opportunities
5.1 Develop a business model	• Misaligned incentives • Low or no revenues from adaptation • Low willingness to pay for adaptation
5.2 Undertake financial structuring	• Low or no revenues from adaptation

	● High upfront costs ● Timing of benefits
5.3 Develop a commercial structure and delivery plan	● Regulatory complexity and red tape ● Lack of multilevel governance cooperation
6.1 Identify, monitor and disclose progress on adaptation financing	● Regulatory complexity and red tape ● Lack of multilevel governance cooperation ● Lack of technical and skills capacity
6.2 Report on externally financed projects	● Regulatory complexity and red tape ● Lack of multilevel governance cooperation
6.3 Learn and reflect on the preparation of your Investment Plan	● Regulatory complexity and red tape ● Lack of multilevel governance cooperation ● Lack of technical and skills capacity

4. A deep dive into pressing adaptation finance barriers

4.1 Low or no revenues from climate risk reduction

The lack or uncertainty of revenues from adaptation actions present one of the core financing barriers explicitly recognised in the AIC. It constitutes a serious challenge for attracting private financing and creates a wedge between economic and financial benefits. Rather than attempting to force revenues where they don't naturally exist, the AIC offers a more sophisticated approach: it reframes value, reallocates who pays, and restructures projects so that investment becomes viable despite weak direct

cash flows. The AIC addresses this mainly during Phase 4 - Economic appraisal and finance matchmaking, where regional authorities identify the full set of benefits, co-benefits and beneficiaries from the final list of adaptation options in their pathways.

Specifically, Tasks 4.1 and 4.2 concentrate on identifying benefits and assessing economic and financial returns. These tasks critically separate economic value from financial revenue by quantifying avoided damages, service continuity, health gains, and ecosystem services. This demonstrates that projects can deliver high economic returns even when financial returns are weak or nonexistent. The process distinguishes who benefits, who pays, and who finances upfront, allowing projects with no revenues to remain investment-worthy in public finance terms. This reframing supports justification for tax-based funding, transfers, and EU grants while enabling blended structures where public funds cover the non-revenue components and providing evidence to indirectly crowd in finance from insurers, utilities, and land-use actors. Essentially, the AIC replaces "no revenues" with "strong socio-economic returns" as the primary decision criterion. Finally, in Task 4.3 the list of adaptation options is enhanced with a description of potential value capture mechanisms, essentially targeting the issue of revenue generation where possible. Having identified the beneficiaries in a holistic manner, allows practitioners to consider who can ultimately pay for adaptation.

Task 3.3 transforms pathways into investment packages by bundling measures rather than financing single adaptation actions in isolation. These packages combine non-revenue adaptation components like flood protection and early warning systems with revenue-neutral or revenue-positive elements such as climate-proofed infrastructure, nature-based tourism, and energy efficiency improvements. This packaging enables cross-subsidisation and improves overall bankability, reducing reliance on each project generating its own income while enabling hybrid funding models that combine grants, loans, and budgets. Together, these AIC tasks allow regions to finance adaptation without pretending it behaves like a commercial investment.

534

535 **4.2 Regulatory Complexity and Red Tape**

536 Lengthy regulatory procedures, complex permitting requirements, and fragmented administrative
537 responsibilities are a major barrier to delivering adaptation at regional level. Adaptation projects often
538 cut across sectors such as water, land use, infrastructure, and nature, triggering multiple approval
539 processes that are poorly aligned in time and scope. These delays increase transaction costs, deter
540 private actors, and undermine the credibility of adaptation investment pipelines. The AIC addresses
541 this barrier by embedding regulatory awareness, reform actions, and learning into the investment
542 planning process.

543 Task 1.1 tackles regulatory barriers upstream, before projects are fully defined. Regions are guided
544 to systematically map the policy, legal, and regulatory frameworks that shape adaptation action,
545 including planning law, environmental permitting, and procurement rules, as well as the budgetary
546 and approval processes that influence the timing and sequencing of investments. Regions also
547 examine the alignment or misalignment between adaptation objectives and sectoral regulations. By
548 making regulatory constraints explicit at an early stage, Task 1.1 helps regions avoid designing
549 adaptation pathways that are institutionally unrealistic and enables early identification of bottlenecks
550 that may affect costs, timelines, or feasibility. These can then be factored into prioritisation and
551 sequencing decisions rather than emerging as late-stage obstacles. The task also stresses the
552 importance of understanding financial approval processes and decision-making around budget and
553 capital investments from the outset, ensuring that the Climate Resilience Strategy and eventual
554 Investment Plan are aligned with wider regional priorities and comply with existing governance
555 requirements.

556 Task 2.3 directly addresses red tape by reframing regulatory complexity as an enabling environment
557 challenge rather than a fixed constraint. Regions are encouraged to streamline or coordinate approval
558 processes across departments and levels of government, clarify regulatory responsibilities, and
559 introduce standardised procedures or guidance for adaptation-related investments. Crucially, the task

allows regions to treat regulatory reform itself as a strategic adaptation action, potentially supported by technical assistance or public funding. By linking regulatory improvements to financing outcomes, the AIC strengthens the incentive for institutional change and reduces the transaction costs that often stall adaptation projects. The task also acknowledges that institutional change is a lengthy process, and so directs focus towards financial solutions that can progress under the current or slightly improved institutional landscape.

Finally, Task 6.3 ensures that regulatory barriers are not only addressed once but progressively reduced over time. Through structured learning and reflection, regions assess the extent to which regulatory bottlenecks impeded the adaptation investment plan, which procedures caused delays or increased costs, whether early assumptions about permitting and approvals proved accurate, and how governance arrangements can be improved in future iterations of the Investment Plan.

4.3 Lack of information on financial opportunities for adaptation

Many regions remain locked into a narrow set of traditional financial sources and instruments, typically public budgets and grants, due to lack of information on this issue. While essential, these instruments are insufficient to meet growing adaptation needs and often reinforce short-term, siloed investment decisions. This lock-in limits innovation, constrains scale, and reduces the ability to crowd in private or blended finance. The AIC explicitly targets this barrier by expanding the strategic financing horizon of regions and embedding diversification into investment planning.

Task 2.1 is the primary mechanism for breaking conceptual and institutional lock-in. Regions are guided to map existing sources and instruments currently used for adaptation and related investments, an exercise that can raise awareness of potential lock-in to traditional finance. From there, they identify additional or underutilised sources, such as development banks, utilities, private capital, and insurers, alongside alternative instruments like loans, guarantees, blended finance, and revolving funds. Regions also assess the suitability of different instruments for different types of adaptation

actions, whether climate-proofing or pure adaptation. By distinguishing between what is used today and what could be used in the future, Task 2.1 creates a structured space for regions to challenge inherited financing practices, shifting adaptation from a grant-funded public responsibility towards a portfolio of investments aligned with risk, benefits, and beneficiaries. This task is supported by the P2R Catalogue of Sources and Instruments (England et al., 2024), which includes 57 sources, 78 instruments, and 169 case studies demonstrating how regions can move beyond traditional public financing and EC grants.

Task 2.3 then operationalises diversification by addressing the barriers that prevent regions from accessing new sources and instruments, including lack of familiarity, institutional risk aversion, regulatory constraints, and limited technical capacity. Regions identify concrete actions to unlock alternative financing, such as capacity building or aggregation of projects, and sequence these so that more complex instruments are introduced progressively. This task recognises that financial lock-in is not only technical but institutional, and explicitly links institutional change to improved access to finance. Its results feed back into Task 2.1, allowing teams to recalibrate their list of desired sources and instruments over time.

Finally, Task 4.3 translates diversification ambitions into practical financing decisions. Regions match specific adaptation actions with the most appropriate mix of sources and instruments based on cost, risk profile, and benefits, combining public funding with other instruments to de-risk and leverage additional capital. Through this matchmaking process, Task 4.3 normalises the use of non-traditional instruments and builds confidence among regional authorities to move beyond established funding pathways.

5. Conclusion

Bridging the adaptation finance gap requires addressing a broad set of barriers. Climate-related projects demand long-term financing, yet financial markets favor short-term investments, while

public funding alone cannot meet the growing need for climate resilience. Institutional investors such as insurers can provide long-term capital; however, allocation inefficiencies, limited risk-transfer mechanisms, and complex procedures constrain private investment. Governance is equally critical: strong institutions, transparency, and technical capacity enable equitable finance distribution, while weak governance and information asymmetries restrict access. Simplified procedures and increased transparency are therefore essential to unlock resources, particularly for vulnerable regions.

This study identifies the most frequently encountered adaptation finance barriers affecting adaptation planning and implementation and classifies them into five broad categories, based on established literature, providing a structured basis for analysis. Each category is then described in greater depth by disaggregating it into specific sub-barriers, enabling a more nuanced understanding of the challenges involved.

Against this background, the AIC offers a structured, region-wide framework consisting of 18 tasks to identify which of these AIC tasks address each of these barriers. By integrating strategic planning, economic and financial appraisal and investment prioritization, the AIC strengthens the capacity to develop coherent and bankable Climate Resilience Investment Plans. In doing so, it responds to governance constraints, information gaps, economic justification challenges, and financial structuring needs. Closing adaptation finance gaps therefore requires not only additional resources, but also structured processes that reflect regional differences in capacity and vulnerability.

The analysis of key barriers further illustrates how the AIC provides targeted solutions. For projects with low or no direct revenues, the AIC distinguishes economic value from financial returns, identifies beneficiaries, and enables blended finance arrangements that combine public and complementary instruments. To address regulatory complexity, it incorporates early mapping of legal and institutional frameworks, supports alignment of procedures, and promotes continuous learning to reduce administrative obstacles. To overcome limited awareness of financing options, it encourages

diversification beyond traditional sources by identifying alternative instruments and matching them to specific adaptation actions, thereby expanding financial capacity and reducing lock-in.

Adaptation finance is not a one-size-fits-all process. Differences in socioeconomic conditions, institutional capacity, governance quality, and climate risk exposure can intensify financial barriers and widen investment gaps within each region's Climate Investment Plan. By sequencing and applying the AIC tasks, regions can address these disparities in a systematic manner, even if the AIC alone may not be sufficient to fully overcome all barriers to adaptation (England, 2026). Ultimately, this process supports more equitable access to finance and contributes to territorial cohesion within the European context.

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798 **Appendix 1 - Adaptation Investment Cycle Tasks.**

799 The Adaptation Investment Cycle (AIC) consists of six phases and 18 tasks that guide regions in
800 creating and executing Climate Resilience Investment Plans, with each phase supported by practical
801 resources, case studies, and succinct sub-tasks underpinned by enabling conditions for adaptation
802 finance, where all tasks are recommended though some are more critical or challenging than others..

803 **Phase 1 – Define regional context and objectives**
804 Establish the policy, financial, and investment context for adaptation. This includes aligning with

regional development goals, identifying financing criteria and partnerships, assessing historical and future climate-related costs, and defining a preliminary budget and investment rationale.

Phase 2 – Address strategic financing barriers
Identify and diversify potential funding and financing sources. Assess existing instruments, explore new opportunities, and define actions to overcome barriers to mobilising finance.

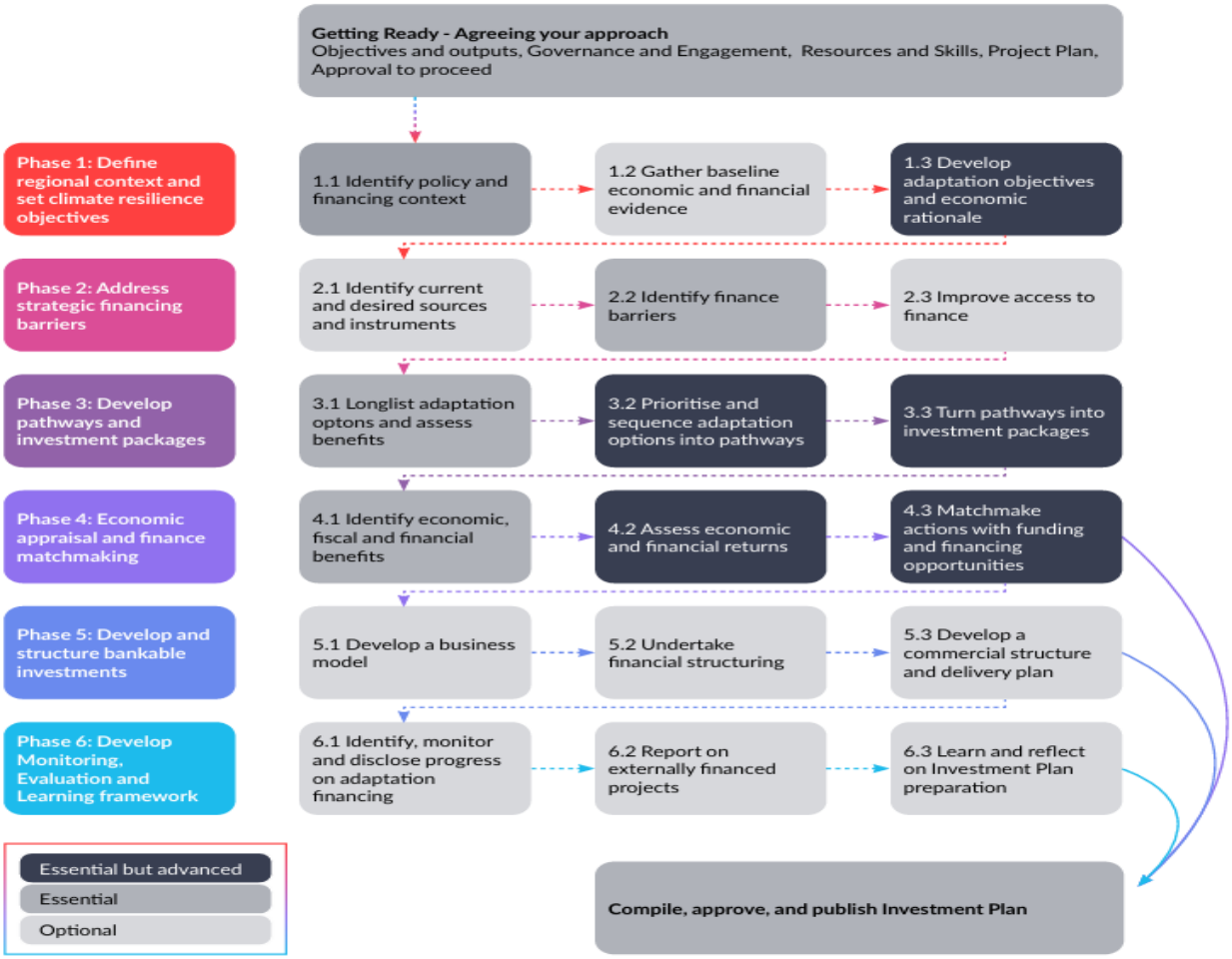
Phase 3 – Develop pathways and investment packages
Compile and prioritise adaptation options, organise them into sequenced pathways (short-, medium-, and long-term), and structure them into investment-ready packages.

Phase 4 – Economic appraisal and finance matchmaking
Assess the economic and financial viability of proposed actions and align projects with appropriate funding and financing sources.

Phase 5 – Structure bankable investments
Develop tailored business models, financing arrangements, and delivery structures for projects requiring more complex financial solutions.

Phase 6 – Monitoring, evaluation and learning
Define indicators, monitor and report progress (including private sector involvement), and integrate lessons learned into future planning cycles.

Figure 3. Adaptation Investment Cycle Tasks.



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824 Source: *England et al., 2026.*