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International review of setting and monitoring climate change adaptation targets

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1 Executive summary

1.1 Purpose of the study

Scotland faces a rapidly changing climate, with rising temperatures, shifting precipitation patterns and more frequent extreme weather events already affecting communities, infrastructure and ecosystems. These climate change impacts are projected to intensify over the coming decades, placing growing pressure on public services, natural systems and populations. As Scotland continues to strengthen its national response, effective adaptation planning has become an essential part of long-term climate resilience.

Scotland's third Scottish National Adaptation Plan (SNAP3) introduced, for the first time, a national monitoring and evaluation (M&E) framework designed to track progress in building climate resilience. However, while this framework includes indicators linked to adaptation outcomes and objectives, it does not yet define quantified resilience targets. The UK Climate Change Committee (CCC) has recommended that Scotland develop specific and measurable targets to strengthen accountability, support monitoring and clarify the level of resilience being sought.

This study draws on a structured review of international literature and adaptation plans, interviews with policymakers and technical experts from seven jurisdictions and a two-round modified Delphi process with Scottish experts, primarily from relevant policy and analytical areas within Scottish Government. The Delphi method is a structured, iterative method designed to gather informed judgement from experts to identify both areas of consensus and disagreement.

Together these sources provide practical evidence about:

- how adaptation targets are currently being used internationally;
- what credible and useful adaptation targets look like;
- how they can be governed, monitored and reviewed;

- and how stakeholder engagement contributes to the development of legitimate and workable targets.

The research was not intended to prescribe specific targets for Scotland, but to identify the conditions, structures and processes required to develop robust adaptation targets in a complex and evolving risk landscape.

1.2 Key findings

The evidence shows that adaptation targets work best when they are clearly defined, built into delivery systems, aligned with institutional capacity, and supported by strong governance and monitoring.

1.2.1 Clarity and quality of adaptation targets

The international review and results from the Delphi study consistently show that high-quality adaptation targets are most effective when they:

- drive action, not simply record activities;
- reflect a layered structure, with long-term resilience outcomes supported by near-term delivery or output targets;
- differentiate between process, output, outcome and impact targets, using each type appropriately; and
- be supported by an explicit Theory of Change that explains how actions lead to outcomes and impacts.

1.2.2 Governance, decision-making and institutions

Evidence consistently shows that credible and deliverable target systems require a hybrid governance model that combines:

- central coordination to maintain ambition, coherence and transparency;
- distributed sectoral responsibility for developing and delivering targets; and
- independent scrutiny to reinforce credibility and political discipline.

1.2.3 Stakeholder engagement

Evidence shows that while engagement is valuable, it does not guarantee influence. Target design is often led by governments and technical experts with authority to implement, while broader stakeholders shape outcomes mainly when there is genuine co-design, iteration and decision-making power. Delphi participants supported a differentiated approach in which:

- Citizens and communities shape the early, value-based stages of problem framing—what matters, whose risks count, and what fairness requires.
- Experts and technical specialists play a sustained role throughout target-setting, including interpreting evidence, prioritising risks, and designing metrics.
- Government retains final accountability.

1.2.4 Capacity, resources and feasibility

Capacity constraints emerged as one of the most significant limiting factors in effective adaptation target-setting. Participants in the Delphi study emphasised:

- limited analytical and modelling capacity;
- uneven sectoral readiness;
- significant evidence and data gaps;
- overstretched delivery bodies and competing statutory demands;
- insufficient and unstable funding to support planning, delivery and monitoring.

1.2.5 Integration, coherence and implementation pathways

Targets are most credible and deliverable when embedded into established planning, budgeting and delivery systems. The evidence shows that targets must:

- align with SNAP3 cycles, statutory reporting processes and cross-government planning;
- be coherent with related strategies (climate, nature, water, land, health, infrastructure) to avoid fragmentation and ensure clarity for delivery bodies;
- sit within a clear implementation pathway with milestones, roles, assumptions and review points; and
- be supported by functioning monitoring, evaluation and learning systems that provide the evidence required to assess progress.

These findings show that adaptation target-setting is as much a governance challenge as a technical one, shaped by institutional capacity, political incentives and delivery systems.

1.3 Design principles for setting adaptation targets in Scotland

The evidence base points to nine practical design principles:

1. Design targets to drive action;
2. Embed scientific and hazard-based evidence at the core of target design;
3. Balance ambition with feasibility through phased development;
4. Use mixed measurement approaches where evidence is incomplete;
5. Integrate equity directly into ambition-setting and evaluation;
6. Ensure targets remain interpretable and usable, avoiding unnecessary complexity;
7. Provide clear and predictable review processes;
8. Design within system capacity;
9. Align targets with wider policy systems.

1.4 Policy implications for setting adaptation targets in Scotland

The study highlights several actions that would support an effective adaptation target setting system:

1. Establish a phased, layered adaptation target framework.

2. Integrate hazard- and risk-based evidence into all stages of target development.
3. Anchor revision processes in statutory cycles with tightly governed flexibility.
4. Embed equity within target ambition and delivery.
5. Strengthen analytical, modelling and monitoring capability across government.
6. Adopt mixed-method assessment frameworks.
7. Prioritise simplicity and usability in target system design.
8. Strengthen cross-government coordination and coherence.
9. Develop transparent engagement pathways.
10. Provide stable, multi-year funding for implementation.

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2 Glossary and Abbreviations

Glossary	
adaptive management	A cyclical approach where decisions are revisited and adjusted as new evidence, learning and conditions emerge. Central to iterative target-setting.
attribution	Proving that an observed impact (e.g. reduced losses) is caused by a specific action. Often impossible in complex systems.
baseline	The starting point against which progress is measured. In adaptation, baselines may be dynamic rather than fixed, because climate risks continue to evolve.
climate risk	The potential for adverse impacts resulting from climate-related hazards (such as heatwaves, flooding or drought), interacting with the exposure and vulnerability of people, infrastructure, ecosystems or assets (adapted from IPCC, 2022).
co-design	A participatory approach where stakeholders, including communities and delivery partners, are directly involved in shaping targets, metrics and implementation pathways.
contribution	Demonstrating that an action plausibly supports resilience, even if causality cannot be isolated.
enablers	The capacities, resources, data systems, governance structures and institutional arrangements required for targets to be credible and deliverable.
evaluation	The periodic and structured assessment of the performance, effectiveness and efficiency of an intervention, typically asking what worked, what didn't and why.
impacts	The longer-term, higher-level changes to systems, vulnerability or resilience (e.g. reduced heat-related illness, fewer properties at high flood risk).
indicators	Measurable variables used to track progress, performance or change over time.
implementation pathway	The processes, institutions, funding routes and operational systems through which adaptation targets are delivered in practice.

learning	The deliberate process of reflecting on monitoring and evaluation findings, and new evidence more broadly, to improve decisions, practice, design and delivery over time.
mainstreaming	Embedding adaptation targets and actions within existing planning, budgeting, regulatory and delivery systems (e.g. procurement, land-use planning, asset management). Integration increases feasibility and accountability.
maladaptation	Adaptation actions that increase risk or cost or exacerbate ineffectiveness or inequity. For example, protecting valuable assets in ways that heighten risk for neighbouring communities.
milestones	Intermediate steps or checkpoints within a longer-term adaptation pathway. Milestones help maintain momentum and enable course-correction.
monitoring	The ongoing and systematic collection of data to track whether activities are being delivered as planned and whether interim changes are occurring.
Monitoring and Evaluation (M&E)	A combined approach that links monitoring and evaluation activities to track implementation and assess effectiveness. Often used where learning processes are present but not formalised into MEL.
Monitoring, Evaluation and Learning (MEL)	A set of integrated processes that bring together monitoring, evaluation and learning to track implementation, assess results and effectiveness, and iteratively improve the design and delivery of adaptation actions. Although MEL is often supported by frameworks or systems, the core emphasis is on the underlying processes and activities.
outputs	The tangible, immediate products or services delivered by an intervention (e.g. flood maps produced, cooling centres established).
outcomes	The short- to medium-term changes resulting from the outputs (e.g. improved access to heat refuges, better-informed land-use planning).
risk	The potential for adverse consequences where something of value is at stake and the outcome is uncertain. In climate adaptation, risk is commonly understood as arising from the interaction of hazard, exposure and vulnerability.

risk thresholds	Points at which increasing climate risk signals unacceptable conditions or triggers action. For example, maximum tolerable heat levels in classrooms.
targets	Specified level of performance, threshold or outcome to be achieved, often assessed using one or more indicators.
Theory of Change	A structured explanation of how actions and investments are expected to lead to desired outcomes and impacts. A ToC clarifies assumptions and supports coherent target design.
uncertainty	The inherent difficulty in predicting climate hazards, impacts and system responses. Managing uncertainty requires adaptive pathways, scenario modelling and iterative revision.
Abbreviations	
CCC	Climate Change Committee (UK)
CXC	ClimateXChange (Scotland)
GGA	Global Goal on Adaptation
IPCC	Intergovernmental Panel on Climate Change
MEL	Monitoring, Evaluation and Learning
NAP	National Adaptation Plan
OECD	Organisation for Economic Co-operation and Development
SIDS	Small Island Developing States
SNAP	Scottish National Adaptation Programme
ToC	Theory of Change
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

3 Introduction

3.1 Context for the study

Scotland faces a rapidly changing climate, with rising temperatures, shifting precipitation patterns and more frequent extreme weather events already affecting communities, infrastructure and ecosystems. These climate change impacts are projected to intensify over

the coming decades, placing growing pressure on public services, natural systems and populations. As Scotland continues to strengthen its national response, effective adaptation planning has become an essential part of long-term climate resilience.

Scotland's climate adaptation policy is guided by the third Scottish National Adaptation Plan (SNAP3), which sets out actions to address climate change impacts from 2024 to 2029. Compared to previous plans, SNAP3 has significantly strengthened its monitoring and evaluation (M&E) framework (discussed in Section 3.5 below), introducing directional indicators, improving data quality and placing greater emphasis on understanding the link between actions and outcomes.

However, quantifiable adaptation targets have not yet been established. In its November 2023 report Adapting to Climate Change: Progress in Scotland, the UK Climate Change Committee (CCC) recommended that future adaptation plans include quantified resilience targets to provide clear benchmarks, clarify responsibility for delivery and strengthen monitoring by highlighting evidence gaps. In its response to the draft SNAP3 in April 2024, the CCC reiterated that specific and measurable targets for resilience across Scottish society would support appropriate budgeting, enable progress tracking and increase accountability for delivery.

International experience is beginning to demonstrate what effective adaptation target-setting may require. For example, Germany became the first country to introduce measurable adaptation targets in its 2024 Climate Adaptation Strategy, developed over two years through extensive engagement with ministries, stakeholders and citizens. Early reflections highlight improved inter-ministerial coordination and stronger governance links. Approaches in Kenya and Chile similarly show that aligning targets with risk and vulnerability assessments helps prioritise action and reduce social and geographical inequities. However, because national efforts to set adaptation targets are still in their early stages, detailed examples of emerging practice remain limited. The Scottish Government is therefore looking to understand what effective, workable adaptation targets could look like in practice, and how they might be developed and applied in ways that are grounded in evidence and aligned with national priorities. This forms the basis for the study.

3.2 Research aims

The Scottish Government recognises the value of quantifiable adaptation targets and is looking to learn from international practice. This includes identifying core principles for effective target setting, understanding what well-designed targets should encompass, and examining the processes through which they are developed, reviewed and evaluated. Therefore, a key aim of this study is to draw practical lessons from international approaches that can inform the process of developing measurable, context-appropriate adaptation targets for Scotland.

To achieve this the study addresses five research questions:

1. Which approaches have been taken internationally in setting adaptation targets?
2. What are the key challenges in setting robust, measurable and practical adaptation targets?

3. What can be learned from examples where targets have been set and are being used to monitor adaptation action?
4. How can adaptation targets best be monitored successfully?
5. How could principles identified for setting adaptation targets be applied to Scotland's national adaptation plans in the future?

The research explores the key enablers and challenges in developing adaption targets, including the role of government, stakeholder and citizen engagement, technical capacity and governance arrangements required to track long-term outcomes in complex, dynamic systems. It also considers how adaptation targets can be embedded within institutions in ways that support long-term learning, responsiveness and continuous improvement. By drawing on lessons from comparable jurisdictions, the research provides practical recommendations to inform the development of measurable, context-specific adaptation targets to strengthen SNAP3, shape future SNAPs and support Scotland's ambition to show leadership in climate adaptation.

3.3 Methodology

Setting adaptation targets is complex and highly context specific. There is no single standard approach, and the processes through which targets are developed are often poorly documented. To address this challenge, we used a clear, three-phase methodology designed to generate practical insights for policy and to inform future adaptation target setting in Scotland. The research was carried out between June 2025 and April 2026 and combined three strands of evidence:

1. a structured international review of literature and policy documents;
2. qualitative interviews with selected jurisdictions; and
3. a consensus-based process to test relevance for Scotland.

Together, these phases addressed the five research questions described in the research aims.

3.3.1 Phase 1: Structured review of international practice

Phase 1 established the evidence base for the study through a structured review of academic literature, grey literature and international adaptation plans. The review was guided throughout by the common enquiry framework developed for this project (Appendix B). This framework was built from the research questions, established policy-analysis methods, prior adaptation knowledge and iterative refinement with the steering group and shaped how all sources were identified, coded and analysed.

We undertook systematic searches across academic databases and key grey-literature sources, focusing on recent peer-reviewed work and high-quality reports, particularly those produced after the Paris Agreement 2015. This included research publications, assessments by international organisations and policy think-tank reports accessed through platforms such as Google Scholar. The initial search returned 84 references. Nine were excluded as not relevant, leaving 75 core sources. Each reference was logged in an Excel database and coded

against the themes and sub-questions in the enquiry framework. Findings were then synthesised across 11 thematic evidence summaries.

In parallel, we conducted a structured review of national and sub-national adaptation plans and associated monitoring and evaluation (M&E) or monitoring, evaluation and learning (MEL) frameworks. Jurisdictions were selected using a multi-step sampling strategy (Appendix A) that prioritised countries with relatively mature adaptation systems and broad comparability with Scotland. We reviewed national adaptation plans from 22 countries. Because very few included explicit quantitative targets—and following discussion with the steering group—the sample was expanded to include nine sub-national jurisdictions with more developed or innovative target-setting practice.

All literature and documents were analysed using the same enquiry framework, enabling consistent assessment of key issues including the purpose of setting adaptation targets, governance and institutional arrangements, stakeholder engagement, use of evidence, resource and capacity constraints, timelines and the technical quality of targets. This structured approach provided a transparent and comparable evidence base for the analysis presented in Section 4.

3.3.2 Phase 2: Interviews with selected jurisdictions

To complement the evidence from the document and literature reviews, we carried out semi-structured interviews with policymakers and technical experts from seven jurisdictions (four national and three sub-national jurisdictions) that had developed, were developing, or demonstrated an innovative approach to adaptation targets. Short case summaries of these jurisdictions are provided in Appendix E.

Interviews lasted 45–60 minutes and followed a topic guide based on the enquiry framework (Appendix C), ensuring consistency while allowing exploration of context-specific issues. Interview data were analysed thematically and compared with findings from Phase 1. The findings from this integrated analysis are presented in Section 4.

3.3.3 Phase 3: Assessing relevance for Scotland

Phase 3 examined how the international lessons identified in Phases 1 and 2 could be applied in Scotland. To do this, we used a modified Delphi process. This is a structured, iterative method designed to gather informed judgement from people with relevant experience, particularly in areas where evidence is incomplete and decisions involve interpretation, trade-offs and practical considerations. It is designed to identify both areas of convergence and areas where views legitimately diverge, without aiming for unanimity or forcing consensus. The approach is well suited to adaptation target-setting, where uncertainty is inherent, evidence alone cannot provide definitive answers and operational feasibility needs to be understood from those working within the system. Participants respond independently and anonymously, reducing the influence of hierarchy or dominant voices. Views are gathered over successive rounds with controlled feedback, to allow for reflection and refinement.

We adapted this approach to the Scottish context, inviting a diverse panel of experts, primarily from within Scottish Government, with practical, policy and system-level experience identified by ClimateXChange and the steering group. An initial online survey was sent to approximately 30 stakeholders and produced eleven responses. The findings

from this first round informed the design of a second survey, which focused on areas of uncertainty and divergence particularly relating to feasibility, fit and practical application. The second survey was sent to the same group and received thirteen responses. This level of participation is appropriate for a Delphi-style process, where the strength of the method lies in the quality and relevance of expert insight rather than in achieving a statistically representative sample. Insights from both stages informed the Scotland-focused analysis in Section 5 and the policy implications in Section 6.

3.4 Limitations of the study

We drew on structured and transparent research procedures across all three phases of the study. However, given the breadth of the research questions, the volume and variability of potentially relevant material and the time available, this work does not constitute a comprehensive or systematic assessment of all adaptation target-setting practice internationally. As a result, it remains possible that some relevant approaches or evidence were not captured through our search and review procedures. The international review focused on English-language and publicly accessible documents, and although we sought to prioritise jurisdictions broadly comparable to Scotland, findings inevitably draw on material produced in a range of institutional and geographic contexts. While this was appropriate for the aims of the research, some of the practices identified may not be fully transferable to the Scottish context. Documentation quality also varied considerably across jurisdictions, which limited the depth of analysis possible in some cases.

The qualitative evidence base was necessarily limited in scope. Interviews were conducted with a small number of selected policymakers and technical experts available during the interview period and findings therefore reflect the perspectives of those individuals rather than the full range of institutional or stakeholder views. Similarly, the modified Delphi process was deliberately expert focused in order to elicit informed judgement on issues where evidence is incomplete. However, this means that citizen and community perspectives were not included at this stage.

The modified Delphi process also has methodological limitations. Delphi approaches are not designed to be statistically representative; their purpose is to gather informed judgement from experts rather than to produce results that reflect a wider population. For this reason, the smaller number of responses in each round does not undermine the validity of the method. However, it does mean that the findings reflect the perspectives of those experts who took part, rather than capturing the full range of views across the wider system. This should be kept in mind when interpreting areas of agreement or divergence.

Integration of findings across the three phases required researcher interpretation, although this was mitigated through the use of a common analytical framework, triangulation across data sources and iterative engagement with the steering group. As the research was conducted within a defined timeframe, the findings should be understood as a snapshot of practice in a rapidly evolving policy area.

3.5 The SNAP3 Monitoring, Evaluation and Learning (MEL) system

Scotland's third Climate Change Adaptation Programme (SNAP3) is supported by a Monitoring and Evaluation (M&E) framework designed to assess progress in building climate resilience across four themes: nature, communities, public services, and economy and

industry. The framework provides a structured way of linking the Plan's activities and delivery mechanisms to short-, medium- and long-term changes in resilience. The SNAP3 M&E framework was published in September 2024 by the Scottish Government. It is notable that a report on monitoring outcomes of SNAP3 using indicators representing the four themes, published by ClimateXChange in August 2024, widens this scope by discussing monitoring, evaluation, *and learning* (MEL) of SNAP3. In this report, we will refer to MEL, except where referring specifically to the published SNAP3 M&E framework. This approach reflects the relevance of learning to target setting, particularly in relation to the updating of targets in the light of evolving and uncertain risks and new information.

3.5.1 Structure of the SNAP3 M&E framework

SNAP3 is organised around five core elements: the strategic aim, outcomes, objectives, enablers and activities. These elements form the basis of the monitoring maps used in the SNAP3 M&E framework, which illustrate how actions are expected to create enabling conditions, deliver objectives and contribute to outcomes over time. The M&E framework is then structured around these monitoring maps and incorporates: (i) five-yearly outcome-level indicators linked to the four themes; (ii) annual objective-level indicators that track nearer-term progress; and (iii) policy evaluation and learning components that support improvement over successive cycles.

The five elements of SNAP3 can be summarised as follows, with brief examples to illustrate the distinction between levels:

1. **Strategic aim:** the overarching ambition of SNAP3—to build Scotland's resilience to climate change aligned with national outcomes.
2. **Outcomes:** the long-term changes SNAP3 intends to achieve within each theme (one per theme, each split into 2–4 areas) e.g. under Communities: 'Communities are prepared for and adapt to climate change impacts.'
3. **Objectives:** what policy actions are expected to achieve during the Plan period (3–6 per theme) e.g. under Public Services: 'Strengthen climate risk management across health and social care systems.'
4. **Enablers:** the conditions and capacities that must be in place for objectives and outcomes to be achieved—such as resources, governance arrangements and system capabilities (21–30 per theme, grouped into 6–7 areas) e.g. 'Improved availability of climate risk data and guidance for local authorities.'
5. **Activities:** the delivery actions and mechanisms set out in SNAP3 that are intended to create enabling conditions and deliver the objectives (12–21 per theme, grouped into 4–6 areas) e.g. 'Provide flood risk management training for local planners' or 'Update sectoral guidance to reflect new climate projections.'

Together, these elements structure the SNAP3 monitoring maps and provide the architecture for tracking progress through outcome indicators, objective indicators, evaluation processes and learning mechanisms.

3.5.2 Positioning targets in the SNAP3 M&E framework

Adaptation MEL frameworks often distinguish between outputs, outcomes and impacts, as defined by OECD (2023). This three-tier model provides a useful way of understanding the different levels at which adaptation targets could be developed in future national plans.

> **Outputs** reflect the immediate deliverables of adaptation activities — for example, *kilometres of drainage upgraded*, *numbers of properties retrofitted*, or *guidance documents produced*.
>
> **Outcomes** capture changes in capacities, behaviours or system characteristics that contribute to resilience — for example, *increased public awareness of climate risks*, *improved ecological condition*, or *greater uptake of adaptive land-use practices*.
>
> **Impacts** relate to long-term reductions in climate-related harm, losses and damages, or improvements in climate-sensitive wellbeing — for example, *reductions in heat-related illness*, *fewer properties experiencing repeat flood damage*, or *lower financial losses associated with extreme events*.

All the outcome indicators defined in the SNAP3 M&E framework align with outcome-level indicators in this model. The objective indicators in SNAP3 represent a mixture of output- and outcome-level metrics. For example, indicators tracking *public awareness*, *ecosystem condition*, or *the adoption of resilience-enhancing practices* function as outcome-level indicators because they reflect changes that contribute to long-term resilience and are influenced by the outputs delivered under SNAP3. These types of indicators are essentially predictive, in that they relate to system characteristics that should, in principle, enable populations and services to withstand, recover from and adapt to climate hazards.

SNAP3 does not currently define impact-level indicators. However, some existing monitoring data relevant to climate risks, for example information on properties affected by flooding, heat-related health impacts, or economic losses from severe weather, illustrate the types of evidence that could inform future impact-level indicators framed around reductions in, or avoided, losses and damages over time. Indicators that track actual losses can provide evidence of whether improvements observed at the outcome level translate into reductions in climate-related harm. Considering the MEL system in this way helps identify where different types of targets might be positioned in future adaptation plans, including the potential for longer-term targets related to reducing measurable losses and damages. This framing is intended to support thinking for SNAP4 and subsequent plans, recognising that future iterations are likely to retain a broadly similar outcome–objective structure but should not be constrained by the architecture of SNAP3.

3.5.3 Implications for adaptation target setting

The current SNAP3 M&E framework already includes numerous quantitative indicators that could support the development of adaptation targets or milestones. A subset of objective indicators could underpin targets related to the delivery of specific outputs or initial changes necessary during the Plan period. Outcome indicators could support targets linked to more substantive improvements in resilience. This could include for example, increases in access to key services, adoption of adaptive management practices, or agreed tolerances for specific climate hazards.

There is also scope to introduce impact-level indicators and targets to assess longer-term adaptation performance, particularly where reduced losses, damages or harm would signal

progress towards SNAP3's strategic aim of Scotland having increased resilience to the impacts of climate change. Because climate risks will evolve, such impact-level targets may be most useful as benchmarks for learning and policy refinement rather than fixed commitments. Where targets are based on avoided losses or damages, baselines or no-adaptation counterfactuals would need to be established using emerging methodological approaches.

Theories of change that link outputs, outcomes and impacts, and that reflect the monitoring maps in the SNAP3 M&E framework, might be used to refine and update targets. For example, where desired reductions in losses and damages are not being achieved, a theory of change might be used to interrogate assumptions about the pathways via which outcomes that are assumed to enhance resilience at the outcome level translate into reduced losses and damages at the impact level. A better understanding of these pathways might result in revisions to targets associated with resilience indicators at the outcome level, for example where the importance of certain 'resilience capacities' is found to have been over- or under-estimated.

A more detailed analysis of the SNAP3 M&E framework in relation to target setting is provided at the end of this report (Appendix D). This analysis informed the design of Phase 3 (the modified Delphi exercise), helping shape questions about how adaptation targets might best be framed and structured within the SNAP3 system.

3.6 Report structure

The report is structured around the study's five research questions.

Section 4 addresses Research Questions 1–4 by presenting findings from the international literature review, document analysis and interviews. It examines how adaptation targets are currently defined, governed, supported, delivered and integrated in national and sub-national contexts.

Section 5 addresses Research Question 5, applying the international lessons to Scotland and drawing on insights from the modified Delphi process to assess what forms of adaptation targets may be feasible, appropriate and useful within the Scottish policy system.

Section 6 provides the overall conclusions of the study and outlines the policy implications for future development of adaptation targets in Scotland.

4 Findings from the literature, document review and interviews

4.1 Introduction

Adaptation targets are shaped by a wide range of technical, institutional and political factors. To understand how effective target systems are developed, this chapter synthesises evidence from three sources: (i) the international academic and grey literature, (ii) the review of national, sub-national and sectoral adaptation frameworks, and (iii) interviews with policymakers, practitioners and experts. Together, these sources address Research Questions 1–4 by examining how adaptation targets are defined, governed, supported and implemented across different jurisdictions.

The chapter begins with a review of current practice in selected jurisdictions (Section 4.2), summarising how national, sub-national and sectoral governments are currently using quantified, time-bound and directional targets in their adaptation strategies. This overview draws on the synthesis of evidence from both the literature and document review and the interview findings. It is presented at the start of the chapter because it offers a concise picture of the existing landscape of adaptation target-setting, which helps contextualise and orient the more detailed thematic analysis that follows. For clarity and coherence, the remainder of the chapter is divided into two parts.

Part A presents findings from the literature and document review, outlining the characteristics of high-quality targets and the governance, capacity and integration conditions that support credible and deliverable target systems.

Part B summarises insights from stakeholder interviews, highlighting how jurisdictions interpret and navigate the practical realities of designing, negotiating, implementing and revising adaptation targets in practice.

4.2 Current practice in selected jurisdictions

A review of adaptation plans from 22 national and nine subnational jurisdictions found that explicit, quantified and time-bound adaptation targets remain relatively uncommon at national level. Eight of the 22 national jurisdictions reviewed included at least some quantified, time-bound targets, although their scope, level and governance function varied considerably. In some cases, a single quantified target was embedded within a broader framework of largely directional objectives. In others, multiple quantified targets were adopted and framed as part of an iterative process of refinement. Only a small number of jurisdictions developed more comprehensive approaches that spanned multiple sectors and levels. Among the nine subnational jurisdictions reviewed, three articulated at least some quantitative, time-bound adaptation targets. Adaptation targets have largely been developed though experimentation, selective quantification and incremental refinement. Table 2 summarises the eight national jurisdictions and three subnational jurisdictions identified as having at least some quantified, time-bound adaptation targets. Semi-structured interviews were conducted with policymakers and technical experts from seven jurisdictions (four national and three sub-national) that had developed, were developing, or demonstrated innovative approaches to adaptation targets. Short case summaries of these jurisdictions are provided in Appendix E.

4.2.1 Emerging patterns in target design

Several broad patterns emerge from the international review. First, quantified targets are most commonly found at the output level. These typically relate to implementation milestones, infrastructure delivery, restoration areas (e.g. hectares restored), or institutional and capacity-building actions. Such targets are generally easier to measure and tend to fall within clearer administrative control. As a result, quantification is most common where delivery levers are established and data systems are mature.

Second, a smaller group of jurisdictions have begun to articulate outcome-level targets focused on the conditions and capacities that contribute to resilience and reduce risk, such as improved preparedness and reduced exposure. These targets attempt to define what success looks like in terms of vulnerability or risk reduction. However, they are more

methodologically complex and often influenced by external variables, including climatic variability and demographic change.

Third, explicitly framed impact-level targets, defined as quantified reductions in realised climate-related losses, damages or residual risk, remain rare. When included, they tend to take the form of long-term and aspirational goals that signal the desired direction of travel, rather than targets linked to clearly defined pathways or accountability mechanisms. Interviewees and document analysis suggest that attribution challenges, shifting climate baselines and political caution limit the adoption of quantified impact targets where delivery pathways are uncertain.

At subnational scale, cities were more likely than national governments to adopt spatially explicit or hazard-specific quantified targets, such as urban heat reduction or green infrastructure coverage. This may reflect more direct control over land-use planning and infrastructure delivery. However, even at city level, quantified targets tend to focus on outputs rather than demonstrable reductions in risk exposure. While Table 2 illustrates how jurisdictions structure adaptation targets, document review alone cannot fully explain how these targets function within governance systems in practice. These issues are explored further through the interview evidence presented later in this section.

4.2.2 How adaptation targets are embedded in governance systems

Interview findings show that adaptation frameworks often combine numeric, directional and indicator-based targets within the same system. Interviews examined how these different forms are used, what governance roles they serve, and what strengths and limitations have emerged in implementation. Table 1 presents examples drawn from interviewed jurisdictions to show how adaptation targets serve different governance functions depending on what they are intended to influence. Some focus on institutional capacity and integration, others on delivery of measures, others on the conditions and capacities that contribute to resilience and reduce risk (such as improved preparedness and reduced exposure), and a small number on reductions in realised losses.

Table 1: Observed Governance Functions of Adaptation Targets Across Jurisdictions

Target type	What they do	Example	Observations from the review
Input and capacity	Input or capacity targets focus on embedding climate risk within institutional systems and decision-making processes.	Percentage of organisations integrating climate risk into planning.	Interviewees described such targets as important for mainstreaming adaptation and reducing reliance on isolated initiatives. They are often within direct administrative control and can be reported consistently across sectors. However, they primarily track institutional behaviour rather than changes in exposure or vulnerability and, on their own, do not demonstrate whether resilience conditions are improving.
Output	Output targets focus on the delivery of tangible	Kilometres of drainage infrastructure upgraded or numbers of	These targets are frequently quantified, linked to budgets and implementation programmes, and are easily understood by stakeholders. They provide clear evidence of activity and enable transparent

	adaptation measures.	retrofits completed.	reporting of progress. However, they do not show whether vulnerability or risk exposure is declining. Approaches dominated by output targets therefore demonstrate activity without clear evidence of reduced vulnerability.
Outcome	Outcome targets capture changes in vulnerability, exposure, preparedness or acceptable levels of risk.	Reducing the proportion of properties at high flood risk or establishing probabilistic flood protection standards.	These targets clarify what resilience means in practical terms and link policy action to changes in risk conditions. Where modelling capacity and governance frameworks are well established, outcome-level or risk tolerance standards can provide stable benchmarks for long-term planning. However, because they are influenced by many external factors including climate variability and socio-economic changes, it can be difficult to attribute observed changes to specific interventions.
Impact	Impact targets aim to reduce climate-related harm, losses or damages.	Eliminating heat-related deaths.	Such targets articulate the ultimate purpose of adaptation policy and send a clear signal of long-term ambition. However, avoided losses are difficult to measure because they depend on estimating what would have happened in the absence of adaptation, and outcomes may also be influenced by external factors such as climate variability and socio-economic change. In addition, delivery pathways are often uncertain, meaning that impact-level targets are rarely embedded within formal monitoring frameworks.

Table 2. How Selected Jurisdictions Structure Adaptation Targets

Jurisdiction (Instrument)[1]	Target-Setting Approach	Extent of Quantification[2]	Dominant Target Type	Legal / Institutional Status	Implications for Target Design
Canada (National Adaptation Strategy, 2023)	Structured around five interconnected systems (e.g. disaster resilience, health and well-being, nature and biodiversity, infrastructure, economy and workers), alongside cross-cutting foundational themes (knowledge, tools and governance), with system-level goals, medium-term objectives, key milestones and near-term targets aligned to objectives, including instances where multiple targets relate to a single objective.	Extensive	Output and emerging outcome	National strategy with defined monitoring framework	Demonstrates how quantified targets can be layered across interconnected systems and aligned with strategic objectives
Chile (National Adaptation Plan, 2017)	Sectoral adaptation plans including specific time-bound "goals," some functioning as quantified targets within broader directional objectives.	Moderate	Primarily output	Sectoral plans under national adaptation framework	Illustrates incremental quantification within sectoral planning even where the overarching strategy remains largely directional
Germany (German Strategy for Adaptation to Climate Change, 2024)	33 targets and 45 sub-targets to 2030 and 2050; targets required to be "measurable," which may include numeric or directional formulations.	Moderate	Output with emerging outcome elements	First German strategy to establish measurable adaptation targets under federal framework	Shows how legal requirements for measurability can support structured target-setting while allowing flexibility in format

[1] Complete list of documents reviewed in Section 7.1

[2] Extent of Quantification reflects the relative number and sectoral coverage of explicit, time-bound numeric or formally measurable targets within the adaptation framework, based on document review. "Limited" indicates isolated or highly selective quantified standards; "Moderate" indicates multiple sectoral quantified or measurable targets; "Extensive" indicates broad cross-sector use of quantified or formally measurable targets embedded within the overall framework. Classifications are comparative rather than absolute.

Japan (Climate Change Adaptation Plan, 2021)	Sectoral and cross-cutting adaptation measures accompanied by KPIs and monitoring indicators across multiple domains.	Extensive	Predominantly output	National adaptation plan with structured KPI-based monitoring	Demonstrates mainstreaming of adaptation through sectoral performance indicators rather than standalone quantified risk standards
Kenya (National Climate Change Action Plan III, 2023–2027)	Eight priority sectors broken down into actions with quantified "expected results" aligned to planning cycle.	Moderate	Output with emerging outcome elements	Time-bound national action plan	Illustrates integration of quantified targets within short- to medium-term planning and development priorities
Netherlands (National Climate Adaptation Strategy; Delta Programme)	Quantification concentrated in the water domain, notably through clearly defined probabilistic flood protection standards (e.g. 1:100,000 annual exceedance probability), while the broader national adaptation strategy includes comparatively fewer quantified, time-bound targets across sectors.	Limited	Outcome (risk tolerance standard)	Flood protection standards legally embedded within the Delta Programme; broader strategy primarily strategic in orientation	Illustrates how quantified risk standards may be well developed in technically mature domains, while broader cross-sector quantification can evolve more gradually.
South Korea (Third National Climate Change Adaptation Plan, 2020)	Sectoral adaptation measures accompanied by quantified elements; consistency across sectors varies.	Moderate	Primarily output	National adaptation plan	Reflects use of quantified elements within sectoral planning; cross-sector comparability depends on interpretation and implementation
Rwanda (Revised NDC: Mitigation and Adaptation Priorities, 2020)	Multiple quantified adaptation-related targets across sectors integrated within NDC and development planning processes.	Extensive	Predominantly output	Embedded within NDC and national planning instruments	Demonstrates alignment of adaptation targets with broader climate and development commitments

Barcelona (Pla Clima 2018–2030)	Spatially explicit and time-bound municipal targets (e.g. per capita water consumption reduction; urban greening expansion).	Moderate	Output and emerging outcome	Municipal climate strategy	Illustrates place-based target setting where cities have direct control over infrastructure and service delivery levers
Lisbon (Metropolitan Plan for Adaptation to Climate Change, PMAAC-AML)	Quantifiable urban adaptation measures focused on greening, water efficiency and public space adaptation.	Moderate	Output	Metropolitan adaptation plan	Shows how quantified targets can support visible implementation and public communication in urban contexts
Paris (Plan Climat 2024–2030)	Adaptation-relevant quantified targets embedded within broader climate action plan including multiple sectoral actions.	Moderate	Predominantly output	Municipal climate action plan	Demonstrates integration of adaptation-related targets within wider climate strategies, though adaptation and mitigation targets are not always clearly distinguished

Table 2 provides illustrative examples of how different target types operate in selected jurisdictions and is not intended to be exhaustive.

4.3 Evidence from the literature and document review

4.3.1 Characteristics of high-quality adaptation targets

Across the literature and international document review, a consistent conclusion emerges: the quality of adaptation targets depends on clarity of intent, structure and measurability. Well-designed targets specify the risk addressed, the population or system concerned, the geographic scope, and the intended change over time (Magnan, 2016; Leiter *et al*., 2019). They distinguish between different types of targets and identify indicators (Berrang-Ford *et al*., 2019; UNEP, 2022), embed review mechanisms (Leiter *et al*., 2019; UNEP, 2022) and incorporate safeguards against maladaptation (UNEP, 2022; OECD, 2023). Where these elements are absent, targets risk becoming vague, symbolic or difficult to evaluate. This section synthesises the core characteristics of high-quality adaptation targets identified in the literature and observed in practice.

4.3.1.1 Defining target types improves clarity

Adaptation targets generally fall into four categories: process, output, outcome and impact (Berrang-Ford *et al.*, 2019; UNEP, 2022). Process targets relate to institutional steps, outputs to actions delivered, outcomes to measurable changes in vulnerability or system performance, and impacts to reductions in climate-related loss or harm. These categories differ in measurability, attribution and time horizon. In practice, frameworks often blur these distinctions. Activities such as publishing plans or launching programmes may be reported as adaptation progress without clear evidence of risk reduction (Buntaine *et al.,* 2017; Dzebo, 2019; Canosa *et al*., 2020). Distinguishing short-term process milestones from longer-term outcome and impact targets helps prevent administrative activity from being conflated with substantive adaptation (Magnan, 2016; UNEP, 2022).

Many jurisdictions therefore adopt layered structures in which near-term process and output targets support delivery, while outcome and impact targets provide strategic direction. Canada's National Adaptation Strategy and Japan's Climate Change Adaptation Plan illustrate how measurable near-term commitments can be aligned with longer-term objectives (UNEP, 2022; OECD, 2023).

4.3.1.2 High-quality targets define hazard, exposure, location and intended change

High-quality targets make the "unit of success" explicit. Generic formulations such as "increase resilience" lack the specificity required for implementation or evaluation (Magnan, 2016). Clear targets identify the hazard, the exposed people or assets, the relevant system or location, and the measurable change sought over a defined timeframe (Magnan, 2016; Berrang-Ford *et al*., 2019; Adaptation Scotland, 2022). For example, the Netherlands' statutory flood protection standard requires that by 2050 every resident behind a primary flood defence faces an annual individual mortality risk from flooding of no more than 1 in 100,000. This specifies the hazard, the protected population, the infrastructure system and a quantified risk threshold within a defined timeframe, providing a concrete benchmark for engineering standards and investment decisions.

Where strong technical evidence exists, targets tend to be similarly precise. Belize's mangrove restoration commitments specify hectares to be protected or restored by a defined year (Arkema *et al*., 2023). Other examples include hazard-specific ecological

thresholds (Matthews *et al*., 2014; Bino *et al*., 2021), spatially bounded restoration targets (Goyette *et al*., 2023) and sectoral performance outcomes (Judd *et al*., 2022). Specificity strengthens clarity, monitoring, and integration into delivery systems.

4.3.1.3 Adaptive, revisable targets perform better under climate uncertainty

Static targets risk becoming misaligned as climate risks evolve. The literature emphasises designing targets that can be revised as evidence and policy priorities change (Hallegatte, 2009; Wise *et al*., 2014). Adaptive pathways approaches frame targets as part of staged decision processes rather than fixed end points. They incorporate thresholds signalling when existing measures become insufficient, triggers for alternative actions, and scheduled review cycles to reassess risk and performance (Haasnoot *et al*., 2013). Embedding review and revision into target design should therefore be understood as good governance rather than policy failure, supporting long-term resilience and learning (Hallegatte 2009; Biesbroek *et al*., 2018; UNEP, 2024).

4.3.1.4 Measurement systems should be defined at adoption

Target clarity depends on measurability. A consistent principle is that targets should be accompanied by a defined measurement plan specifying baselines, indicators, data sources, institutional responsibilities and reporting cycles (Leiter *et al*., 2019; UNEP, 2020; Essex *et al*., 2020). Many jurisdictions adopt targets before indicators or baselines are fully established, deferring measurement to later cycles and weakening accountability (UNEP, 2022; Mongelli *et al*., 2024). Strengthening monitoring and data systems is therefore fundamental to credible target-setting (UNEP, 2022; World Bank, 2023).

4.3.1.5 Tiered indicator systems, structured around a theory of change, improve coherence and link actions to impacts

Outcome indicators provide forward-looking evidence of improvements in vulnerability or system performance, while impact indicators capture reductions in loss or harm. Because outcome data mature slowly and attribution is complex, many jurisdictions rely initially on process and output indicators, even though these do not demonstrate risk reduction on their own (Berrang-Ford *et al*., 2019). Recent guidance and reviews encourage tiered systems that link process, output, outcome and (where possible) impact metrics along a coherent results chain (UNEP, 2022; OECD, 2023). In such systems, outputs represent actions delivered, outcomes reflect measurable changes in exposure or vulnerability, and impacts capture ultimate reductions in harm. Making these causal links explicit prevents delivery indicators from substituting for substantive progress and clarifies how near-term actions contribute to long-term resilience (Magnan, 2016). For example, an urban heat strategy might link tree planting outputs to increased canopy cover outcomes and, ultimately, to reductions in heat-related mortality. Although multiple interventions typically contribute to impact reduction and attribution is rarely linear, articulating these pathways improves coherence and review (Hallegatte, 2009; Wise *et al*., 2014; Watkiss and Hunt, 2019).

4.3.1.6 Embedding equity into target design strengthens distributive accountability

Equity is widely recognised as central to adaptation (Eriksen *et al*., 2015; Dilling *et al*., 2019; Biesbroek *et al*., 2025). Adaptation targets are inherently distributive, shaping whose risks are reduced and who benefits first. Yet equity is often expressed as principle rather than

measurable commitment. High-quality targets identify intended beneficiaries and require that progress be tracked through disaggregated indicators across relevant dimensions of vulnerability (Ziervogel and Taylor, 2008; Adaptation Scotland, 2022).

Although equity is rarely framed as a standalone quantified target, some jurisdictions operationalise it through disaggregated monitoring, spatial prioritisation or beneficiary-specific commitments. For example, Canada's National Adaptation Strategy tracks climate-related health outcomes across defined vulnerable populations, while several European cities prioritise adaptation investment in socially vulnerable neighbourhoods (Reckien *et al*., 2018; EEA, 2015). Belize's mangrove targets are framed in relation to protecting coastal communities and livelihoods (Arkema *et al*., 2023). Where clearly specified, such mechanisms strengthen accountability by clarifying intended beneficiaries and preventing aggregate improvements from obscuring persistent inequalities.

4.3.1.7 Safeguards are needed to prevent maladaptation

Poorly designed targets can shift risks across sectors, locations or social groups (Magnan, 2016; UNEP, 2022). Targets framed narrowly around visible outputs, such as hectares restored or flood defences constructed, may generate ecological pressures or downstream impacts if system interactions are not assessed. In such cases, adaptation can redistribute risk rather than reduce it. The literature therefore emphasises integrating maladaptation screening and cross-sector assessment into target design rather than treating these as afterthoughts (OECD, 2023). This is particularly important where land use, water management and infrastructure systems interact closely. Ensuring that targets deliver net resilience gains and avoid locking in future vulnerabilities is central to long-term effectiveness (Bino *et al*., 2021; OECD, 2023).

4.3.2 Governance, decision-making and institutions

Adaptation target-setting is shaped not only by technical considerations but also by governance structures, institutional capacity and political incentives. The literature consistently shows that targets operate as political-administrative tools serving multiple functions: signalling ambition, guiding delivery, supporting learning and structuring accountability.

4.3.2.1 Targets serve multiple institutional and political purposes.

The literature shows that adaptation targets are often designed to perform several roles simultaneously, rather than fulfilling one primary purpose. For example:

Agenda-setting. Targets often use broad or aspirational language to raise the visibility of adaptation, communicate political commitment and align with international expectations—even when operational detail remains limited (Magnan 2016; UNEP 2020, 2022, 2024; Buntaine *et al*. 2017).

Guiding institutional effort. Targets help structure planning, justify budget allocations, and prioritise sectors or measures (Berrang-Ford *et al*. 2019). Documentary evidence from Canada and Japan emphasises that indicators and measurement frameworks are essential for steering investment and monitoring delivery (UNEP 2022; OECD 2023).

Accountability benchmarks. Even when non-binding, targets create reference points for public, parliamentary or peer scrutiny. However, the literature documents widespread

weaknesses in baselines, indicators and monitoring systems, which often make accountability symbolic rather than enforceable (Buntaine *et al*. 2017; Dzebo 2019; EEA 2015).

Engagement and shared responsibility Adaptation targets can help communicate urgency and engage citizens, businesses and institutions (Magnan 2016). National adaptation strategies—for example in Japan—explicitly use KPIs and indicators to embed adaptation across administrative levels and to promote public recognition (Japan Climate Adaptation Plan, 2021).

International alignment and legitimacy. Targets also help countries signal their alignment with global processes such as UNFCCC reporting, NDC commitments and regional frameworks (Biagini *et al*. 2014; England *et al*. 2018; UNEP 2022). This alignment role can encourage the use of broad, aspirational statements rather than operationally specific targets.

4.3.2.2 Governance typically follows a central coordination–distributed ownership model

The literature identifies a dominant governance pattern in which central government provides coordination and strategic direction, while sectoral ministries and subnational authorities design and deliver operational targets. This arrangement balances cross-government coherence with the flexibility needed for sector-specific and place-based implementation.

Central government as coordinator: National environment or climate ministries most commonly lead the development of adaptation targets and UNFCCC reporting (Berrang-Ford *et al*. 2014, 2019). In practice, they convene cross-government actors, align priorities and embed adaptation targets within national strategies and regulatory frameworks.

Inter-ministerial coordination is essential but variable: Because adaptation spans multiple policy areas, coordination bodies, such as climate secretariats and inter-ministerial committees, are mentioned as important for coherence (England *et al*. 2018). Their role is primarily to facilitate across sectors, resolve competing priorities and translate high-level objectives into measurable targets. Zambia's Interim Climate Change Secretariat uses this approach to align agriculture, water and environment ministries around shared goals (England *et al*. 2018).

Finance ministries are essential enablers: A recurring finding is that without the involvement of finance ministries, adaptation targets remain underfunded and weakly implemented (Arkema *et al*. 2023; OECD 2023; UNEP 2022). Sectoral cases such as Belize show how evidence-based targets can be aligned with national development and finance structures (Arkema *et al*. 2023). Embedding adaptation in budgetary processes e.g. through expenditure tracking, multi-year financing plans or integration into routine budgeting, significantly improves deliverability. The literature notes emerging examples where adaptation spending is linked to national development budgets or public financial management reforms, for example Belize's integration of adaptation targets into its Nationally Determined Contribution (NDC) and associated finance structures, though most reviews conclude that systematic budget integration is still limited and uneven.

Independent advisory bodies strengthen transparency: Although they cannot enforce compliance, climate change committees, audit institutions and scientific advisory bodies

enhance transparency by monitoring progress, assessing evidence and advising governments (Arkema *et al*. 2023; Berrang-Ford *et al*. 2019). Their presence can reinforce the credibility of centrally coordinated processes.

Sectoral and subnational actors develop and deliver operational targets: More specific and measurable targets often emerge at sectoral or local levels, where governance structures and technical capacity support detailed implementation. Examples include environmental flows in water management (Bino *et al*. 2021; Judd *et al*. 2022), wetland and habitat restoration (Goyette *et al*. 2023), and urban and regional adaptation planning (Reckien *et al*. 2018). These cases demonstrate how distributed ownership enables targets to reflect local risks, regulatory responsibilities and operational capacities, while remaining aligned with a central coordination framework.

4.3.2.3 Accountability is often indirect and non-binding

Across the literature, accountability for adaptation targets is generally weak, operating through political and procedural channels rather than legal or enforceable mechanisms. Most targets are embedded in policy frameworks rather than legislation, meaning governments face no formal penalties for underperformance (Berrang-Ford *et al*. 2019). As a result, accountability relies heavily on internal reporting, periodic strategy updates and peer scrutiny within government rather than external assessment (EEA 2015). This is particularly the case where adaptation strategies rely on directional policy commitments or recommended actions rather than quantified targets. Austria's national adaptation strategy provides one example. The strategy sets out sectoral objectives and recommended actions across government rather than binding performance benchmarks, with implementation coordinated across ministries and federal states and reviewed through periodic progress reporting. While this approach supports coordination and shared ownership, it offers limited mechanisms for corrective action if progress is insufficient. Independent oversight bodies such as climate change committees, audit institutions and scientific advisory panels can strengthen transparency by tracking progress and advising governments (Arkema *et al*. 2023; Berrang-Ford *et al*. 2019), but their role is advisory and they cannot compel revisions to targets or reallocation of resources. Some countries do have more structured oversight architectures, for example, Canada combines interdepartmental reporting, scrutiny by the Auditor General and oversight from the Commissioner for Environment and Sustainable Development, yet even these mechanisms stop short of creating legally enforceable obligations.

A recurring finding is that meaningful accountability depends on the availability of clear indicators, baselines and monitoring, evaluation and learning (MEL) systems. Where these measurement systems are incomplete or disconnected from target-setting, it becomes difficult to assess progress, ensure comparability or initiate revisions (Bino *et al*. 2021; Ford *et al*. 2013; UNEP 2022). Without robust indicators and MEL frameworks, accountability remains largely symbolic because there is no consistent basis for evaluating performance or signalling when targets require adjustment.

4.3.2.4 Adaptation targets are political constructs shaped by feasibility and institutional constraints

The literature shows that adaptation targets are shaped less by what would most effectively reduce climate risk and more by what is politically, financially and institutionally viable.

Several issues recur in how targets are designed. Short political cycles create strong incentives for visible, near-term outputs, making measurable actions more attractive than longer-term or transformational investments (Geden 2016; Hallegatte 2009; Zhang *et al*. 2023). Standardised or symbolic indicators such as plans produced or hectares restored, are often chosen because they are easier to implement and compare, even when they align only loosely with ecological thresholds or system dynamics (Bino *et al*. 2021; Goyette *et al*. 2023; Ford *et al*. 2013).

Budgetary constraints also limit ambition as targets usually need to fit within existing budgets, fragmented funding streams and limited administrative capacity, which encourages incremental approaches rather than more substantial or transformational shifts (UNEP 2020, 2022, 2024; OECD 2023). Data availability also influences target design. What can be measured is often prioritised, and in data-poor contexts targets tend to default to process indicators rather than vulnerability-reduction outcomes (Leiter *et al*. 2019; Berrang-Ford *et al*. 2019).

4.3.2.5 Equity and justice are widely acknowledged but rarely embedded in target design

Although Section 4.3 highlighted the importance of embedding equity within the design of adaptation targets, the literature shows that only a limited number of adaptation frameworks operationalise equity directly within target systems. Across the literature, equity is frequently cited as a core principle in adaptation planning, yet in practice it is more often addressed through consultation processes, participation mechanisms or high-level principles rather than through measurable or enforceable commitments (Magnan 2016; Dilling *et al*. 2019; Biesbroek *et al*. 2025). As a result, distributional accountability remains limited and the intended beneficiaries of adaptation measures are often left unspecified. Some national strategies reference equity through methodological guidance, for example by encouraging vulnerability assessments and distributional considerations in countries such as Bangladesh, as well as through wider international guidance promoting social and vulnerability-based criteria when selecting measures. These tools influence how targets are developed but typically stop short of generating explicit equity-focused targets or disaggregated indicators.

The literature also shows that technocratic, indicator-driven approaches to adaptation can inadvertently marginalise lived experience and Indigenous knowledge. Studies of ecosystem and land-use indicators demonstrate that standardised metrics, such as hectares restored or protected, often overlook Indigenous land management practices and locally defined wellbeing outcomes, privileging what is easy to quantify over what communities value (Ford *et al*. 2013; Bino *et al*. 2021; Eriksen *et al*. 2015). Similar issues arise in urban adaptation research, where vulnerability metrics based largely on available administrative data can exclude informal settlements or undocumented populations, thereby underrepresenting those who are most at risk (Reckien *et al*. 2018).

4.3.3 Stakeholder Engagement

4.3.3.1 Stakeholder engagement is broad but influence over target design remains concentrated

Across the literature, stakeholder engagement in adaptation target-setting is described as broad in scope but uneven in influence. Environment or climate ministries typically lead and

coordinate these processes, supported by expert groups responsible for modelling, indicator development and technical assessment (Judd *et al*. 2022; Arkema *et al*. 2023; Matthews *et al*. 2014). Other participants commonly include scientific institutions, sectoral agencies such as water or forestry authorities, non-governmental organisations and, in some cases, private-sector actors involved in infrastructure delivery or risk management.

Although these processes often include civil society organisations and community groups, studies highlight that decision-making authority over target ambition, metrics and thresholds largely remains with government and technical experts (Magnan 2016; Eriksen *et al*. 2015; Canosa *et al*. 2020; Biesbroek and Delaney 2020). Consistent with this, Ziervogel and Taylor (2008) show that participation frequently informs agenda-setting or problem framing but rarely shifts the underlying power dynamics that determine formal decision authority. As a result, pathways from participation to decision rights are typically weak, and engagement tends to focus on shaping priorities rather than influencing the technical specification of targets.

4.3.3.2 Engagement improves relevance, legitimacy and feasibility even when formal influence is limited

Despite these limitations, the literature emphasises significant benefits associated with well-structured stakeholder and community level engagement. Participatory processes can improve the relevance of targets by surfacing granular insights into local vulnerabilities, lived experience and sector-specific constraints (Dilling *et al*. 2019; Leiter *et al*. 2019). Ziervogel and Taylor (2008) similarly highlight how community knowledge can illuminate risk dynamics that formal assessments overlook, particularly in contexts where administrative data is limited or uneven.

Citizen engagement also enhances legitimacy, especially where affected communities understand how decisions were made and how their input shaped the process. These legitimacy effects can strengthen public support and reduce resistance during implementation. Moreover, wider engagement can help refine feasibility assessments, identify implementation barriers early, and highlight where quantitative targets may conflict with social or distributional priorities. Even when technical parameters remain expert-defined, wider engagement, including citizen engagement, contributes to a more grounded and socially informed design process.

4.3.3.3 Trade-offs are handled most effectively when engagement is deliberative and co-productive

The literature also shows that stakeholder engagement is most effective when trade-offs are surfaced and negotiated transparently rather than resolved internally by technical teams (Arkema *et al*. 2023; Matthews *et al*. 2014; Yule *et al*. 2025). Trade-offs arise when decisions require balancing competing priorities, for example, distributing resources across sectors, reconciling environmental and economic objectives, or determining which populations are prioritised for risk reduction.

Structured deliberation, iterative workshops and co-production approaches help clarify these competing interests and can improve both the robustness and legitimacy of decisions. In Austria's national adaptation strategy, for example, multi-stakeholder workshops were used to negotiate priorities across sectors such as agriculture, environment and regional

development, reflecting a governance model that relies on consensus-building rather than quantified targets. Similar deliberative processes were used in Germany when developing measurable adaptation targets under the Climate Adaptation Act, where ministries, experts and stakeholders contributed to refining targets and resolving overlaps across thematic clusters. These examples illustrate how explicit negotiation can build shared understanding even when government retains responsibility for final decisions.

Several studies of participatory adaptation processes warn, however, that insufficient or superficial engagement can lead to tokenism, privileging technical or administrative perspectives over lived experience (Eriksen *et al*. 2015; Dilling *et al*. 2019; Biesbroek *et al*. 2025; Kythreotis *et al*. 2020). Ziervogel & Taylor (2008) reinforce this concern, showing that without meaningful deliberation, engagement processes risk reproducing existing inequalities, with marginalised voices heard but not acted upon. This underscores the need for engagement approaches that not only solicit input but also address underlying power dynamics.

4.3.4 Capacity, Resources and Feasibility

Across the literature and documents reviewed, capacity, resources and feasibility consistently emerge as the foundations of credible adaptation targets. Where evidence systems, institutional mandates, finance and monitoring capabilities are strong, targets become clearer, more measurable and more actionable. Where these enabling conditions are weak, targets tend to be symbolic, vague or unrealistic, regardless of political intent (UNEP 2020; UNEP 2022; OECD 2023; World Bank 2023; Magnan 2016). Developing robust targets therefore requires investing in the analytical, financial, institutional and delivery systems that shape both the form and ambition of adaptation targets before they are integrated into wider planning and implementation frameworks (Biagini *et al*. 2014; Adaptation Scotland 2022; Leiter *et al*. 2019).

4.3.4.1 Strong evidence systems enable credible and actionable adaptation targets

The strength of a government's evidence base is a key predictor of its ability to set credible and measurable adaptation targets. Jurisdictions with robust risk assessments, climate projections, modelling capacity and exposure analysis are better able to translate scenarios into quantitative or threshold-aligned targets, such as hydrological modelling used to define environmental flow requirements, biodiversity thresholds, or city-scale heat and flood analyses that inform spatial commitments (Matthews *et al*. 2014; Bino *et al*. 2021; Judd *et al*. 2022; Goyette *et al*. 2023; Arkema *et al*. 2023; Mongelli *et al*. 2024; Neocleous *et al*. 2023).

The literature review emphasised the importance of downscaled models, local indicators and practical monitoring tools in supporting targets that can guide real-world decisions (Adaptation Scotland 2022; UNEP 2020; UNEP 2022; UNEP 2024; World Bank 2023; OECD 2023; Tompkins *et al*. 2018; Berrang-Ford *et al*. 2014; Berrang-Ford *et al*. 2019; Arfanuzzaman 2024; Canosa *et al*. 2020; Yule *et al*. 2025). However, capability is uneven: some sectors maintain strong in-house analytical expertise, while others lack tools or rely heavily on external consultants, resulting in significant variation in what different parts of government can credibly commit to (Biesbroek & Delaney 2020; Reckien *et al*. 2018; UNEP 2022; World Bank 2023). This variation means that jurisdictions with strong evidence systems tend to set time-bound, quantitative or threshold-based targets, while those with

weaker evidence bases may set directional, qualitative or process-based targets (Magnan 2016; Leiter *et al*. 2019; Biesbroek *et al*. 2018). Effective target-setting requires evidence systems capable of supporting the level of specificity sought. Outcome- and impact-level targets require data, modelling and clear baselines to establish thresholds and plausible pathways for change, whereas many process and output targets can be developed with more limited analytical foundations.

4.3.4.2 Technical capacity shapes both the form and specificity of adaptation targets

Capacity strongly influences both what governments target and how precisely they do so. Where technical systems and data infrastructures are strong, targets tend to be quantitative, time-bound and aligned with thresholds (Berrang-Ford *et al*. 2014; Arkema *et al*. 2023; Goyette *et al*. 2023). Where capacity is weaker, targets remain qualitative, directional or process-based (Berrang-Ford *et al*. 2019; Tompkins *et al*. 2018; UNEP 2020, 2022, 2024). Many strategies express high ambition but lack measurable values, with quantification occurring only in sectors where statutory levers or long-established delivery systems exist. In these contexts, the form of targets reflects analytical constraints as much as political ambition (Biagini *et al*. 2014; Adaptation Scotland 2022; OECD 2023; Magnan 2016).

4.3.4.3 Financial feasibility is essential but rarely integrated into target-setting

Across the literature, few national or local strategies link target levels to costed delivery plans, budget lines or long-term finance pathways. Global and national reviews consistently identify chronic underfunding and the absence of clear financing pipelines, often resulting in strategies that list desirable actions without showing how they will be delivered (UNEP 2020, 2022, 2024; World Bank 2023; OECD 2023; Arfanuzzaman 2024). While appraisal tools exist (Watkiss and Hunt 2019), they are seldom applied systematically. This disconnect means that targets may formally commit governments to outcomes that are financially unviable, creating expectations that exceed available resources. In such cases, targets become barriers to implementation because they absorb administrative effort without generating deliverable pathways. Embedding financial realism at the design stage is therefore essential (UNEP 2020, 2022; World Bank 2023).

4.3.4.4 Clear mandates and governance structures enable feasible and deliverable targets

Strong evidence does not guarantee feasibility. Governance arrangements, including clear mandates, coordination mechanisms, and structured monitoring systems, are decisive in determining whether targets can be delivered. Jurisdictions with well-defined responsibilities and coordination structures tend to set more specific and actionable targets (EEA 2015; England *et al*. 2018; Reckien *et al*. 2018; Dzebo 2019; Leiter *et al*. 2019; OECD 2023). Where responsibilities are fragmented, targets remain vague or become confined to sectors with strong statutory levers such as water management (Berrang-Ford *et al*. 2014; Berrang-Ford *et al*. 2019; Tompkins *et al*. 2018; Ziervogel and Taylor 2008; Roggero and Thiel 2021). Feasible targets therefore require clarity on ownership, delivery partners and the legislative or regulatory frameworks that enable implementation (Magnan 2016; OECD 2023; World Bank 2023).

4.3.4.5 Monitoring capacity and attribution limits what targets can realistically track or revise

Monitoring, evaluation and learning (MEL) systems determine whether targets can be tracked or adjusted over time. Many governments lack stable indicators, consistent data or clear reporting responsibilities, forcing reliance on process indicators that are easy to measure but weak proxies for vulnerability reduction (Magnan 2016; Leiter *et al*. 2019; Biesbroek *et al*. 2018; UNEP 2022; OECD 2023). Because strict attribution is rarely possible in complex systems, feasible targets focus on contribution, system performance and functional improvements rather than direct causal claims (Hallegatte 2009; Moser and Ekstrom 2010). The literature also highlights the importance of staging through interim milestones and scheduled reviews to keep long-term targets on track (Biesbroek *et al*. 2018; UNEP 2024; Matthews *et al*. 2014; Bino *et al*. 2021). Approaches grounded in a theory of change are increasingly recommended because they help clarify causal pathways, intermediate outcomes and realistic expectations of progress.

4.3.4.6 Targets are more deliverable when aligned to sectoral and local implementation capacity

Targets are most feasible when aligned with the practical capabilities of the institutions responsible for delivery. The literature highlights persistent scale mismatches between national ambitions and local authority capacity, with many local governments lacking the staff, data systems or operational tools required to implement targets consistently (Berrang-Ford *et al*. 2014; Berrang-Ford *et al*. 2019; Reckien *et al*. 2018; England *et al*. 2018; Ziervogel and Taylor 2008; Yule *et al*. 2025). Feasible targets therefore need to be co-designed with delivery systems, tailored to available capacity and grounded in realistic assessments of what can be operationalised at different scales (Biagini *et al*. 2014; Adaptation Scotland 2022; OECD 2023; World Bank 2023).

4.3.4.7 Political framing strongly influences whether governments quantify adaptation targets

Target-setting is also shaped by how adaptation is politically and conceptually understood. Concepts such as acceptable risk, resilience thresholds and success criteria are inherently political (Tompkins *et al*. 2018; Magnan 2016; Geden 2016). Some jurisdictions avoid quantification because adaptation is understood as an iterative, learning-oriented process that cannot easily be captured by fixed numerical values**.** Others quantify only where delivery levers and accountability mechanisms are clear (Biesbroek and Delaney 2020; Canosa *et al*. 2020; World Bank 2023). The literature warns that arguments about "feasibility" can limit ambition, especially when budgets are tight or when tasks are shifted to organisations that lack the capacity to deliver them. (Eriksen *et al*. 2015; Biesbroek *et al*. 2025; Puig *et al*. 2025; Kythreotis *et al*. 2020). Feasibility is ultimately determined by the mix of analytical capacity, governance arrangements and how willing governments are to define what success looks like.

4.3.5 Integration, Coherence and Implementation Pathways

Across the literature, a consistent message is that the credibility and deliverability of adaptation targets depend on how well they are integrated into existing planning, governance and monitoring systems (UNEP 2020, 2022; OECD 2023; World Bank 2023;

Berrang-Ford *et al*. 2014, 2019). Targets aligned with sectoral programmes, statutory duties and cross-government processes have clearer delivery pathways, while targets that sit outside these systems struggle to influence decisions (Adaptation Scotland 2022; Arkema *et al*. 2023; Bino *et al*. 2021; Judd *et al*. 2022). Integration concerns how targets connect to mandates, planning cycles, investment processes and review mechanisms (OECD 2023; Magnan 2016; Leiter *et al*. 2019). When governance is coherent and supported by functioning review systems, targets can shape policy and investment decisions; when governance is fragmented, targets tend to remain aspirational rather than actionable (Berrang-Ford *et al*. 2019; Arfanuzzaman 2024; Roggero and Thiel 2021).

4.3.5.1 Targets are most effective when embedded within established planning and delivery systems

Evidence shows that targets are more influential when they are integrated into established planning and delivery systems such as procurement, regulatory standards, spatial planning, asset management and service delivery (UNEP 2020, 2022; OECD 2023; World Bank 2023; Adaptation Scotland 2022; Reckien *et al*. 2018). Documented examples include Japan and Canada, where targets are embedded within sectoral strategies and statutory frameworks, and European ecological commitments, which are most enforceable when connected to water and biodiversity legislation (Bino *et al*. 2021; Judd *et al*. 2022; Goyette *et al*. 2023; Biesbroek and Delaney 2020). In contrast, plans that lack linkages to statutory or sectoral systems tend to exert limited influence on decisions (Reckien *et al*. 2018; Lyytimäki *et al*. 2021; England *et al*. 2018). Integrated targets therefore sit within delivery architectures that support enforceability, accountability and political traction (Arkema *et al*. 2023; OECD 2023; World Bank 2023).

4.3.5.2 Fragmentation across sectors and levels of government undermines coherent target delivery

The literature consistently identifies fragmentation across sectors and governance levels as a barrier to effective implementation of adaptation targets. National plans often contain overlapping frameworks or differing definitions of what constitutes a target (Berrang-Ford *et al*. 2014, 2019; Arfanuzzaman 2024). Document reviews show that Germany, Finland and the Netherlands use the term ‘target’ inconsistently across sectors. While the literature does not identify this inconsistency as a direct barrier to implementation in these specific jurisdictions, studies of European national and urban adaptation plans show that inconsistent terminology, weak indicator frameworks and unclear links between actions and outcomes are common challenges that contribute to fragmented governance and make it harder to track progress (Reckien *et al*. 2018; Lyytimäki *et al*. 2021; Sietsma *et al*. 2021). Research also suggests that local authorities struggle to align with national ambition because of unclear linkages between governance systems and reporting requirements (Kythreotis *et al*. 2020; Yule *et al*. 2025). As a result, coherence that appears strong in documentation often proves difficult to operationalise in practice. Fragmentation therefore limits alignment, coordination and the translation of targets into operational action (Roggero and Thiel 2021; World Bank 2023). The literature suggests that coherence can be strengthened through clearer vertical alignment between national and subnational targets, shared indicator frameworks, and coordinated monitoring and reporting systems that link sectoral and territorial levels of governance (Berrang-Ford *et al*. 2019; Reckien *et al*. 2018; Wise *et al*. 2014).

4.3.5.3 Global and regional frameworks support integration, but domestic revision remains inconsistent

Global and regional frameworks, including the Paris Agreement and Global Stocktake, provide regular points for reviewing adaptation targets (UNEP 2020, 2022, 2024; Magnan 2016; Tompkins *et al*. 2018). Donor and multilateral funding cycles also create external rhythms for reporting and revision (World Bank 2023; OECD 2023). Several countries, including Canada and Germany, align their monitoring and reporting systems with these external processes (Berrang-Ford *et al*. 2019; Reckien *et al*. 2018; Yule *et al*. 2025). However, international cycles rarely ensure domestic revision. Long-term targets often remain unchanged because revision entails political costs, such as reputational risk or perceptions of failure (Geden 2016; Raiser *et al*. 2020). The literature emphasises that while global processes structure reporting, domestic political commitment, institutional authority and internal governance mechanisms determine whether targets are updated. External frameworks can facilitate integration, but domestic political incentives and institutional arrangements are the primary drivers of change (UNEP 2022; World Bank 2023).

4.3.5.4 Iterative revision mechanisms are necessary but politically sensitive and inconsistently used

The literature distinguishes between formal revision mechanisms (monitoring and reporting systems, donor requirements) and informal mechanisms (political leadership, new evidence, interdepartmental negotiation) (UNEP 2020, 2022, 2024; Berrang-Ford *et al*. 2019). Structured revision processes are documented in Canada and Japan, but many countries lack clear pathways for updating targets (Leiter *et al*. 2019; Sietsma *et al*. 2021). Revision is politically sensitive because altering a target can be interpreted as lowering ambition or admitting inadequate progress (Biesbroek *et al*. 2025; Dilling *et al*. 2019). Revision is more likely where monitoring systems are well institutionalised and have senior-level support (Matthews *et al*. 2014; Bino *et al*. 2021; Judd *et al*. 2022). Where responsibilities are unclear or indicator systems are weak, targets tend to remain static (Magnan 2016; UNEP 2022). Iterative revision therefore depends as much on political culture and institutional support as on technical mechanisms (Hallegatte 2009; Moser and Ekstrom 2010; Wise *et al*. 2014).

4.3.5.5 Meaningful integration must align with political, social and contextual realities as well as technical systems

The literature cautions that integration cannot be treated solely as a technical exercise (Eriksen *et al*. 2015; Dilling *et al*. 2019; Biesbroek *et al*. 2025). Aligning targets with global frameworks may overlook local knowledge or equity concerns, and ecological studies warn against generic targets that lack regional grounding (Goyette *et al*. 2023; Matthews *et al*. 2014). Document reviews show that resistance to quantification in cases such as Austria reflects deeper political and conceptual understandings of adaptation, including the belief that adaptation is iterative and cannot be meaningfully expressed through fixed values (Reckien *et al*. 2018; Lyytimäki *et al*. 2021). Integration also requires legitimacy, communication and narratives that resonate with institutions and communities (Garvey *et al*. 2023; Kythreotis *et al*. 2020). Equity considerations remain central to meaningful alignment (Eriksen *et al*. 2015; OECD 2023). Integration is therefore shaped by values, political priorities and authority, not only by technical frameworks (Magnan 2016; World Bank 2023)

4.3.5.6 Deliverability depends on embedding targets in the operational systems responsible for implementation

For targets to influence real-world outcomes, they must align national ambition with the operational systems responsible for implementation, including land-use planning, water management, infrastructure investment, biodiversity management and economic development (OECD 2023; World Bank 2023). Targets influence outcomes most effectively when they are embedded in regulatory systems, investment cycles and sectoral delivery pathways (Arkema *et al*. 2023; Bino *et al*. 2021; Judd *et al*. 2022; Goyette *et al*. 2023).

Document reviews show that cities such as Barcelona, Paris and Lisbon incorporate adaptation into spatial planning, procurement and infrastructure programmes, integrating targets directly into the delivery systems responsible for implementation. This reflects a broader pattern observed in the literature, where local and regional authorities are often better positioned to operationalise adaptation commitments because they control land-use planning, infrastructure investment and service delivery (Reckien *et al*. 2018; Sietsma *et al*. 2021; Lyytimäki *et al*. 2021). By contrast, national strategies more commonly establish strategic direction while relying on sectoral ministries and subnational authorities to translate targets into operational action. Where targets sit outside these operational systems, they tend to remain disconnected from implementation and have limited influence on investment decisions or sectoral practice (Berrang-Ford *et al*. 2014, 2019; Adaptation Scotland 2022; Garvey *et al*. 2023).

4.4 Evidence from Interviews

Part A has examined what the international literature and national strategies reveal about effective adaptation target-setting, the characteristics of high-quality targets, the systems that support them, and the governance and feasibility conditions that shape their credibility. Part B now turns to the interview evidence. Semi-structured interviews were conducted with policymakers and technical experts from seven jurisdictions: Canada, Germany, Kenya and the Netherlands, and the cities of Barcelona, Lisbon and Paris. In responding to interview questions, practitioners described their experiences in terms of drivers, negotiation, institutional culture and iterative learning. For this reason, the interview findings are presented as a narrative account of how jurisdictions actually agree, design, operationalise and revise adaptation targets in practice.

Although structured differently, the interview findings reinforce and add nuance to the five analytical themes identified in Part A by illustrating how these dynamics play out in practice within government institutions. They illuminate how constraints and opportunities are interpreted within government, how ambition is negotiated, and how targets evolve over time within real institutional settings.

4.4.1 What Jurisdictions Have Learned About Setting Adaptation Targets

The seven jurisdictions examined, four national governments and three cities, took different approaches to setting adaptation targets. Some set clear numeric targets. Others used broader goals supported by indicators. Some wrote targets into law, while others relied on reporting and coordination. Despite these differences, common lessons emerged about how targets are introduced, defined and maintained over time.

The sections that follow examine five themes. First, what prompts governments to move from general adaptation goals to measurable targets. Second, how targets are negotiated with the departments responsible for delivering them. Third, what "measurable" means in practice, including how governments deal with outcomes influenced by multiple factors. Fourth, how monitoring and review affect whether targets remain visible and are updated over time. Fifth, how the way government is organised, and the data and staff capacity it has, shape the type of targets that are set.

The interviews largely reinforced the literature finding that targets tend to be introduced at moments when climate evidence converges with political or institutional triggers, such as legal changes, external reporting pressures or recent climate impacts that heighten the need for clearer commitments. Interviewees described targets as useful for setting direction and tracking progress. They did not identify a single model that works in all contexts, although targets were seen as most effective when they align with how government is organised, the data available and the actors responsible for delivery. Further detail on the interview approach and case study findings is provided in the appendices, including the interview topic guide (Appendix C) and jurisdictional case summaries (Appendix E).

4.4.1.1 Why targets are introduced

Climate risk assessments shaped what targets looked like, but they did not by themselves lead governments to introduce measurable targets. In Germany, the trigger was legal. The Climate Adaptation Act required the national strategy to include measurable targets, indicators and measures. Interviewees suggested that without this change, targets would not have been developed in such a structured way. In Canada, measurable targets were added late in drafting the National Adaptation Strategy. Interviewees described pressure to demonstrate tangible progress on resilience, alongside sustained advocacy from the insurance sector for clearer national benchmarks. Austria has debated SMART targets for more than a decade but has chosen not to adopt them. Interviewees cited concerns about attribution, shifting climate baselines, and the risk that numeric targets could imply more certainty than exists.

At city level, recently experienced climate impacts sharpened the case for targets. In Barcelona, drought made water-related targets more urgent and specific. In Paris, repeated heatwaves increased pressure for measurable commitments on cooling and greening. In Lisbon, adaptation plans were produced, but interviewees noted that the metropolitan strategy does not clearly consolidate headline numeric targets. Some quantitative figures appear in sectoral initiatives or supporting documents, but they are not presented as a unified set of strategic targets in the main plan. Across these cases, clearer adaptation targets tended to emerge when climate risk evidence was reinforced by legal requirements, external pressure or recent impacts that increased demand for measurable commitments.

4.4.1.2 Ownership and negotiated ambition

In all jurisdictions, ambition was shaped through negotiation with those responsible for delivery. In Germany, each ministry drafted its own targets within a shared structure. The Environment Ministry coordinated the process but did not set target levels. Interviewees emphasised that ministries should commit only to targets they are willing and able to implement. In Canada, responsibility is organised around five thematic "systems" (such as health and infrastructure), each led by a designated federal department. These lead

departments developed targets within their area, aligned with existing programmes and funding. Interviewees were clear that limited resources constrained ambition and departments avoided commitments that were not backed by secured budgets.

Austria provides a contrasting example of how ambition is negotiated where formal targets have not been adopted. Rather than adopting formal SMART or quantified adaptation targets, the national adaptation strategy relies on sectoral goals and collaborative monitoring processes developed through workshops and dialogue across ministries, provinces and experts. Interviewees explained that concerns about attribution, shifting climate baselines and the risk of overpromising led policymakers to favour consensus-based coordination over formal targets.

A similar pattern appeared at city level. In Barcelona, delivery departments own their targets, while the climate office coordinates reporting. In Paris, sector departments define commitments within their mandates. In Lisbon, fragmented responsibilities across municipalities made it harder to consolidate and track targets consistently. Across the interviews, targets were more likely to be implemented when the actors responsible for delivery helped define them.

4.4.1.3 What "measurable" means in practice

The interviews show that "measurable" is understood differently across jurisdictions and sectors. In Germany, some targets include clear quantitative values and timeframes. Others are framed as directional goals, supported by indicators that are still being developed. Interviewees described this as a pragmatic approach: i.e. start with measurable commitments and refine them over time. Canada's targets also vary. Some targets set clear numerical milestones. Others focus on ensuring that climate risk is built into planning, investment and decision-making processes. Interviewees explained that many early targets are near-term milestones intended to build momentum and support monitoring.

Austria tracks more than 100 quantitative indicators but has not adopted formal SMART targets[3]. Interviewees explained that the strategy emphasises monitoring progress and learning across sectors rather than defining fixed numerical thresholds for performance. There is also ongoing debate about whether numeric thresholds can capture adaptation outcomes, particularly where attribution is complex.

The city cases show similar variation. Barcelona's water targets are clearly quantified, reflecting strong technical capacity. However, interviewees noted that greening targets are more difficult to deliver in a dense city where space is limited and drought places additional pressure on vegetation, meaning that targets in this area are often more contested and harder to achieve in practice. In Lisbon, quantitative figures tend to appear within individual measures or sectoral initiatives rather than as clearly defined strategic targets. Interviewees

[3] SMART is a widely used policy framework for designing targets. The acronym stands for Specific, Measurable, Achievable, Relevant and Time-bound. A target described as "SMART" clearly defines what will change, includes a measurable indicator, sets a defined timeframe, and is judged realistic given available capacity and resources. A formal SMART target is explicitly structured in this way in a strategy, often as a clear numeric commitment with a deadline.

noted that the metropolitan adaptation plan does not present a consolidated set of overarching numeric targets in the main strategy document.

Across cases, interviewees questioned how far changes in outcomes can be directly linked to policy or their interaction with other social-economic factors. For example, heat-related deaths depend not only on government action but also on population age, individual behaviour and the severity of heat events. Drought can reduce water use, but it can also damage trees and green space. Because these outcomes are influenced by many factors, some jurisdictions use indirect indicators, for example measures such as tree canopy cover, access to cooling centres, or reductions in potable water consumption, to track progress, rather than trying to measure final impacts alone. In practice, what counted as "measurable" depended on the data available, the nature of the sector and the practical limits on delivery.

4.4.1.4 Monitoring, revision and accountability

How targets are monitored affects whether they remain useful over time. In Germany, targets sit within a formal cycle linking climate risk assessment, strategy, monitoring and revision. Progress is reviewed through the monitoring process and feeds into a formal policy cycle in which the strategy is revised every four years and the national climate risk assessment is updated every eight years. Monitoring results inform public reporting and subsequent revisions to targets. There are no sanctions for missing targets, but ministries are expected to explain gaps and propose further action. Canada's monitoring framework is still being developed. Each lead department reports on progress within its system. Interviewees described this as an evolving process that is expected to strengthen over time. Austria provides a different model. Although the national adaptation strategy does not include formal SMART or quantified targets, progress is monitored through a combination of indicator tracking and sector workshops. Experts from ministries, provinces and academia review progress through structured discussion alongside more than 100 quantitative indicators.

At city level, Barcelona has an established reporting process. Departments report on implementation and indicators, and the climate office compiles this information for senior leadership. Targets are not legally binding, but regular reporting creates visibility and follow-up. In Lisbon, interviewees described monitoring as uneven. Where reporting systems are fragmented, it becomes difficult to track targets consistently. Across all the cases we looked at, formal penalties for missing a target were rare. Accountability operated mainly through reporting, political scrutiny and periodic strategy updates. Interviewees suggested this reflects the difficulty of attributing outcomes directly to policy action, as well as the need to maintain departmental ownership and flexibility when climate risks, data and implementation capacity are still evolving. Where regular review cycles exist, they allow targets to be adjusted rather than fixed permanently.

4.4.1.5 Institutional culture and capacity

Interviewees often explained differences in how adaptation targets are designed and used across jurisdictions and sectors by referring to how their governance systems are organised and what kinds of commitments are considered credible within them. In sectors with strong engineering traditions, such as water management, numeric targets were described as more straightforward to define and monitor. These sectors often already work with technical

standards and routine monitoring, making quantified thresholds more familiar and defensible. In Austria, where a decision has been made not to develop quantified targets, interviewees emphasised a culture of coordination and consensus, which supports dialogue and qualitative assessment rather than rigid national thresholds. In Germany, a formal legal framework and established inter-ministerial structures shaped the cluster-based organisation and regular review cycle. In Canada, the federal system means responsibility for adaptation is shared across federal departments, provinces and territories. National targets therefore need to reflect what different actors are willing and able to implement, which can limit how prescriptive or ambitious they are at national level. In Lisbon, detailed planning documents are common, but fragmented responsibilities across municipalities make consistent tracking more difficult.

Interviewees also pointed to differences in capacity. Data availability, technical expertise and staff resources influence what can realistically be measured and reported. Where monitoring systems are already established, targets can be more precise; where data systems are still developing, targets tend to begin as milestones or directional commitments. These factors help explain why jurisdictions facing similar climate risks have adopted different approaches to setting and monitoring targets.

4.4.1.6 Iteration and learning

Across the interviews, setting adaptation targets was described as an iterative process shaped by practical constraints. Governments faced trade-offs between precision and credibility, ambition and deliverability and outcome measurement and system-level change. Rather than resolving these tensions upfront, jurisdictions adjusted their targets over time, refining indicators, strengthening monitoring systems and aligning ambition with available resources. In many cases, revisions were triggered by scheduled strategy review cycles, new climate risk assessments, monitoring results, or major climate events that revealed gaps in existing approaches. Target-setting was therefore described not as a one-off design exercise, but as part of a broader process of institutional learning.

4.4.1.7 Balancing targets across the results chain

Interview evidence suggests that adaptation target systems are most effective when targets at different levels of the results chain, inputs, outputs, outcomes and impacts, are designed to work together. Jurisdictions that rely predominantly on input or output targets can demonstrate activity but often struggle to show whether resilience conditions are improving. Conversely, jurisdictions that focus solely on high-level outcome ambitions may find it difficult to evidence delivery progress, maintain operational accountability or secure sustained political support.

Interviewees emphasised that greater clarity and coherence tend to emerge where institutional integration, delivery actions and resilience outcomes are aligned within a single framework. This alignment helps ensure that shorter-term milestones support, rather than compete with, longer-term resilience objectives. While impact-level targets remain the most challenging to operationalise, given attribution difficulties, shifting climate baselines and long time horizons, interviewees noted that linking deliverables to broader resilience ambitions can strengthen strategic coherence. Across jurisdictions, interviewees described effective target systems as those that provide complementary performance signals: inputs and outputs that track delivery and institutional capacity, and outcomes that articulate

changes in vulnerability, exposure or preparedness. The interviews therefore suggest that the effectiveness of adaptation target-setting depends less on uniform quantification across all levels and more on whether different target types are combined to form a coherent and mutually reinforcing results chain.

4.4.2 Summary and implications for Section 5

Across all evidence sources, a consistent picture emerges. Adaptation target-setting is not a purely technical exercise; it is shaped by institutional capacity, political incentives, governance structures and social context. High-quality targets are clear, measurable and embedded in credible delivery pathways, yet few jurisdictions achieve this fully. Many rely on process or output indicators because data, modelling capability or attribution methods remain limited. Governance arrangements that combine central coordination with distributed ownership appear most common and support alignment, but accountability usually remains political rather than legal. Stakeholder engagement improves relevance and legitimacy but rarely shifts technical parameter-setting unless deliberation is structured and power imbalances are explicitly managed.

The interview evidence reinforces the literature by showing how target-setting unfolds in practice: through negotiation with delivery actors, iterative refinement, and pragmatic interpretation of what counts as “measurable.” Targets are seen to be most effective when supported by established monitoring systems, clear ownership, and alignment with operational delivery structures. Practitioners emphasised that building such systems takes time and that targets often mature across successive strategy cycles.

These insights provide the foundation for Section 5, which examines how the lessons from international experience can inform the development of adaptation targets tailored to Scotland’s governance system, evidence base and delivery landscape. The findings presented here set out the enabling conditions and design choices that underpin credible, feasible and context-appropriate adaptation targets.

5 Applying lessons of adaptation target setting and monitoring to Scotland

5.1 Introduction

This section applies the international lessons from Section 4 to the Scottish context. It draws on insights from a two-round expert elicitation process (using a modified Delphi approach), which explored the credibility, feasibility and practical implications of different approaches to adaptation target-setting in Scotland. The process was designed to identify where expert perspectives converge, where they diverge, and how issues such as equity, uncertainty, governance and revision cycles should shape the development of future targets.

The analysis synthesises views expressed across both rounds and is organised around five core dimensions of adaptation target-setting: target design, governance, stakeholder engagement, system capacity and policy integration. These dimensions reflect the themes used in Section 4 while focusing specifically on their implications for Scotland.

Section 5.2 examines how adaptation targets should be designed, including their purpose, structure and measurement approaches. Section 5.3 considers governance arrangements required to ensure accountability and stability over time. Section 5.4 explores the roles of citizens, experts and government in shaping and legitimising targets. Section 5.5 examines the institutional capacity, resources and evidence systems required to support implementation. Finally, Section 5.6 considers how targets should be embedded within wider policy systems, including the role of scientific evidence, ambition and equity in guiding long-term adaptation pathways.

5.2 Designing adaptation targets for Scotland

Please note: quotes from Delphi survey participants are included in italics throughout Sections 5.2–5.6.

5.2.1 Targets should primarily function as tools to drive action and enable delivery

Across both survey rounds, participants consistently emphasised that adaptation targets should function first and foremost as mechanisms that trigger and support practical adaptation action. As one participant put it, "Targets should drive action on the ground and enable the conditions to make things happen – process, people, funding." Targets were viewed as tools to clarify priorities, direct resources and strengthen enabling conditions for delivery, such as skills, funding processes and long-term planning. Accountability was seen as an essential mechanism for encouraging timely action and enabling early corrective intervention when progress falls short**.** One participant noted that "being held to account is the overall motivator that will likely drive a lot of the other aspects."

Participants also stressed that high-quality targets must be designed with a clear understanding of their intended users. Targets aimed at ministers, public bodies or regulators require clarity and operational relevance that directly supports decision-making, resource allocation and compliance. As one participant explained, the "key purpose of [a] target should be to motivate action: by signalling to ministers and policy makers what needs to happen by when." These responses reinforce the view that adaptation targets should primarily guide behaviour and decision-making within government, rather than serving only to signal policy ambition or communicate priorities.

5.2.2 A layered, time-bound structure is preferred, in which long-term outcomes guide ambition and near-term delivery targets drive implementation.

There was strong support for an adaptation target framework operating across multiple time horizons. Long-term outcome or impact targets were seen as essential for articulating Scotland's resilience objectives and providing coherence across sectors and policy cycles. Near-term delivery or output targets were viewed as equally important for maintaining urgency, supporting accountability and making implementation progress visible. As one participant observed, "[it is] really important to have a mix of short, medium and long term focus for targets."

Views on medium-term stepping-stone or outcome targets were more tentative. While participants recognised their potential value for mapping adaptation pathways, they also

highlighted challenges in defining and evidencing them at present. Participants therefore favoured a phased structure, beginning with long-term outcomes and near-term delivery targets before expanding into more detailed pathway milestones over time. Several participants cautioned against over-specifying interim milestones prematurely, with one noting the importance of "don't pretend to know what you don't know."

5.2.3 A system-level Theory of Change is viewed as the most effective organising framework

Across both rounds, participants expressed strong support for using a system-level Theory of Change (ToC) to structure adaptation targets. A well-developed ToC was seen as an effective way to explain how near-term actions contribute to long-term outcomes, articulate causal pathways and make underlying assumptions explicit. As one participant explained, "A theory of change is a familiar tool… It would make clear the contribution of each output target to outcomes and impacts."

Participants emphasised that the ToC should be treated as a living tool that can evolve as evidence develops. They cautioned against overly linear models that risk creating false certainty within complex climate systems and highlighted the importance of focusing on contribution rather than strict attribution when assessing progress. Participants also noted that the assumptions underpinning the ToC are as important as the targets themselves and should be explicitly documented and revisited as learning accumulates. However, a minority cautioned that ToCs risk becoming symbolic or procedural exercises if they are not actively integrated into monitoring and evaluation processes.

5.2.4 "Clear and measurable" targets require a mixed-method approach rather than reliance on numbers alone

Participants demonstrated a nuanced understanding of what constitutes a clear and measurable adaptation target. While quantitative thresholds and indicators were valued where robust and meaningful, participants strongly rejected the idea that clarity depends solely on numerical precision. As one respondent noted, "Quantitative is always preferred… but qualitative measures can be used where appropriate and can be equally as informative if done robustly." This reflects the complexity and uncertainty inherent in adaptation and a desire to avoid false precision. Participants argued that clarity should derive from agreed criteria for assessing progress, consistent use of evidence and clear documentation of uncertainty, rather than from numerical targets alone.

Several participants also highlighted that numeric indicators can fluctuate in response to external shocks, such as extreme weather events, emphasising the importance of clear interpretive guidance when assessing progress. Qualitative tools such as narrative assessments were viewed as potentially valuable complements to quantitative indicators, provided they are structured using agreed rubrics and shared evidence standards.

5.2.5 Alignment with SNAP3 is essential, but targets should not be constrained by current indicators

Participants agreed that adaptation targets should be aligned with the SNAP3 monitoring, evaluation and learning framework in order to ensure coherence and continuity across policy cycles. However, they were equally clear that target development should not be

constrained by the existing indicator set. As one participant commented, “regarding SNAP indicators, my view is we shouldn’t restrict target development using current indicators.”

Participants therefore supported using SNAP3 as an organising frame while allowing flexibility to develop new indicators, fill measurement gaps and update monitoring approaches as the evidence base evolves. In this view, targets should be driven primarily by desired outcomes and actions rather than by what is currently easiest to measure.

5.2.6 Simplicity, manageability and phased development are critical for a credible target system

Finally, participants emphasised the importance of designing a target system that is simple, usable and manageable in practice. Overly complex frameworks risk obscuring priorities and making it harder for delivery bodies to engage meaningfully with the system.

Participants therefore recommended starting with a minimum viable set of targets focused on the most significant outcomes and actions and expanding the framework over time as evidence and monitoring approaches develop. As one participant cautioned, attempts to construct highly detailed target hierarchies too early risk producing “a complicated system of targets that is full of holes and compromises and doesn’t really work.” Keeping the system focused and proportionate was therefore seen as an important safeguard against excessive complexity and a way of ensuring that targets support, rather than distract from, practical adaptation delivery.

5.3 Governance and accountability

5.3.1 Review cycles should be stable, statutory and tightly governed, with only narrowly defined exceptions

Participants strongly favoured a tightly bounded governance model in which fixed statutory review cycles provide the core accountability framework for adaptation targets. These cycles were valued for providing stability and predictability, helping ensure that adaptation commitments remain visible and are not displaced by competing policy priorities. Several participants highlighted the practical importance of fixed review schedules, noting that “continuous / ad hoc updating of targets will undermine confidence so better to operate on a transparent fixed review period.”

Similarly, respondents emphasised that stable review cycles allow sufficient time and resources for meaningful evaluation and delivery. As one participant observed, “fixed timescales are easier to plan for.” Another noted that “rolling and evidence-triggered updates sounds fraught… and vulnerable to being ignored / kicked into the long grass.”

While most participants accepted that reviews outside the statutory cycle could be justified in exceptional circumstances, they emphasised that such triggers should be narrowly defined and externally driven. For example, one respondent noted that “external conditions should also include climate disasters.” However, participants were generally resistant to revisiting targets routinely or in response to short-term performance issues. One participant argued that “[there is] not much point having targets if we are to simply adjust them to fit current (under) performance.”

Across both Delphi rounds, respondents drew a clear distinction between adapting delivery in response to learning and revising the targets themselves. Participants emphasised that learning processes should strengthen implementation rather than weaken ambition. As one participant noted, “revising targets downward is not something I like at all… it allows the underperformance to continue.”

Round 2 responses also highlighted the need for safeguards to maintain credibility when out-of-cycle reviews occur. Transparency and independent scrutiny were widely viewed as essential. One participant emphasised the value of “independent QA and publishing reviews… to ensure full transparency of the reasoning behind any changes.” Another highlighted that independence is important “to mitigate against the risk of political influence on targets.” Participants also stressed that criteria for exceptional review should be clearly defined. As one respondent noted, “the definition of exceptional circumstances should be extremely strict – financial restraints… should not be considered exceptional circumstances.”

5.3.2 Learning and monitoring should be continuous, while formal target revision remains infrequent

Across both rounds, participants emphasised that monitoring and learning should occur continuously even when formal revision of targets takes place only at fixed statutory intervals. Respondents highlighted the importance of routine assessment processes to track progress, identify emerging risks and support implementation. One participant commented that “there is a role… for continued (annual) assessments… we can’t wait 5 years.”

Such processes were seen as important for improving delivery and strengthening accountability between formal review cycles. However, participants emphasised that learning-driven adjustments should primarily influence implementation decisions rather than the targets themselves. This reflects a widely shared view that flexibility in delivery is appropriate, whereas flexibility in target ambition risks weakening the accountability function of the system.

5.3.3 Governance should combine central coordination with distributed delivery responsibility

The Delphi findings indicate strong support for governance arrangements that combine central coordination with distributed responsibility for delivery. Adaptation was widely understood as a cross-cutting policy challenge involving multiple sectors and institutions, making purely centralised or purely decentralised governance models difficult to sustain. As one participant explained, “required action is so varied and spread across multiple agents. Responsibility has to fall to those actively involved in delivery… though coordination within a central team [is] also necessary.” Similarly, another respondent described the preferred model as “somewhere in between central authority with distributed delivery autonomy.”

Across responses, participants emphasised that central coordination is important for maintaining coherence, transparency and momentum across the adaptation system, while sector-specific actors remain best placed to understand risks, operational constraints and delivery pathways within their respective domains. Participants therefore emphasised that central authority should focus primarily on coordination, oversight and accountability rather than direct operational control. As one respondent noted, “coordination is important to

ensure consistency, transparency and timeliness. However individual areas will be best placed to understand what appropriate targets would look like and how to manage progress."

5.4 Stakeholder engagement

5.4.1 Citizens and communities should shape early problem-framing and value-based decisions

Participants emphasised that citizens and communities have an important role in the early, value-based stages of adaptation target setting. Engagement was seen as particularly valuable when defining the problem, articulating what resilience should mean for Scotland and identifying whose risks and needs should be prioritised. Participants viewed lived experience as important for informing societal trade-offs and considerations of fairness in decisions about who benefits from adaptation and who bears the costs. Several respondents emphasised that citizen engagement is most meaningful during early scoping stages. As one participant noted, "I think citizens should be engaged at the start to scope the targets needed."

Participants were more cautious about citizen influence in technically complex stages of the process, such as defining acceptable levels of climate risk or determining detailed implementation pathways. Some respondents emphasised the technical nature of these decisions, with one commenting on the risk of "the tyranny of participation… this strikes me as extremely technical work." Citizen and community engagement was therefore widely viewed as most valuable where societal values and lived experience are central to decision-making, rather than across every stage of target design.

5.4.2 Experts and technical specialists should have sustained influence across all stages

Across both Delphi rounds, participants consistently supported a strong role for experts and technical specialists throughout the adaptation target-setting process. Expert involvement was seen as particularly important when interpreting complex evidence, assessing climate risks, understanding system interdependencies and identifying feasible pathways for adaptation. As one participant observed, "Co-creation with experts will make better, evidence based targets. Co-creation with the public will make them participatory and more socially acceptable." At the same time, respondents emphasised that expert influence should complement rather than replace societal perspectives. As one participant explained, "experts and communities can and should have a role, but these are also political decisions and choices that ministers need to own." Participants also noted that meaningful engagement requires time and facilitation skills. One respondent commented that while community perspectives are important, "few are well enough informed to do so meaningfully at the current time."

5.4.3 Engagement should be meaningful, proportionate and focused where it adds the most value

Participants emphasised that engagement processes should be purposeful, proportionate and clearly designed. Meaningful participation was valued more highly than broad but

superficial engagement. Poorly designed processes were seen as risks to trust and legitimacy, while excessive consultation could lead to stakeholder fatigue.

Several participants highlighted the technical complexity of adaptation decision-making, noting that individuals may struggle to engage meaningfully with highly specialised policy discussions. One respondent noted that "individuals in isolation will have little concept of the big picture or be able to weigh trades offs objectively." Participants therefore emphasised the importance of focusing engagement where it adds the most value, particularly when decisions involve social trade-offs or distributive impacts.

5.4.4 Government must retain final decision-making authority

Participants were clear that engagement should inform, rather than replace, democratic accountability. Adaptation targets were widely understood as political choices that require ministerial ownership and responsibility.

As one participant stated, "Scottish Government needs to take responsibility for targets, with ongoing engagement with technical experts." In this view, engagement processes should help inform decisions and improve legitimacy but should not replace the formal accountability of government institutions.

5.4.5 Transparency about roles, purpose and influence is essential for legitimacy and trust

Finally, participants emphasised the importance of transparency about who participates in target-setting processes and how their input influences decisions. Clear communication about the purpose and scope of engagement was seen as essential for maintaining trust and avoiding unrealistic expectations about the role of different actors. Without clarity about roles and influence, engagement processes risk creating confusion or undermining confidence in the legitimacy of the target-setting process. Ensuring transparency about how citizen, expert and government roles interact was therefore viewed as an important element of credible governance for adaptation targets.

5.5 System capacity, resources and feasibility

5.5.1 Limited institutional capacity and uneven system readiness constrain delivery

Participants repeatedly highlighted that Scotland's adaptation system faces significant capacity constraints across central government, agencies and delivery partners. These constraints include shortages of specialist expertise, limited analytical and modelling capability, restricted staff time and competing statutory obligations. As one participant noted, "capacity in many organisations [is too limited] to allow things to be done differently rather than just continuing as normal because that's all people have time to do."

Participants also observed that levels of readiness vary significantly across sectors. Some areas of policy and practice already have clearer evidence bases and established delivery pathways, while others remain at earlier stages of development. This uneven readiness creates challenges for implementing consistent target frameworks across the adaptation system.

5.5.2 Resourcing gaps and uncertain funding undermine delivery and monitoring

Adaptation was widely perceived as under-resourced relative to the scale of climate risk. Many also emphasised that credible targets require sustained financial and institutional support for planning, delivery and monitoring activities. Several respondents highlighted the importance of stable funding to support long-term capability building. As one participant observed, "near term funding and high ambition gives confidence to stakeholders."

However, participants stressed that resource constraints should not be used to justify weakening adaptation ambition. One respondent argued that "[we] can't just weaken the target because we have underdelivered otherwise no accountability and makes the targets meaningless." These responses highlight the tension between the scale of adaptation ambition and the current level of resources available to support implementation.

5.5.3 Evidence gaps and weak baselines limit what can be targeted at present

Participants identified substantial evidence gaps across many areas of adaptation monitoring and evaluation. In particular, respondents highlighted challenges associated with defining robust baselines, identifying appropriate indicators and measuring long-term adaptation outcomes. Several respondents cautioned against creating false precision when evidence remains limited. Participants emphasised that attempts to set precise quantitative targets without adequate evidence could produce misleading performance signals or unintended consequences. External shocks, such as extreme weather events, may also affect measured outcomes in ways that do not directly reflect progress in adaptation.

These challenges reinforce the importance of developing stronger data systems and analytical capabilities over time. Brooks *et al*. (2019) highlight emerging approaches within adaptation monitoring frameworks, including anomaly-based indicators, climate-adjusted baselines and counterfactual methods that estimate losses relative to expected climate conditions[4]. However, their operational application remains limited by data availability and modelling uncertainty. Participants therefore emphasised the need for measurement approaches that combine different types of evidence. As one respondent noted, *"*ideally we want a mix of unambiguous numeric targets and more qualitative assessments to bring depth and nuance."

5.5.4 Over-complex target systems risk overwhelming delivery organisations

[4] Examples of potential methodological approaches discussed in the wider literature (including Brooks et al. 2019) include anomaly-based indicators, climate-adjusted baselines, and counterfactual techniques that estimate losses relative to expected climate conditions. Other strands of work explore identifying thresholds in climate variables above which impacts escalate rapidly (e.g. temperature thresholds associated with heat-related mortality; McMichael et al. 2008; Gasparrini et al. 2015). These approaches remain constrained by data limitations, modelling uncertainty and the need for context-specific calibration.

Participants consistently warned that overly complex target architectures could place excessive administrative burdens on delivery organisations. Risks identified included increased reporting requirements, fragmentation across sectors and diversion of staff time away from practical implementation. Several respondents highlighted the risk that complex frameworks could undermine usability. Participants therefore emphasised the importance of simplicity and clarity in target system design so that institutions responsible for delivery can engage effectively with the framework.

5.5.5 Feasible implementation requires prioritisation and phased development

Participants emphasised that a credible target system must reflect the current level of institutional capacity and evidence availability within Scotland's adaptation system. Several respondents noted that meaningful implementation would require changes in organisational practices and capabilities.

A phased approach to target development was widely supported. Participants suggested beginning with a limited number of high-priority targets and expanding the framework as analytical capabilities, monitoring systems and evidence bases improve. Breaking longer-term objectives into manageable steps was also viewed as important for sustaining delivery momentum. As one participant observed, "breaking the required action… down into achievable blocks."

Participants also noted that medium-term milestones may remain difficult to define in the near term. One respondent commented that "medium-term targets are less important than doing short and long term targets well." Together, these responses suggest that prioritisation, sequencing and iterative development will be essential for implementing a credible adaptation target system under current institutional conditions.

5.6 Embedding targets in policy systems

5.6.1 Scientific evidence should actively structure adaptation targets, with hazard- and risk-based approaches strongly preferred

Across the Delphi process, participants emphasised that scientific evidence should play a central role in structuring adaptation targets. Several respondents stressed that "scientific evidence must feature to ensure targets remain up to date as new evidence of risks emerges." Participants highlighted the importance of linking targets directly to climate risks, including through the use of climate projections, hazard modelling and risk assessments. Hazard-based framing was seen as particularly valuable because it connects climate science with concrete policy outcomes. As one participant explained, hazard-based approaches help demonstrate the need to invest in resilience measures that address climate hazards and their impacts on people and infrastructure.

Participants also emphasised that targets must be sufficiently precise to guide action and accountability. As one respondent noted, "a target should be a target, not a rough idea." At the same time, respondents recognised that some aspects of adaptation cannot be captured through single numerical indicators. As discussed in earlier sections, qualitative or proxy-based measures may sometimes be necessary, provided they are embedded within a broader risk-based framework and accompanied by clear criteria for assessing progress.

5.6.2 Targets should evolve with new evidence through orderly and transparent processes

Participants widely agreed that adaptation targets must be able to respond to significant developments in scientific knowledge. As one respondent noted, “we need to adapt as new evidence comes to light.” However, participants were equally clear that constant or ad hoc revision of targets could undermine credibility and create uncertainty. One respondent observed that even evidence-triggered revisions can generate instability because “nobody knows when new evidence will arise.”

Participants therefore favoured an approach in which scientific evidence is continuously monitored, while formal revision of targets occurs through established governance processes. Stability was widely seen as an important feature of credible target systems. As one participant commented, “five years isn’t that long… stability is important.” In this approach, scientific evidence plays an ongoing role in informing implementation and interpretation of targets, while formal revisions occur through predictable and transparent review processes.

5.6.3 Ambition should lead, even where evidence and delivery capacity are still developing

Participants consistently emphasised the importance of maintaining ambitious adaptation targets, even where evidence and delivery systems are still evolving. Respondents frequently described ambition as necessary for signalling long-term direction and driving policy momentum. As one participant noted, “there needs to be long term ambition… based around the desire for a resilient society.” At the same time, participants emphasised that ambition should be structured in ways that support credible implementation. Near-term targets should remain achievable in order to build confidence and sustain delivery momentum. As one respondent explained, “targets must be achievable in the short term to build engagement and trust.” Participants also emphasised that uncertainty in the evidence base should not prevent action.

Several respondents argued that adaptation policy should follow precautionary principles when knowledge is incomplete. One participant stated directly that Scotland should “abide by precautionary principle when evidence is lacking.”

5.6.4 Ambition must be differentiated across sectors

Participants emphasised that adaptation risks, evidence bases and delivery systems vary substantially across sectors. As one respondent noted, “assuming all sectors have similar levels of risk, capacity or resource is not realistic.” A uniform approach to ambition was therefore widely viewed as impractical. Participants highlighted the diversity of adaptation challenges across sectors and the need to tailor targets to different contexts. As one participant explained, “it may be hard to have a consistent level of ambition when dealing with different contexts and complexities.” Participants therefore supported maintaining high overall ambition while allowing sector-specific targets to reflect differing risks, knowledge bases and delivery pathways.

5.6.5 Equity should shape adaptation ambition rather than being treated as a separate objective

Participants emphasised that equity and justice considerations should be embedded within adaptation targets rather than addressed through separate or stand-alone objectives. As one respondent explained, “equity/justice are inherent in becoming more climate resilience – so aren't at odds with being very ambitious.”

In practice, participants suggested that equity considerations should influence how adaptation ambition is applied across sectors and communities. This could involve prioritising protection for groups facing higher vulnerability or exposure to climate risks or evaluating whether adaptation efforts reduce or reinforce existing inequalities.

Participants also emphasised the importance of transparency in how equity considerations are applied. One respondent highlighted the need for “central monitoring that equity is covered.” Embedding equity within adaptation targets was therefore seen as an important way of ensuring that resilience-building efforts contribute to broader social outcomes.

6 Conclusions and forward directions

The evidence from the literature, international practice and stakeholder engagement points to a clear conclusion. Effective adaptation target-setting depends as much on governance, capacity and delivery systems as on technical design. Across jurisdictions, targets work best when they are clearly defined, aligned with institutional responsibilities, embedded in delivery systems and supported by robust monitoring and review. The challenge for Scotland is not whether to set adaptation targets, but how to design them so they are credible, deliverable and aligned with how government operates.

This study combined evidence from international literature, policy review, stakeholder interviews and a two-round Delphi process to identify how adaptation targets can be designed and implemented in practice. This process identified areas of convergence and divergence in how these findings could be applied to adaptation target-setting in Scotland.

There was strong consensus across the evidence on several core features of effective adaptation targets. Agreement was particularly clear on the purpose of targets (to drive action), the value of a layered structure linking long-term outcomes with near-term delivery actions, the importance of hazard- and risk-based evidence and the role of hybrid governance combining central coordination with sectoral delivery responsibility. Participants also agreed on the use of statutory cycles for regular review, the rejection of continuous or ad-hoc revision, the use of mixed quantitative and qualitative evidence and the importance of proportionality and phased development. There was also agreement that equity should shape target ambition rather than sit in stand-alone targets.

Where views diverged, this was usually due to practical constraints rather than differences in principle. For example, participants broadly recognised the potential value of medium-term stepping-stone targets and more sophisticated risk-based metrics, but many emphasised evidence gaps, data limitations and uneven sectoral readiness that make them difficult to implement immediately. Several therefore favoured prioritising long-term outcomes and near-term delivery targets initially, with medium-term milestones introduced as monitoring systems and evidence bases mature. Similarly, while participants broadly supported public engagement in value-based questions, views varied on how far citizens should be involved in technically complex or ongoing decision-making processes.

These findings indicate that adaptation target-setting is constrained less by conceptual disagreement and more by limitations in data, capacity and institutional readiness. In several areas, views were conditional or context-specific rather than reflecting full agreement. Participants generally shared similar underlying principles but differed in how these should be applied in practice depending on institutional capacity, sectoral context or the stage of framework development. The clearest examples of context-dependent consensus related to:

- The degree of central authority. Although a fully distributed model was widely rejected, participants differed in how strong central coordination should be. Many responses emphasised that the appropriate balance between central oversight and sectoral autonomy would depend on the policy area, delivery responsibilities and existing governance arrangements.
- The balance between simplicity and completeness. Participants broadly agreed that target systems should remain usable and manageable. However, views differed on how streamlined the initial architecture should be. Some favoured a minimal set of high-priority targets to maintain clarity and reduce administrative burden, while others supported more detailed structures provided they remained practical for delivery institutions.
- The design and timing of medium-term stepping-stone targets. While their potential value for mapping adaptation pathways was widely recognised, participants differed in their views on when and how such milestones should be introduced. Many emphasised that their feasibility would depend on improvements in monitoring systems, baselines and analytical capability.

6.1 On Design principles for setting adaptation targets

These findings translate into a set of nine practical principles for designing adaptation targets that are credible, deliverable and aligned with Scotland's institutional context.

Target design:

1. **Design targets to drive action.** Targets should clearly specify who must act, by when, and on what basis. A layered structure should link long-term outcomes with near-term delivery actions.
2. **Embed scientific and hazard-based evidence at the core of target design.** Climate projections, hazard modelling and risk assessments should inform ambition-setting and prioritisation, with mechanisms to manage evolving evidence and uncertainty.
3. **Balance ambition with feasibility through phased development.** Initial frameworks should focus on a limited number of high-value targets and expand as data, analytical capability and monitoring systems mature.
4. **Use mixed measurement approaches where evidence is incomplete.** Structured qualitative, proxy or provisional indicators can be used where data are limited, provided they are applied transparently and embedded within a wider science-led framework.

Governance and review:

5. **Integrate equity directly into ambition-setting and evaluation.** Adaptation targets should reflect differences in vulnerability and exposure, including higher protection standards or accelerated timelines for communities facing greater risk.
6. **Ensure targets remain interpretable and usable, avoiding unnecessary complexity.** Target systems should be simple enough to guide decision-making while robust enough to support meaningful assessment of progress.
7. **Provide clear and predictable review processes.** Continuous monitoring of evidence should be combined with formal revisions tied to statutory review cycles and narrowly defined exceptional triggers.

Implementation feasibility

8. **Design within system capacity.** Target frameworks should reflect current institutional capability and develop incrementally so that targets remain actionable rather than symbolic.
9. **Align targets with wider policy systems.** Adaptation targets should be coherent with strategies across climate, nature, land, water, health and infrastructure, supported by central stewardship and sectoral delivery roles.

Together, these principles define the conditions under which adaptation targets can move beyond aspiration to shape decisions, investment and delivery across Scotland's adaptation system.

6.2 Policy implications for adaptation target-setting in Scotland

The findings suggest that effective target-setting depends not only on technical design choices but also on strengthening institutional capability, governance arrangements and cross-sector coordination. The following actions highlight priority areas where policy development and institutional investment would support the creation of credible, ambitious and implementable adaptation targets.

1. **Establish a phased, layered adaptation target framework.**

   Begin with a small number of high-value targets linking long-term outcomes with near-term delivery actions, supported by a Theory of Change that clarifies pathways, assumptions and cross-sector linkages. Expand into medium-term milestones as evidence, baselines and monitoring systems mature.

2. **Integrate hazard- and risk-based evidence into target development.**

   Strengthen the use of climate projections, hazard modelling and national risk assessments to provide a consistent scientific basis for ambition-setting, prioritisation and evaluation.

3. **Anchor revision processes in statutory cycles with tightly governed flexibility.**

   Maintain five-year statutory review points as the primary mechanism for updating targets, with exceptional revisions permitted only when predefined, transparent and evidence-based triggers are met.

4. **Embed equity within target ambition and delivery.**

   Ensure that vulnerability and exposure influence the level of ambition, timelines and resource allocation. Central oversight can help maintain consistency while allowing sectoral and local tailoring.

5. **Strengthen analytical, modelling and monitoring capability.**

   Investment is needed to improve baselines, close evidence gaps, strengthen climate information and support the development of risk-based and mixed-method indicators.

6. **Adopt mixed-method assessment frameworks.**

   Develop clear success criteria, interpretive guidance and structured qualitative tools so that progress can be assessed fairly, particularly where metrics are influenced by climate variability.

7. **Prioritise simplicity and usability in target system design.**

   Avoid overly complex architectures or reporting burdens. Focus on the most material risks and outcomes so the framework remains manageable within existing capacity.

8. **Strengthen cross-government coordination and coherence.**

   Ensure adaptation targets align with related strategies across climate, nature, land, water, health and infrastructure, supported by central stewardship and sectoral delivery responsibilities.

9. **Develop transparent engagement pathways.**

   Clarify the roles of citizens, experts and delivery partners in shaping and implementing targets, while ensuring government retains accountability for final decisions.

10. **Provide stable, multi-year funding for implementation.**

    Long-term investment will be required to support capacity building, data systems, analytical functions and the practical delivery of adaptation targets across sectors.

In practice, developing effective adaptation targets in Scotland will require sustained institutional investment, clear governance arrangements and a phased approach that aligns ambition with delivery capacity.

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8 Appendices

Appendix A Review Methodology

Sampling methodology for selecting national-level jurisdictions

Estimates suggest that, as of 2024, 171 countries (87%) have at least one national adaptation planning instrument in place (Adaptation Gap Report 2024). However, no single repository provides comprehensive information on which include monitoring, evaluation and learning (MEL) systems, or have established adaptation targets.

To identify the countries that are most likely to have developed adaptation targets, we began from two assumptions:

1. Planning instruments without a MEL framework are unlikely to have adaptation targets, so we first identified countries with established MEL systems.
2. The more advanced the MEL system, the more likely it is to include adaptation targets.

Using these assumptions, we developed a four-step process to identify the national jurisdictions with well-developed MEL systems.

Step I: Identify national jurisdictions that submitted a NAP to the UNFCC and developed a MEL framework

Using the NAP Global Network Trends database, we identified:

- 62 countries that have submitted a National Adaptation Plan (NAP) to the UNFCCC.
- Among these, countries that have:
  - Developed a supporting MEL framework (45 countries)
  - Established MEL indicators (41 countries)
  - Committed to progress reporting, indicating advancement of their MEL system (52 countries)

Step II: Identify additional jurisdictions with MEL systems not submitted to UNFCCC

Because many high-income countries do not submit adaptation plans to the UNFCCC, additional sources were required.

- Using Leiter *et al*. (2021)[5], we identified additional countries that have developed a MEL system for their adaptation instrument, even if these instruments were not submitted to the UNFCCC.

[5] Leiter, T., Olhoff, A., Al Azar, R., & Barmby, V. (2021). Adaptation Monitoring, Evaluation and Learning (MEL) Systems: Strengthening Climate Resilience Through Evidence-Based Decision-Making. United Nations Development Programme (UNDP) and German Development Cooperation (GIZ). This study systematically reviewed national adaptation monitoring, evaluation, and learning (MEL) systems worldwide. It provides a comparative

- We also used the categorisation described in the same source to determine the stage of development of each country's MEL system i.e.
    - Starting Intention
    - Early Stage
    - Development Stalled
    - Advanced Stage
    - NAP M&E System Approved
    - Progress Report Published
    - Evaluation Published

Step III: Identify countries that have published NAP progress reports

- A published NAP progress report indicates that a country is more likely to have a well-developed and actively used MEL system, recognizing that reporting is only one component of MEL and may not fully reflect the existence of formal MEL frameworks, indicators, or processes. Using the UNEP Adaptation Gap Report (2024), we identified countries that have publicly available NAP progress reports.

Step IV: Select national jurisdictions with well-developed MEL systems and characteristics similar to Scotland

- Using the combined results from Steps I–III, we identified **47 jurisdictions** with the strongest evidence of well-developed MEL systems.
- We then used a Large Language Model (LLM) to compare these jurisdictions with Scotland, assessing the degree of similarity across relevant characteristics specifically governance structures, socio-economic features and institutional arrangements.
- Based on this analysis, we selected 22 jurisdictions for further examination.

The 22 national jurisdictions selected for further analysis were:

Austria, Belgium, Brazil, Canada, Chile, Czech Republic, Finland, France, Germany, Ireland, Japan, Kenya, Netherlands, New Zealand, Norway, Philippines, South Africa, Spain, Switzerland, South Korea, Thailand, Rwanda

These jurisdictions were examined in detail to determine whether their adaptation instruments included specific targets.

Limitations

- Some countries may have updated their adaptation plans since Leiter *et al*. (2021) and could therefore have developed new or revised MEL frameworks and targets since then.

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overview of how different countries design, implement and institutionalise MEL systems for climate change adaptation, whether or not they have submitted a National Adaptation Plan (NAP) to the UNFCCC. It provides a standardised typology of MEL system development stages, allowing for consistent comparison across countries and thus complements the UNFCCC and NAP Global Network data.

- Adaptation plans do not always explicitly include a MEL framework. While reasonable effort was made to identify such frameworks, through primary and secondary sources, some may have been overlooked or unavailable publicly.

Sampling methodology for selecting subnational-level jurisdictions

The review of national adaptation plans revealed that few included explicit targets. Following discussion with the project steering committee, the scope of analysis was expanded to include subnational jurisdictions.

Evidence suggests that, while European cities are increasingly developing MEL systems, quantified targets are still uncommon.

The **European Environment Agency (EEA)** report *Urban adaptation in Europe* shows that although cities and regions are developing monitoring and evaluation indicators and tools, only 55% of European local climate action plans include metrics that could measure progress. Of these, 72% focus on action outputs rather than targets or outcomes. Only 2% of indicators were linked to specific targets (Ramboll, 2024 in EEA 2024. Urban adaptation in Europe: what works? Implementing climate action in European cities. EEA Report 14/2023). The report also stresses that more tangible local targets are needed to measure progress and enable effective scaling of adaptation efforts.

A 2022 study by Gancheva, Lundberg and Vroom (*Climate adaptation: Measuring performance, defining targets and ensuring sustainability European Union*) reviewed the adaption plans of three cities (Athens, Kielce and Stockholm) and two regions (Flanders and North Rhine-Westphalia), finding broad objectives but no clear quantitative targets.

Given this context we took a purposeful sampling approach drawing on:

- suggestions from within the research team, CXC and the Scottish Government team.
- literature from the review in Phase 1 identifying cities with more advanced MEL systems
- expert input including informal insight from one of the authors of the Ramboll, 2024 publication (informally) who identified cities known to have set targets.

Based on this process and together with the steering committee we identified 8 cities and 1 region to research further.

Barcelona, Boston, Copenhagen, Hamburg, Helsinki, Lisbon, Paris, Bydgoszcz, and California.

Appendix B Framework for analysing the development of national climate adaptation targets

Framework feature / characteristic	Questions for analysis[6]
Status	• What is level or status of development and operationalisation of national/regional/sectoral adaptation targets?
Governance of target development	• What governance structures did countries/ regions/ sectors establish to develop targets? • Was there a dedicated coordination body? • Were existing institutions used as a coordination body, or was a new body(ies) created? • Which ministries led the process? • How were subnational governments involved? • Accountability and transparency? E.g. How are targets monitored and reported? Are mechanisms in place to revise targets if circumstances change?
Purpose/motivation	• What was the rationale for the establishment of the target? • Did any formal policy mandates or legal frameworks guide target development? • Are targets reactive (addressing existing risks) or proactive (anticipating future risks)?
Political economy and decision-making dynamics	• How have political priorities shaped target selection? • How are conflicts between economic priorities and adaptation needs managed? • Are there examples of lobbying or vested interests shaping targets? • How do targets reflect genuine adaptation needs or political feasibility? • What role have donor requirements played (especially for developing countries) in setting targets?
Stakeholder engagement approach	• Which sectors, civil society groups, academia, and private sector actors were involved in helping set national adaption targets? • What was the breadth and depth of participation to develop targets? • What consultation methods were used (workshops, surveys, technical committees)? • How were different stakeholder voices weighted in decision-making for setting / developing targets?

[6] These are the set of questions to guide enquiry and analysis of the adaption target development process. They will form the basis of the semi-structured interviews with policymakers and technical experts from selected jurisdictions. All the questions within each framework feature may not be answered.

Framework feature / characteristic	Questions for analysis[6]
	• Inclusion - Were marginalised or vulnerable populations consulted? How were trade-offs between stakeholder interests resolved?
Technical and scientific foundation	• What climate science / vulnerability / risk assessments informed target development and selection? • How were priority risks considered in the development and selection of targets? • How was risk tolerance or risk appetite considered, were accepted levels of risk considered? For example, 'What level of disruption are we willing to accept', such as road closures? • Were targets aligned with latest climate scenarios (which? e.g. 1.5°C, 2°C, 4°C pathways low probability worst case (high consequence) scenarios)? • Were adaptation limits considered (what is technically feasible vs. aspirational)?
Resource and capacity considerations	• Were implementation capacity, financial resources and technical/institutional capabilities, considered when developing and setting targets? • Were costing exercises carried out as part of the process of developing and setting targets? • Were financing commitments secured as part of the process of developing and setting targets? • Do resource allocations match the scale and ambition of targets? Were trade-offs between achievable vs. aspirational targets assessed?
Timeline and Sequencing	• What was the speed and pacing of the target development process? • How did (international) deadlines affect the process? • How did the process allow for iterative refinement? • Was time allowed for target validation? • Can targets be updated based on monitoring and evaluation?
Influences and learning	• What role have international frameworks, donor requirements, or peer country experiences played in shaping the approach and selection of targets?
Integration and coherence with existing planning	• How did target-setting connect with existing national development planning, sectoral strategies, regional or global targets, risk reduction planning or budgetary processes? Or was the target-setting process carried out in isolation?
Quality and characteristics of targets	• What makes a good target? • What are the characteristics of the targets that have been developed?

Framework feature / characteristic	Questions for analysis[6]
	○ Outcome targets: Measurable reductions in climate risk or vulnerability (e.g. "reduce flood risk to X% of population by 2030") ○ Process targets: Implementation milestones for adaptation measures (e.g. "establish early warning systems in all vulnerable districts by 2028") ○ Capacity targets: Building institutional and technical capabilities (e.g. "train 500 agricultural extension workers in climate-smart practices") ○ Investment targets: Financial commitments for adaptation infrastructure and programs • How specific, measurable, time-bound are the targets? • Are targets cross-sectoral?

Appendix C Topic Guide for Key Informant Interviews

We developed a list of interview questions to guide key informant discussions, selecting a tailored subset for each participant based on their role and experience with adaptation target setting. Interviews lasted 45–60 minutes and followed a semi-structured format: each had a customised topic guide to steer the conversation, but interviewers followed participant responses flexibly, meaning not all questions were asked in every case.

Ethical Considerations

Informed written consent was obtained from all participants prior to interview. Each participant received a consent form in advance, which they reviewed, digitally signed and returned. At the start of every interview, verbal consent was also confirmed to ensure participants were fully aware of the purpose of the research and their rights.

Topic Guide with full questions

Thank you for agreeing to take part in this interview. Before we begin, I'd like to briefly remind you of the purpose of our conversation.

This interview is part of research on setting and monitoring adaptation targets, carried out to inform how the Scottish Government measures its progress on adaptation and resilience. We are interested in hearing your perspective on how adaptation targets have, or have not, been developed in your country [*or city]*.

Your participation is voluntary. You can skip any question or stop the interview at any time. With your permission, I would like to take notes and/or record the conversation. Everything you share will be confidential and used only for the purposes of this research. The interview will take around 45–60 minutes.

Before we start:

- Do you have any questions about the research?
- Can we confirm that you have received, signed, and returned the consent form?

- Do you feel comfortable proceeding?

	Theme	Possible questions
1.	**Introduction**	• Can you describe your role in [jurisdiction] and your responsibilities for adaptation target-setting?
2.	**Defining and framing adaptation targets**	• In your view, what makes a "good" adaptation target? • How did you come to this view?
3.	**Status and development process**	• What is the current status of adaptation target-setting in your context (e.g. pre-development, in development, implemented, evaluated)? • What steps have been taken so far, and what remains to be done? • How are targets refined over time? (e.g. through monitoring, evaluation, or other mechanisms)
3.	**Status and development process**	• What is the current status of adaptation target-setting in your context (e.g. pre-development, in development, implemented, evaluated)? • What steps have been taken so far, and what remains to be done? • How are targets refined over time? (e.g. through monitoring, evaluation, or other mechanisms)

4.	**Quality and characteristics of targets**	**Nature and level of targets**
		• How would you describe the adaptation targets that have been developed for your jurisdiction?
		• At what level are these targets set (e.g. activity, output, outcome, or impact)?
		• What type of targets are they (e.g. process, capacity, investment)?
		Design of targets
		• Are the targets measurable and time-bound?
		• Are they set within individual sectors, or are they designed to be cross-sectoral?
		• What influenced the decision to set these particular types of targets?
		Purpose of targets
		• Would you describe the targets as:
		  ○ Milestones (markers of progress along the way), or
		  ○ End outcomes (specific results to be achieved)?

	Theme	Possible questions
		• Why was this approach chosen?
5.	**Purpose and motivations**	**Drivers of target setting** • What motivated the development of these targets? • Were they introduced because of policy mandates, legal requirements, or political priorities? • Are any targets required by law? **Agreement and support** • To what extent was there shared agreement on the need for targets? • If persuasion was needed, how was buy-in achieved? **Nature of response** • Would you say the targets are mainly: • Reactive, responding to existing risks, or • Proactive, anticipating future risks? • Note: some targets, such as those on finance or capacity building, may not directly link to specific risks. In these cases, how would you describe their purpose? **Influence of purpose** • Has setting targets helped inform required spending on adaptation (public or public and private)? • How did the purpose and motivation behind target setting influence the types of targets chosen?
6.	**Integration and coherence**	**National and sectoral alignment** • How did the process of developing targets take account of existing national plans and sectoral strategies? **International alignment** • To what extent are the targets aligned with, or influenced by, international frameworks (e.g. SDGs, Sendai Framework, Convention on Biological Diversity)? • Were indicators or objectives from these frameworks used or adapted to help streamline reporting at the national level?
7.	**Governance and institutions**	• Which government department or team led the target-setting process, and why? • What challenges did this team face, and how were they overcome? • What roles did other ministries, agencies, or subnational governments play?

	Theme	Possible questions
		• Were there challenges in coordinating across these actors, and how were they addressed? • Who is responsible for ensuring targets are met? • How often is progress reported, and why was this schedule chosen?
8.	**Political economy and decision-making**	• How have political, economic, or funding considerations influenced the development of targets? • Were there tensions between scientific recommendations and political feasibility? If so, how were these managed? • How were equity, justice, and vulnerable groups considered when developing targets? • Did these considerations affect the design or measurement of targets?
9.	**Stakeholder engagement**	**Process and participation** • Can you describe the process of stakeholder engagement (if any) in developing the targets? • Other than government, who was involved (e.g. civil society, academia, private sector)? **Challenges and influence** • What challenges arose during stakeholder engagement, and what helped to overcome them? • How influential was stakeholder participation in shaping the targets? (In what areas was their input most significant?) **Balancing priorities** • How were trade-offs managed—both between different stakeholder interests and between stakeholder priorities and the need to address future or uncertain climate risks?
10.	**Knowledge and technical capacity**	**Use of evidence** • What scientific evidence or risk assessments informed target-setting? • What challenges arose in using this type of evidence, and how were they overcome? **Risk and decision-making** • How has the idea of risk tolerance or acceptable risk levels been considered? • How have targets been shaped by the need to balance risk and affordability? (Can you share any examples?)

	Theme	Possible questions
		• Given that climate risks evolve in uncertain and sometimes unexpected ways, how has target-setting addressed uncertainty, and what provisions exist to revise targets as risks change? **Technical capacity** • How did team capacity or technical expertise influence the types of targets that were set? • Where did the technical expertise come from?
11.	**Resources and feasibility**	• How did financial, technical, or institutional capacities influence target-setting? • Were costing exercises or financing commitments part of the process? • What challenges or trade-offs arose between the level of ambition and available resources?
12.	**Timeline and sequencing**	• What have been the key milestones or steps in setting targets? • Were any steps particularly challenging, and how were these challenges addressed? • How have external deadlines (e.g. international reporting) influenced the pace or design of targets?
	Final reflections and closing	• Looking back, what would you do differently if you were to go through this process again? • What do you consider the key enablers of success in your approach to setting and managing targets? **Closing Remarks** • Thank you for your participation. We are conducting similar interviews with other jurisdictions. Your responses will be anonymised and collated to help inform the Scottish Government's approach to adaptation target-setting. • Do you have any questions before we finish? • If you think of any questions later, you can contact us at: • Project team - Kate Lonsdale: kate.lonsdale@climatesense.global • Climate X Change - Kay White: kay.white@ed.ac.uk

Appendix D Summary review of SNAP3 MEL architecture and indicators

Nick Brooks, for Climate Sense, October 2025

Elements and indicators in the SNAP3 MEL Framework

The SNAP3 MEL framework defines the following five elements across the four SNAP3 themes (nature, communities, public services, and economy and industry):

1. **Strategic aim:** to 'build Scotland's resilience to climate change' as part of Scotland's set of National Outcomes (applies across all four themes)
2. **Outcome:** what the policies and activities set out in the Plan expect to accomplish in the longer term to bring about increased resilience to climate change impacts in Scotland (one per theme, broken down into 2-4 areas)
3. **Objectives:** the aims of the policies in the plan over its delivery period, which if achieved should lead to progress toward the intended outcomes (3-6 per theme)
4. **Enablers:** enabling factors that overcome barriers to achieving outcomes and objectives in SNAP3. Objectives and outcomes will only be achieved if critical enabling factors are in place and barriers removed (21-30, across 6-7 areas per theme)
5. **Activities:** the activities occurring from the key policies and delivery mechanisms set out in SNAP3 which will deliver the objectives and outcomes and put in place the necessary enablers for these to be achieved (12-21, across 4-6 areas per theme)

The MEL framework also defines **indicators** at the level of **outcomes** (2-6 per theme; 16 in total) and **objectives** (8-13 per theme; 40 in total). Outcome indicators measure phenomena such as ecological health, public awareness, community action and wellbeing, collaboration across public services, levels of risk assessment and action in the public and private sectors, employment in green jobs, and uptake of grants for specific adaptation actions.

SNAP3 MEL through the lens of outputs, outcomes and impacts

The SNAP3 outcome indicators echo outcome indicators used in other adaptation contexts. Typically, outcomes are defined as short- to medium-term changes resulting from the **outputs** of adaptation activities (OECD 2023). **Outputs** are defined as goods and services and short-term changes that are under the control of those implementing adaptation actions (OECD 2023). In adaptation contexts, **outcomes** are often changes in capacities, capabilities and characteristics that make populations and systems better able to anticipate, plan for, cope with, recover from and adapt to climate related tresses and shocks, i.e. more resilient. Changes in resilience, measured in terms of these capacities, capabilities and characteristics therefore are often measured at the outcome level (e.g. Venable *et al*. 2022).

Outcomes contribute to longer-term impacts that, in adaptation contexts, can be seen as the ultimate measure of adaptation performance or success. These might include reduced losses and damages and improvements in climate-sensitive aspects of human, ecological and economic wellbeing such as health, poverty and inequality, relative to a historical baseline or 'no-adaptation' counterfactual. These measures indicate whether inferred changes in resilience, as measured at the outcome level, have translated into reduced harms from climate change.

The SNAP3 Objective indicators represent a mix of output, outcome, and impact indicators as typically defined in adaptation MEL contexts based on the OECD (2023) definitions. These include indicators of losses and damages in the form of properties flooded and disruptions to transport and supply chains under the Public Services and Economy and Industry themes. Certain activities and enablers in the SNAP3 MEL framework exhibit characteristics of outputs and outcomes and might also be tracked using output and outcome indicators.

Although SNAP3 does not define indicators at the impact level, there is considerable scope to define such indicators. These would measure climate related losses and damages and climate-sensitive aspects of human, ecological and economic wellbeing as indicators of longer-term adaptation performance/ effectiveness at a level above that of the SNAP3 outcomes. As such, they would provide a way of assessing progress towards the SNAP3 strategic aim.

Implications for target setting

The SNAP3 MEL framework already includes numerous quantitative indicators against which targets and milestones might be set. Viewing the framework through the lens of outputs, outcomes and impacts demonstrates that there is scope for identify additional indicators, and by implication targets, at these three levels, linked through a theory of change that relates changes in one level to changes in the next level up. This could be done while retaining the current SNAP3 MEL architecture of activities, enablers, objectives and outcomes.

A subset of SNAP3 objective indicators might be associated with targets for the delivery of certain outputs and the achievement of certain outcomes. The outcomes of most interest in relation to target setting are likely to be those associated with changes that most demonstrably increase resilience. These might include targets for the adoption of certain management regimes and access to key services and resources. They also might include tolerances and coping ranges measured in terms of the severity of a specific hazard that can be accommodated without significant adverse impacts (for which definitions and thresholds need to be agreed) (European Commission 2013, Brooks *et al*. 2019a).

A set of impact level indicators and targets could be defined to measure success in delivering the SNAP3 strategic aim, based on avoided losses, damages and harm. These might include existing indicators of losses and damages in the SNAP3 framework, for which targets might be developed. Such impact level targets would need to be reviewed and potentially revised in the light of escalating climate risks. Consequently, any such targets might best be used as benchmarks against which adaptation performance is measured for the purpose of learning and policy revision, rather than binding goals. If these targets were based on avoided, rather than actual, losses and damages, baselines would need to be established based on historical data or 'no-adaptation' counterfactuals, for which methodologies are emerging and might be further developed (Brooks *et al*. 2019b).

Questions for consideration when developing adaptation targets

1. To what extent should targets be linked to existing indicators, the logic of the existing SNAP3 MEL framework, and each other (through a theory of change)?

2. Is the current SNAP3 MEL architecture appropriate, or would a framework based on outputs, outcomes and impacts be preferable for target setting?
3. Are new indicators with associated targets required; if so, at what levels?
4. Are any activities and enablers in the SNAP3 MEL framework useful for target setting?
5. Should targets be set for delivery/implementation of SNAP3 policies (output level)?
6. Should targets be set for improvements in the capacities that make people, places and systems more resilient (outcome level)?
7. Can outcome targets be developed that specify the severity of specific hazards that certain national systems should accommodate to ground targets in climate risk?
8. Should additional indicators targets be developed based losses and damages, building on existing indicators under SNAP3 themes (impact level)?
9. How would targets based on losses and damages be operationalised, given the need for baselines and the evolving nature of climate change risks?
10. Should targets be associated with milestones?
11. How many targets are appropriate (at each level and in total)?

    3.

    4.

Appendix E Case Summaries of Adaptation Target Approaches in Interviewed Jurisdictions

Countries

Austria

Austria's adaptation governance is collaborative, iterative and consensus driven. Adaptation targets have been shaped primarily through coordination and agreement across ministries, rather than through statutory obligation or central imposition.

Institutional Context

Adaptation competences are spread across several sectors and governance levels. National Adaptation sits within the Ministry for Climate Action, Environment, Forestry, Agriculture, Water and Regions. The National Adaptation Strategy (NAS) and National Adaptation Plan (NAP) are developed in a broad stakeholder process and are now in their third iteration. The cycle involves strategy revision, publication of a progress report, and subsequent updating. The adaptation team does not direct sectoral ministries but plays a coordinating role, convening actors, facilitating dialogue, identifying risks and synergies and working to prevent maladaptation. The strategy is structured around 14 policy areas (e.g. water management, construction and housing, health, tourism) and – complemented by scientific evidence, studies and literature - relies on workshops and expert consultation to ensure interdisciplinary input and co-ownership.

Why Austria Has Not Adopted SMART Targets

SMART (specific, measurable, achievable, relevant, time-bound) adaptation targets have not been formally adopted. Interviewees saw this as a response to the complexity of adaptation. Climate impacts vary across sectors and evolve over time. Attribution is difficult and isolating the effects of specific measures from broader socio-economic change or intensifying climate risks is not easy. Baselines also shift as climate risks intensify, making it unclear whether targets should focus on reducing absolute harm or limiting the rate of increase.

Heat-related morbidity and mortality was cited as an example. Should a target focus on reducing total deaths, while exposure is increasing? Or slow the rate of increase in impacts? Which baseline year should be used? If damages increase despite adaptation efforts, does this indicate policy failure, insufficient ambition, or more severe climate conditions? Interviewees noted that numeric targets could provide a sense of certainty that may not fully reflect this underlying complexity. These challenges, combined with Austria's coordination-based governance model, have contributed to caution about rigid quantitative thresholds. Instead, the strategy relies on dialogue, quantitative *and* qualitative assessment and iterative monitoring to balance ambition with realism.

How Target Discussions Take Place

Adaptation goals are developed through sector workshops. Ministries, provinces, academia, social partners, NGOs and practitioners review challenges and goals, assess climate risk and measures' relevance and discuss progress. This helps define ambition while maintaining cross-sector ownership and ensuring effectiveness as well as inclusion of social aspects. Targets are structured at three levels:

- One overarching national goal focused on resilience and synergies.
- Sector-level overarching goals.
- Sub-targets within sectors.

Vulnerability assessments underpin these discussions by describing expected climate trends and sectoral risks. Rather than planning against a single prescribed climate scenario, the strategy presents a range of projected developments. No specific scenario is embedded as a binding benchmark.

Monitoring Through Structured Dialogue

Monitoring combines quantitative indicators with structured expert review. The process includes:

- 47 quantitative and qualitative criteria
- Workshops across all 14 sectoral areas.
- Structured qualitative ratings of progress.
- Descriptive feedback from participants.

Experts (from ministries, provinces, academia and practice) review progress towards set goals, sub-targets and recommended activities (over 120 in total), assessing progress using a structured scale and providing contextual explanation. The Environment Agency synthesises indicator data and workshop findings into the progress report, with participants given the

opportunity to review interpretations before publication. Although the strategy and reports are not legally binding, influence derives from stock-taking, inter-ministerial coordination, professional networks and sustained dialogue rather than formal enforcement.

Reflections and Lessons

Austria's approach shows that structured adaptation governance can develop without adopting formal SMART targets. Progress has been driven by collaborative monitoring, sustained networks and regular revision of strategy. Interviewees highlighted the importance of engaging sector experts early, linking monitoring to practical solutions, maintaining trust across institutions and recognising the value of qualitative information, particularly for social dimensions of adaptation.

While international debate around SMART targets continues, Austria's approach reflects a system in which ambition is shaped through consensus, coordination and realism about measurement challenges. The case demonstrates how institutional culture and governance arrangements influence adaptation target-setting alongside technical considerations.

Germany

Germany's approach to adaptation target-setting is legally mandated, organised around seven thematic clusters, each led by a responsible ministry and embedded in a formal policy cycle. The Climate Adaptation Act requires the national adaptation strategy to include measurable targets, indicators and measures. Although the law mandates targets, their content and ambition are negotiated between ministries rather than imposed centrally.

Institutional and Legal Context

The Act formalised adaptation target-setting within a structured policy cycle. It introduced a four-year strategy revision cycle and an eight-year national climate risk assessment, embedding targets within a recurring assessment–monitoring–revision process. Before the Act, Germany had an adaptation strategy but no legal requirement to define measurable targets. Interviewees described the legislation as providing both political momentum and an institutional framework that strengthened coordination across ministries. However, the Act does not prescribe specific target levels, nor does it include sanctions for non-compliance. Where targets are not met, ministries are expected to propose corrective measures. In practice, targets function as steering and accountability tools rather than enforceable legal thresholds.

How Targets Were Developed

Target development was coordinated through the Inter-Ministerial Working Group on Adaptation. The Environment Ministry provided overall guidance, but line ministries drafted their own targets within the cluster structure. Advice was given that "good" adaptation targets should:

- Align with priority risks identified in the national climate risk assessment
- Be influenceable at national level
- Focus on outcomes rather than counting measures
- Be time-bound where feasible (with at least one 2030 target per cluster)

Each cluster was initially asked to propose three to five targets to ensure manageability. Drafts were reviewed and revised through technical exchanges and formal consultation, with overlaps resolved through facilitated discussion. Decentralised ownership was considered preferable to centrally imposed ambition and ministries were expected to only commit to targets they were prepared to implement.

What "Measurable" Means in Practice

The meaning of "measurable" varies across clusters. Some targets include explicit quantitative values and timelines while others define directional change, supported by developing indicators. In several cases, targets were adopted before appropriate indicators existed. Indicator systems are being refined over each successive cycle, with ministries commissioning research to address data gaps. Interviewees described target-setting as pragmatic, with scientific assessment balanced by political and practical considerations. Not all targets meet ideal criteria but this is accepted as part of institutional learning. The priority was to begin measurable target-setting and improve precision over time.

Stakeholder and Citizen Engagement

Structured stakeholder engagement accompanied target development. This included consultation on draft targets and the draft strategy, online input and a dialogue event involving around 60–70 stakeholders and approximately 40 ministry representatives. Stakeholders contributed expertise and suggested refinements, although final decisions remained with ministries. Separate regional citizen dialogues invited randomly selected participants to articulate visions of a climate-resilient Germany. Their input influenced the strategy's vision more than the technical design of targets.

Funding, Ownership and Constraints

There is no central adaptation fund; ministries finance measures within existing budgets. Many measures were already underway and were incorporated into the adaptation framework. Fiscal constraints and political feasibility shaped the level of ambition, and not all identified risks are addressed in the first cycle. Targets are anchored in the national climate risk assessment, which prioritises high-risk areas.

Monitoring and Iteration

Germany's framework operates as a structured policy cycle linking risk assessment, strategy, monitoring and revision. Targets may be refined or made more quantitative in subsequent cycles, and indicator systems are expected to mature over time. This iterative design allows ambition to develop progressively rather than requiring full precision from the outset.

Reflections and Lessons

Germany's experience shows how a legal mandate can establish adaptation targets while still leaving space for negotiation between ministries. Targets are organised within seven thematic clusters, with each ministry responsible for developing and delivering its own commitments. Although the law requires targets to be set, their ambition and design emerge through discussion rather than central direction. The process combines stakeholder engagement with gradual improvement in measurement, linking targets to a regular cycle of monitoring and revision. In this way, measurable targets operate as practical governance tools, shaped by risk assessments, ministerial ownership and available resources.

Canada

Canada's approach to adaptation target-setting is driven by national priorities and oriented toward mainstreaming resilience across systems. Targets were introduced through the development of the 2023 National Adaptation Strategy (NAS), rather than through legislation. While not legally mandated, they were intended to introduce measurable commitments to pursue near-term action.

Institutional Context

The NAS is organised around five interconnected "systems" (e.g. health and well-being, infrastructure, disaster resilience, nature and biodiversity, and economy and workers), each led by a responsible federal department. Environment and Climate Change Canada (ECCC) coordinates overall delivery, while central agencies, including Treasury Board and Finance, participate in formal governance structures to provide oversight of federal implementation. In Canada's federal system, implementation requires collaboration with provinces, territories and Indigenous governments, and the NAS was framed as a shared vision for whole-of-society action rather than a top-down directive. Targets are not enshrined in law, and there are no statutory penalties for non-compliance. Accountability instead relies on public reporting, audit scrutiny and periodic strategy renewal.

Why Targets Were Introduced

Interviewees described the inclusion of targets as both political and strategic. The insurance sector had advocated for measurable national adaptation goals for over a decade, arguing that escalating climate losses required clearer risk reduction benchmarks. At the same time, the federal government sought to secure whole-of-society buy-in and demonstrate progress on resilience. Targets were intended to:

- Drive implementation beyond high-level goals.
- Focus limited resources on priority risks.
- Trigger the development of measurement approaches.

The decision to include measurable targets came relatively late in the policy process. Once confirmed, departments were instructed to develop near-term, realistic targets aligned with existing programs and funding streams.

How Targets Were Developed

Each "system lead" department drafted targets within its domain, coordinated by ECCC. Departments were encouraged to ensure targets were measurable, achievable and aligned with current policy instruments. In the first NAS cycle, many targets focus on mainstreaming i.e. embedding climate risk into planning, investment and service delivery.

As a result, targets often address process and capacity-building outcomes (e.g. integrating risk into decision-making, expanding program participation) alongside longer-term resilience ambitions. Near-term milestones were prioritised to build momentum. Interviewees acknowledged that ambition was shaped by funding constraints and political feasibility. Departments were cautious about committing to targets without guaranteed resources.

What "Measurable" Means in Practice

Canada's 25 targets vary in specificity. Some include quantitative thresholds and timelines and others combine directional outcomes with supporting indicators. In certain cases, long-term ambitions (e.g. eliminating heat-related deaths by 2040) were included to signal the scale of transformation required, even where pathways remain uncertain.

Interviewees described targets as tools to mobilise action and improve coordination rather than as precise scientific endpoints. Where data gaps exist, monitoring and evaluation frameworks are being developed and expanded. The forthcoming progress report is expected to assess performance towards targets using both qualitative and quantitative assessments.

Funding, Leverage and Iteration

Funding limitations significantly shaped target design. Dedicated adaptation funding was lower than initially requested, leading some departments to align targets with initiatives already underway. A key strategy has been to mainstream resilience into major investment streams such as infrastructure and federal asset management. Through Treasury Board's Greening Government Strategy and oversight role, resilience requirements are increasingly embedded in federal planning and procurement processes. The NAS will be updated over time, with a next update planned by 2030. Targets are expected to be reviewed and updated in future cycles. Accountability is maintained through public reporting, Auditor General scrutiny and periodic strategy updates informed by evolving climate science and awareness of Canada's top climate risks.

Reflections and Lessons

Canada's experience demonstrates how measurable adaptation targets can be introduced through political commitment rather than legislation. The approach is characterised by distributed accountability across system leads, strong horizontal coordination and an emphasis on mainstreaming as a first step. Targets function as coordination and mobilisation tools within Canada's federated system, shaped by risk assessment, fiscal realities and intergovernmental dynamics.

The Netherlands

The Netherlands approaches adaptation target-setting in two different ways. In flood and water management, clear legal standards and stable funding are already in place. However, in broader adaptation policy, covering sectors such as health, agriculture and infrastructure, target setting has developed more gradually, with targets emerging through dialogue and practical experience rather than fixed national thresholds.

Institutional Context

Dutch adaptation policy is shaped by two main programmes. The Delta Programme, backed by the Delta Act and supported by around €1 billion per year, focuses on flood risk, freshwater supply and spatial adaptation. It operates with clear legal standards, for example flood protection levels of 1:100,000 per year, alongside stable governance and financing. Alongside this sits the National Adaptation Strategy, which addresses sectors beyond water management, including health, agriculture, infrastructure and nature. When first adopted in 2016, the strategy focused less on quantitative targets and more on raising awareness and

engaging ministries that were still beginning to see adaptation as part of their responsibilities. Early efforts therefore concentrated on strengthening coordination rather than defining measurable thresholds.

Why Quantitative Targets Are Uneven

The Netherlands has a long history of numerical standards in flood management, supported by established institutions and monitoring systems. Similar standards do not yet exist across other areas of adaptation. Outside the water sector, responsibilities are more fragmented, data and capacity vary and acceptable levels of risk are less clearly defined. Interviewees noted that, unlike mitigation policy, adaptation does not have a single metric such as CO_2 emissions. For hazards such as heat, drought or pluvial flooding, there is less agreement on acceptable risk levels and how ambition should be measured. While flood protection norms are well established, other sectors are still working out how to translate climate risk into concrete targets. One idea discussed was that adaptation policy should at least 'keep pace' with climate change. In practice, this means ensuring that as hazards intensify, preparedness and protection increase accordingly so that overall risk does not rise without corresponding action. Rather than eliminating risk entirely, the aim is to prevent the gap between rising climate pressures and adaptive capacity from widening. The focus is therefore on maintaining resilience over time rather than setting a single fixed threshold.

Monitoring as a Driver of Target Clarity

A distinctive feature of the Dutch approach has been experimentation with monitoring as a way of clarifying goals. While formal national monitoring is coordinated centrally, the Climate Adaptation Services (CAS), a boundary organisation operating between government, business and knowledge institutions, established an informal "Monitoring Lab" to support subnational learning. The Monitoring Lab creates a protected space in which provinces, municipalities and water boards can test tools, share experience and reflect on progress without political pressure. Through this process, three monitoring questions emerged: 'Are we doing what we said we would do?', 'What effects are we seeing?' and 'Are we on track?'. The third question has proved most influential. Participants recognise that it is difficult to judge whether the system is on track without clearer goals. Monitoring discussions therefore encouraged greater clarity about targets, even where formal quantitative standards were absent.

How Targets Are Developing in Practice

Current work focuses on supporting regional groupings to define more concrete goals for hazards such as heat, pluvial flooding, drought and sea level rise. National government facilitates this process but does not prescribe uniform targets. Given the decentralised nature of spatial adaptation and variation in local capacity, identical national standards are neither feasible nor considered appropriate. Instead, institutions convene dialogue, provide tools and support regions in defining context-specific ambitions.

Adaptive Management and Revision

Target-setting is embedded in a broader tradition of adaptive delta management. Major Delta decisions are reviewed every six years and supported by synthesis documents explaining assumptions and choices. Independent scientific review reinforces transparency and robustness. Revision is treated as a normal feature of governance rather than as

evidence of failure. Interviewees also stressed the importance of creating safe spaces where participants can reflect beyond organisational mandates. Such settings are seen as essential for addressing complex questions about acceptable risk and long-term limits.

Reflections and Lessons

The Dutch experience shows how different approaches to adaptation target-setting can coexist within one country. In flood protection, long-established legal standards make quantitative targets straightforward. In other sectors, targets are emerging gradually through dialogue and practical experimentation.

Monitoring, particularly the question 'Are we on track?', has helped sharpen thinking about ambition. Rather than imposing uniform thresholds, the approach enables regions to define and revisit their own goals over time. Adaptation target-setting in the Netherlands combines technical expertise with ongoing discussion about acceptable risk, using quantitative standards where they are well established and adaptive management where they are not.

Cities

Paris

Paris has progressively strengthened adaptation targets across successive climate plans, particularly as heatwaves, flood risk and urban overheating became more visible public and political concerns. While earlier plans articulated general resilience goals, experience showed that without measurable targets it was difficult to assess progress or sustain momentum. Targets were therefore introduced to embed adaptation more firmly within municipal governance and to signal commitment to political leadership and residents.

Institutional Context

Adaptation in Paris is embedded across departments rather than managed by a single isolated unit. The climate team coordinates the overall climate plan and aggregates reporting, but operational departments such as urban planning, green spaces, water, public health and education are responsible for delivering sector-specific actions.

The climate plan integrates mitigation, adaptation, resilience, nature-based solutions and social equity considerations. Vulnerability to heat and other risks is unevenly distributed across neighbourhoods, and this shaped both the framing and location of adaptation targets.

Why Introduce Targets

Interviewees described several motivations for introducing measurable targets. First, they were seen as necessary to move beyond broad intentions. Second, they enable monitoring and accountability. Third, they strengthen coordination across departments by clarifying expectations. Finally, they signal seriousness to elected officials and the public.

There was recognition that without quantified goals, adaptation risks remaining aspirational. At the same time, adaptation is inherently multi-sectoral and influenced by external factors, which complicates target design.

How Targets Were Developed

Target-setting drew on climate projections, heatwave mortality data, flood risk assessments, green space analysis and neighbourhood vulnerability mapping. Major heatwave events acted as political catalysts, reinforcing the urgency of adaptation.

Departments reviewed existing sectoral plans and identified where climate considerations could be strengthened. The climate team facilitated coordination but did not impose targets. Each department proposed sector-specific commitments within its mandate and budget. Targets were shaped through internal negotiation to ensure feasibility within the constraints of a dense urban fabric and competing land uses.

Paris has limited opportunities for large-scale green expansion. As a result, targets often involve creative approaches such as greening rooftops, redesigning schoolyards, integrating trees into street redesign and embedding nature-based solutions within existing infrastructure.

Quantitative and Process Targets

There was internal debate about the value and limits of quantification. Quantitative targets are viewed as important for measurement and credibility. Examples include expanding green surface area, increasing shaded spaces, developing cooling facilities during heatwaves and improving access to climate shelters. Many targets are time-bound, often aligned with 2030 milestones.

At the same time, some commitments are process-oriented, such as integrating climate risk into planning regulations and urban design standards. These are harder to measure but essential for long-term resilience.

Reducing heat-related mortality illustrates attribution challenges. Health outcomes depend on demographic factors, public health systems and behavioural responses as well as physical adaptation measures. For this reason, Paris often uses measurable proxies such as cooling infrastructure or shaded space rather than outcome targets alone.

Monitoring and Consequences

Departments report periodically on agreed targets. The climate team consolidates this information and produces monitoring reports that inform political leadership. Some indicators, such as hectares of green space, are straightforward. Others are influenced by external variables.

Targets are not legally binding. However, missing them can lead to political scrutiny, reputational risk and internal accountability discussions. Civil society and media attention following extreme weather events can intensify this scrutiny. Targets also provide leverage for securing funding and prioritising projects.

Reflections and Lessons

Paris demonstrates a politically responsive model of municipal adaptation target-setting. Targets function as steering tools, coordination mechanisms and communication devices as much as technical instruments. They are negotiated within administrative constraints and revised over time as conditions change.

The case shows that measurable adaptation targets can strengthen institutionalisation and accountability in a complex urban administration, even where outcomes are influenced by factors beyond municipal control.

Barcelona

Barcelona introduced adaptation targets within its 2018 Climate Plan, which marked a strategic reset integrating mitigation, adaptation and climate justice. Targets were shaped by strong internal reporting culture, sectoral negotiation and significant spatial and climatic constraints. The process reflects both technical confidence in some sectors and political negotiation in others.

Institutional Context

The 2018 Climate Plan was developed by a core team including the Energy Agency, adaptation and resilience staff, social rights and citizen engagement units. Operational departments such as water, parks, coastal management and urban planning were closely involved. The climate office coordinates and reports on the plan, but departments retain responsibility for delivery.

Before drafting targets, the city undertook downscaled climate projections and vulnerability assessments. These highlighted increasing drought, extreme heat, sea level rise and pluvial flooding risks. Heat and water scarcity were identified as particularly pressing, shaping both the urgency and content of targets. Barcelona is a dense Mediterranean city with limited available land and growing water stress. These structural conditions strongly influence what can realistically be targeted.

Internal Debate on Quantification

There was substantial internal discussion about how far to quantify adaptation. In some sectors, especially water management, numerical targets were relatively straightforward. The water department operates with modelling tools and established engineering standards. For example, reducing potable water consumption to 100 litres per person per day was framed as both technically measurable and publicly communicable. Flood and wastewater systems also use return period thresholds and technical benchmarks. These provided a foundation for measurable targets linked to drainage capacity and infrastructure resilience.

In contrast, green space targets were more contested. Barcelona committed to increasing green surface area by approximately 1.6 square kilometres between 2015 and 2030. Given the city's density, achieving this requires redevelopment projects, green roofs, pocket parks and greening of schoolyards. However, drought and tree mortality have complicated delivery, illustrating how climate impacts themselves can undermine progress toward adaptation targets.

Why Targets Matter Internally

Within the climate office, there was a clear view that indicators without targets were insufficient. Targets were seen as necessary for meaningful monitoring and internal accountability. However, the climate office does not have authority to impose targets. Each department had to agree to commitments based on its operational capacity and budget. This meant that target-setting involved negotiation rather than instruction. Departments

needed to feel confident that they could deliver. In some cases, targets were calibrated to align with existing plans or capital investment cycles.

Targets were also framed in ways that could resonate politically. For example, ensuring access to climate shelters within a five minute walk provides a concrete and socially visible objective, particularly during heatwaves.

Limits of Municipal Control

Many adaptation outcomes depend partly on citizen behaviour and private sector decisions. Water consumption levels depend on household choices. Expansion of green space may require cooperation from private landowners. Heat resilience is influenced by building design and retrofitting decisions beyond direct municipal control. This complicates attribution. If targets are missed, it may not reflect municipal inaction but rather external factors such as drought intensity, demographic change or behavioural trends.

Monitoring and Revision

The climate office collects annual data from departments and tracks implementation rates. Reporting also occurs quarterly at executive level. Targets are not legally binding and there are no statutory penalties. However, they are politically salient. Failure to show progress can generate scrutiny from elected officials, civil society and the media.

Interviewees acknowledged that targets are both necessary and imperfect. Measurement methodologies influence results, and extreme events such as prolonged drought can distort performance indicators. Targets are therefore revisited during plan updates, and adjustments may be made in response to new climate information or political priorities.

Reflections and Lessons

Barcelona illustrates a negotiated municipal model of adaptation target-setting. Engineering-oriented departments were more comfortable with quantification, while land use and greening targets required more political compromise. A strong reporting culture supported measurable commitments, but delivery remains department-led and influenced by external factors.

The case shows that municipal adaptation targets must balance technical feasibility, spatial constraints and political credibility. Targets function as coordination tools and public signals of ambition rather than as legally enforceable guarantees of specific outcomes.

Lisbon Metropolitan Area

Lisbon's experience highlights the distinction between structured adaptation planning and clearly defined strategic targets. While adaptation planning has expanded significantly across Portugal, explicit metropolitan level quantitative targets are less clearly embedded in the Lisbon plan than might initially appear.

Institutional and Methodological Context

Adaptation planning in Portugal began scaling up around 2010. Early municipal strategies were often broad climate plans, with adaptation framed as sectoral actions. Over time, planning became more structured and methodologically consistent. A key influence was the ADAM methodology, adapted from the UKCIP Adaptation Wizard and applied across more

than two dozen municipalities. The ADAM cycle includes preparation, assessment of current and future vulnerabilities, identification and evaluation of adaptation options, integration into territorial planning instruments, monitoring and revision. The methodology became embedded in municipal tenders and metropolitan planning processes. In principle, the cycle anticipates monitoring and target-setting. In practice, interviewees noted that most effort has focused on vulnerability assessment and defining options, while monitoring and measurable targets have received less systematic attention.

How Targets Appear in the Lisbon Plan

The Lisbon Metropolitan Adaptation Plan implemented the early stages of the methodology in depth. It includes baseline analysis, sectoral vulnerability assessment and identification of adaptation measures at multiple scales. Measures are typically framed with assigned responsibility, thematic area and indicative timeframe. However, explicit numeric targets linked to overarching strategic objectives are less visible. Some numbers associated with Lisbon, such as figures related to tree planting or drainage improvements, may originate from individual projects or sectoral initiatives rather than from a consolidated metropolitan target framework. Interviewees cautioned that extracting numbers without understanding their origin risks misrepresenting the strategy. Targets may sit within supporting documents, sector annexes or separate funding programmes rather than within the main strategy text.

Why Targets Are Difficult to Consolidate

Several structural factors limit the consolidation of metropolitan targets. Implementation remains largely municipal. Each municipality has its own leadership, priorities and administrative capacity, while the metropolitan authority has a coordinating role but limited mandate to direct action. Portugal's 2021 climate law requires municipalities and regions to adopt climate action plans. However, interviewees suggested that enforcement is limited and legal obligation alone does not ensure implementation capacity. National mandates may thus generate compliance in producing plans without guaranteeing delivery or measurable progress. More broadly, interviewees described a national planning culture in which strategy production can become an end in itself. Plans are developed over several years and then replaced by new plans, while systematic monitoring and evaluation receive less sustained attention. This can create a gap between planning activity and implementation outcomes.

Characteristics of Effective Targets

From the interviewee's perspective, effective adaptation targets require three elements. They should be measurable, time-bound and clearly assigned to a responsible actor. Without these components, targets risk being delayed or overlooked. These principles are particularly relevant in contexts where monitoring systems are fragmented. Unclear responsibility or absent deadlines weakens follow-through.

Monitoring and Midterm Review

Lisbon Metropolitan Area is undertaking a midterm evaluation after five years. However, monitoring remains decentralised and data collection inconsistent across municipalities. There is no single consolidated inventory of progress. Plans are sometimes used to support funding applications or justify projects rather than as active management tools. This

reinforces the challenge of moving from structured planning to measurable, coordinated implementation.

Citizen and Stakeholder Engagement

Public consultation is formally required in plan development, but participation levels vary. Citizens are rarely involved in defining numeric targets and target-setting often seen as an administrative function. Stakeholders such as researchers and nongovernmental organisations may provide technical critique, but direct citizen influence on measurable commitments is limited.

Reflections and Lessons

Lisbon's approach illustrates that comprehensive planning frameworks do not automatically produce clear metropolitan targets. Strong methodologies and widespread plan adoption can coexist with weak consolidation of measurable commitments. However, interviewees also noted a steady increase in interest in adaptation and in the human and institutional resources dedicated to it. This creates greater opportunities to learn from earlier planning processes and gradually improve governance and monitoring systems. The case thus underscores the importance of linking targets to responsibility, timeframes and monitoring systems while also highlighting the limits of top-down legal mandates without capacity-building and coordinated follow-through. For cities considering quantified adaptation targets, Lisbon's experience suggests that institutional culture and implementation practice are as important as methodological design.

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