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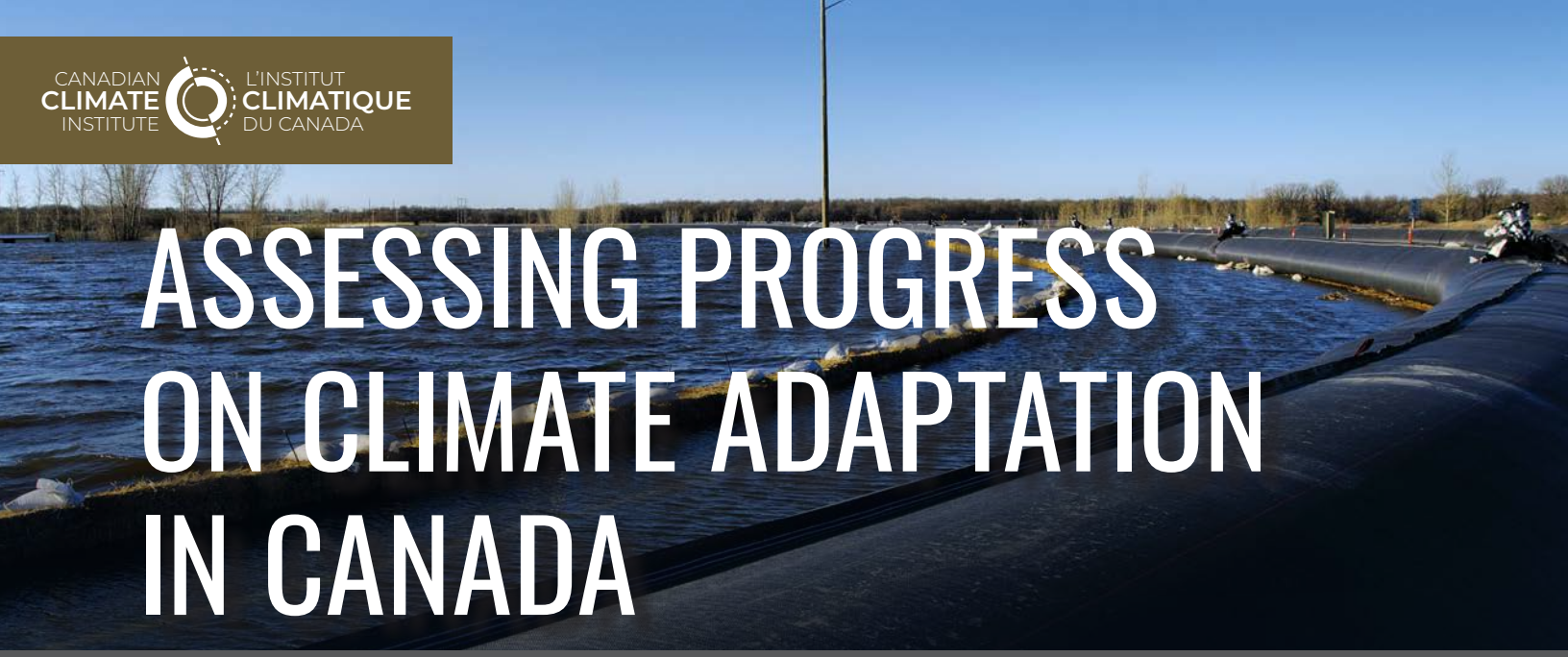

ASSESSING PROGRESS ON CLIMATE ADAPTATION IN CANADA

Building blocks and best practices for a robust monitoring and evaluation system

Canada's climate is rapidly warming, posing wide-ranging risks for Canadian society. As the consequences of climate change become more severe for the health and well-being of Canadians, governments must pursue a much more ambitious approach to climate adaptation. By committing to Canada's first-ever National Adaptation Strategy, the federal government has indicated that it recognizes the need to better promote and manage adaptation at the national level.

A monitoring and evaluation (M&E) system will be a critical part of the National Adaptation Strategy. A robust M&E system tracks progress towards goals and targets based on clear metrics of progress. It would support improvement of the National Adaptation Strategy over time, enabling the government to adjust priorities as necessary given changing risks and social vulnerability. It would also inform policymakers about whether adaptation actions and policies identified in the strategy are in fact helping Canada adapt and become more resilient. And if not, it would create avenues to course-correct if necessary (see Box 1).

This paper provides guidance on key elements of a robust M&E system for adaptation in Canada. We summarize the four building blocks necessary for a successful system—context, content, operationalization, and communication. Based on these blocks, we identify nine best practices for Canada to guide the development of a national adaptation M&E system.

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BOX 1

PROGRESS AND OUTCOMES: WHY MONITORING AND EVALUATION MATTER

A monitoring and evaluation system serves two critical functions. **MONITORING** focuses on assessing policy implementation progress, often through the use of specific indicators, whereas **EVALUATION** assesses policy outcomes, including policy effectiveness (OECD 2002).

Adaptation M&E systems are important mechanisms for both policy learning and accountability. They help decision makers understand the results of adaptation actions and convey a picture of progress over time (Leiter 2015). They can improve adaptation policy development by deepening understanding about what kinds of adaptation responses work in different contexts, identifying implementation gaps, and providing evidence on whether policies and actions are achieving their desired outcomes. They also support countries in meeting their commitments under the Paris Agreement, which encourages signatories to report their progress on adaptation to the international community.

Adoption of the Paris Agreement. Photo: UNclimatechange (CC BY 2.0).

CURRENT ADAPTATION ASSESSMENT, MONITORING, AND EVALUATION IN CANADA

As Canada develops its first National Adaptation Strategy and an associated M&E system, it can look not only to global best practices but also to its own experience. The following section examines the current state of practice around adaptation M&E in Canada, including in federal and provincial/territorial orders of government.

2.1 Adaptation assessment at the federal level

While the Government of Canada has legislated the requirement to report progress on greenhouse gas emissions in the *Canadian Net-Zero Emissions Accountability Act*, it has not formalized similar reporting requirements for progress on adaptation. To date, the only public assessment of national adaptation progress was a 2017 report by the Office of the Auditor General on the implementation of the 2011 Federal Adaptation Policy Framework (Office of the Auditor General of Canada 2017). The report provided a one-time synthesis of adaptation actions and gaps across federal government departments and agencies, but stopped short of assessing the effectiveness of specific adaptation policies, programs, and projects and as such did not perform a complete M&E function.

The Government of Canada has conducted a number of assessments on changing exposure, adaptive capacity, and vulnerability of Canadian regions and economic sectors as well as the country as a whole (Warren and Lemmen 2014; Lemmen et al. 2016; Warren and Lulham 2021). These assessments can be useful for informing adaptation planning and understanding evolving climate change risks in Canada, but have not been designed for use in M&E.

The most notable federal government effort towards national adaptation M&E thus far was the creation of the Expert Panel on Climate Change Adaptation and Resilience Results. The Panel was convened in 2017 with a six-month mandate to develop a list of indicators that could be used to track adaptation progress in Canada. However, the Panel's mandate was challenging for several reasons. By tasking the Panel specifically with

creating indicators for adaptation M&E, it was directed to determine content for a federal adaptation M&E system before the federal government had designed such a system, including establishing the system's intended purpose, scope, and approach. Further, even if the Panel's recommended indicators had been adopted, nearly all of them are output indicators, which on their own contribute little to a broader understanding of how and why resilience or vulnerability are changing as a consequence of adaptation.

The Panel was further constrained by limited federal government planning on adaptation in 2017. At that time, the government had articulated a high-level vision for adaptation and resilience in the 2016 Pan-Canadian Framework on Climate Change but did not identify specific adaptation policy goals, objectives, or an implementation plan against which an M&E system could assess progress. Notably, there was also no commitment by the federal government to implement the Panel's findings. The Panel dissolved following the completion of the report, and its recommended indicators have not been applied for assessment or evaluation of progress on the adaptation objectives of the Pan-Canadian Framework.

The federal government's 2020 *Healthy Environment and Healthy Economy* plan, its next attempt to chart a course for climate policy including adaptation, included a commitment to create a national adaptation strategy that contains specific objectives, targets, and actions, as well as a framework for assessing national adaptation progress over time (Government of Canada 2020). It is as yet uncertain how the forthcoming National Adaptation Strategy will monitor and evaluate progress, or whether the findings of the Expert Panel's report will be able to contribute to an M&E system. Nonetheless, this strengthening of Canada's national adaptation response is a critical opportunity for developing a strong M&E system that can support an ambitious vision for adaptation and contribute to iterative policy improvements over the long term.

2.2 Adaptation assessment, monitoring, and evaluation at the regional level

Most provincial and territorial governments currently report on adaptation progress in some fashion. Typically responsibility for conducting progress reports lies with environment ministries, but in British Columbia, New Brunswick, Newfoundland and Labrador, and Québec the responsibility rests with dedicated offices that manage climate change policy planning. Ten provincial and territorial governments have committed to producing annual adaptation progress reports, but only seven have consistently accomplished this task.[1] In Newfoundland and Labrador, the provincial government has committed to producing progress reports at the midway and end points of the five-year implementation of the provincial adaptation strategy, while in Ontario the government has committed to producing adaptation progress reports every four years.

When provincial and territorial governments in Canada produce such progress reports, the majority focus on summarizing implementation progress on policy objectives and actions rather than tracking adaptation performance and resilience. Two governments, Northwest Territories and Saskatchewan, have attempted to address the latter by defining outcome indicators for tracking adaptation progress.

[1] British Columbia, New Brunswick, Northwest Territories, Nova Scotia, Prince Edward Island, Saskatchewan, and Yukon have produced annual reports.

Saskatchewan's indicators form the basis of its annual public progress reports (Government of Saskatchewan 2018), while the Northwest Territories' indicators are only used for internal assessment purposes and are not publicly available (Government of Northwest Territories 2020). British Columbia is in the process of developing metrics to track actions as part of its future M&E framework (Government of British Columbia 2021).

Current provincial and territorial government approaches to assessing adaptation progress are therefore largely focused on monitoring the *implementation* of adaptation policies and actions, rather than evaluating the *outcomes* of policies, programs, or projects. As at the federal level, significant work remains to be done to build and operationalize rigorous M&E to evaluate whether current adaptation efforts are effective in reducing key risks and vulnerabilities and building resilience.

FOUR BUILDING BLOCKS OF A NATIONAL ADAPTATION M&E SYSTEM

Guidebooks for developing national adaptation M&E systems propose four building blocks that should inform the design of an M&E system (Hammill et al. 2014; Price-Kelly et al. 2015). Embracing this approach can help the federal government build a rigorous M&E system that evaluates whether the forthcoming National Adaptation Strategy and corresponding implementation plans are effective in reducing risks and vulnerabilities and increasing resilience across the country. The four building blocks are as follows:

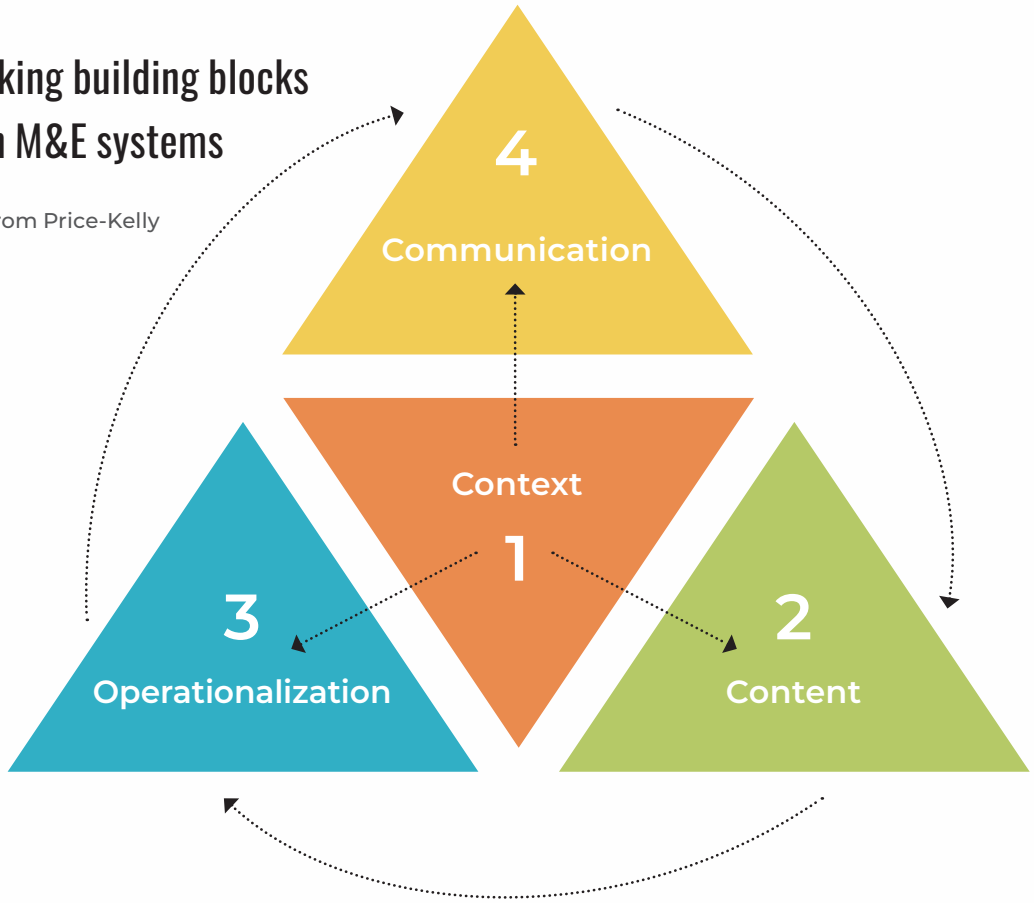
1. **CONTEXT:** The mandate, purpose, and scope of M&E.
2. **CONTENT:** What is being assessed.
3. **OPERATIONALIZATION:** The organization and implementation of data gathering and analysis.
4. **COMMUNICATION:** How the findings are communicated and to whom.

Importantly, the four building blocks are closely interlinked and frequently iterative. The context, in particular the scope and purpose of M&E, provides the foundation for all subsequent building blocks (see Figure 1). For example, the target audience should already be considered during the design of the M&E system rather than after it has been completed. The following sections describe each of the four building blocks and draw on international examples for illustration. Two examples with particular relevance to Canada, the adaptation M&E systems of the U.K. and Germany, are outlined in Appendix A.

Figure 1:

Four interlocking building blocks of adaptation M&E systems

Source: Adapted from Price-Kelly et al. (2015).



3.1 Context: Mandate, purpose, and scope

The starting point for the development of a national adaptation M&E system is its **context**—in particular, the **mandate** for developing the M&E system, the **purpose** of undertaking M&E, and the **scope** of what the M&E system will cover.

A country's M&E system is almost always linked to a particular adaptation plan or strategy. The **mandate** for the development of the M&E system typically stems from one of three sources: a climate change law, a national climate change policy, or from the national adaptation plan itself (Leiter 2021). The type of mandate and its specificity can impact the M&E development process. In both the U.K. and Kenya, for instance, the national climate change law contains specific provisions regarding the institutional setup and the frequency of reporting, which have facilitated the development process (see Appendix A). Examples from other countries show that vague or weak mandates—whether set in policy or in legislation—that lack these specific provisions have caused a lack of engagement from ministries and a delay in reporting.

The stated **purpose** of M&E systems in national adaptation strategies and plans is typically to track implementation, learn from experience, and inform decision making. During the development process of the M&E system it is important to specify what information the M&E system is expected to generate and for whom. For example, the primary purpose of Norway's M&E system is to generate and share lessons from policy implementation. Accordingly, instead of an indicator-based framework, Norway

uses a qualitative approach based on peer exchange and dissemination of lessons learned (GIZ 2014). If the purpose of M&E is to hold a government accountable for fulfilling its adaptation commitments, then a set of standardized quantitative indicators would best meet this purpose.

M&E systems should be explicit about whether they focus only on tracking the implementation status of actions identified in the national plan or strategy, or whether they also aim to assess the effects of the implemented actions. The latter might require longer time horizons to detect policy-induced change, since it takes time for the policies to lead to adaptive outcomes. To date, most adaptation M&E systems focus primarily on implementation (i.e., implemented actions and outputs) without assessing medium- or long-term outcomes. Different purposes can be addressed within the same M&E system, however, through the parallel use of multiple approaches including quantitative and qualitative information (see 3.2).

The **scope** of the M&E system—the range of what it monitors and evaluates—is linked to the scope of the associated national adaptation strategy or plan. A particular consideration is whether the strategy or plan contains only actions under the responsibility of the national government or also sub-national actions implemented by other orders of government or other stakeholders. In some federally organized countries such as France or Germany, the scope of the national adaptation M&E system is restricted to actions taken by federal government entities. In the U.K., the devolved administrations in Scotland and Wales undertake their own adaptation progress monitoring (OECD 2022). Some local governments also conduct M&E for their urban adaptation plans (Scott and Moloney 2021). To date, national and subnational adaptation M&E systems have often remained unconnected (Leiter 2015).

3.2 Content: Approaches, outputs, outcomes, and indicators

The **content** of M&E systems rests on three types of decisions: what approach to take, how to measure policy outputs and outcomes, and how to use indicators and qualitative information.

3.2.1 Approaches

National governments have chosen a range of different approaches to structure their M&E systems and use various methods of gathering data (see Table 1). Some employ multiple approaches in parallel. For example, policy evaluation processes are often established separately from policy implementation monitoring (Leiter 2021). Importantly, the specific setup of a national adaptation M&E system needs to fit the respective purpose, scope, and the available resources to operate that system. Multiple comparative reviews have shown that there is no single blueprint for national adaptation M&E systems (Hammill et al. 2014; Leiter et al. 2017; EEA 2020). Each of the approaches described in Table 1 can be designed in different ways. Hence, the choice of a particular approach does not lead to a fixed template for how to implement it but instead requires careful, context-specific selection of methods.

Table 1:

Approaches used in national adaptation M&E systems

Approaches	Description	Examples and references
Reporting on actions taken	Descriptive reporting of actions undertaken and/or outputs achieved by government entities and other entities over a certain time period.	Brazil, France, Kenya, Philippines, Germany, Grenada. (Climate Change Commission 2019; GIZ 2017; Government of Brazil 2017; Government of Grenada 2022; Republic of Kenya 2021)
Theories of change with indicators	Developing a change model, such as a results chain, a theory of change, or a pathway (Bours et al. 2014) that describes the connection between inputs (funding, resources), outputs (policies, actions), and outcomes (adaptation and resilience benefits).	Philippines, Germany (evaluation), U.K. (under development) (Climate Change Commission 2016; Kind et al. 2019; OECD 2022)
Stand-alone indicators	Monitoring of input, output, or outcome indicators that are considered relevant to adaptation or resilience, but without mapping out a theory of the intended change process (as described in the row above) or without linking indicators to particular actions.	Canada's Expert Panel, Germany's monitoring report. (Expert Panel 2018; Umweltbundesamt 2019)
Gathering experiences	Qualitative gathering of information from experiences gained during implementation, including challenges, successes, and lessons learned. A variety of methods can be used, including interviews, focus groups, stakeholder meetings, and online surveys.	Germany (evaluation), Grenada, Kenya, Norway. (GIZ 2014; Government of Grenada 2022; Kind et al. 2019; Republic of Kenya 2021)
Assessing the contribution to changes in climate risk or vulnerability	Assessing the contribution to changes in climate risk or vulnerability. National climate risk or vulnerability assessments can provide the basis for this approach but need to be accompanied by analysis about the contribution of adaptation interventions to any changes in risk or vulnerability.	U.K. (qualitative assessment of managing risks). (Climate Change Committee 2021)

3.2.2 Measuring outputs and outcomes

Climate adaptation is essentially a change process. Adaptation interventions create two main stages of change (OECD 2002):

- **OUTPUTS**: the immediate products and services created by an adaptation intervention, for example the number of people trained, new plans or policies adopted, or infrastructure built or upgraded.
- **OUTCOMES:** the effects of adaptation intervention outputs on increasing resilience (for example, broader coverage of climate risk insurance), reducing climate impacts (for example, stabilized agricultural yields despite water stress, fewer failures of critical infrastructure), and reducing societal exposure (for example, fewer assets located in high-risk areas).

Outputs can often be fully attributed to interventions and can usually be directly measured. The effects that outputs produce—their **outcomes**—can be positively or negatively influenced by other factors that might be unrelated to the intervention, such as other social and political changes. Hence, assessing

adaptation outcomes requires disentangling effects attributable to adaptation interventions from those of other background forces. For example, if fewer insurance claims for damage from natural disasters are approved, this might be due to higher hurdles for payouts by insurers rather than due to fewer damages because of more effective adaptation.

Furthermore, the benefits of some interventions only unfold after an extended period of time. For example, while mangroves are highly effective at reducing the impact of wave erosion on coasts, it can take 10 years or more for newly planted mangroves to generate their full protective capacity (McIvor et al. 2012). As a consequence, the positive outcomes of this intervention can only begin to be measured years after the intervention. It is therefore more difficult to measure outcomes than outputs.

The 2021 global stocktake of adaptation M&E systems found that most M&E systems focus primarily on measuring outputs rather than outcomes (Leiter 2021). This leaves us with a critical knowledge gap on the actual effects of current adaptation efforts. In response to this gap, some countries, such as the U.K., are now updating their M&E systems to better assess adaptation outcomes.

3.2.3 Use and selection of indicators

In the context of adaptation M&E systems, **indicators** are measurable variables that are used to assess or track different aspects of adaptation, such as vulnerability, adaptive capacity, climate change impacts, adaptation actions, or adaptation results. M&E systems therefore need to specify what the indicators aim to measure (Leiter et al. 2019). Due to the context specificity of adaptation, there is no fixed list of adaptation indicators (Leiter and Pringle 2018; IPCC 2022). Reviewing indicators used by other countries may be helpful to generate ideas, but indicators should always be designed with the particular context (including data availability) and M&E purpose in mind.[2] Indicators used under particular circumstances in one country might not be transferable to another, or might need adjustments.

Any proposed indicator needs to clearly describe how it actually measures adaptation (Expert Panel 2018). Too often this relationship is not specified and rests on implicit assumptions about how the indicator is relevant to adaptation that can lead to false conclusions (Leiter et al. 2019). The relationships between indicators and desired adaptation progress need to be clearly specified, particularly if the indicators are intended to measure adaptation outcomes. These relationships can be specified using a theory of change, a results chain, or an adaptation pathway (see Table 1) (Bours et al. 2014; IPCC 2022).

Outlining the intended adaptation process can in turn guide the selection of indicators since it maps the changes that need to occur in order to achieve the intended adaptation objectives. In practice, indicator selection is often constrained by data and resource availability. On the one hand, resource requirements can be greatly reduced if existing data sources are utilized; on the other hand, existing data sources might miss the specific link to adaptation. For example, the Expert Panel drew from the Canadian Environmental Sustainability Indicators in selecting its final list of proposed indicators (Expert Panel 2018), but the sustainability indicators were not originally designed to measure adaptation. As an example, data on water demand would need to be interpreted together with information on changes in water policy or water tariffs in order to assess whether it measures the effects of adaptation policy.

[2] Indicators used by national adaptation M&E systems in Europe are outlined in EEA (2018).

Combining multiple existing data sources or supplementing existing ones with new information can be a solution. For example, combining data on power outages and data on the occurrence and location of extreme weather events can indicate to what extent power outages were due to climate hazards. Countries have often started their adaptation M&E systems with a reliance on existing data sources and seek to gradually add new information that specifically captures adaptation responses.

Effective, consistent, and reliable use of indicators requires specifying their calculation methods and data (Leiter et al. 2019: 39). For this purpose, Germany's adaptation monitoring system introduced indicator factsheets that detail how an indicator is to be measured, what data sources are used, and how it can be interpreted (Schönthaler et al. 2010; see Appendix A). Similarly, Canada's Expert Panel on Climate Change Adaptation and Resilience Results provides factsheets for each proposed indicator in its final report, including its rationale, context, baseline, relevance for Indigenous Peoples, limitations, and potential data sources (Expert Panel 2018). Without such clarity, indicator data can be unreliable, non-comparable, and ultimately, unusable. For example, the Green Climate Fund uses the indicator "number of beneficiaries" but does not prescribe a standardized calculation method. Each project uses a different method to estimate beneficiaries, which yields widely differing numbers that are not comparable across projects (Pauw et al. 2020).

Furthermore, depending on the expressed purpose of the M&E system, indicators are not always a necessary or appropriate approach. M&E systems that aim primarily to enhance policy learning and lesson-sharing require broader and deeper information than what quantitatively-defined indicators can provide. In addition, indicators do not on their own explain how or why change happens, so further qualitative information is needed for their interpretation (Leiter and Pringle 2018). Accordingly, of those countries that operate an adaptation M&E system, many use at least one approach that is not primarily based on quantitative indicators (Leiter 2021).

3.3 Operationalization

Operationalization refers to the way that the implementation of the M&E system is organized—that is, the institutional arrangements for data gathering and analysis. In most countries, the supervision and management of the M&E system are the responsibility of the national government entity in charge of climate policy. Technical agencies, academia, or other service providers often provide support. In a small number of countries, national adaptation M&E is organized by independent entities outside government, for example in the U.K., through its Climate Change Committee. The Committee was established by the Climate Change Act in 2008, which equips it with a mandate to assess and report on adaptation progress to Parliament every two years (see Appendix A). Ireland also established an independent council charged with independently reviewing the implementation of climate policy including adaptation progress.

The data required for M&E systems is typically collected by multiple organizations. Accordingly, a process needs to be put in place to share the respective data (and its interpretation, if applicable) with the coordinating unit of the adaptation M&E system. Experience from several countries has shown that data sharing across government departments can be an impediment to operationalize an M&E system, especially if the mandate for the M&E system is weak. A participatory development process

can help to create buy-in. The indicators used for Germany's monitoring report, for instance, were selected based on an intensive stakeholder engagement process, which included agreements on data sharing between the collecting entity and the coordinating unit of the M&E system (see Appendix A).

3.4 Communication

M&E is only as useful as its contributions to iteratively improving adaptation policy over time, and ultimately to improving adaptation outcomes. Effective communication of M&E findings to policymakers is therefore essential. Of particular relevance are the **format**, **timing**, and **frequency** of reporting.

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The **format** of reporting is an important aspect of whether M&E findings are communicated effectively. All countries that have reported on their national adaptation plan implementation progress to date did so via a written report (Leiter 2021). Key findings are distilled into presentations and briefing notes for government units, committees, and senior-level decision makers. Some use additional formats such as factsheets or short videos and disseminate key findings in webinars and newsletters.

The **timing** of the release of an M&E report is especially relevant when aiming to inform other planning processes. In the U.K., for example, progress reports are published a year before the next iteration of the National Adaptation Programme is due, leaving sufficient time to inform its development process. Careful attention to publication timing is also important to maximize opportunities for uptake and attention, including in the media.

The **frequency** of reporting can also have an impact. The 2021 global stocktake of M&E systems showed that most countries report either every two years or every four-five years (Leiter 2021). The longer the interval, the fewer the opportunities to utilize M&E findings. While annual reporting has been challenging to implement in several countries, very long reporting periods (four years or more) make M&E less useful for short and medium-term policy updates, and generate fewer opportunities for policy learning. National governments therefore need to find an adequate balance between what is possible given existing capacities and resources and what is needed for the purpose of M&E.

NINE BEST PRACTICES FOR DESIGNING CANADA'S ADAPTATION M&E SYSTEM

The following section describes nine best practices for establishing a national adaptation M&E system in Canada. They cut across the four building blocks discussed in Section 3.

4.1 Define the purpose of Canada's M&E system in terms of accountability, policy learning, and improved decision making

Current federal, provincial, and territorial government approaches to adaptation M&E tend to focus narrowly on tracking policy implementation rather than assessing adaptation outcomes. This framing of adaptation M&E is limiting, given that it should also support ongoing learning, identification of gaps, and improved adaptation decision making about policy goals and actions (Expert Panel 2018). To maximize the benefits of adaptation M&E, Canada's national adaptation strategy can broadly define the purpose of the accompanying M&E system to include ensuring political accountability for meeting policy objectives, facilitating policy learning, and informing future decision making.

4.2 Legislate a strong federal mandate on adaptation M&E

Currently there are no national adaptation monitoring, evaluating, or reporting mandates enshrined in legislation, although such a mandate exists in the *Canadian Net-Zero Emissions Accountability Act* for reporting on mitigation progress. International experience demonstrates that a legislated adaptation mandate facilitates buy-in and commitment across government departments and agencies to design and implement adaptation M&E and to sustain it over the long term. In the U.K., for example, the Climate Change Committee reports to Parliament every two years under assessment powers mandated through the *Climate Change Act*. While most provincial and territorial government M&E mandates in Canada exist only as non-legally binding pledges in climate change or adaptation strategies, several provinces (British Columbia, Manitoba, Nova

Scotia) have passed legislation that requires regular reporting of adaptation progress (see Appendix B), establishing a precedent for the federal government to take similar steps.

4.3 Integrate findings from regional M&E systems and work in partnership with Indigenous leadership to build a full national picture of adaptation progress

While adaptation requires action from all orders and areas of government, coordination of these efforts has proved a challenge. Indeed, adaptation remains a highly fragmented policy domain in the Canadian context (Office of the Auditor General of Canada 2017). The diversity of M&E approaches emerging at the regional level is indicative of this decentralization. In the absence of specific federal standards around adaptation policy (which exist in the case of much mitigation policy) or other clearly defined national best practices, Canada's provinces and territories are both developing individualized adaptation processes and designing dissimilar M&E systems to track their progress.

Establishing a complete picture of Canadian adaptation progress requires an M&E system that is scalable between federal, provincial, and territorial levels. This is complicated by the reality that different jurisdictions are already proceeding with divergent adaptation strategies and adaptation M&E systems. To avoid the creation of disconnected M&E systems at national and sub-national levels, the Government of Canada could convene a working group to identify opportunities for integrating national and sub-national M&E processes, and identify policies and/or processes to this effect in the national adaptation strategy. These processes could include tracking implementation of major policies that affect risk or vulnerability outcomes at different scales, harmonizing certain core indicators, and collaborating on specific case studies.

Defining roles and relationships in national adaptation strategy is particularly important for building partnerships with Indigenous leadership on M&E. The 2018 report from the Expert Panel on Climate Change Adaptation and Resilience Results emphasizes the inclusion of Indigenous Knowledge Systems in adaptation M&E, and the 2016 Pan-Canadian Framework specifies that in addition to scientific knowledge, adaptation decisions should be informed by Indigenous and traditional knowledge. Current adaptation reporting in Canada still relies heavily on scientific and policy data, but there are some emerging efforts at the regional level to expand the scope of M&E with Indigenous leadership. The governments of British Columbia and Yukon, for example, have launched processes to co-develop Indigenous-led adaptation M&E systems, and the Government of Canada may be able to learn from that process in developing an equivalent national system that meaningfully integrates traditional and scientific knowledge .

4.4 Integrate multiple approaches and lines of evidence

The emphasis on government accountability in Canadian adaptation reporting means that current approaches to adaptation M&E tend to focus on monitoring policy implementation, for example by tracking how many government agencies have engaged in adaptation planning processes, how much funding is made available for resilient infrastructure upgrades, or how many stakeholders are reached in adaptation program design. A more ambitious scope for national adaptation M&E will necessitate the integration of multiple approaches and lines of evidence to understand how adaptation actions are affecting vulnerability and resilience outcomes. While early M&E systems in other countries tended to focus

on tracking policy implementation status, a new generation of adaptation M&E systems is integrating reports on adaptation actions with information on its effects. Together these lines of evidence should examine whether Canadian adaptation policies are responding to the most pressing risks with the appropriate and effective actions, and if adaptation efforts are reaching and supporting those who are most vulnerable in a changing climate.

4.5 Develop indicators that capture both policy outputs and outcomes

The indicator recommendations from the Expert Panel on Climate Change Adaptation and Resilience Results consist primarily of policy output indicators, along with a smaller list of outcome indicators (Expert Panel 2018). Evaluating the adaptation and resilience outcomes of policy actions, however, is critical for improving policy efforts over time (see Section 3.2.1 and 3.2.2). Canada's adaptation M&E system therefore needs both types of indicators, but further consideration should be given for how to expand the focus on outcomes in the indicator set. For example, future climate change risk and vulnerability assessments may be designed to provide useful data for outcome indicators. Indicator selection decisions must also make linkages between outputs and outcomes explicit to enhance understanding of how policies and actions are related to adaptation and resilience outcomes. Finally, each individual indicator should be clearly justified and defined with details on its rationale, measurement, data inputs, interpretation, and limitations. This is critical for ensuring replicability, comparability, and useability over time.

4.6 Apply qualitative methods alongside quantitative output and outcome indicators to enhance their explanatory power

Tracking adaptation policy implementation and adaptation or resilience outcomes is commonly conducted using quantitative indicators. Quantitative indicators on their own, however, are often unable to explain how and why adaptation interventions shape resilience and vulnerability outcomes. The most effective adaptation M&E integrates qualitative methods like interviews, focus groups, and surveys to contextualize indicators and explain their relationship to adaptation outcomes (Bours et al. 2014). Integrating quantitative indicators with qualitative assessment approaches can lend more nuance to reporting on adaptation processes and effects, which is critical for supporting policy learning and lesson sharing. This can be achieved using theories of change, results chains, or adaptation pathway models that describe the relationships between inputs, outputs, and outcomes (Table 1).

Quantitative indicators on their own are often unable to explain how and why adaptation interventions shape resilience and vulnerability outcomes.

4.7 Allocate sufficient time and resources to get institutional design right and ensure ongoing analytical capacity

Canada's multi-level approach to adaptation presents technical challenges for coordinating data sharing and analysis, as well as political challenges for defining the roles and responsibilities of the federal government and provincial and territorial governments with respect to adaptation M&E. Building buy-in within federal departments and from sub-national governments, Indigenous leadership, the scientific community, and local communities necessitates a collaborative and transparent process that identifies mutual interests and opportunities for data sharing and reporting. The federal government can bring in key stakeholders through existing networks like the Canadian Council of Ministers of the Environment, the Adaptation Platform, and the Expert Panel on Climate Change Adaptation and Resilience Results to support the institutional design process for the M&E system. It therefore needs to provide sufficient support, resources, and time to get that process right and ensure that the national M&E system is credible and useful.

In addition, because of the need to integrate multiple approaches and lines of evidence into the M&E system, it must be supported on an ongoing basis by strong analytical capacity, including the creation and maintenance of policy networks that facilitate information flows, strong mandates for M&E, sufficient resources to support M&E work, and appropriate research and technical training for staff (Craft and Howlett 2012).

4.8 Align the timing and frequency of reporting to best support the national adaptation strategy

A comprehensive national M&E system that both monitors policy implementation and evaluates the effects of policies and actions on adaptation and vulnerability requires multiple types of reporting windows. Canada's national M&E system should sequence future progress reports, national climate change assessments, and evaluation studies to support key milestones in the national adaptation strategy. This can be accomplished by establishing multiple points in time for assessment, such as annual reporting of shorter-term output indicators, comprehensive national climate change assessments every five years, and periodic assessments of adaptation outcomes.

4.9 Present M&E findings in accessible formats for diverse stakeholders

M&E findings must be easily accessible to stakeholders inside and outside governments in order to achieve accountability and transparency. The national M&E system can build on existing communication infrastructure like the Canadian Centre for Climate Services to report findings and progress to government stakeholders and the public. Making findings available in multiple formats, not just as official reports, will increase the accessibility and relevance of M&E findings for different audiences. These formats could include official reports, information sheets, interactive databases, and videos. For example, interactive web pages could allow users to explore different indicators used in M&E reports. Short videos could be created to describe Canadian's experiences with climate change and adaptation responses in different places.

CONCLUSION

This paper provides a starting point for the federal government to build an adaptation monitoring and evaluation system that is coherent, ambitious, and practical. The building blocks and best practices identified here can ensure Canada continues to learn and adapt in the face of a changing climate as Canada implements a National Adaptation Strategy.

Canada's forthcoming National Adaptation Strategy should highlight the importance of M&E to Canada's adaptation efforts and establish clear goals, objectives, and actions that facilitate measurement and assessment of progress. It should also lay the groundwork for successful adaptation monitoring and evaluation that incorporates the best practices described in this document, including:

- Clearly describing the objectives of M&E including enhancing accountability, learning from experience, and improving decisions
- Establishing a strong federal mandate on comprehensive and sustained M&E, including consideration of enshrining the mandate in legislation
- Describing how M&E will be coordinated with other orders of government
- Emphasizing the importance of tracking adaptation outcomes, and not just the outputs of policies and actions
- Defining targets and indicators for measuring outputs and outcomes where possible, and identifying a process for defining indicators and targets that require additional work after the strategy is released
- Identifying institutional arrangements for M&E, including lead and supporting departments and engagement of other actors
- Outlining how monitoring, reporting, and evaluation activities will take place with respect to the regular review and update of the strategy or of accompanying implementation plans
- Committing to publishing M&E findings that are accessible and appropriate for a variety of audiences

Ultimately, adaptation is a process rather than an endpoint. Canada's efforts to adapt and become more resilient must constantly evolve based on new information, and on the experience of successes and failures. Success will require a robust system for M&E, as good measurement

enables good management. By adopting an ambitious federal mandate on adaptation M&E, integrating multiple approaches to adaptation assessment, working with sub-national governments, and effectively communicating findings to key stakeholders, the federal government can build a robust adaptation M&E system that improves the effectiveness of adaptation policy and action, and that ultimately contributes to a more secure and resilient Canada.

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APPENDIX A:

Summary of global adaptation M&E systems

Many of Canada's peer nations have already developed national adaptation strategies or plans that include M&E systems. A global stocktake of national adaptation M&E systems found that as of September 2021, at least 24 countries had published a progress report on national adaptation plan implementation and 15 had conducted an evaluation of policy outcomes during or after the completion of their national adaptation plan (Leiter 2021; see Table A1). An additional 25 countries are in an advanced stage of developing an M&E system for their national adaptation plan, but have not yet progressed to the stage of publicly reporting on implementation progress. Canada has much to learn from the experience of these other countries.

Table A1:

Countries with operational national adaptation M&E systems

Adaptation progress report published	Adaptation evaluation published
Austria, Belgium (Flanders), Brazil, Burkina Faso, Cambodia, Chile, Cyprus, France, Germany, Japan, Kenya, Kiribati, Lithuania, Mexico, Netherlands (Delta Programme), Norway, Portugal, Slovakia, Spain, South Africa, South Korea, Sweden, Switzerland, United Kingdom	Belgium, Cambodia, Chile, Czech Republic, Finland, France, Germany, Ireland, Mexico, Netherlands, Philippines, South Korea, Spain, Switzerland, United Kingdom

Source: Table 3 in Leiter (2021). Note: Countries can appear in both columns if they publish separate progress and evaluation reports.

The development of an M&E system is therefore ongoing and does not end with the first reporting. Ministries and agencies responsible for climate policy typically coordinate the development of adaptation M&E systems. Some countries establish technical working groups or committees of experts from inside and outside of government to support the development, and many consult extensively with stakeholders. The development of adaptation M&E systems typically takes several years, partly due to the time required to reach clarity on what exactly to measure and how, and partly due to the sheer number of stakeholders that are engaged. National adaptation M&E systems often start with an interim version and evolve over time, for example by adding new data sources, changing indicators, or adjusting the reporting approach (Leiter 2021).

Germany and the United Kingdom are two of Canada's peer countries that are early movers in establishing national adaptation M&E systems. An overview of their M&E systems is detailed below. Factsheets on other countries' adaptation M&E systems are available online.

Country case: **Germany**

Germany's National Adaptation Strategy was adopted in 2008. It is implemented through an Adaptation Action Plan that has been revised every four to five years (2011, 2015, and 2020). Germany developed an indicator-based monitoring system to monitor climate impacts and adaptation responses (Schönthaler et al. 2010). Expert working groups identified possible indicators for each of the 15 action fields of the adaptation strategy. The process took five years, partly due to the large number of stakeholders involved at the national level, plus the 16 federal states, and respective technical and academic entities. The first monitoring report was published in 2015 (Umweltbundesamt 2015) and the second in 2019 (Umweltbundesamt 2019).

Germany's approach to M&E has both strengths and weaknesses. The development of indicators followed an inclusive and scientifically informed process, but resulted in an average of just three "response indicators" per action field, with three action fields left without any indicators (fisheries, transportation, and tourism). According to two specialists involved in the development process, "The number of indicators was limited intentionally in order not to lose the broad thematic focus" (van Rüth and Schönthaler 2018: 99). The 42 response indicators predominantly measure outputs, not outcomes, and four of them refer to mitigation rather than adaptation. In addition, monitoring is only undertaken at the federal level and so cannot be linked to actions under the jurisdiction of sub-national governments. Furthermore, the monitoring report is published at an interval of just every four to five years, despite the fact that data for most indicators is available far more frequently. This means that the monitoring system cannot inform planning and decision making in the interim with up-to-date data. Likewise, the indicator-based response monitoring is unable to fulfill the M&E purpose of gathering lessons learned. Germany's national adaptation M&E system therefore consists of three additional components shown in Table A2. The newest component, an independent evaluation based on interviews with stakeholders (Kind et al. 2019), has been described as adding substantial value to the monitoring system (Daschkeit 2021).

Table A2:

Components of Germany's national adaptation M&E system

Component	Description	Frequency	References
Monitoring of stand-alone indicators	Monitoring of climate change impact and adaptation response indicators. The indicators are stand-alone in the sense that they are neither linked to any theories of change or results chains nor to particular adaptation measures.	Every 4 years	Federal Environment Agency (Umweltbundesamt) (2015, 2019)
Progress assessment	Assesses implementation progress as well as the findings of the monitoring report, the evaluation and the vulnerability assessment, and makes recommendations for the next iteration of the Action Plan (which is jointly published with the progress report).	4-5 years	Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (2015, 2019)
Evaluation	Independent evaluation based on a results model, interviews and expert assessments.	Every 4 years	Kind et al. (2019)
Assessment of national climate change vulnerability	Assessment of the observed and expected climate change impacts in the 15 action fields based on climate change impact chains.	Every 6 years	Federal Environment Agency (Umweltbundesamt) (2021)

Country case: **United Kingdom**

The U.K.'s Climate Change Act of 2008 established the Climate Change Committee (CCC) as an independent body with the statutory duty "to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change" (Climate Change Act 2008). The CCC has a sub-committee on adaptation composed of experts from academia, think tanks, and the private sector.

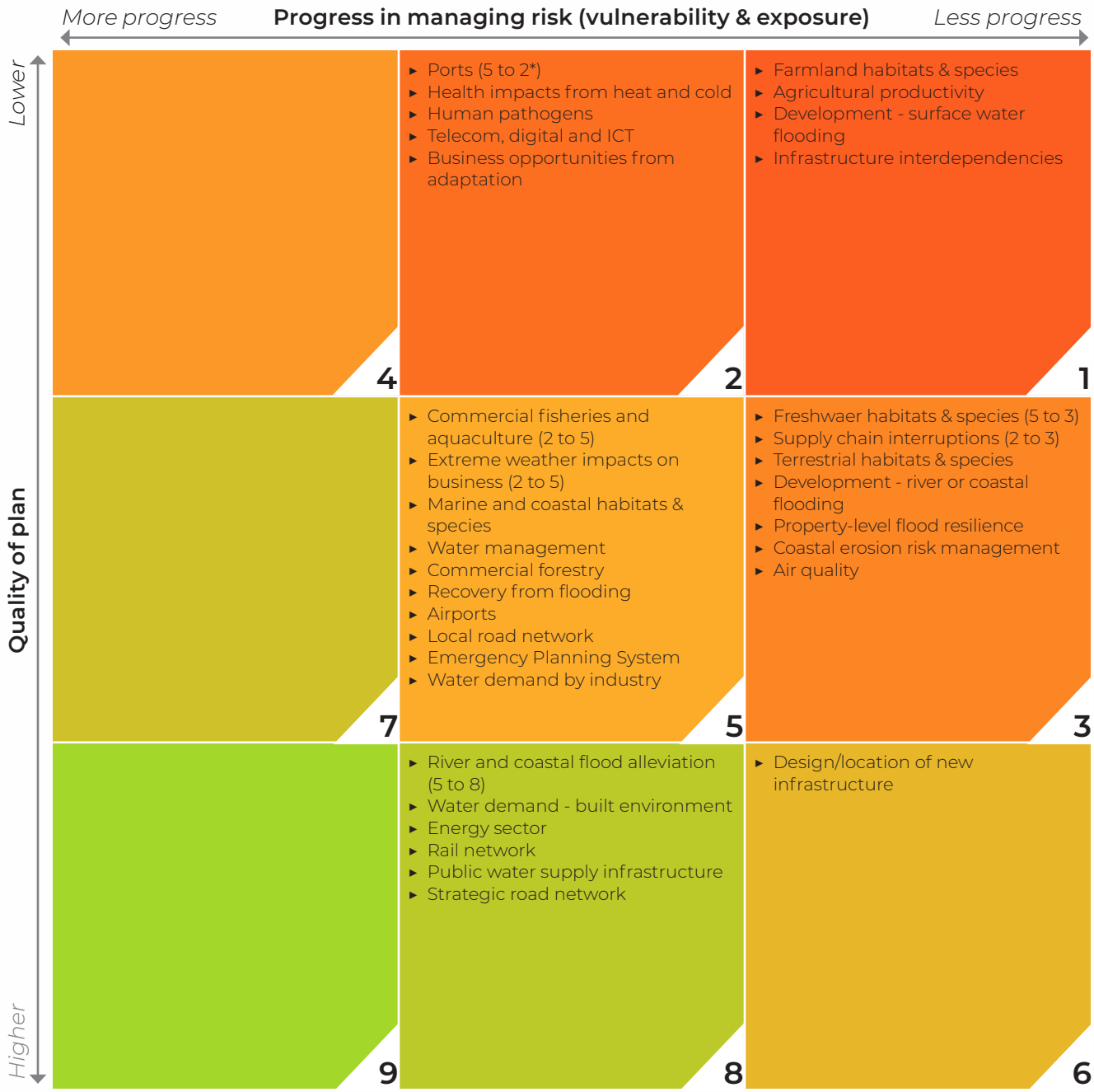
The U.K.'s approach to M&E has a number of strengths. The purpose of the U.K.'s adaptation M&E system goes beyond accountability and tracking implementation by explicitly mandating recommendations for improving adaptation policy. As per the *Climate Change Act*, the government must respond to the progress reports and state whether it accepts the recommendations. The progress reports have also been sequenced in a way that leaves sufficient time to inform the development process of new iterations of the National Adaptation Programme.

Between 2010 and 2014, the progress reports looked at barriers and enablers of adaptation and at associated data availability, thereby employing a systematic approach to understanding the adaptation process rather than seeking out indicators without any analytical basis. From 2015 onwards, the CCC has prepared progress reports every two years that cover all risks that are addressed by the National Adaptation Programme (the U.K.'s national adaptation plan). In addition, the devolved administrations of Scotland, Wales, and Northern Ireland produce their own progress reports on their own national adaptation plans. These progress assessments differ in structure and frequency since they are tailored to the respective national policy process (OECD 2022).

The CCC's approach goes beyond that of most other countries, as it assesses the effects that adaptation policies and actions have on managing climate risks. The findings of the progress assessment are summarized in a nine-box grid that indicates progress in regard to the quality of planning and the management of risks (see Figure A1).

Figure A1:

Assessment matrix of the CCC's adaptation progress report



Source: Climate Change Committee (2021: 21).

The U.K. is currently preparing for its third National Adaptation Programme that is due by mid-2023. Acting on a recommendation from the CCC's last progress report, the government seeks to develop adaptation pathways as a basis for more quantitative adaptation targets that would allow better measurement of adaptation progress.

APPENDIX B:

Regional adaptation policy landscape in Canada

Province or Territory	Comprehensive risk assessments	Policies	Progress reports to date
Alberta	Alberta commissioned a literature review on the evidence base for climate change risks to Alberta that was to inform the development of an adaptation strategy. It has not conducted a comprehensive risk assessment since 2008 and 2012.	Climate Leadership Plan (2015) - Now defunct	Climate Leadership Plan – Progress Report 2016-2017 Climate Leadership Plan – Progress Report 2017-2018 Climate Leadership Plan – Progress Report 2018-2019
British Columbia	2019 Preliminary Strategy Climate Risk Assessment	Climate Change Accountability Act (2007) Climate Preparedness and Adaptation Strategy (2022)	2020 Climate Change Accountability Report 2021 Climate Change Accountability Report
Manitoba	Manitoba had set out to conduct a provincial risk assessment in the 2015 TomorrowNow plan (now defunct), then to develop an adaptation strategy and M&E framework based on this assessment.	Climate and Green Plan Implementation Act (2018) A Made-in-Manitoba Climate and Green Plan (2017)	
New Brunswick	(Conducted locally)	Climate Change Act Transitioning to a Low-Carbon Economy: New Brunswick's Climate Change Action Plan (2016)	New Brunswick Climate Change Action Plan Progress Report (2020)
Newfoundland and Labrador	Projected Impacts of Climate Change for the Province of Newfoundland & Labrador (2018 Update)	The Way Forward on Climate Change in Newfoundland and Labrador (2019)	Climate Change Action Plan 2019-2024 Mid-term Report
Northwest Territories	NWT Hazard Identification Risk Assessment Report (2014)	Climate Change Strategic Framework (2018) Climate Change Action Plan (2019)	NWT Climate Change Action Plan: Annual Report 2019-20 NWT Climate Change Action Plan: Annual Report 2020-21
Nova Scotia	Adapting to a Changing Climate in Nova Scotia: Vulnerability Assessment and Adaptation Options (2005)	An Act to Achieve Environmental Goals and Sustainable Prosperity (2019) Climate Change Plan for Clean Growth: Discussion Paper (2021) Towards a Greener Future: Nova Scotia's Climate Change Action Plan (2009)	Climate Change Progress Report October 2019
Nunavut		Upagiaqtavut Setting the Course: Climate Change Impacts and Adaptation in Nunavut (2011)	

Province or Territory	Comprehensive risk assessments	Policies	Progress reports to date
Ontario		Preserving and Protecting our Environment for Future Generations: A Made-in-Ontario Environment Plan (2018)	Online progress updates available: https://www.ontario.ca/page/made-in-ontario-environment-plan
PEI	Prince Edward Island (PEI) Climate Change Risk Assessment (2021)	Taking Action: A Climate Change Action Plan for Prince Edward Island (2018-2023)	Progress Report: A Climate Change Action Plan for Prince Edward Island (2018-2019)
Quebec		2030 Plan for a Green Economy (2020) 2030 Plan for a Green Economy: Implementation Plan (2021-2026)	
Saskatchewan		The Management and Reduction of Greenhouse Gases Act (2018) Prairie Resilience: A Made-in-Saskatchewan Climate Change Strategy (2017)	Saskatchewan's Climate Resilience Measurement Framework Climate Resilience in Saskatchewan 2019 Report Climate Resilience in Saskatchewan 2020 Report Climate Resilience in Saskatchewan 2021 Report
Yukon	Yukon commissioned a review of research on climate change impacts and adaptation in 2017 and is currently conducting a comprehensive risk assessment that will be released in 2022	Our Clean Future: A Yukon strategy for climate change, energy and a green economy (2020)	Our Clean Future 2020 Annual Report