ICAT | INITIATIVE FOR Climate Action Transparency

NON-STATE AND SUBNATIONAL ACTION GUIDE

Integrating the impact of non-state and subnational mitigation actions into national greenhouse gas projections, targets and planning

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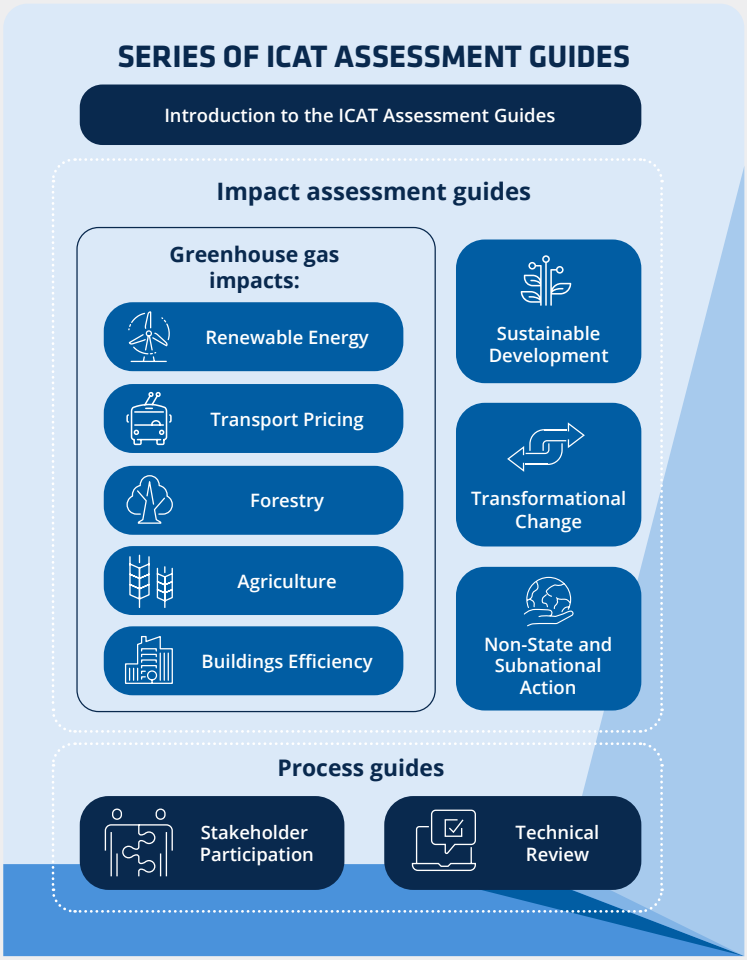
How to use the Assessment Guides

This guide is part of a series developed by the Initiative for Climate Action Transparency (ICAT) to help countries assess the impacts of policies and actions. It is intended to be used in combination with other ICAT assessment guides and can be used in conjunction with other guidance.



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PART I

Introduction, objectives and key concepts

1 Introduction

The challenge of climate change requires a concerted effort by national governments and a diverse range of non-state and subnational actors, such as states and cities, businesses and civil society. Non-state and subnational climate action is needed to achieve national mitigation targets, but can go beyond these targets to raise ambitions. Non-state and subnational actors therefore need to be fully integrated into the national vision to maximize synergies, ensure buy-in and fully realize the mitigation potential of a country.

1.1 Context for non-state and subnational action

The Paris Agreement recognizes the importance of non-state and subnational actions, and explicitly encourages non-state and subnational actors (see Box 1.1) to scale up their climate actions.[1] Globally, non-state (e.g. companies or investors) and subnational (e.g. cities, states and regions) action is accelerating, with a growing number of commitments and initiatives being announced and implemented. This action can have a direct impact on national emissions trajectories, national policy implementation and the achievement of national targets.[2,3] At the same time, national governments often do not yet fully consider the impacts of mitigation activities of these actors when determining national climate policies and implementing nationally determined contributions (NDCs).[4] Increased climate action is required globally: with the mitigation targets put forward so far, the world is heading towards a 3°C temperature rise, rather than a 1.5–2°C rise.[5] A better understanding of climate actions at different scales and by different actors in a country can help countries to develop realistic and comprehensive targets, and support effective policy planning to achieve these targets.

National governments may not be fully aware of the various mitigation actions undertaken by companies, investors, cities, states and regions. They may be unsure about the extent to which these actions help achieve national targets, such as those in the NDCs, or go beyond them. They may also be unable to reflect the impact of these actions in national greenhouse gas (GHG) projections, target setting and planning. Monitoring of historical GHG emissions at the national level automatically reflects all emissions reduction efforts undertaken within a country, including those not driven by national

BOX 1.1

Non-state and subnational (state) actors

Non-state actors are all actors that are not government (including at the national, state and city levels). Examples are companies, investors, civil society organizations, trade unions, research institutions and universities, financial institutions, activist groups, tribes, indigenous peoples, youth or women's groups, and faith-based communities.

Subnational actors include any form of government that is not at the national level, such as cities, states, provinces and regions.

The term "cooperative initiative" describes a joint undertaking of various actors, and can involve government bodies, including from the national level. International cooperative initiatives involve actors from different countries. For example, the Climate and Clean Air Coalition[6] is an international cooperative initiative with several national governments, finance institutions, non-governmental organizations (NGOs) and many others as partners.

Refer to Section 3.1 for further explanation of non-state and subnational actors.

[1] UNFCCC (2015), par. 135.

[2] For example, Global Covenant of Mayors for Climate & Energy (2018); Hsu et al. (2018).

[3] See Section 3.1 for more details on the key concepts used in this guide.

[4] Some national governments (e.g. Canada and the United States) include state-level action in their national projections.

[5] UNEP (2018).

[6] www.ccacoalition.org/en

governments.[7] Explicit consideration of non-state and subnational mitigation actions can lead to accurate and comprehensive projections, and better inform effective planning and policies at the local scale. It can also help countries identify promising subnational and non-state approaches that can be scaled up or supported by the national government or other partners.

Climate mitigation projections play an important role in identifying national and sectoral pathways, devising policies, and understanding whether countries will be able to reach their NDC targets. Under the Enhanced Transparency Framework of the Paris Agreement, all parties are required to report on progress made in implementing and achieving NDCs.[8] However, current policy projections that help estimate future emissions pathways often focus on national policies and do not explicitly account for other actions.

National targets are often realized through implementation by non-state and subnational actors. Non-state and subnational actions can also lead to ambitious emissions reductions, beyond those achieved by national policies alone; these actions mutually reinforce each other.[9] There is thus a compelling rationale for including the impact of non-state and subnational actions in national climate analysis to increase the accuracy of projections and enhance ambition. A comprehensive understanding of how non-state and subnational actions fit within, and contribute to, overall national targets and policies can help build realistic emissions projections.

However, policymakers face many challenges when attempting to identify and quantify the impact of non-state and subnational actions, and integrate them into their own models, and GHG emissions projections and planning. These include data availability and data gaps, lack of harmonized data and common indicators, uncertainty about the attainment of targets, and the need to use common metrics for non-state and subnational actions and national policies. This document aims to offer solutions to these challenges by providing a series of steps to determine the potential impact of non-state and subnational actions, while addressing overlaps and avoiding double counting.

[7] Although not attributing changes in emissions to individual actions.

[8] https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-paris-agreement/reporting-and-review-under-the-paris-agreement

[9] UNEP (2016, 2018).

1.2 Purpose of the guide

The purpose of this guide is to help national policymakers and analysts assess the impact of non-state and subnational actions. This knowledge can inform and improve the development of future national GHG trajectories and climate-relevant policies and targets, such as those in the NDCs. The methodology contained in this guide provides steps for users to identify, quantify and aggregate the impact of non-state and subnational actions, and integrate them into mitigation targets, projections and scenarios, which may support policy development, policy evaluation and target-setting.

The assessment may provide additional benefits. Developing an understanding of potential emissions reductions from non-state and subnational actions may boost national governments' confidence that current targets can be met or, alternatively, provide an insight into the emissions gap that needs to be bridged. It may support development of more ambitious national mitigation targets. The guide may also improve awareness about non-state and subnational actions, and facilitate coordination and communication between national, non-state and subnational actors for efficient implementation and aligned decision-making. This will help national governments set targets and put in place the right policies to enable action and ambition by non-state and subnational actors. The guide can also be used to assess the impact of non-state and subnational actions on specific policy targets – for example, a national energy efficiency scheme, renewable energy targets or penetration of electric vehicles. It may offer insights into whether non-state and subnational actions are effective or are likely to enjoy a broad mandate if enacted at the national level. As well, detailed analysis using this guide of innovative policies implemented at subnational level can improve understanding of such policies, which could potentially be translated to, or replicated at, the national level.

This forward-looking guide is fundamentally different from existing national guidance on GHG emissions accounting in the context of reporting under the United Nations Framework Convention on Climate Change (UNFCCC),[10] which covers past and current emissions by all actors within a country's jurisdiction, including non-state and subnational actors. The guide is not intended as a means to

[10] See, for example, reporting requirements for Annex I countries: https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/reporting-requirements.

attribute achieved emissions reductions to specific non-state or subnational actors, or to apportion the national or sectoral target to subnational actors. Instead, the guide helps to determine the potential impact of existing (and pledged) non-state and subnational actions, which, if realized, will be reflected as reductions in emissions in the national GHG inventory.

Application of the guide to the national or sectoral context can help policymakers answer the following questions, among others:

- What non-state and subnational climate actions are occurring in the country?
- Which of these actions, or sums of actions of various stakeholders, will have a climate mitigation impact in the country or a specific sector?
- How big is their impact for a national or sectoral mitigation pathway?
- How can non-state and subnational actions contribute to meeting or overachieving NDC mitigation targets?
- Which actions reflect ambition and go beyond existing policies, and by how much?
- How can non-state and subnational actions enable new, more ambitious NDC mitigation targets to be set?
- What insights can the analysis of potential impacts from non-state and subnational actions provide for future national and international policies?

1.3 Intended users

This guide is intended primarily for national government ministries and agencies, research institutions and NGOs. It can also be used by non-state and subnational actors to inform their own actions and understand the relationship with national action. Throughout this guide, the term "user" refers to the person applying the methodology.

The following examples demonstrate how different types of users can apply the guide:

- **National government ministries and agencies.** Identify and quantify the impact of non-state and subnational mitigation actions, and integrate them into national and/or sectoral mitigation assessments and scenarios, policy development and target-setting.
- **Research institutions and NGOs.** Identify and assess the mitigation potential of non-state and subnational mitigation actions in comparison with national policies or NDCs, and provide support to decision makers.
- **Non-state and subnational actors.** Identify and assess the mitigation potential of non-state and subnational mitigation actions towards meeting and/or supplementing sectoral, national and international targets.

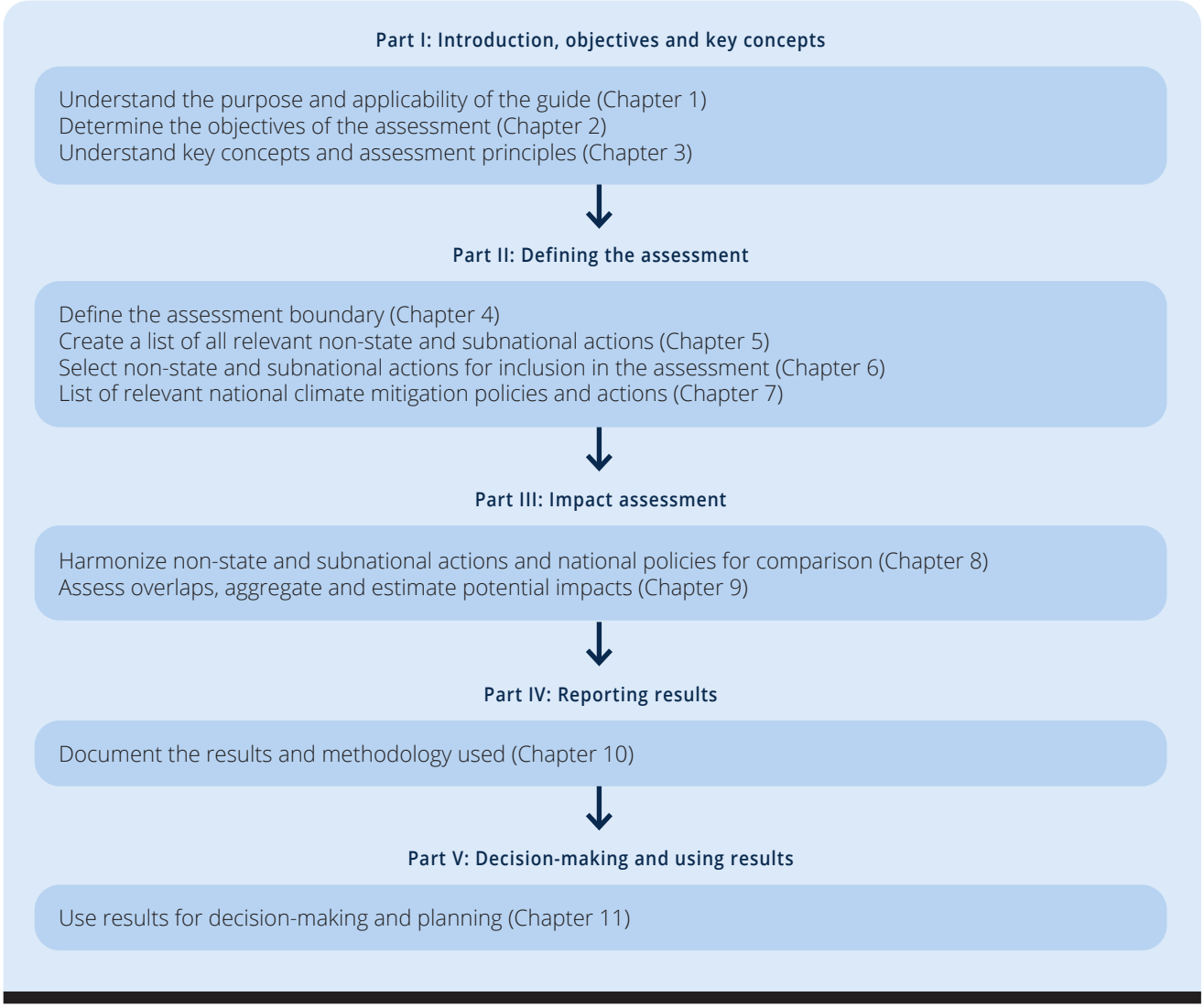
This guide can accommodate a variety of objectives from a range of users (see Chapter 2). For example, a national government may want to use the guide to improve its understanding of actions being taken by non-state and subnational actors, and identify sectors where a greater degree of action is occurring. A university undertaking national emissions projections may want to use this guide to improve emissions scenarios by incorporating the impact of subnational and non-state actions.

1.4 Scope, applicability and limitations of the guide

The guide provides principles, concepts and procedures applicable to all types of non-state and subnational climate mitigation actions. It is organized into five parts (Figure 1.1). Part I introduces the guide, and provides objectives, principles and an overview of steps for conducting an assessment. It also introduces some common challenges around such an assessment. Part II discusses how to define the assessment, including selecting non-state and subnational actions for inclusion in the assessment. Part III provides impact assessment steps, including assessing overlaps, aggregating impacts, and comparing ambition across non-state/subnational and national/sectoral policies and targets. Part IV covers reporting of results, and Part V discusses the use of assessment results for decision-making. The guide details a general process for users to follow when conducting an assessment. It includes

FIGURE **1.1**

Overview of the methodology



illustrative examples, but does not prescribe specific calculation methodologies, tools or data sources.

The guide can be applied to address various objectives, and users may skip parts that are not relevant for their objectives. Further, some of the steps can be undertaken simultaneously or applied in a different order rather than sequentially; this has been highlighted, where relevant. The guide focuses on non-state and subnational activities that mitigate climate change, such as increasing renewable energy generation or improving energy efficiency. These could be activities with an explicit mitigation objective or with broader sustainable development benefits, including emissions reductions (see Box 1.2). For example, cooperative international initiatives to improve air quality also reduce GHG emissions.

Adaptation is recognized as equally important to mitigation. However, because of significant differences in metrics and approaches, and since adaptation is not currently considered in GHG emissions projections, the guide does not consider specific adaptation-related impacts of actions. These could potentially be explored in the future.

Given the wide range of non-state and subnational actions, with varying levels of available information, users will need to make several assumptions in aggregating their impacts – for example,

BOX **1.2**

Sustainable development impacts of non-state and subnational actions

Sustainable development impacts are wider economic, social and environmental national development impacts or outcomes, beyond climate change mitigation. For example, a state government initiative targeting emissions reductions or energy savings may have multiple benefits, including climate change mitigation, improved air quality, positive impacts on health and increased crop yields. These, in turn, can lead to reduced public spending on health or rural job creation, and increased agriculture exports, which can further help with poverty reduction. For more information on how to assess these broader impacts, refer to the Initiative for Climate Action Transparency (ICAT) *Sustainable Development Methodology.*

assumptions about the likelihood of a company achieving its stated target. There is often no single, correct approach underlying such assumptions. The guide walks users through possible situations and related conservative assumption choices, but it is not feasible to discuss every situation for every set of actions and actors. Users should use their judgment, based on knowledge gathered about the actions during the assessment process, stakeholder inputs and/or expert consultations. The guide stresses that users should be conservative in their approach, to avoid overestimating impacts and manage accompanying uncertainty, and that all assumptions and methods should be clearly stated, with their underlying rationale. Assumptions should be revisited and updated in subsequent assessments as new information becomes available.

The guide is intended for ex-ante (forward-looking) assessments to understand the expected future impacts of non-state and subnational actions. Ex-post (backward-looking) assessments are not included in this guide. Ex-post assessments can, however, be used to check the results of ex-ante assessments by monitoring the performance of actions over time, verify baselines and underlying assumptions, and guide future strategies. Ex-post assessment can be applied separately on an ongoing basis as new non-state and subnational actions are implemented and/or more information becomes available.

The guide is framed by the global context, which increasingly recognizes and promotes interaction between national governments and non-state and subnational actors. For example, the Paris Agreement explicitly encourages governments to work more closely with these actors.[11] The guide aims to support and inform these discussions without specifically addressing them. The following topics are therefore not included in the scope of this guide:

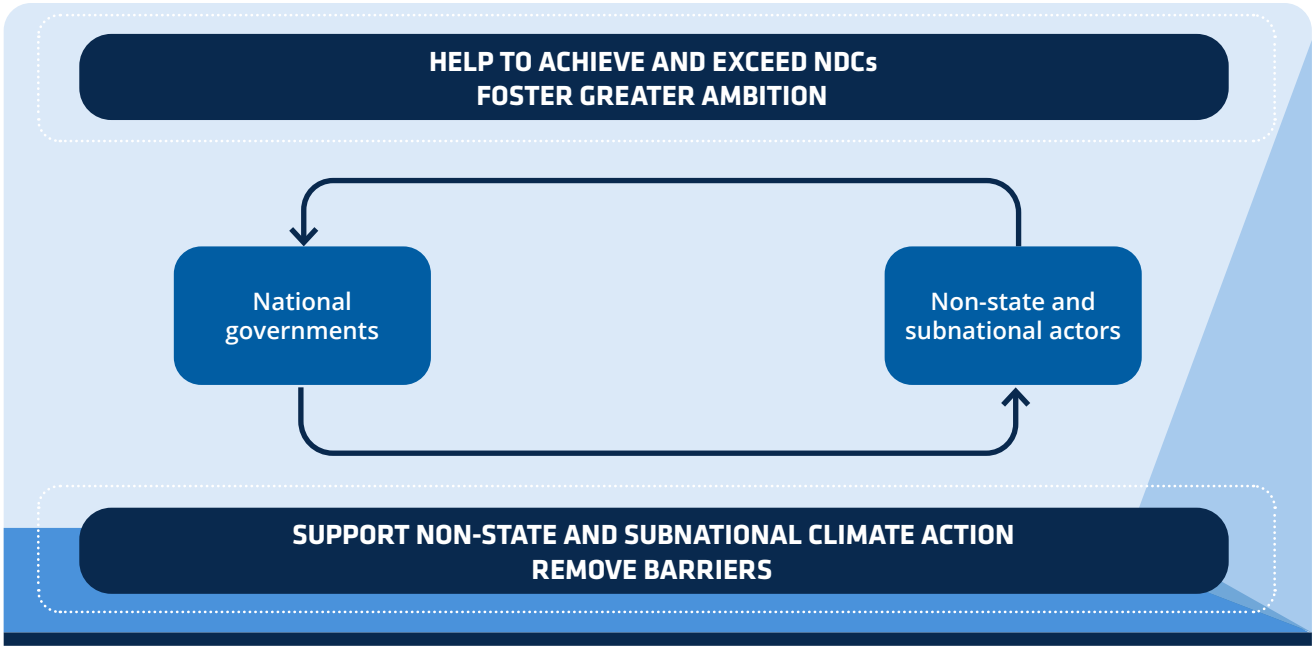
- What can governments do to promote non-state and subnational actions within their country?
- What options exist to engage non-state and subnational actors in the country?
- How can national governments and non-state and subnational actors work together more effectively?
- How can policies related to non-state and subnational actions be better integrated into national policies, and vice versa?
- How can national governments and non-state and subnational actors work towards using comparable GHG accounting methodologies, assumptions, reporting formats and target metrics?

When applying the methodology, users should bear in mind that national government and non-state and subnational action can mutually reinforce each other, as shown in Figure 1.2. However, in many cases, it is impossible or unnecessary to determine which comes first. In fact, non-state and subnational actors and national governments operate in a single system, where governments set the rules and regulations of the economic activity within their jurisdiction. When national governments set climate targets or adopt new policies, they send signals to, and influence, non-state and subnational actors. At the same time, when non-state and subnational actors adopt targets and policies, they contribute to meeting goals adopted by national governments.

[11] UNFCCC (2015), par. 119.

FIGURE **1.2**

Relationship between national and non-state and subnational climate action



1.5 Key recommendations

This guide includes key recommendations, which are recommended steps to follow when assessing and reporting impacts. Key recommendations are intended to help users to produce credible impact assessments that are based on the principles of relevance, completeness, consistency, transparency, comparability, accuracy and conservativeness.

Key recommendations are indicated in subsequent chapters by the phrase "It is a *key recommendation* to …". All key recommendations are also compiled in a checklist at the beginning of each chapter.

The *Introduction to the ICAT Assessment Guides* provides more information on how and why key recommendations are used within the ICAT series of assessment guides.

1.6 Relationship with other aggregation studies

A number of studies have aggregated emissions reductions from non-state and subnational actions in individual countries or even globally. Appendix A lists several of these studies that quantify impacts of actions from a range of actors. There is considerable confusion about the different methodologies available to practitioners, whether there is one "right" methodology for any given situation, and where the ICAT *Non-State and Subnational Action Guide* fits in.

Drawing from these individual studies, this guide has compiled a comprehensive set of steps to provide a framework for users to assess the impacts of different kinds of mitigation actions, implemented by a range of actors within a sector or nation. The guide differs from other studies in that it does not aggregate actions for any country or other region; instead, it sets out the steps necessary to perform such an impact assessment (Box 1.3). Broadly speaking, the various quantification studies use similar steps to aggregate emissions reductions. The ICAT *Non-State and Subnational Action Guide* complements these studies, rather than competing with them or contradicting them.

Given the nature of this exercise, considerable flexibility is built into each step in the guide to allow quantification of a range of actions from disparate actor groups across multiple sectors. Based on their objectives, users can choose distinct options (e.g. focus on subnational actors and the forestry sector only), follow different approaches (e.g. for assessing overlaps) and make different assumptions

BOX **1.3**

ICAT *Non-State and Subnational Action Guide* and aggregation studies

The relationship between this guide and the individual aggregation studies listed in Appendix A is similar to the relationship between individual GHG emissions inventories and the Greenhouse Gas *Protocol Corporate Standard*,[12] or between individual city GHG inventories and the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories*.[13] Similar to the Greenhouse Gas Protocol standards, this guide focuses on identifying steps to develop GHG inventories and provides guidance for users to make appropriate choices in each step. However, unlike the Greenhouse Gas Protocol standards, this guide is not a standard with specific requirements. Users can select an option in each step and make assumptions – based on data availability, resources and their objectives. They transparently record their assumptions and choices; different choices made between options can lead to significant differences among various assessments of non-state and subnational actions.

(e.g. regarding baselines) while following the recommended steps. The choices made at each step will lead to unique results. For example, the studies listed in Appendix A are different from each other in their objectives, assessment boundaries and assumptions made, even if they follow the same broad steps. [12][13]

Therefore, users should not necessarily search for the "right" methodology; instead, they should use the steps outlined in this guide, choosing options and assumptions at each step that are appropriate to their objectives and data constraints.

1.7 Relationship to other methodologies and resources

This guide is part of the ICAT series of guides for assessing impacts of policies and actions.[14] It is intended to be used in combination with any other ICAT documents that users choose to apply, including:

- sector-level methodologies for assessing GHG impacts of policies and actions in the energy, transport, agriculture and forestry sectors
- *Sustainable Development Methodology* for assessing the environmental, social and economic impacts of policies and actions
- *Transformational Change Methodology* for assessing the transformational impacts of policies and actions
- *Stakeholder Participation Guide* on how to carry out effective stakeholder participation when designing, implementing and assessing policies and actions, as well as non-state and subnational actions
- *Technical Review Guide* on how to review assessment reports, covering the impact of non-state and subnational actions, and GHG, sustainable development and transformational impacts.

The ICAT series of assessment guides is intended to enable users who choose to assess the GHG impacts, sustainable development impacts and transformational impacts of a policy or action to do so in an integrated and consistent way within a single impact assessment process. Users should refer to the *Introduction to the ICAT Assessment Guides* for more information about the ICAT assessment guides and how to apply them in combination.

This methodology builds on existing resources such as the Greenhouse Gas Protocol *Policy and Action Standard* (© WRI 2014; all rights reserved)[15] the Greenhouse Gas Protocol *Mitigation Goal Standard*,[16] the Global Climate Action report[17] and the Fulfilling

[12] Available at: http://ghgprotocol.org/corporate-standard.

[13] Available at: https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities.

[14] https://climateactiontransparency.org/icat-toolbox

[15] Available at: www.ghgprotocol.org/policy-and-action-standard.

[16] Available at: https://ghgprotocol.org/mitigation-goal-standard.

[17] Data-Driven Yale, NewClimate Institute and PBL (2018a).

America's Pledge report.[18] It adapts the structure, and some of the tables, figures and text from these resources, where relevant, to assessing non-state and subnational impacts. Figures and tables adapted from these resources are cited, but for readability not all text taken directly or adapted from these resources (primarily the *Policy and Action Standard* and the Global Climate Action report) is cited.

1.8 Process for developing the guide

The guide was developed through an inclusive, multi-stakeholder process convened by ICAT. The development of this document was led by a project team composed of the NewClimate Institute (lead), the World Resources Institute (WRI), The Climate Group and CDP. One of the appendices (Appendix C) was led by CDP, with contributions from WRI, the NewClimate Institute and The Climate Group.

The first draft was developed by the project team with inputs from a Technical Working Group (TWG). The TWG consisted of experts and stakeholders[19] from a range of countries identified through a public call for expressions of interest. The TWG contributed to the development of the technical content of the guide through participation in regular meetings and written comments. A Review Group provided written feedback on the first draft, which was taken into account to produce a second version of the guide in July 2018. The July 2018 version was applied by various organizations in three countries – India, Mexico and the United States – to ensure that it can be practically implemented.

The following three pilot assessments were part of the practical application of this guide:

- Assessment of corporate actions in India. WRI India and the Confederation of Indian Industry analysed voluntary targets of 53 companies, representing 28% of India's industrial sector emissions in 2014, to understand how they relate to India's national GHG emissions projections for 2020 and 2030. This assessment of the GHG emissions reduction impact of voluntary business commitments in India's industrial sector is referred to as the "India corporate actions assessment" in this guide.
- Assessment of non-state and subnational actions in the United States. The initiative America's Pledge used the guide to aggregate mitigation efforts from cities, states, companies and various coalitions in the United States to understand their impact on national emissions projections. The comprehensive assessment of how cities, states and businesses are driving the United States towards a low-carbon future is referred to as the "Fulfilling America's Pledge report" in this guide.
- Assessment of subnational actions in Mexico. Grupo Ecológico Sierra Gorda applied the methodology in Mexico to understand how a state-based nationally appropriate mitigation action (NAMA) in the agriculture and forestry sector (called "Subnational mitigation actions for forest regeneration and the implementation of planned grazing mitigation action") compares with the country's NDC and sectoral goals. The assessment is referred to as the "Mexico subnational actions assessment" in this guide.

This version of the guide was informed by the feedback gathered from these assessments and includes case studies from these applications. Parallel work that has also informed this version includes the Global Covenant of Mayors 2018 Global Aggregation report;[20] and the Data-Driven Yale, NewClimate Institute and Netherlands Environmental Assessment Agency (PBL) *Global Climate Action from Cities, Regions and Businesses* report[21] (referred to as the "Global Climate Action report" in this guide).

ICAT's Advisory Committee, which provides strategic advice to ICAT, reviewed the second draft. More information about the development process, including governance of the initiative and the participating countries, is available on the ICAT website.

All contributors are listed in the Contributors section.

[18] America's Pledge (2018a).

[19] Listed at: https://climateactiontransparency.org/icat-toolbox/non-state-subnational-action/technical-working-group.

[20] For more information, see: https://www.globalcovenantofmayors.org/impact2018.

[21] Available at: http://bit.ly/yale-nci-pbl-global-climate-action.

2 Objectives of assessing the impact of non-state and subnational actions

This chapter provides an overview of objectives users may have when assessing the impacts of non-state and subnational climate actions. Defining the assessment objectives is an important first step because decisions made in later chapters are guided by the stated objectives.

Checklist of key recommendations

- Determine the objectives of the assessment at the beginning of the impact assessment process

Recognizing that governments have limited resources and that these can vary significantly across countries, this guide offers an approach that can be tailored, depending on users' objectives for undertaking the assessment. It is a *key recommendation* to determine the assessment objectives at the beginning of the impact assessment process. The chosen objectives inform how users apply various steps in the guide (see Section 3.2). Further, analyses can be narrowly targeted (focusing on a subset of actions or sectors, such as the impact of cement companies' voluntary targets on industrial sector emissions) or broader (such as assessing the impact on national emissions of all non-state and subnational actions across the economy). Examples of possible objectives for assessing the impacts of non-state and subnational actions are discussed below. Box 2.1 provides objectives used in some assessments.

Users can assess the impacts to pursue different objectives, such as the following:

- Understand the landscape of non-state and subnational effort – for example, by analysing the types of actions being undertaken and the types of actors that are involved. This information can be used in a variety of ways, such as to determine opportunities for engagement with non-state and subnational actors; promote new actions; or determine the extent of adoption of a policy or action among regional public and private non-state and subnational actors (e.g. cities, businesses), which can indicate the implicit mandate or consensus around different types of actions.
- Determine the combined expected impact of all non-state and subnational actions in a country or sector. The impact of non-state and subnational actions is not an additional impact because it does not consider potential overlaps with national policies, but it can nevertheless demonstrate the contribution that non-state and subnational actors may make, and inform efforts to encourage or strengthen such actions. Users can tailor their assessments to focus on the collective impact of specific types of actions or actors; for example, the guide can be used to assess the collective impact of actions by local governments in the transport sector.
- Determine the contribution of non-state and subnational actions towards achieving national or sectoral climate change targets (e.g. NDC targets). Economy-wide or sectoral targets are achieved through policies and actions at multiple levels and through the involvement of multiple actors. Users may want to assess the specific contribution of non-state and subnational actions in realizing these targets.
- Determine the level of additional effort needed to achieve an NDC target, considering existing national policies and the contribution of non-state and subnational actions. Users can assess the gap between the impact of existing climate policies and actions, and the targets. Policymakers and others can use this understanding to inform strategies and initiatives to bridge the gap. Where the sum of non-state and subnational actions goes beyond the national target, such results should not provide a perverse incentive to slow down climate action by the national government. The assessment results can instead be used to inform future policy design, including enhancement of national mitigation targets and reformulation of NDCs towards enhanced ambition (also mentioned below).
- Understand the potential of non-state and subnational actions to enable the country or sector to achieve a more ambitious target.

For instance, users can assess the mitigation potential of non-state and subnational actions to raise ambition and adjust the national or sectoral targets upwards.

- Improve emissions projections or inform realistic economy/sector-wide emissions reduction targets. For example, users may want to incorporate the impact of subnational renewable energy goals as they revise the national renewable energy target. Others may be interested in determining how public–private partnerships to promote electric mobility affect the transport sector emissions pathway.

- Determine how non-state and subnational actions impact the ambition set out in specific policies. For example, users can assess the extent to which non-state and subnational actions contribute to a national policy to phase out hydrofluorocarbons (HFCs).

Users should also identify the intended audience(s) of their assessment. Possible audiences include policymakers, funders, non-state and subnational actors, analysts and research institutions. Depending on the type and depth of analysis chosen, it may be helpful for the user to consult with other stakeholders (including actors included in the scope of the analysis) to ensure the highest possible accuracy and completeness of the information used for the analysis, and to check results for sense.

BOX **2.1**

Examples of assessment objectives

Fulfilling America's Pledge report was developed to estimate the aggregate impact of a growing stream of non-state and subnational actions on economy-wide emissions to 2025. It provides a comprehensive assessment of how existing commitments by cities, states and businesses influence the overall national emissions trajectory.

India corporate actions assessment aggregates the emissions reduction impact of voluntary climate initiatives undertaken by Indian businesses by 2020 and 2030, and compares it with the national emissions trajectory.

Global Climate Action report assesses the impact of cities, regions and businesses on global GHG emissions by 2030, including national analysis for 10 key countries.

Mexico subnational actions assessment compares the impacts of a state-based NAMA in the agriculture and forestry sector with national targets.

3 Key concepts, steps and assessment principles

This chapter introduces key concepts contained in this guide, provides an overview of the steps involved and describes principles to help guide the assessment.

Checklist of key recommendations

- Base the assessment on the principles of relevance, completeness, consistency, accuracy, comparability and transparency

3.1 Key concepts

This section provides an overview of key concepts used throughout the guide.

3.1.1 National actions

National actions are interventions taken or mandated by a national government, which may include policies, laws, directives, decrees, regulations, standards, incentives and other types of policy instruments that aim to achieve a specific target.

3.1.2 Non-state and subnational actors

Actors that are distinct from the central government of a nation State are defined using a wide variety of terminology. Within UNFCCC, the terms "non-Party stakeholder" and "observer organization" distinguish individual national government authorities that are signatories (Parties) to the Convention from other actors and groups of actors, including entities within the United Nations system, intergovernmental organizations and NGOs. Within the literature, and throughout the broader climate action community, many categorizations are used for individual actors and groups of actors. The term "non-state actor" is particularly common, and may cover the broad landscape of civil society, economic actors, and subnational or substate actors. The Global Climate Action portal (previously known as NAZCA) uses the following categories: cities, regions, companies, investors, civil society organizations and cooperative initiatives. In some cases, non-state is used synonymously with non-governmental, and may be interpreted to exclude all government actors, including at the level of nations, cities, regions, local municipalities and other jurisdictions. Common categorizations include non-state, subnational, municipalities, non-federal, intergovernmental organizations, cities and city networks, local governments, public sector, business, private sector, trade unions, research institutions and universities, financial institutions, activist groups, tribes, indigenous peoples, youth or women's groups, and faith-based communities. Varying definitions for non-state actors mean that these categories do not have clear boundaries and often overlap. Furthermore, cooperative efforts may involve actors from different categories, and may also include (national) governments.

For the purposes of this guide, the phrase "non-state and/or subnational actor" refers to the broad range of individual or collective climate actors other than an individual central government authority of a nation State (see Section 4.1). Non-state actors include economic actors such as companies, businesses, trade unions and investors; civil society; and international organizations. Subnational actors include any form of government that is not a national government, such as cities, states, provinces and regions.

3.1.3 Non-state and subnational action

This guide specifically focuses on mitigation actions, and uses the generic term "action" for all mitigation efforts by non-state and subnational actors. Non-state and subnational action is any kind of activity that reduces GHG emissions and is led by non-state and subnational actors.[22] The guide also considers actions that may have other impacts but also reduce GHG emissions – for example, through energy efficiency improvements, renewable energy expansion and other non-GHG actions. Some actions can be legally binding (e.g. a state government setting a GHG emissions reduction target), whereas others are voluntary (e.g. a company committing to 100% renewables).

[22] An exception can be cooperative initiatives, which are sometimes led by a (national) government or a group of governments.

Actions can be put forward and pursued individually (by *one* subnational or non-state actor) or cooperatively in the form of initiatives (by a *group* of actors, including non-state and/or subnational actors, with or without national governments). A huge variety of individual and cooperative actions exist, including general statements calling for action, political declarations, quantifiable targets for reducing emissions, commitments, pledges, plans, initiatives, strategies, and concrete policies and programmes (Table 3.1).

Actions can also be categorized in terms of targets and policies – which can be either economy-wide or sector-specific (see Section 4.3). They can include both GHG and non-GHG actions. Targets can be represented as a base year absolute target, fixed level target, base year intensity target or baseline scenario target (Table 3.2). However, often targets lack detailed information on the base year or other reference levels (see Section 5.3 on how to address data gaps). Policies refer to interventions by a government or other entity, and can include laws, directives and decrees; regulations and standards; taxes, charges, subsidies and incentives; information instruments; voluntary agreements; implementation of new technologies, processes or practices; and public or private sector financing and investment. Table 3.3 presents general types of policies and actions; however, the list is not exhaustive, and there may be policies and actions of other types.

At times, actions may be commitments to adopt a target in future. These commitments may have been publicly announced but are still under development.[23] For instance, under the Science Based Targets initiative (SBTi), companies commit to developing a science-based target within 24 months of its public announcement.[24]

Given the wide range of actions, it is important to develop criteria to determine suitability of actions for inclusion in the assessment (see Chapter 6), and clearly indicate which actors or initiatives are retained for the final analysis.

TABLE 3.1

Examples of individual and cooperative actions

Individual actions
Non-state action
• Iberdrola, a Spanish utility, aims to reduce its direct carbon dioxide (CO_2) emissions by 100% from 2007 to 2050.
• ACC, India (a cement company) aims to reduce operational CO_2 equivalent (CO_2e) emissions intensity by 35% per tonne of product by 2017 compared with 1990 levels through increased energy efficiency.
• ANZ Bank of Australia issues US$ 470 million green bonds worth for projects in renewable energy and energy efficiency in buildings.
• BNP Paribas sets aside €100 million for investment in start-ups working on innovative solutions for energy transitions.
• Mahindra Lifespace Developers Limited (an Indian investor) aims to reduce operations CO_2e emissions intensity by 10% per square metre from 2013 to 2020 through increased energy efficiency and solar energy installations.
Subnational action
• The city of Glasgow aims to reduce CO_2e emissions from government operations by 30% from 2005 to 2020.
• The province of Alberta, Canada, is committed to reducing methane emissions from the oil and gas sector by 45% by 2025.
• The Oriental Region of Morocco pledges to increase its energy efficiency and reduce community energy consumption by 12% by 2020 compared with 2009 levels.
• The state of California sets a goal to reduce petroleum consumption by cars and trucks by 50% by 2030.

[23] Some actors may not publicly announce their actions, in which case it will not be possible to include them in the assessment.

[24] Further information on the SBTi is available at: http://sciencebasedtargets.org.

TABLE **3.1,** continued

Examples of individual and cooperative actions

Cooperative action
• Under the RE100 initiative, companies in different countries each commit to procuring 100% of their electricity consumption from renewable energy.[25] • Under the Climate & Clean Air Coalition Agriculture Initiative, several international organizations and countries aim to raise ambition in NDCs to include actions to reduce methane and black carbon emissions from key agricultural sectors by sharing and implementing best practices.[26] • The New York Declaration on Forests – endorsed by national and subnational governments, companies, indigenous peoples and civil society organizations – calls for halving the loss of natural forests globally by 2020, and striving to end it by 2030. • The Cement Sustainability Initiative aims to reduce CO_2 emissions from cement production and report annually on progress, including independent third-party assurance. • The Alliance of Energy Efficiency Financing Institutions, led by the European Bank for Reconstruction and Development and the United Nations Environment Programme Finance Initiative (UNEP FI), aims to scale up energy efficiency financing, and work with institutional and public financiers to provide climate finance to clients.

Source: Global Climate Action portal (http://climateaction.unfccc.int).

TABLE **3.2**

Types of targets used by non-state and subnational actors

Target type	Description	Common metrics
Base year or absolute emissions	A target that aims to reduce or limit the increase of emissions by a specified quantity relative to emissions in a historical base year	GHG emissions relative to historical emissions of a specified year
Fixed level	A target that aims to reduce or limit the increase of emissions to an absolute emissions level in a target year	Absolute GHG emissions for a target year
Base year intensity	A target that aims to reduce emissions intensity by a specified quantity relative to a historical base year	GHG emissions per unit of another variable (typically gross domestic product, but may also be population, energy use or a different variable)
Baseline scenario	A target that aims to reduce emissions by a specified quantity relative to a projected emissions baseline or business-as-usual scenario	GHG emissions relative to a reference case that represents emissions in the absence of activities taken to meet the target
Non-GHG	Targets framed in terms of energy efficiency, renewable energy or other objectives not directly expressed in terms of GHG emissions or emissions reductions	Varied
Specific policies and actions	Interventions such as laws, directives, and decrees; regulations and standards; taxes, charges, subsidies and incentives; information instruments; voluntary agreements; implementation of new technologies, processes or practices; and public or private sector financing and investment	Varied

Source: Adapted from WRI (2014b).

[25] Further information on RE100 is available at: http://there100.org/re100.

[26] Further information on the CCAC Agriculture Initiative is available at: https://ccacoalition.org/en/initiatives/agriculture.

TABLE **3.3**

Common types of policies and actions adopted by subnational actors

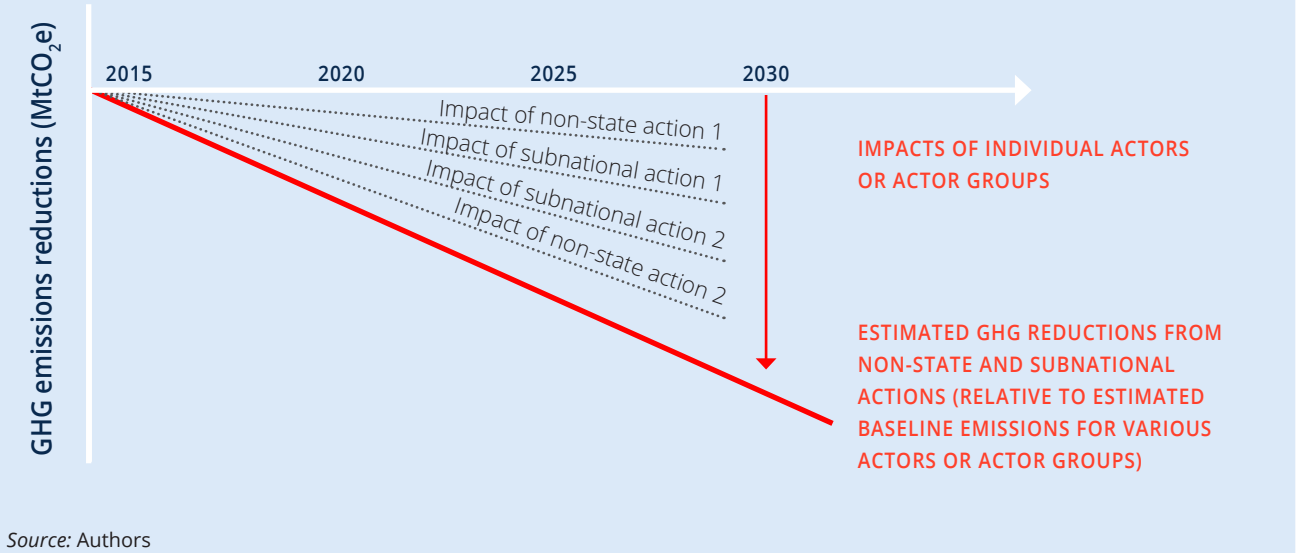
Type of policy or action	Description
Regulations and standards	Regulations or standards that specify abatement technologies (technology regulation or standard), or minimum requirements for energy consumption, pollution output or other activities (performance regulation or standard). They typically include penalties for non-compliance.
Taxes and charges	Levies imposed on each unit of activity by a source – for example, a fuel tax, carbon tax, traffic congestion charge, or import or export tax.
Subsidies and incentives	Direct payments, tax reductions, price supports or the equivalent provided by a government to an entity for implementing a practice or performing a specified action.
Voluntary agreements or actions	Agreements, commitments or actions undertaken voluntarily by public or private sector actors, either unilaterally or jointly in a negotiated agreement. Some voluntary agreements include rewards or penalties associated with participating in the agreement or achieving the commitments.
Information instruments	Requirements for public disclosure of information. They include labelling programmes, reporting programmes, rating and certification systems, benchmarking, and information or education campaigns aimed at changing behaviour by increasing awareness.
Emissions trading programmes	Programmes that establish a limit on aggregate emissions of various pollutants from specified sources; require sources to hold permits, allowances or other units equal to their actual emissions; and allow permits to be traded among sources. These programmes are also referred to as emissions trading systems or cap-and-trade programmes.
Research, development and deployment policies	Policies aimed at supporting technological advances, through direct government funding or investment, or facilitation of investment, in technology research, development, demonstration and deployment activities.
Public procurement policies	Policies requiring that specific attributes (such as social or environmental benefits) are considered as part of public procurement processes.
Infrastructure programmes	Provision of (or granting a government permit for) infrastructure, such as roads, water, urban services and high-speed rail.
Implementation of new technologies, processes or practices	Implementation by an entity of new technologies, processes or practices at a broad scale (e.g. those that reduce emissions compared with existing technologies, processes or practices).

3.1.4 Bottom-up aggregation

Bottom-up aggregation refers to adding the individual impacts of non-state and subnational actions to determine the total potential impact of all the actions included within the assessment. It involves estimating GHG reductions from each action relative to individual baseline scenarios that represent what would have happened in the absence of the action, then aggregating the resulting GHG reduction estimates. This method can be used to estimate the collective impact of a group of non-state and/or subnational actors (Figure 3.1). It should be noted that this impact is not additional to the impact of national policies because of potential overlaps with national policies, which are not considered here. GHG reductions can be calculated either on a cumulative basis over a defined time period or on an annual basis for a given year. The aggregation should include adjustments to avoid

FIGURE **3.1**

Example of bottom-up aggregation of estimated GHG reductions from non-state and subnational action



Source: Authors

any total or partial overlaps between non-state and subnational actions, to avoid overestimating the collective impact.

The aggregated GHG reduction estimate can be presented without comparison with any reference scenario. For example, the cities and local governments committed to the Global Covenant of Mayors for Climate & Energy could collectively achieve annual reductions of 1.4 $GtCO_2e$ in 2030 and 2.8 $GtCO_2e$ in 2050 compared with business as usual (BAU).[27] Or the GHG reduction estimate can be compared with national GHG emissions (historical or projected) or a national GHG target. For example, voluntary actions from 53 companies analysed in the India corporate actions assessment could lead to a 12% absolute reduction in GHG emissions by 2030 relative to a BAU scenario, which amounts to a reduction of 1.2–1.5% at the national level by 2030. It is important to note that the comparison cannot simply be assumed to be additional to national action, because potential overlaps with national actions have not been determined, and baselines have not been harmonized with the national target.

[27] Global Covenant of Mayors for Climate & Energy (2018).

It is important that users carefully select a baseline scenario and/or estimate the baseline scenario for each individual action or sector so that they do not overestimate the resulting GHG reductions (also see Section 3.1.6). Another methodological challenge is that subnational actions of different types often interact in complex ways and cannot be simply aggregated to understand their collective impact. For example, efficiency gains from a policy and the policy-driven addition of renewables may both lead to GHG reductions in the power sector, but when occurring simultaneously there are likely to be overlaps. Accounting for this type of overlap may require the development of simplifying assumptions to assess overlap and recognize limitations; alternatively, more sophisticated assessment models incorporating interactions among actions may be used. In many cases, it will not be possible to assign clear causality to individual actions, particularly if they are implemented simultaneously.

3.1.5 Top-down integration

Top-down integration involves estimating the impact of non-state and subnational actions, and incorporating this impact into national projections and scenarios, often based on existing national assessment models. The starting point for the

analysis is an up-to-date national GHG emissions projection or scenario. An important first step is to review which policies, targets and drivers are already included in the national projection or model. The projection may only reflect the impacts of national policies and targets, along with various socioeconomic drivers and trends, such as gross domestic product (GDP), population and energy prices. In addition, it may already include the impacts of selected non-state and subnational actions. Users should review which non-state and subnational actions are already included, then follow the same steps in the guide as for bottom-up aggregation to identify and estimate the impacts of additional non-state and subnational actions. The national emissions projection should be adjusted to reflect the impacts of non-state and subnational actions not already included in the original projection – for example, because the commitments were made later. The result is a revised GHG emissions projection that incorporates the impacts of non-state and subnational actions, current national policies, and other socioeconomic and market drivers (Figure 3.2).

The difference between the original projection and the updated projection reveals the potential impact of non-state and subnational actions in the country. The updated projection can be used to set a higher national mitigation target that builds on the additional GHG mitigation efforts undertaken by non-state and subnational actors.

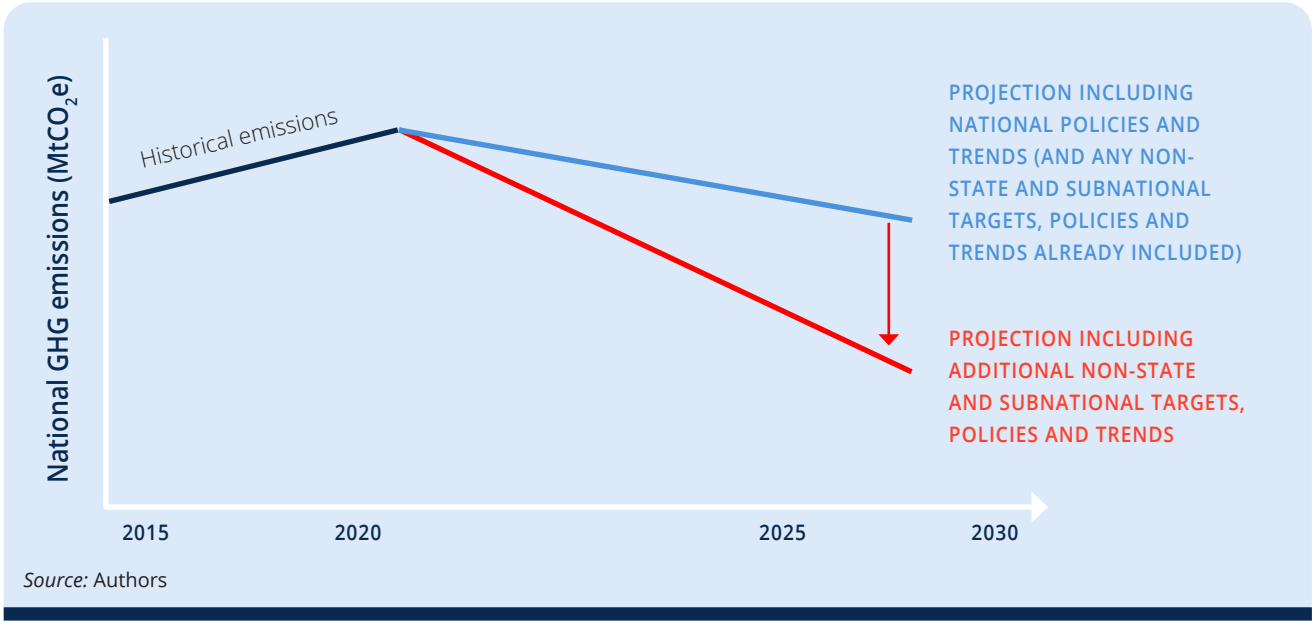
This approach requires that the national GHG projection or scenario is available in a transparent format, where the underlying assumptions can be adjusted to reflect the impacts of additional actions. This approach is not feasible if the user does not have access to the underlying calculations or assumptions. Further, in many cases, national targets do not directly link to specific projections. In some cases, governments use projections as a basis for discussion of the targets; in other cases, the targets are determined in a political process independently of scenario modelling.

3.1.6 Baselines

Baselines are required to provide a reference for the impact of actions. Different approaches can be used to calculate baselines – for example, a constant emissions level can be used (e.g. base year emissions), or users can assume that emissions grow at a certain rate, informed by the historical and projected economic growth rate. Baselines for specific actors can also be determined – for example,

FIGURE **3.2**

Example of integrating the impacts of non-state and subnational action into national GHG emissions projections



Source: Authors

by using industry sector projections from the International Energy Agency's World Energy Outlook[28] for companies operating in the same sector.

3.2 Overview of steps

Users should follow the assessment steps that are appropriate to their objectives. Some objectives may only require the steps relating to aggregation, which involve adding individual impacts of non-state and subnational actions. Others may require further integration into national emission trajectories, such as projection models or scenarios; for these, users will need some additional steps. The guide indicates which steps are not applicable for a particular objective.

This section provides an overview of steps for some broad objectives that users may be interested in pursuing. Those only seeking to understand the growing landscape of non-state and subnational efforts in a country should follow the steps indicated in Figure 3.3. This kind of landscape analysis can provide insights into the types of actors, actions and sectors covered by non-state and subnational actions.

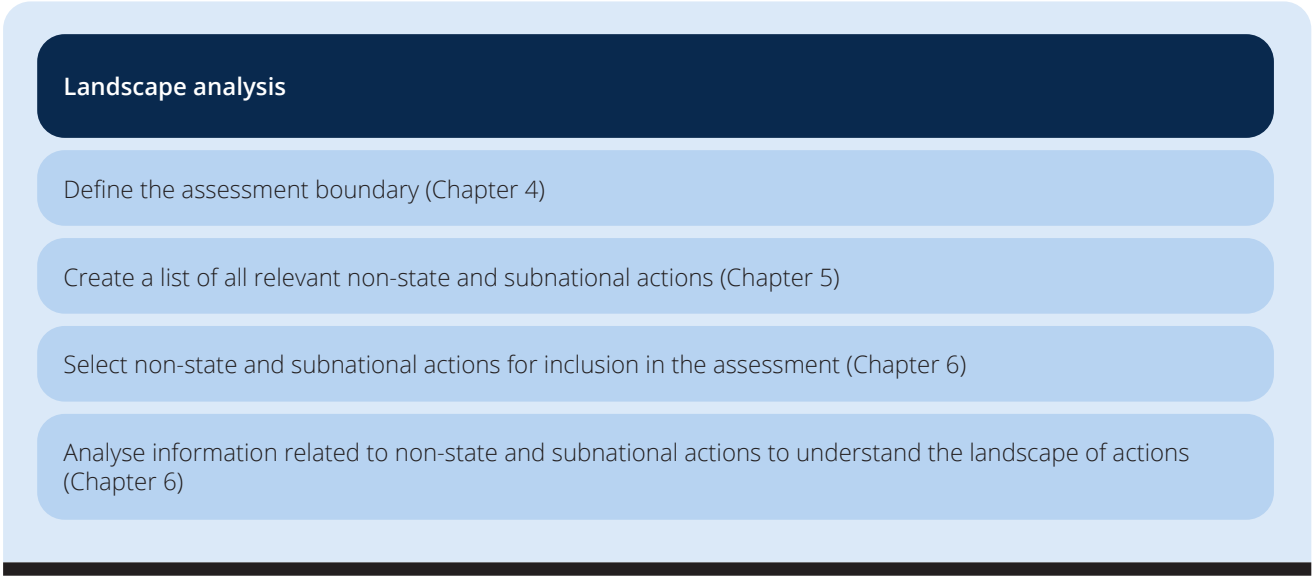
Users can build on this analysis to determine the aggregate potential impact of identified actions. Figure 3.4 shows the steps needed to account for overlaps between non-state and subnational actions, and aggregate their potential impact at a national or sectoral level. The impact obtained through such analysis is not additional to national policies, as overlaps with national policies have not been determined here.

Users interested in learning about the *additional* impact of non-state and subnational actions should consider how non-state and subnational actions interact with existing national (sectoral) policies. An economy-wide (sectoral) model makes it easier to examine interactions between various policies and actions, but this can also be done without the use of a model if users do not have access to an already developed model. This is illustrated in Figure 3.5.

Users with access to an economy-wide climate model can follow the steps in Figure 3.6 to estimate additional impacts that consider interactions between policies and actions, and incorporate the effect of socioeconomic drivers (e.g. GDP, population growth).

FIGURE **3.3**

Understanding the scope of non-state and subnational actions



[28] Available at: www.iea.org/weo.

FIGURE **3.4**

Determine aggregate potential impact of non-state and subnational actions

Aggregate potential impact of non-state and subnational actions (considering overlaps between actions but not with national policites)

Define the assessment boundary (Chapter 4)

Create a list of all relevant non-state and subnational actions (Chapter 5)

Select non-state and subnational actions for inclusion in the assessment (Chapter 6)

Analyse information related to non-state and subnational actions to understand the landscape of actions (Chapter 6)

Harmonize non-state and subnational actions for comparison (Chapter 8)

Assess overlaps between actions (Chapter 9)

Estimate potential impacts for individual actions (Chapter 9)

Aggregate potential impact of non-state and subnational actions (Chapter 9)

Develop new scenarios for enhanced ambition of non-state and subnational actions (Chapter 9)

Aggregate potential impact of non-state and subnational actions for each enhanced ambition scenario (Chapter 9)

FIGURE **3.5**

Determine potential additional impact of non-state and subnational actions

Additional impact of non-state and subnational actions (additional to national policies)

- Define the assessment boundary (Chapter 4)
- Create a list of all relevant non-state and subnational actions (Chapter 5)
- Select non-state and subnational actions for inclusion in the assessment (Chapter 6)
- Analyse information related to non-state and subnational actions to understand the landscape of actions (Chapter 6)
- List relevant national/sectoral policies and actions (Chapter 7)
- Harmonize non-state and subnational actions and national policies for comparison (Chapter 8)
- Assess overlaps between non-state and subnational actions and national policies (Chapter 9)
- Estimate potential impacts for individual actions (Chapter 9)
- Aggregate potential additional impact of non-state and subnational actions (Chapter 9)
- Develop new scenarios for enhanced ambition of non-state and subnational actions (Chapter 9)
- Aggregate potential additional impact of non-state and subnational actions for each enhanced ambition scenario (Chapter 9)

FIGURE **3.6**

Model additional impact of non-state and subnational actions

3.2.1 Planning the assessment

It is important to plan the steps, responsibilities and resources needed to meet the objectives of assessing non-state and subnational impacts. The time and human resources required to use this guide in its entirety depend on a variety of factors, such as whether it is a national or sectoral assessment, the range of non-state and subnational actions selected, the extent of data collection needed and whether relevant data have already been collected.

Related resources for quantifying mitigation impact

This guide focuses on assessing the impacts of a range of actions from different types of actors. The information in the guide on quantifying impacts can be supplemented with broader knowledge from

other resources, including methods, databases and tools that are specific to particular types of actors (e.g. companies, subnational entities) or to particular types of actions (e.g. policies, projects, targets). These resources can provide additional information on issues discussed in this guide, such as determining realistic baselines, understanding additionality of actions, and developing mitigation projections.

The Greenhouse Gas Protocol website[29] provides a number of related resources, including the *Policy and Action Standard*, the *Mitigation Goal Standard*, the *Project Protocol*, the *Scope 2 Guidance*, *Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects*, sector-specific emissions calculation tools, and other tools and methods. Platforms such as Climate Action Tracker, Climate Watch, the Global Climate Action portal, the Global Covenant of Mayors, and the Cities GHG Inventory Data Portal (under development) are other useful resources for a variety of policies and actions.

Planning stakeholder participation

Stakeholder participation is recommended at many steps throughout the guide, although it may apply differently depending on the user, the objectives and the scope of assessment. In general, stakeholder participation can strengthen the assessment in many ways, including by:

- ensuring that important non-state and subnational actions are included in the assessment, and accurately accounted for
- providing a mechanism for stakeholders who are engaged in non-state and subnational actions to share information that may affect the likelihood of implementation of the action (see Section 6.2) or overlaps between actions (see Chapter 9)
- supporting the development of realistic assumptions and baselines so that impacts are not overestimated
- building understanding, participation, shared ownership and support for national or sectoral targets, policies and projections among stakeholders, which may enhance implementation and impact
- facilitating buy-in from stakeholders for assessment objectives and results
- providing a mechanism for stakeholders to raise issues relating to non-state and subnational actions
- raising awareness and improving understanding of complex issues for all parties involved, building their capacity to contribute effectively
- addressing stakeholder perceptions of risks and impacts, and helping to develop measures to reduce negative impacts and increase benefits for all stakeholder groups, including the most vulnerable
- enabling enhanced ambition and finance by strengthening the underlying assessment.

Various sections throughout this guide explain where stakeholder participation is recommended – for example, in creating a list of non-state and subnational actions, and selecting relevant ones to assess (Chapters 5 and 6); assessing overlaps and comparing ambition (Chapter 9); reporting results (Chapter 10); and decision-making and using results (Chapter 11).

Before beginning the assessment process, users should consider how stakeholder participation can support their objectives, and include relevant activities and associated resources in their assessment plans. It may be helpful to combine stakeholder participation for non-state and subnational impact assessment with other participatory processes involving similar stakeholders, such as those being conducted for assessment of GHG and sustainable development impacts in the same sector.

It is important to conform with national legal requirements and norms for stakeholder participation in public policies. Requirements of specific donors, and of international treaties, conventions and other instruments that the country is party to should also be met. These are likely to include requirements for disclosure, impact assessments and consultations. They may include specific requirements for certain stakeholder groups (e.g. United Nations Declaration on the Rights of Indigenous Peoples, International Labour Organization Convention 169), or specific types of policies and actions (e.g. UNFCCC guidance on safeguards for activities that reduce emissions from deforestation and degradation in developing countries).

[29] www.ghgprotocol.org

During the planning phase, users should identify stakeholder groups that may be affected by, or may influence, the assessment (such as representatives of the non-state and subnational actions included in the assessment boundary, or relevant national policymakers). Appropriate approaches should be identified to engage with the target stakeholder groups, including through their legitimate representatives. Effective stakeholder participation could be facilitated by establishing a multi-stakeholder working group or advisory body consisting of stakeholders and experts with relevant and diverse knowledge and experience. Such a group may advise and potentially contribute to decision-making, to ensure that stakeholder interests are reflected in the assessment. It is also important to ensure that stakeholders have access to a grievance redress mechanism to protect their rights relating to the impacts of non-state and subnational actions.

Refer to the ICAT *Stakeholder Participation Guide* for more information, such as how to plan effective stakeholder participation (Chapter 4), identify and analyse different stakeholder groups (Chapter 5), establish multi-stakeholder bodies (Chapter 6), provide information (Chapter 7), design and conduct consultations (Chapter 8), and establish grievance redress mechanisms (Chapter 9). Appendix B of this document summarizes the steps in this guide where stakeholder participation is recommended and provides specific references to relevant information in the *Stakeholder Participation Guide*.

Planning technical review (if relevant)

Before beginning the assessment process, users should consider whether technical review of the assessment report will be pursued. The technical review process emphasizes learning and continual improvement, and can help users identify areas for improving future assessments. Technical review can also provide confidence that the impacts of non-state and subnational actions have been estimated and documented according to ICAT key recommendations. Refer to the ICAT *Technical Review Guide* for more information on the technical review process.

3.3 Assessment principles

This section outlines key principles for the identification, quantification and integration of impacts of non-state and subnational actions and commitments.[30] These principles underlie the step-by-step approach presented in the following chapters. It is a *key recommendation* to base the assessment on the principles of relevance, completeness, consistency, accuracy, conservativeness, comparability and transparency.

- **Relevance.** Ensure that the assessment appropriately reflects the incremental (additional) GHG impacts of non-state and subnational actions, and serves the decision-making needs of policymakers. Users should apply this principle when selecting the desired level of accuracy and completeness from a range of methodological options.

- **Completeness.** Include all significant non-state and subnational mitigation impacts in the mitigation assessment boundary. The boundary itself can be quite narrow (e.g. the industry sector in the case of the India corporate actions assessment) or broad (e.g. nationwide in the case of the Fulfilling America's Pledge report). Disclose and justify any specific exclusions. To support users with the analysis, especially as data availability can represent a significant challenge for many countries, this guide provides an overview of the principal international databases for non-state and subnational action (Appendix A).

- **Consistency.** The step-by-step approach provides recommendations on how to overcome the many differences in accounting approaches for non-state and subnational actions, as well as data collection and calculation methods. It is recommended that users consistently use this approach to allow meaningful performance tracking over time. Eventually, this may lead to more consistent approaches to accounting, data collection and calculation methods for non-state and subnational actions. Users should transparently document any changes to the data, assessment boundary, methods or any other relevant factors in the time series.

- **Accuracy.** Given the constraints of non-state and subnational actions, which are often voluntary commitments and with limited accountability, it is important to achieve sufficient accuracy to enable users and stakeholders to make appropriate and informed decisions with reasonable confidence about the integrity of the reported information. Users should pursue accuracy to the extent possible; this will be informed by a number of factors, including the objective,

[30] Adapted from WRI (2014b).

the availability of data, the type of actions to be assessed and levels of uncertainty. Where feasible, users can provide ranges for their impact estimates, corresponding to different underlying assumptions (e.g. high versus low likelihood of achievement of targets, low and high economic growth assumption underlying emissions projections).

- **Conservativeness.** Users should be conservative in their assumptions and approaches, given the often voluntary and sometimes uncertain nature of non-state and subnational actions. A conservative approach may mean that users exclude certain actions from the assessment if data are insufficient or if overlaps cannot be determined. Presenting a range of results, consisting of various scenarios reflecting different assumptions, is recommended to illustrate the sensitivity of the results to the assumptions. Any assumptions used to estimate impact, determine the likelihood of achievement or determine potential overlaps should be carefully recorded, and the underlying rationale explained.

- **Comparability.** Current non-state and subnational actions and initiatives are very difficult to compare, because of different methodologies, data sources, assumptions, objectives and reporting formats. This document offers information to enhance comparability. Users should exercise caution when comparing the impacts of non-state and subnational actions. Differences in reported emission impacts may be a result of differences in methodology or GHG accounting rather than real-world differences. Additional measures are necessary to enable valid comparisons, such as consistency in the time frame of the assessments, the types of impacts included in the assessment boundary, baseline assumptions, calculation methodologies, methods for assessing policy interactions, and data sources. Additional consistency to facilitate comparability can be provided through GHG reporting programmes or more detailed sector-specific methodologies.[31] To understand whether comparisons are valid, all methodologies, assumptions and data sources used must be transparently documented.

- **Transparency.** Users should provide clear and complete information for reviewers to assess the credibility and reliability of the results. Users should also document data sources, calculations, assumptions and uncertainties. To the extent possible, they should also document the processes, procedures and limitations of the assessment in a clear, factual, neutral and understandable manner (detailed further in Part III).

In practice, users may encounter trade-offs between principles during their assessments. For example, users may find that achieving the most complete assessment requires using less accurate data for a portion of the assessment, which would compromise overall accuracy. Conversely, achieving the most accurate assessment may require excluding sources or effects with less accuracy, compromising overall completeness. Users should balance trade-offs between principles depending on their objectives. Over time, as the accuracy and completeness of data increase, the trade-off between these accounting principles will likely diminish.[32]

3.4 Common challenges in quantification, aggregation and integration

Users may encounter multiple challenges when trying to identify, quantify and aggregate the impacts of non-state and subnational actions, and integrate them into national or sectoral targets and mitigation planning. The approach described in this guide addresses these challenges in the relevant steps outlined in Part II. Where such a challenge may exist, the guide points to it, provides an example and describes how to address it. Table 3.4 lists some of the most frequently encountered challenges and where further information can be found to resolve them.

[31] For example, the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, the Greenhouse Gas Protocol, and reporting systems such as those managed by UNFCCC, the Global Covenant of Mayors, CDP and The Climate Group.

[32] WRI (2014b).

TABLE **3.4**

Common challenges relating to quantification, aggregation and integration of non-state and subnational actions

Challenge	Description	Chapters with information on how to address the challenge
Lack of clarity about non-state and subnational targets	Some non-state and subnational targets are very vague, contain no quantitative information, and therefore may be difficult to assess in terms of their expected mitigation impact. The ambiguity can lead to uncertainty about the impact of non-state and subnational mitigation actions.	Chapters 4 and 6
Overlaps, double counting and additionality of actions[a]	Overlap between non-state and subnational mitigation actions, and with national actions can lead to double counting of mitigation efforts in a system where multiple actors are working towards the same goal. In addition, there may be overlap between targets for sectors and subsectors at national and subnational levels (e.g. national energy efficiency target and state energy efficiency policy for residential and industrial sectors). As a result, the combined effect of these actions could be less (or more) than the sum of the individual effects of implementing them separately. National government and non-state/subnational actors may also take credit for the same reductions and count them as progress towards their individual goals and targets. There are also accounting challenges in avoiding double counting when comparing the impact of non-state and subnational actions aimed at direct and indirect emissions, and national actions. Further, for non-state and subnational actions to contribute to exceeding existing national mitigation efforts or closing the "emissions gap",[b] their impact needs to be additional. Often, non-state and subnational actors formulate their actions in response to climate policy but state them as part of a package as "commitment to climate action". This can again result in double counting. In the case of multinational actions, it can be difficult to attribute the impacts to specific countries. The impact may not be equally distributed across countries. Users may need to make assumptions to estimate distribution, if country-level information is unavailable, which may affect accuracy of the assessment. Fully capturing complex interactions will be difficult with simple bottom-up tools and may require integrated modelling exercises.	Chapters 4, 6, 8, 9 and 10
Differences in baselines, time frames and reference scenarios	Users may find that non-state, subnational and national actions have different baselines/reference scenarios and metrics, making comparisons challenging.	Chapters 8 and 9
Data availability, completeness and usability	Users may want to calculate the impact of non-state and subnational actions when insufficient, outdated or no data are available, or the data are not accurate enough to quantify the impact.	Chapters 5, 7 and 8
Uncertainty in results	A number of factors such as lack of data, opaque underlying assumptions, and the often voluntary nature of non-state and subnational actions can lead to high uncertainty in results.	Chapters 5, 6, 7 and 9
Difficulty in accounting for scope 3 emissions	Scope 3 (indirect) emissions for non-state and subnational actors can be a very significant source of GHG emissions but are currently insufficiently accounted for by a majority of actors and difficult to attribute to specific countries.	Chapters 4 and 5

[a] Overlaps, double counting and additionality are different but closely related topics. For example, overlaps can be caused by a lack of additionality, which can lead to double counting.

[b] The "emissions gap" here refers to the difference between the emissions pathway corresponding with mitigation efforts needed to stay well below a 2°C increase and limit the temperature increase to 1.5°C and the estimated emissions pathway if the country fulfils its current NDC (IVM, 2015).

PART II

Defining the assessment

4 Defining the assessment boundary

This chapter provides steps for defining the assessment boundary in terms of sectors, GHGs, actor groups, action types and indirect emissions included in the analysis.

Checklist of key recommendations

- Specify which sectors and subsectors, actor groups, action types, GHGs, and types of indirect emissions are included in the assessment
- Specify the assessment period

It is a *key recommendation* to specify which sectors and subsectors, actor groups, action types, GHGs, and types of indirect emissions are included in the assessment.

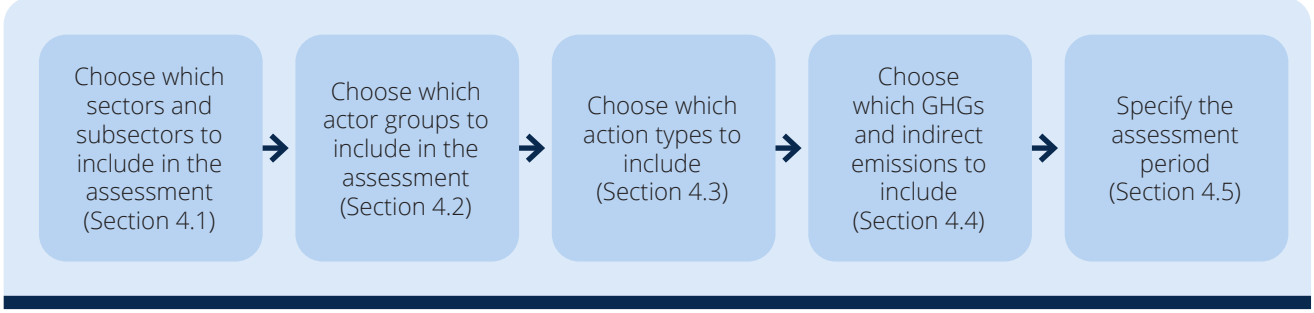
4.1 Choose which sectors and subsectors to include

Users should identify whether the assessment is economy-wide or applicable to specific sectors (Figure 4.2). Economy-wide assessments also include sector-specific actions. Users can consider defining sectors and subsectors according to Intergovernmental Panel on Climate Change (IPCC) categories (Figure 4.3), or follow the categorization used in country-specific models or tools. Users wishing to carry out an economy-wide assessment should cover sectors and subsectors contributing to at least 95% of total national emissions or removals, or 95% of projected national emissions or removals.[33] This will ensure that the coverage can truly be considered economy-wide.

This guide considers agriculture, forestry and other land use (AFOLU); energy-related emissions by sector and subsector; industrial processes and product use; and waste, in line with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. However, the organization of subsectors throughout this guide differs from the IPCC guidelines and is more closely aligned with the kind of subnational actions that exist, to make it easier to apply. If the assessment requires closer alignment with national GHG inventories, users should consider the IPCC guidelines and the national GHG inventory process while aggregating impacts of non-state and subnational actions.[34]

FIGURE **4.1**

Overview of steps in the chapter



[33] This relates to the concept of "key source analysis" in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, which identifies sources that contribute to 95% of the total emissions or 95% of the trend of the inventory in absolute terms.

[34] For a complete list of subsectors, refer to the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

4.2 Choose which actor groups to include

Users should identify which actor groups to include in the assessment. The assessment can include actions taken by all or a subset of the following types of actors:

- cities
- states, provinces and regions
- companies
- investors
- civil society organizations
- others.

Users may choose to focus on one group of actors, such as cities, states or businesses. Alternatively, users may wish to focus more broadly on all actor

FIGURE **4.2**

Defining the assessment boundary

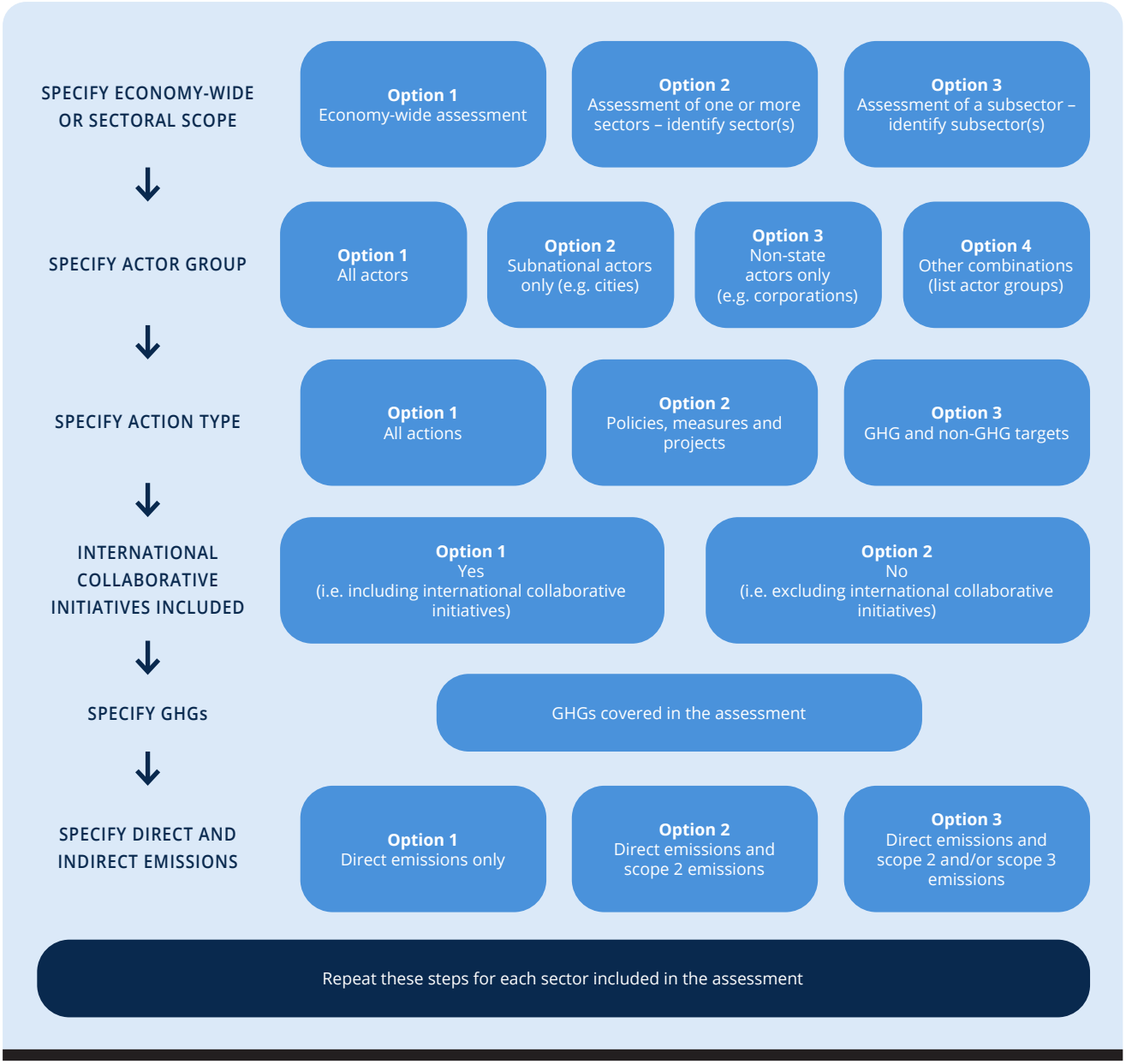
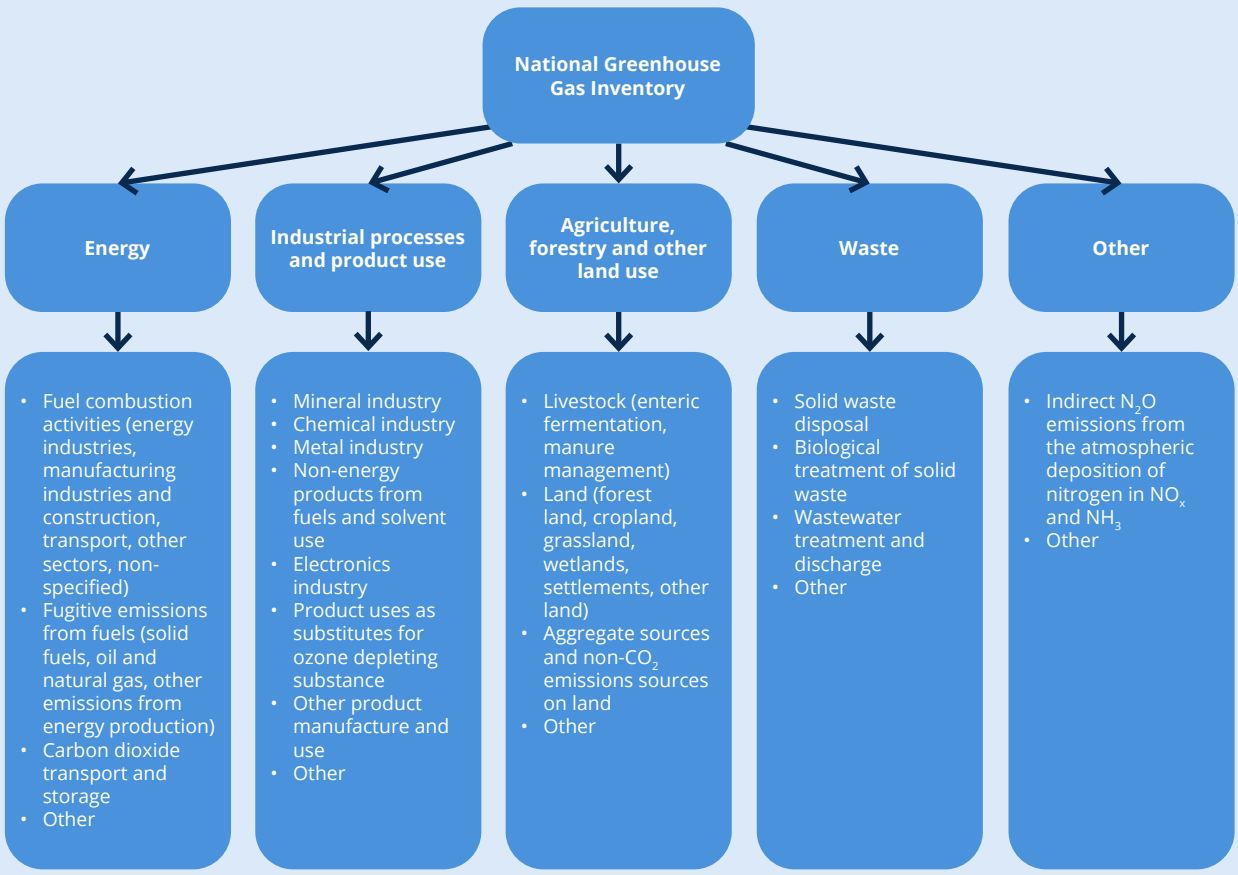


FIGURE **4.3**

Main sectors and subsectors defined by the IPCC for national inventories



Source: IPCC (2006).

Abbreviations: NH_3, ammonia; N_2O, nitrous oxide; NO_x, nitrogen oxides

groups. Depending on the objectives and data availability, specific subgroups may be targeted, such as cities of a certain size or businesses within a specific economic sector (Figure 4.2).

4.3 Choose which action types to include

Users should determine which types of actions by the selected actor groups are to be included in the analysis (Figure 4.2). Non-state and subnational actions can encompass a large number of actions and targets of actors such as businesses, cities, states, provinces and investors across all sectors, sometimes transcending national boundaries. Climate action plans from individual actor groups such as cities may contain mitigation targets, along with specific policies and measures to realize the targets. Some actors, such as investors, may be participating in cooperative initiatives or taking individual action, such as issuing green bonds for clean energy projects. Table 4.1 illustrates the variety of non-state and subnational actions in the United States as an example. Users can adopt a similar table to organize their actions.

TABLE **4.1**

Examples of targets and actions adopted by United States states, cities and businesses

States	Cities	Businesses
GHG target/cap		
Legally binding GHG emissions targets	Climate change goal formally adopted or in progress	Science-based GHG reduction target
Carbon pricing		Internal carbon price
Renewable/CCS/nuclear		
Renewable energy portfolio standards or goals	Committed to 100% renewable energy	Companies with renewable targets such as 100% renewable energy
Property Assessed Clean Energy (PACE) financing to facilitate clean energy investments	Power purchase agreements	Power purchase agreements
Financial incentives for CCS		
Zero-emission credits for nuclear		
Energy efficiency		
Combined heat and power financing and incentives	Energy savings goal formally adopted or in progress	Corporate energy efficiency improvements through Better Buildings Challenge
Energy efficiency resource standard or goals	Energy efficiency procurement policy	Industrial energy efficiency improvements through Better Plants Program
Adoption of "best-in-class" building energy codes	Adoption of the 2015 IECC building code or stretch code	
Appliance and equipment energy efficiency standards	Green building requirements for some private buildings	
	Required building retrofit or retro commissioning	
Transport		
Freight plan with multimodal freight strategies	Car-sharing programme	Emissions reductions from transportation and distribution
Efficient vehicle requirement for public fleet procurement	Bike-sharing programme	Efficient routing efforts
Integration of transport and land use in comprehensive plans	Sustainable transportation plan	Backhauling practices by logistics companies
Dedicated funding streams for public transit	Fuel efficiency requirement for public fleets	
Financial incentives for high-efficiency vehicles	Codified VMT/transportation-related GHG targets	

TABLE **4.1,** continued

Examples of targets and actions adopted by United States states, cities and businesses

States	Cities	Businesses
Clean streets legislation	Codified travel mode target	
California's vehicle emission standards	Vehicle infrastructure incentives	
Zero Emission Vehicle mandate	Vehicle purchase incentives	
Low-carbon-fuel standard	No minimum parking requirements for new developments	
Freight-specific energy efficiency performance metrics	Efficient freight strategy	
	Adoption of technologies to help coordinate freight transport	
Forestry and land use		
Property tax programmes to support sustainable forests	Urban heat island goals	Soil sequestration by food companies
Conservation easement tax credits	Green infrastructure targets and policies	Biogas generation from manure
Cost-sharing programmes to improve forest systems		
Wildfire protection incentives		
Methane		
Landfill gas energy project incentive	Zero-waste goal	Joining EPA's Natural Gas STAR programme
Rules and incentives to reduce food waste		Joining EPA's Methane Challenge
Coal mine methane standards		Actions that reduce food waste by 50%
Methane standards for existing oil and natural gas facilities		
Methane emissions reduction targets		
HFCs		
HFC management programme (stronger than EPA)		Supermarkets committing to reduce HFC emissions and use

Source: America's Pledge (2017).

Abbreviations: CCS, carbon capture and storage; EPA, Environmental Protection Agency; HFC, hydrofluorocarbon; IECC, International Energy Conservation Code; VMT, vehicle miles travelled

Non-state and subnational action types can be broadly categorized into:

- GHG reduction targets (absolute and intensity), which usually do not specify how emissions will be reduced
- sectoral (non-GHG) targets, such as targets for renewable energy or forests
- specific policies, measures and projects to reduce emissions.

Users may want to consider data availability and levels of uncertainty around different actions when deciding which action types to include. Quantitative reduction targets or commitments may have uncertainty relating to their likelihood of being achieved. On the other hand, specific policies, programmes and activities may be more difficult to convert into quantitative GHG reduction outcomes and therefore may involve higher uncertainty.

Actor groups may also differ in terms of the types of actions they undertake. For example, states and regions may have legally binding GHG emissions targets, whereas companies' targets are often not binding and carry more uncertainty. Users may wish to include all types of actions in their assessment, which may increase uncertainty but provide a more comprehensive indication of potential impact. On the other hand, a narrow selection of action types may reduce uncertainty, but may not provide a full picture of the potential impacts.

Users should also decide whether to include commitments to develop targets in future (as opposed to actions that are already planned or under way). A conservative approach suggests that users should exclude these actions, since no target has been announced yet and it may be difficult to quantify the level of reductions targeted in future. When developing additional scenarios with higher ambition in non-state and subnational actions, users can assume these future targets to be consistent with the NDCs or with national GHG targets. This assumes that eventually all national government targets (including the NDC) would trickle down to the actors at different levels (e.g. cities, businesses). While this may mean a different degree of ambition or target for each actor, the NDC level can be assumed to be the average across all.

Users should also specify whether international cooperative initiatives are included in the assessment (Figure 4.2). Table 4.2 provides some examples of cooperative initiatives, with their sector and geographic focus. Inclusion of international cooperative actions with commitments spanning geographical boundaries may prove challenging, because an accurate disaggregation of impacts by individual countries will depend on information availability. Users may want to include these initiatives for a comprehensive indication of potential

TABLE **4.2**

Examples of international cooperative actions

Initiative	Sector	Region
Building Efficiency Accelerator Platform	Buildings	Global
Transport Decarbonization Alliance	Transport	Global
Super-efficient Equipment and Appliance Deployment (SEAD) Initiative	Energy	Global
United for Efficiency (U4E)	Energy	Global, focus on developing countries
Africa Renewable Energy Initiative (AREI)	Energy	Africa
Bonn Challenge	Forestry	Global
New York Declaration on Forests	Forestry	Global
Global Methane Initiative	Non-CO_2	Global

Source: Data-Driven Yale, NewClimate Institute and PBL (2018a).

impact, or exclude them to minimize uncertainty. Users also need to decide whether to include the overall target of the international cooperative initiative (which may involve ambitious membership goals of many initiatives) or evaluate the current contribution of an initiative (e.g. based on current membership numbers).

Users also need to decide whether to include actions to reduce emissions from sources that are excluded from national totals in inventories (e.g. emissions from international aviation and maritime transport). As these categories generally involve multiple countries, any analysis involving these sectors should be undertaken, and documented, separately from the main assessment.

4.4 Choose which GHGs and indirect emissions to include

Users should also specify the GHGs and types of indirect emissions included within the identified (sub) sector(s) in the assessment (Figure 4.2). Specifying which direct and indirect emissions are included in the assessment is necessary to clearly define the scope of the assessment, and address possible double counting between multiple non-state and subnational actors.

GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). Users can assess the impacts of non-state and subnational actions on all or a subset of GHGs, depending on data availability.

The definition of direct and indirect emissions is different for businesses and organizations versus cities and subnational regions. A corporate GHG inventory (which applies to organizations of any type, including businesses, government agencies and civil society organizations) classifies emissions according to scopes (scopes 1, 2, and 3):[35]

- Scope 1 (direct) emissions are emissions that occur from sources owned or controlled by the company – for example, emissions from stationary fuel combustion, mobile fuel combustion in company-owned vehicles, and process-related emissions such as from calcination in the cement industry.

Indirect emissions are a consequence of the company's activities but occur at sources not owned or controlled by the company. These are divided into scope 2 and scope 3 emissions:

- Scope 2 emissions are indirect emissions resulting from the use of purchased electricity, heat or steam.
- Scope 3 emissions are all other indirect emissions that occur in the company's value chain (e.g. purchased goods and services, outsourced transportation, use of sold products).

In the context of a city or subnational GHG inventory, the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories* classifies emissions into scopes relative to the city or subnational geopolitical boundary:[36]

- Scope 1 emissions are emissions from sources located within the city or subnational boundary.
- Scope 2 emissions are emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city or subnational boundary.
- Scope 3 emissions are all other emissions that occur outside the city or subnational boundary as a result of activities taking place within the city or subnational boundary.

One company's scope 2 or 3 emissions are another company's scope 1 emissions, while one city's scope 2 or 3 emissions are another city's scope 1 emissions. Scope 1 emissions of a business located within a city are also the scope 1 emissions of that city. The Greenhouse Gas Protocol provides several resources on calculating sector-specific emissions and developing GHG emissions inventories for industries, as well as subnational entities such as cities.[37]

In contrast to non-state and subnational inventories, national GHG inventories categorize emissions by source. For example, emissions from fossil fuel combustion across sectors (e.g. the cement, iron

[35] WRI and WBCSD (2004).

[36] Adapted from WRI, C40 and ICLEI (2014).

[37] See the Greenhouse Gas Protocol website (www.ghgprotocol.org) for these resources. The website has relevant standards, guidance and sector-specific calculation tools, along with online training resources.

and steel, and aluminium sectors) are listed under a single category. Similarly, industrial process emissions are aggregated and reported in a single category, although disaggregated totals are often available for process emissions from major emitting industries (e.g. cement, and iron and steel). Therefore, emissions from purchased electricity used in the iron and steel industry are accounted for under electricity generation in national inventories, whereas the iron and steel company will account for these as scope 2 emissions.

Actions can target direct emissions (e.g. targets for sources occurring within a city's geographic boundary) as well as indirect emissions (e.g. scope 2 emissions sources). Direct emissions are presumed to be accounted for, but users should specify whether and which indirect emissions will be included in the assessment. Where scope 2 emissions are targeted by chosen actions, users should include them in their assessment boundary (e.g. companies targeting their scope 2 emissions; cities and states aiming to increase the share of renewables in their jurisdictions, which would impact their scope 2 emissions). Inclusion of indirect emissions is likely to result in potential overlaps and double counting that should be carefully addressed when aggregating impacts. Accounting for these overlaps also requires reliable, geographically resolved data on baseline emissions or action-specific activity data (e.g. MWh of electricity consumption) for all actors included in the assessment. In general, users should be conservative and avoid overestimating the aggregated impacts from non-state and subnational actions, while accounting for overlaps and possible double counting by different actor groups. Users may decide whether to address scope 3 emissions depending on availability of data to estimate impact while taking account of overlaps.

The India corporate actions assessment included scope 1 and scope 2 emissions in the analysis. Relevant data were available because companies had annual data on scope 2 emissions in their inventories, and their GHG targets included both scopes.

Differences in emissions accounting across different actors (e.g. nations, cities, companies) also present a challenge. For the sake of simplicity, this guide suggests following the IPCC categories, which list GHG emissions by (direct) sources of emissions and removals by sinks (Figure 4.3),[38] but carefully considering the effect of mitigation actions on reducing electricity use and related (indirect) emissions. For example, international cooperative initiatives from companies in the waste sector should be accounted for in the waste sector, while any effect these actions may have on electricity generation should be accounted for in the energy supply sector.

Box 4.1 illustrates how to define the assessment boundary using some hypothetical examples.

4.5 Specify the assessment period

It is a *key recommendation* to specify the assessment period. If the objective is to understand the expected contribution of the policy or action towards achieving a country's NDC, it may be appropriate to align the assessment period with the NDC implementation period (e.g. ending in 2030). To align with longer-term trends and planning, users may select a longer assessment period, such as 2050, or consider aligning with the requirements for reporting GHG emissions and removals projections under the enhanced transparency framework of the Paris Agreement.[39] Users should also consider whether it will be useful to understand the assessment results only for the end year or also for interim years. For adequate comparison and aggregation, users will need to harmonize the time periods for assessment of non-state and subnational actions with the assessment period for national targets (further discussed in Section 8.1).

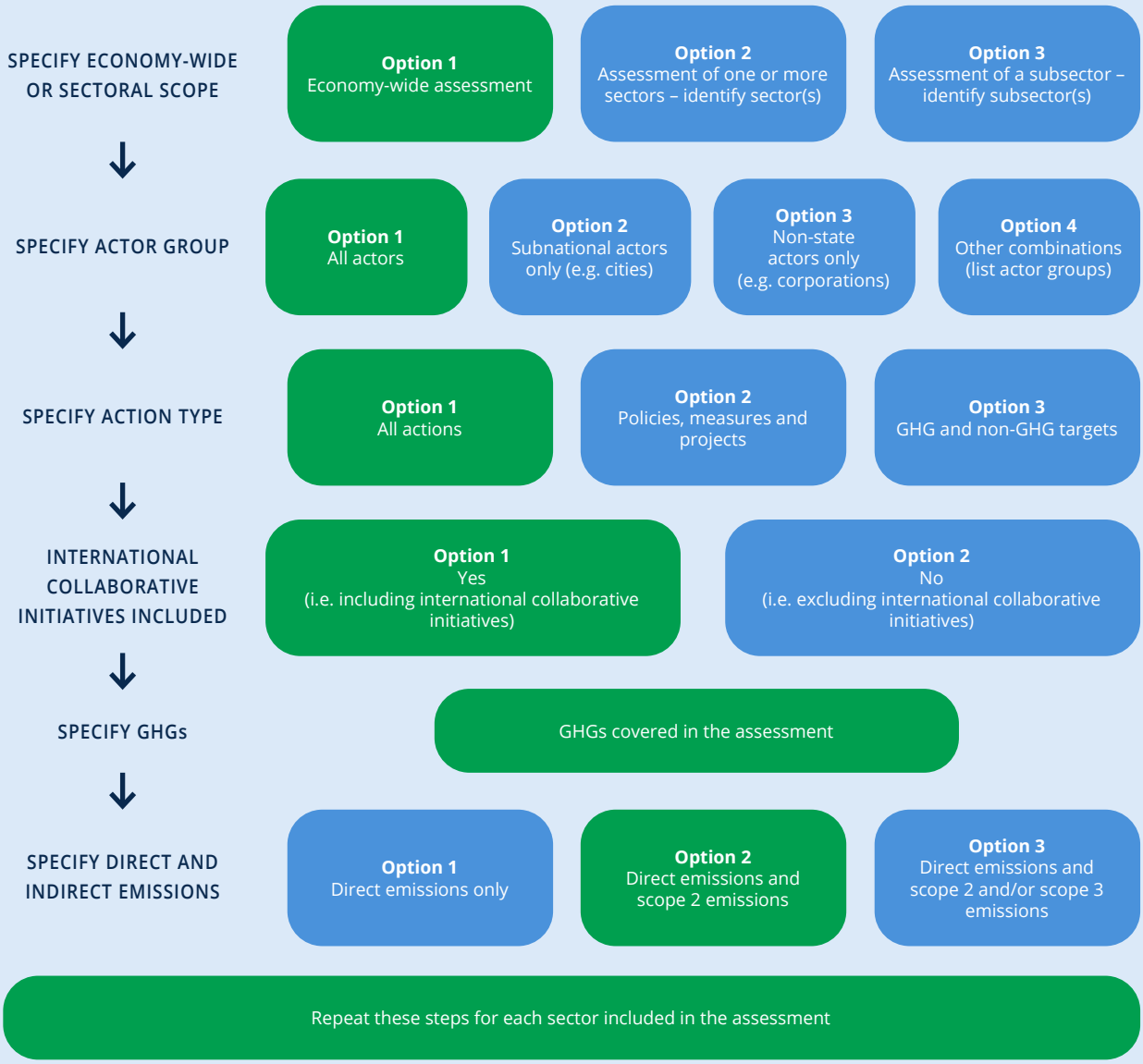
[38] IPCC (2006).

[39] Under the enhanced transparency framework, GHG emissions and removals projections are required to begin from the most recent year in the country's national inventory report and extend at least 15 years beyond the next year ending in zero or five (UNFCCC 2018).

BOX **4.1**

Hypothetical examples of determining assessment boundary based on objectives

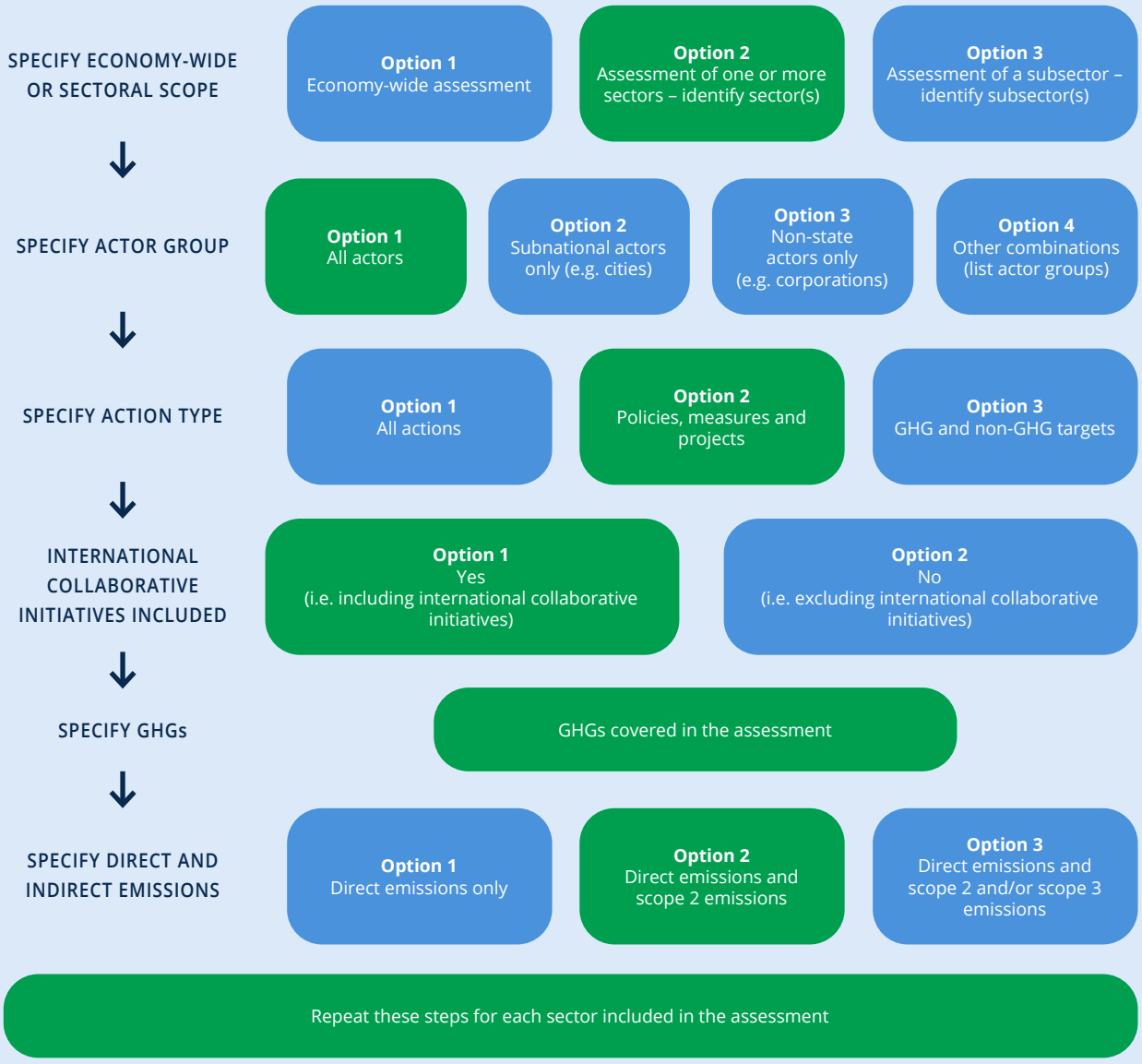
Example 1: The assessment objective is to identify, quantify and integrate the impact of non-state and subnational actions to revise overall national emissions projections for 2030. In this instance, users should go through the steps for all relevant sectors and subsectors identified in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. See the proposed stepwise approach marked in green below.



BOX **4.1,** continued

Hypothetical examples of determining assessment boundary based on objectives

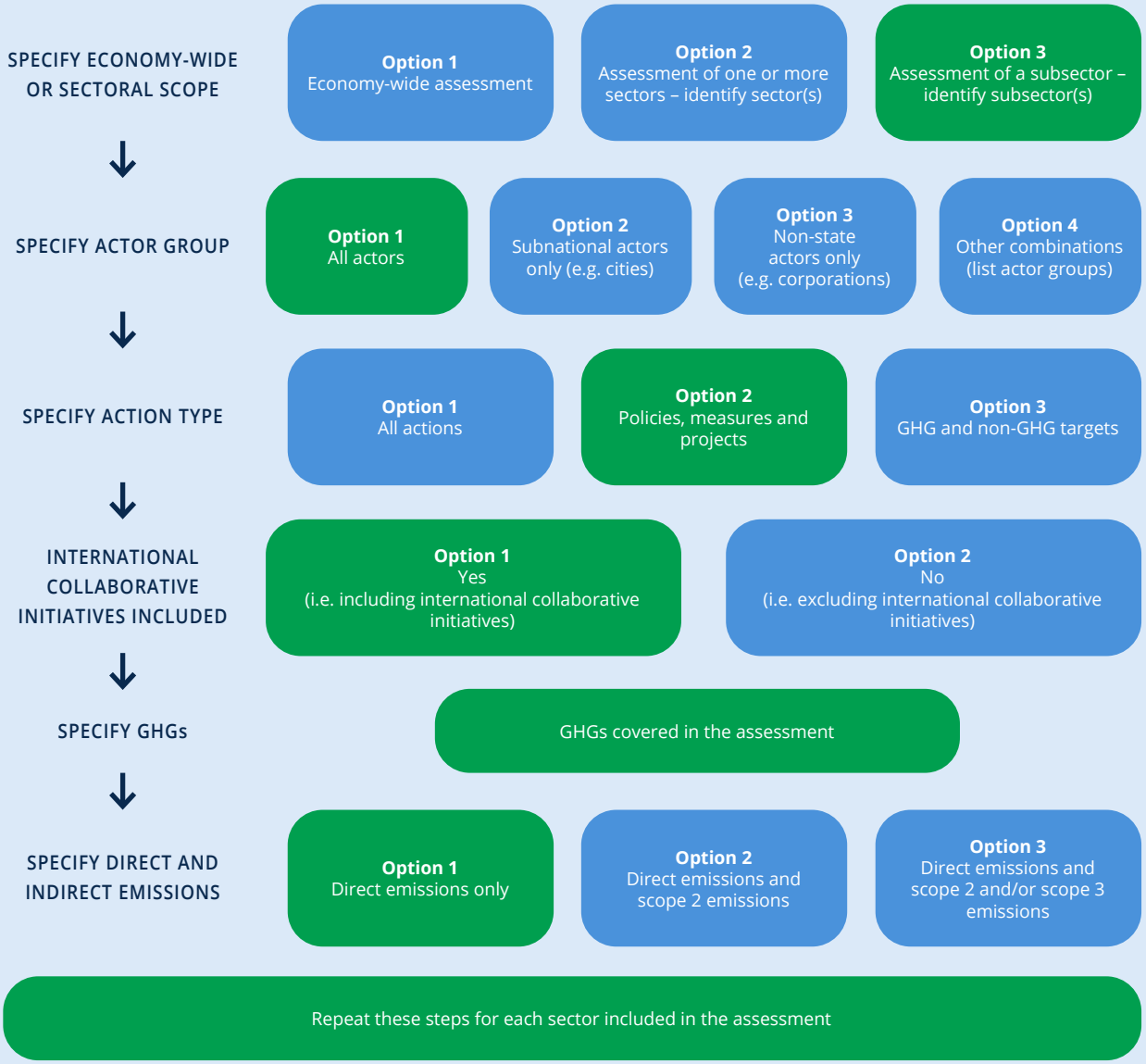
Example 2: The assessment objective is to identify, quantify and integrate the impact of non-state and subnational actions when designing a roadmap to decarbonize the national transport sector by 2050. Here, users should apply the steps for the transport sector (direct emissions) and the energy supply sector (indirect emissions resulting from the production of electricity consumed by electric vehicles). See the proposed stepwise approach marked in green below.



BOX **4.1,** continued

Hypothetical examples of determining assessment boundary based on objectives

Example 3: The assessment objective is to identify, quantify and integrate the impact of non-state and subnational actions on energy efficiency of passenger cars sold nationally by 2030. In this instance, users should apply the steps only to this specific subsector (road transportation), as shown in the proposed stepwise approach marked in green below.



5 Creating a list of all relevant non-state and subnational actions

This chapter describes how to develop a list of non-state and subnational actions considered relevant for the assessment, start gathering and organizing the data needed for further analysis, and address gaps in information.

Checklist of key recommendations

- Compile a list of relevant non-state and subnational actions occurring within the assessment boundary
- Clearly note any specific criteria used to include or exclude actors and actions in the analysis
- Document all methods and assumptions used to fill data gaps; when statistical techniques are used to fill data gaps, document the methods used and data points that are estimated

Depending on the objective selected, users may want to complete the steps in Chapter 7 on collecting information on national policies and actions or projection models *before* undertaking the steps in Chapters 5 and 6.

5.1 Create a list of relevant non-state and subnational actions

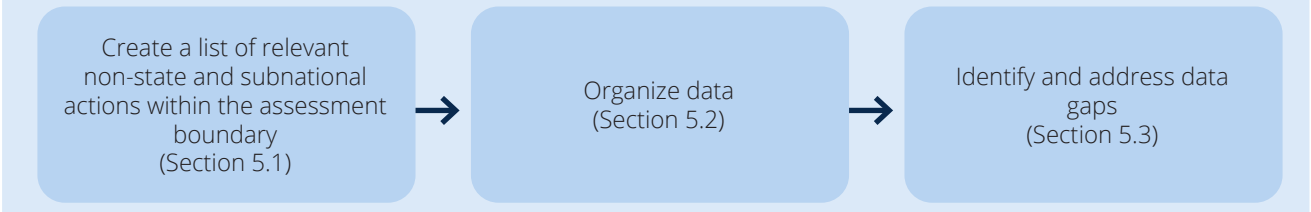
It is a *key recommendation* to compile a list of relevant non-state and subnational actions occurring within the assessment boundary. The list should reflect the assessment boundary. It should include all non-state and subnational actions that fall within the sector(s), actor group(s) and action types selected in Chapter 4, and address the type of emissions and GHGs selected. Users should seek to identify actions for their assessment that will ultimately result in a reduction of GHG emissions. A number of key elements may be helpful to consider when identifying relevant actions, although it should be noted that not all actions may contain every one of these elements.

Users can consider the following to help determine whether an action should be included in the list:

- Documentation of the action includes a clear mention of climate change mitigation, GHG emissions reductions or support for a climate policy.
- The description of the action indicates that the action clearly aims to reduce GHG emissions.
- The action is focused on a specific activity or technology known to reduce GHG emissions.

FIGURE **5.1**

Overview of steps in the chapter



- The action specifies a base year and/or a target year by which to achieve a reduction of GHG emissions.
- The action will take place (at least partially) within the boundary determined in Chapter 4.
- The action is additional to BAU or normal practice, and therefore truly contributes to exceeding the national targets.
- The action specifies intended impact using known, comparable and quantifiable metrics, and clarifies any assumptions – this will reduce limitations in the assessment.

The focus in this step is on compiling a list of actions that fall within the assessment boundary and ideally contain sufficient information (or the information can be obtained) indicated in the elements below that will be useful for further analysis. It is a *key recommendation* to clearly note any specific criteria used to include or exclude actors and actions in the analysis.

5.2 Organize data

Different assessments may require different types of data. For example, a broad assessment with an objective to determine the impact of non-state and subnational actions on a country's overall emissions pathway will require information on base year emissions of the non-state and subnational actors, which can be estimated if no information is provided directly by non-state and subnational actors.[40] If an action does not specify a base year, users can use the year the action was established as the base year. To calculate additional emissions reductions from a city that pledges to increase its share of renewable electricity generation, users need information about the city's energy mix, baseline share of renewables, intended share of renewables as a result of the action, and technology-specific emission factors to convert megawatts of renewable electricity generation into emissions avoided.

At a minimum, users should collect information on actors, sectors targeted, the geographic coverage of actions, and targets in their list of relevant non-state and subnational actions. Additional information may also be required – for example, the year the action was established or adopted, the base year and target year, the latest inventory year and inventory emissions, the current status or reported progress of the action, and whether the action is voluntary or mandatory. If the assessment includes all action types, users may want to also record the type of action to organize actions for later processing and to help inform a decision on whether to include the action in the final assessment.

Users may also want to record any known details about the origin of, or impetus for, the action being established – for example, whether a business action is in response to a regulatory requirement, or whether a subnational action is contributing towards a target of a higher-level jurisdiction. If such information exists, it will be helpful in determining overlaps in Chapter 9. For subnational commitments, it may also be useful to collect information on the region in which a city is located to avoid double counting impacts due to geographical overlap. Users may want to separate non-state and subnational energy supply targets from non-energy supply targets (i.e. production-related targets) to support the overlap analysis in Chapter 9.

Table 5.1 provides a template for organizing the collected information; users can add more categories as needed. Organizing this information by sectors will help in later steps. Users can also organize actions according to whether they are legally binding or voluntary commitments and carry this through the assessment to aggregate impacts for each category of actions separately (also see Box 6.3). This can help reduce uncertainty in results, because legally binding measures are more likely to be implemented.

Users should start with available data from national and international sources. This may include gathering any information previously used in developing climate policies or scenarios, drawing from international databases, or requesting data from data management organizations. A list of the most widely used and internationally accepted data sources for non-state and subnational actions is included in Appendix A. Many databases are regularly updated, and therefore users may want to periodically update their list of related non-state and subnational actions that will feed into the national assessment.

Box 5.1 provides tips for collecting information on non-state and subnational actions. Identifying non-state and subnational actions is an iterative process and should be updated with each assessment. Therefore, users should also record where and how the information has been collected. Depending on

[40] For information on how to quantify base year emissions, refer to WRI (2014a).

TABLE **5.1**

Template for gathering and organizing information relating to non-state and subnational actions

	Guidance	Hypothetical example 1	Hypothetical example 2
Actor	Name of the non-state or subnational actor	City of Amsterdam	Safran (French multinational company)
Sector(s) targeted	Based on IPCC categories or existing climate models or tools	Energy	Industrial process and product use
Geographic coverage	Global/national/regional/city	City	Global
Action type and whether it is legally binding	Identify the action type and whether it is legally binding	Non-GHG target, non-binding	GHG target, non-binding
Base year emissions	Note base year emissions, if available	-	18,920 tCO_2e
Target	Include base year, target year and any assumptions, if available	Install 75,000 MW of renewable energy capacity by 2020	Reduce operational CO_2e emissions by 5% from 2015 to 2018
Monitoring of progress	Note if progress towards fulfilling the action is monitored	Unclear	Yes
Data sources	Note the data source(s)	Global Climate Action portal	CDP
Action retained for further analysis	To be completed in Chapter 6 but has been included here for completeness		

Note: The table is for illustrative purposes only, and specific data-collection requirements may vary based on the objective of the analysis.

the scope of the analysis, it will be helpful to organize the collected data and use adequate tools to make the data machine readable, so that the data are easy to filter and process further.

Users should also begin to organize information in a manner that makes it easier to identify potential overlaps and avoid double counting in the subsequent steps. This is especially the case if users are conducting a broad assessment involving a range of actor groups and action types. For example, users may find it useful to develop and apply a tiering (ordering) system to identify actions that could be subsumed under broader targets, to avoid later double counting of emissions reduction impacts (Box 5.2). Further actions within a sector could also be organized by geographical location to help users identify relationships where overlaps are likely. Actions pertaining to higher subnational jurisdictions, such as regions and states, may encompass those within lower jurisdictions (e.g. counties, cities, businesses). Alternatively, users could organize the information at a later step (see Section 8.1).

BOX **5.1**

Tips for collecting information on non-state and subnational actions

Clarify data needs. Users should decide their data requirements based on the objectives for conducting the assessment. Standards, methodologies, verification systems and data quality vary widely among existing international databases. In addition to data published on these platforms, users may want to capture further details, such as how likely it is that the non-state or subnational action will have the desired impact, or any information that can help users to make rational assumptions about overlap with other actions and national policies.

Build on existing data. Users should leverage existing databases and networks, and build on what has already been collected to avoid duplicating existing data-collection efforts.

Prepare any necessary tables, spreadsheets and other tools to organize information. Users may want to tailor tables and templates to their circumstances and their assessment objectives. Over time, users may want to consider ways of automating data collection and put in place quality control measures. Although this may require a heavy initial effort, it will provide pay-offs in the future when replicating and repeating assessments.

Take time initially to set up a clear process and infrastructure for collecting information. Data gathering can be time-consuming and complex, because non-state and subnational actors follow different methodologies and produce diverse information. Establishing a system, creating clear timelines, and allowing sufficient lead time to collect and process the data will facilitate a smoother process.

Consider any legal or privacy concerns when collecting data or information from third-party providers or directly from non-state and subnational actors. To build and maintain trust of non-state and subnational actors, and alleviate any concerns, it may be useful to prepare a statement of intent outlining how the collected data or information will be used. Alternatively, confidentiality agreements, memorandums of understanding or other formal arrangements may be considered.

Develop a working list of contact information to gather additional details as needed. Even after an initial set of information has been collected, users may later need to contact specific national and other actors or networks for further details to fill data gaps.

BOX **5.2**

Example of a tiering approach

Global Climate Action report: The assessment organizes non-state and subnational actions into two tiers:

- Tier 1 – quantifiable policies, top-down goals and targets (e.g. a city renewable energy goal in the United States)
- Tier 2 – underlying incentives and programmes that may be mechanisms to help achieve the top-down targets but are difficult to quantify on their own (e.g. incentive programmes for renewable energy, siting laws, green tariff programmes with local utilities).

The Tier 2 actions are often subsumed under the Tier 1 actions. They are not separately quantified and accounted for, to avoid double counting of actions.

5.3 Data gaps

Data availability can be a significant challenge for some users. Users may not be aware of existing non-state and subnational actions, and, even when these actions are known, the information available may be incomplete. Actions other than emissions reduction targets often have higher data requirements, but are more likely to have incomplete data. In some cases, users may find that existing sources provide insufficient information and may wish to supplement this information with new data from the target group of non-state and subnational actors. This may extend the time needed for the assessment, but the more up-to-date data may result in more accurate analysis.

Some countries may wish to create a national database for non-state and subnational actions covering all sectors (Box 5.3). Establishing a database requires significant effort, time and capacity, but could be valuable if users plan to repeat assessments over time. This can be especially relevant for policymakers aiming to conduct broad, economy-wide assessments. In addition, such a database could allow tracking of progress and provide recognition of actions, which may further motivate non-state and subnational actors to set more ambitious climate mitigation goals. It is also helpful for policymakers who want to identify opportunities for future engagement with non-state and subnational actors. Users may be able to liaise with the United Nations Environment Programme (UNEP), UNFCCC or individual data providers to obtain a starting point for their own database and avoid duplication of efforts. Users should note that the more loosely defined a national database is, the less useful it may be as a source of information to quantify mitigation actions and integrate them into national GHG planning and processes.

Incomplete data can hinder further data analysis. It is a *key recommendation* to document all methods and assumptions used to fill data gaps; and, when statistical techniques are used to fill data gaps, to document the methods used and data points that are estimated. Below are a few options to address data gaps:

- Use national sources for multilevel information exchange (e.g. the National Environmental Information Exchange Network[41] in the United States or Fossil Free Sweden).
- Conduct extended stakeholder consultations or surveys. For example, users can consult industry associations for non-state actions within a given sector. These also offer additional opportunities for engagement with the private sector.
- Conduct literature reviews, both nationally and internationally.
- Use statistical interpolation techniques – for example
  - » develop models to project future emissions pathways on the basis of estimated population or GDP growth
  - » apply a "nearest neighbours" approach that estimates baseline emissions by comparing a city with nearby cities that report emissions data; this approach is used by the Global Covenant of Mayors for Climate & Energy in their aggregation of cities' targets[42]
  - » extrapolate commitments to actors that have signed on to a platform but have not specified their emissions targets, as was done for the Fulfilling America's Pledge report
  - » scale down national activity data using appropriate allocations and weighting factors. WRI and the Global Covenant of Mayors for Climate & Energy are collaborating to develop a new open platform using this technique. The platform will provide disaggregated, standardized data to cities on activities and emission factors to support inventories and climate action planning.[43] It will provide data on cities across the United States, as well as for 15 other countries, by the end of 2019.

  In addition, it may be useful to conduct a sensitivity analysis that demonstrates the range of uncertainty associated with adopting one data modelling technique over others.
- Review existing programmes by multilateral development organizations, such as the World Bank, the United Nations or multilateral development banks, which all work with

[41] For more information, see: www.exchangenetwork.net.

[42] Global Covenant of Mayors for Climate & Energy (2018).

[43] www.wri.org/our-work/project/us-climate-initiative/tracking-global-engagement.

BOX **5.3**

National database of non-state and subnational actions

Fossil Free Sweden (FFS), established by the Swedish Government, is an example of a national database. More than a purely data gathering undertaking, it is an attempt to gather a critical mass of non-state and subnational stakeholders around a common goal, and eventually help the government to make more ambitious decisions. It has more relaxed requirements for signing up than the Global Climate Action portal and other major international databases on non-state and subnational actions. Non-state and subnational actors sign up themselves to FFS. Although the original purpose of FFS is bigger than creating a list of non-state and subnational actions, and integrating the impact of these actions into national emissions planning, a database of this kind is a big step towards filling data gaps that may exist when relying solely on international databases.

subnational and non-state actors and can provide valuable data.

- In the case of cooperative initiatives, consult the initiative's secretariat.
- Consult individual data providers that feed into databases such as the Global Climate Action portal.

If attempts to bridge data gaps fail and users continue to deal with insufficient information, they may want to redefine their objectives and/or the scope of the analysis (Chapter 4). Users should also analyse how the lack of information affects the uncertainty in calculating impacts of non-state and subnational actions.[44]

[44] See Hsu et al. (2019).

6 Selecting non-state and subnational actions for inclusion in the assessment

This chapter provides criteria that help users decide which actions identified in Chapter 5 should be included in the assessment. It explains how to determine the suitability of each non-state and subnational action based on the availability of quantitative information, the magnitude of the potential impact, and the likelihood of the action achieving its target(s). The chapter discusses several indicators for characterizing and understanding the non-state and subnational actions in a country.

Checklist of key recommendations

- Evaluate non-state and subnational actions to determine their suitability for further analysis, and develop a shortlist of selected actions

6.1 Criteria for suitability

Not all actions are equally suitable for inclusion in the impact assessment. It is a *key recommendation* to evaluate non-state and subnational actions to determine their suitability for further analysis, and develop a shortlist of selected actions. Users should examine each non-state and subnational action in their initial list (obtained in Section 5.1) to determine its suitability against the following criteria, and develop a final shortlist of actions:[45]

- Quantitative information is available to allow further assessment of the action.
- The action will have an impact of significant magnitude.
- The action is likely to be achieved.

These are discussed in more detail below. This step helps fill the "Action retained for further analysis" row in Table 5.1 in Section 5.2.

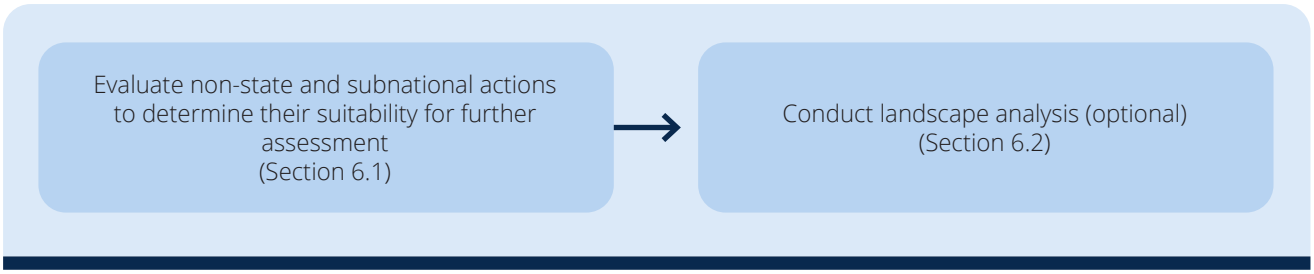
Actions that do not meet these criteria should be excluded from further assessment. Users should record their rationale and assumptions as they apply these criteria to select non-state and subnational actions for subsequent quantification and aggregation of impacts. This will also help users to revisit and modify the analysis over time if additional data or information become available.

6.1.1 Availability of quantitative information

Non-state and subnational actions will need to be quantified in subsequent steps to assess their impact. Therefore, it is important that information is available that is measurable and convertible to energy- or emissions-related metrics. Actions should include specific, clear and quantifiable forward-looking outcomes related (or convertible) to an energy and/or emissions impact. The following questions can help users determine whether

FIGURE **6.1**

Overview of steps in the chapter



[45] These criteria also include those referenced by the Marrakech Partnership for Global Climate Action.

sufficient quantitative information is available to support subsequent steps:[46]

- Is a time frame or target year specified?
- Does the action aim for a specific outcome(s)?
- Is the target energy or emissions related? If not, can it be converted to an energy or emissions outcome?
- Does the target apply to a specific geographic location? This is especially relevant for corporate goals.
- Is it a numerical target? If not, is it reasonably possible to convert it into a numerical target? See also Chapter 8.
- Are baseline data available or able to be estimated?

Box 6.1 gives some hypothetical examples to illustrate quantifiable non-state and subnational actions.

6.1.2 Magnitude of impact

Actions should achieve a significant magnitude of GHG impact. Users should note that it is not necessary to accurately calculate GHG effects in this step, and the potential impact after considering overlaps will be quantified in Chapter 9. Users can estimate potential emissions reductions and organize actions in terms of their major, moderate or minor impact (Table 6.1). Actions with minor impact can be excluded from further consideration. This will help focus the assessment on actions with major or moderate impacts and channel scarce resources to gather information for these actions only. The excluded actions should, however, be revisited in later assessments or if there is reason to believe that the potential impact is no longer minor.

Potential impact will already be known for actions with stated GHG mitigation targets, whereas other actions may require more subjective assessment. Users can also consult the *Policy and Action Standard* for further information on determining the magnitude of impact. Magnitude should be classified as major, moderate or minor based on evidence to the extent possible. Evidence may include prior results of similar actions from existing literature or experience, consultation with experts and stakeholders, or other methods. If there is no evidence, expert judgment should be used.

BOX **6.1**

Availability of quantitative information for non-state and subnational actions

A subnational action that targets energy efficiency of appliances by mandating an increase in efficiency up to the level of current best practice can meet the criteria. Even if there is no direct quantitative target, users can deduce quantitative targets based on information available in prior studies applying best practices in energy efficiency of appliances.

A non-state action focusing on information dissemination to raise awareness about land-use practices that cause a rise in GHG emissions does not meet the criteria. This action should not be considered further because it is not impact- or results-oriented and has no quantitative target, unless behavioural studies in this case can be linked to mitigation impacts. This does not imply that such initiatives could not have an important impact on mitigation or are not necessary; they can potentially be significant in enhancing an enabling environment to facilitate other actions. However, their impact is very difficult to attribute and quantify, and hence they are excluded from further analysis in this guide.

[46] Refer to WRI (2014a) for more details on target-related information that may be needed, and to WRI (2014b) for similar information on policies and actions.

TABLE **6.1**

Categorizing magnitude of potential impact

Magnitude	Description
Major	Change in GHG emissions or removals is likely to be significant in size (>10%).
Moderate	Change in GHG emissions or removals could be significant in size (1–10%).
Minor	Change in GHG emissions or removals is insignificant in size (<1%).

Source: Adapted from WRI (2014b).

6.1.3 Determine the likelihood of achieving non-state and subnational action targets

Users should also determine the likelihood that non-state and subnational actions will achieve their targets. The following qualitative questions can help determine which actions should be considered, based on their likelihood of achievement:

- Is the action legally binding? This can often be a strong indicator that the action will likely meet its target.
- Why was the action initiated?
- Is there clear ownership of the action?
- Is there any accountability for the non-state or subnational actor? Is there any information on past performance of the actor, ideally for similar actions (e.g. other voluntary mitigation actions that the actor pursued)?
- Are there any plans for monitoring progress towards the achievement of targets? One of the Global Climate Action portal criteria for including actions on the portal is whether actions will be monitored.
- Have some (partial) results already been achieved?
- Do non-state and subnational actors have the technical capacity to deliver on their commitments?
- Are sufficient funds allocated to initiate and implement activities necessary to achieve the action?
- Are there political cycles or potential changes in administration that could undermine or strengthen a subnational action?
- Are there indications relating to the financial health of a non-state actor that could undermine its commitment?
- Have similar actors with similar actions in similar circumstances successfully achieved their goals?

When dealing with a small set of actions, users can also quantitatively analyse the likelihood of achievement – for example, by checking progress of each target individually. This may not be feasible if a large number of actions exist within the assessment boundary.

It is important to note that there is no single, common methodology to determine likelihood, and this exercise can be quite subjective. Therefore, understanding the likelihood of achievement should be informed by available data and facts, published literature, prior experience or performance, modelling results, risk management methods, consultations with experts and stakeholders, and so on.

Table 6.2 provides options for likelihood of achievement. Actions that can likely/possibly achieve their potential impact are considered for further analysis. Actions that are unlikely to achieve their targets should not be considered further. Boxes 6.2 and 6.3 illustrate how to determine likelihood using examples and insights from other assessments.

TABLE **6.2**

Assessing likelihood

Likelihood	Description
Likely	Strong reason to believe that the non-state or subnational action's target will be achieved. This may be determined based on indications such as that: • the action is already at an advanced stage • funding is available • clear ownership and responsibilities exist • the necessary capacity and resources have been mobilized • the action is results/impact oriented • an (internal) incentives system exists • a monitoring system is in place • GHG inventory data have shown that progress is under way • the action produces outputs that are consistent with its target.[a] For example, a cooperative initiative aiming to reduce deforestation in supply chains is expected to engage with companies and their supply chains. But, if it only produces knowledge, it may be considered active, but its output is not consistent with the desired goal and the action is less likely to result in impact • non-state/subnational actions are embedded in a public policy or planning instrument • the action has a clear implementation period.
Possible	Some reason to believe that the non-state or subnational action's target will be achieved. Cases where the likelihood is unknown or cannot be determined should be considered possible. Whether to include an action with a possible likelihood depends on the level of accuracy and conservativeness (caution) users aim for in their assessment.
Unlikely	Few reasons to believe that the non-state or subnational action's target will be achieved. This may be determined based on indications such as that: • the action is not (yet) under way • ownership is unclear or responsibility is unassigned • limited or no funding is available • GHG inventory data do not show any progress.

Source: Adapted from WRI (2014b), based on IPCC (2010).

[a] This is based on the function–output–fit (FOF) approach, which says that an impact is likely to occur if the action produces a fitting, attributable output such as product development, technical "on the ground" implementation or infrastructure. Underlying this approach is the assumption that an action's output should be consistent with its intended impacts (Chan et al. 2015, 2018).

BOX **6.2**

Hypothetical examples to determine likelihood

A company has consistently set and achieved five-year emissions reduction targets since 2005. Its most recent report indicates that the company is on track to achieve its 2020 target and that it has also committed to setting a science-based target. The targets are agreed upon at board level, and the company has an employee incentive scheme linked to employees' achievements. Based on these observations, the company is likely to achieve its target, and the action should be included in the assessment.

In 2012, a city set its first ever emissions reduction target – 75% reduction in GHG emissions by 2050 from a 2010 base year. There are no interim targets or milestones, despite the long period over which the target is to be achieved. The city currently has no renewables in its electricity generation portfolio and is home to significant cement operations. There has been little planning so far to ensure that the target will be met, even though the mayor had committed $5 million in 2012 to make some progress. No coherent strategy has been developed to take deep actions in major emitting sectors. Based on the information available, it is unlikely that the city will achieve its target.

BOX **6.3**

Insights from assessments to determine likelihood

India corporate actions assessment: This pilot verified whether companies were on track to meet their voluntary targets. The likelihood of achievement of targets was assessed qualitatively using the following criteria:

- committed actions and plans to achieve the target
- historical emissions reduction trends
- assessing the progress of reduction compared with the target
- other public commitments related to renewable energy, participation in Green Building Adoption, Green Procurement Policy, and so on.

Applying these criteria to individual companies, targets at the company level were assessed as:

- likely to be achieved – on track to meet or overachieve the target
- possible to achieve – not on track, but initiatives would lead to achieving at least 70% of the target
- unlikely to be achieved – actions to achieve target are lagging, but with minimal action 25% of the target may still be achieved.

Estimated reductions by the company were weighted as per these percentages.

Fulfilling America's Pledge report: No explicit likelihood assessment was carried out, but, to be conservative, the study excludes certain types of actions, which can be seen as implicitly determining likelihood. For example, if a city had underlying commitments in specific sectors (e.g. renewable energy and energy efficiency) to achieve its goals, such goals were included because the underlying commitments made it more realistic that the goals would be achieved.

Further, two categories – "existing actions" and "pledged actions" – were developed, which allowed differentiation based on concreteness and stringency. Existing actions are those that have been formally adopted by local and regional governments, are legally binding, and are currently being implemented. Pledged actions are not legally binding and may not show any clear indication of being implemented, even though they may be clearly defined intentions (e.g. executive orders, mayoral announcements, voluntary corporate commitments).

6.2 Conduct landscape analysis

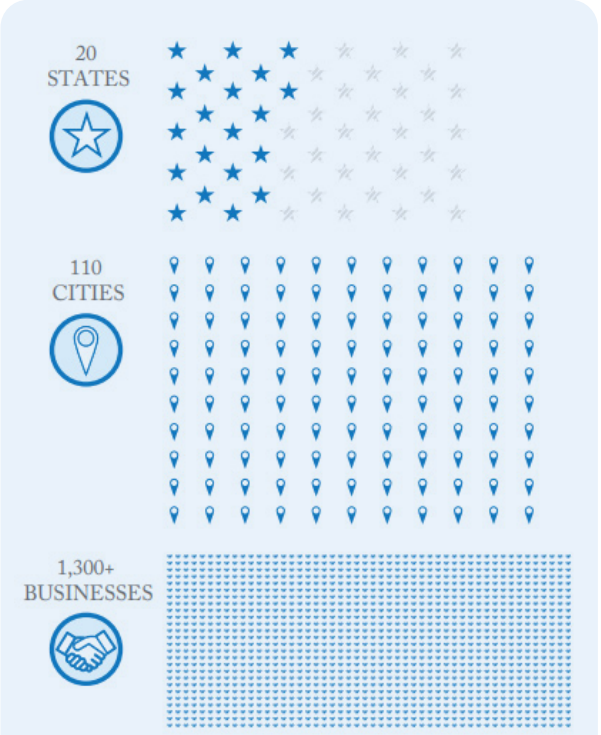
Users who are interested in characterizing and understanding the existing landscape of non-state and subnational actions should be able to do this analysis once actions have been shortlisted. Such analysis provides helpful insight into the type of actors, actions and sectors that are covered; identifies opportunities for engagement with these actors; and promotes new actions. It can also help users to understand to what degree a policy or action has been adopted by public and private non-state and subnational actors, thus reflecting the implicit mandate or consensus around different types of actions. The landscape analysis can be used to obtain an initial picture of the range of climate actions under way in a country. It can help establish a foundation for assessing the aggregated impact of non-state and subnational actions in subsequent years.

This analysis is an optional step. It can be done as a stand-alone exercise or as part of a comprehensive impact assessment exercise. Users can identify several indicators that can provide a snapshot of the scope of non-state and subnational actions within a country or sector. Some examples, based on the analysis done under several studies, including the India corporate actions assessment, the Fulfilling America's Pledge initiative (phase 1), the Global Climate Action report, and the Global Covenant of Mayors 2018 Global Aggregation report, are:

- population, GDP and emissions of states and cities with existing GHG targets compared with country totals
- types of sectors covered by businesses taking action – for example, the 53 companies considered under the India corporate actions assessment represent more than 10 sectors, including automobile, chemicals, engineering, pulp and paper, and services
- emissions from businesses taking action as a percentage of industry emissions in the country (e.g. emissions from the 53 companies in the India corporate actions assessment account for 25% of India's industrial sector emissions)
- number of states, cities and businesses with GHG reduction targets (Figure 6.2)
- types and number of climate-friendly policies and actions adopted by states, cities and businesses (Figure 6.3)
- legally binding versus voluntary actions across different actor groups
- sectors in which companies have made the highest number of commitments – for example, the Global Climate Action report indicated that companies in China have made the most commitments in the electrical equipment and machinery, technology hardware, and chemicals (113) sectors
- targets (and the type of targets) versus no targets – for example, companies in the India corporate actions assessment had GHG intensity targets and carbon neutrality targets, while a few companies only intended to reduce their emissions with no accompanying target
- growth in actions over time – for example, the Global Covenant of Mayors tracks growth in the number of cities committing to the Global Covenant of Mayors initiative over time.

FIGURE **6.2**

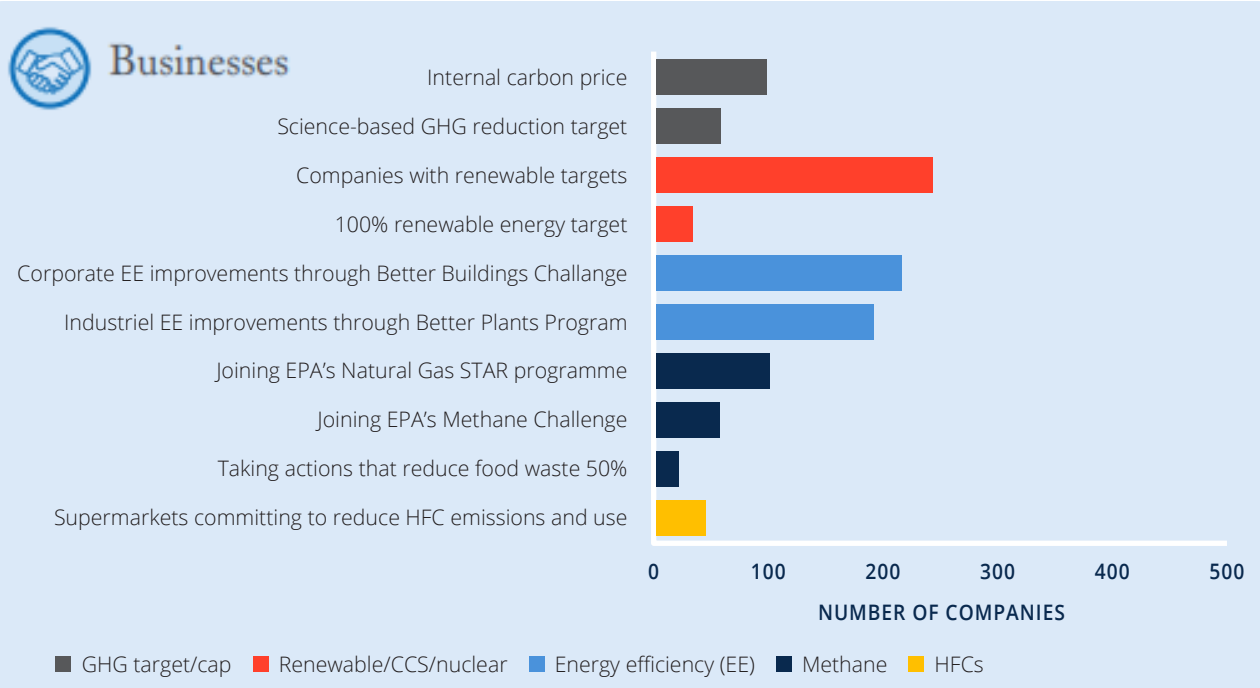
Number of states, cities and businesses with GHG reduction targets



Source: America's Pledge (2017).

FIGURE **6.3**

Type and number of businesses adopting climate-friendly actions



Source: America's Pledge (2017).
Abbreviation: CCS, carbon capture and storage

7 Listing relevant national climate mitigation policies and actions

This chapter explains how to develop a list of relevant national mitigation policies and actions, depending on the objectives of the assessment. This information will be used later to determine any overlaps with non-state and subnational actions, to avoid potential double counting of impacts. It will also be helpful in developing a current policies scenario to pursue the set of objectives that require integration into national policies, if applicable.

Checklist of key recommendations

- List all relevant national climate mitigation policies and actions that relate to the objectives of the assessment
- Document a scenario or model of current policies that will be used for the set of objectives that require integration into national policies
- Gather and organize necessary data for national policies

7.1 Identify national mitigation policies and actions

This chapter focuses on gathering information on national mitigation policies and actions that users will need to compare the potential impact of non-state and subnational actions with national policies. Similar to non-state and subnational actions, national policies may include policies that do not directly target GHG emissions reductions but contribute to reductions, such as energy conservation building codes, appliance standards and labelling schemes.

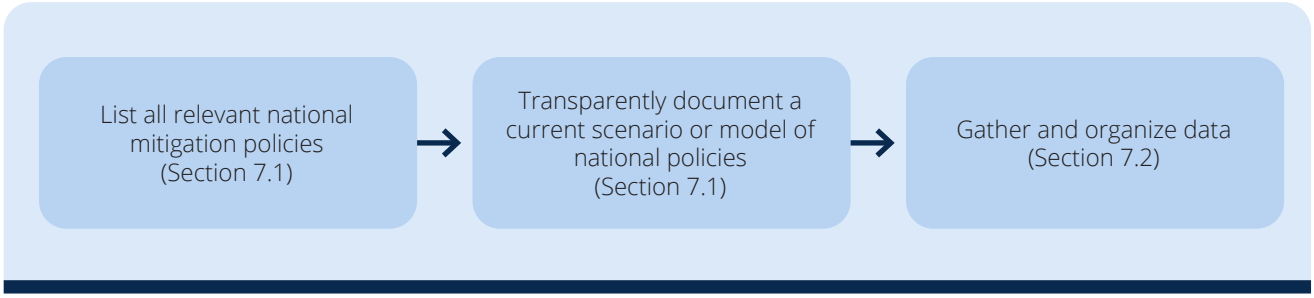
It is a *key recommendation* to list all relevant national climate mitigation policies and actions that relate to the objectives of the assessment. If the assessment is limited to a sector, the list would include all national policies that could have an impact on the sector.

Information on national policies that relate to mitigation is needed to understand overlaps between non-state and subnational actions and national policies. This helps users to identify *additional* non-state and subnational actions – that is, actions that are not subsumed under national policies or carried out as part of implementing national policies (see Section 9.4 for more information on determining overlaps with national policies).

The information on national policies is also needed to assess the set of objectives that involve integrating the impact of non-state and subnational actions into national emissions projections or targets – for example, when comparing the impact of non-state and subnational actions with that of national policies, or understanding how non-state and subnational actions influence the national emissions projections. Box 7.1 illustrates how the comparison between national policies and non-state and subnational actions was done in the Global Climate Action report.

FIGURE **7.1**

Overview of steps in the chapter



BOX **7.1**

Comparing national policies and non-state and subnational actions

As a starting point, the Global Climate Action report uses a "current national policies" scenario, which considers only currently implemented national policies. To capture the uncertainty embedded in future projections, two current national policy scenarios are considered: a scenario produced by the NewClimate Institute and another produced by the Netherlands Environmental Assessment Agency (PBL). Both are supplemented with land use, land-use change and forestry (LULUCF) and agricultural sector projections from the International Institute for Applied Systems Analysis. The current national policies projections included major energy and climate policies implemented as of July 2017.

A "current national policies plus individual actors' commitments" scenario was developed, building on the current national policies scenario. As the name suggests, it included quantifiable actions from individual non-state and subnational actors in addition to national policies. The scenario assumed full implementation of non-state and subnational actions – that is, reductions based on likelihood of achievement were not discounted. Further, it did not consider barriers to implementation. The scenario considered and quantified the overlaps across national policies and non-state and subnational actions.

Source: Data-Driven Yale, NewClimate Institute and PBL (2018b).

If users have access to a modelled scenario representing current national policies, they may want to ensure in this step that the scenario is up to date, and includes all relevant national policies and actions. If such a scenario does not exist, users can use the list of national policies to develop a new scenario representing national policies. Often these scenarios include information on at least a few key subnational policies and actions. For users interested in integration-related objectives (e.g. determining the contribution of non-state and subnational actions towards achieving the national climate change target), it may be helpful to conduct this step before gathering relevant information on non-state and subnational actions (described in Chapters 5 and 6). Users can then determine to what extent existing non-state and subnational actions may already be included in modelled scenarios of national policies, so that they can gather data on these actions. It is a *key recommendation* to document a scenario or model of current policies that will be used for the set of objectives that require integration into national policies.

This step is not necessary for users who are only interested in bottom-up aggregation of non-state and subnational actions to determine their potential impacts, without comparing them with national policies or considering their additionality to national policies. However, in such cases, users should transparently note that the assessment results do not account for potential overlaps with national policies and cannot be considered additional to national actions without further analysis.

7.2 Gather and organize data

It is a *key recommendation* to collect and organize necessary data for national policies. Table 7.1 presents a suggested template for the kind of information users should gather at a minimum. Users should list all sectors and subsectors targeted by the identified national policies and actions, based on the main IPCC categories. They should also include specific targets, including reference levels and target years, and the metrics used. Users should apply the same suitability criteria used for determining whether non-state and subnational actions should be included in the analysis (Section 6.1). Finally, all data sources should be documented.

There are several options for gathering information on national mitigation policies and actions to complete Table 7.1:

- Consult existing national registries and databases. Some countries may have databases of climate mitigation policies that should be consulted first.
- Review the most recent national climate reports such as biennial reports (BRs) or biennial update reports (BURs), national

TABLE **7.1**

Template for information gathering on national climate mitigation policies and actions

	Hypothetical example
Relevant national policies and actions	Reduce emissions from coal power plants
Share of sector's emissions in national emissions	10%
(Sub)sector(s) targeted	Energy
Target (including base/target year and metrics used, if available)	Reduce GHG emissions from coal power plants by 30% by 2030
Is this an NDC target (i.e. included in the NDC?)[a]	Yes
Is the policy NDC-specific or does it contribute to achieving the NDC?[a]	Yes
Impact on national emissions projections	-
Data sources	Environment Ministry

[a] This information is not needed if users have chosen assessment objectives that are not directly related to the country's NDC.

communications and NDCs.[47] Such reports often include information on climate policies that can be useful. A country's NDC is also likely to provide information on GHG emissions reduction targets at national and/or sectoral level.

- Consult a dedicated national body, if applicable. Some countries have an (inter) ministerial or similar body with oversight of emissions mitigation and/or responsibility for steering the NDC process, which can be useful in filling data gaps.

- Consult relevant line ministries, depending on the assessment objectives, to verify that the information contained in BRs or BURs is up to date, or to confirm whether any new policies are in the pipeline. Official roadmaps can also be a relevant source of potential mitigation policies. However, this can be a resource-intensive exercise.

- Conduct literature reviews and search online databases. Literature reviews can provide additional information and analysis, which may be difficult to obtain from discussions with ministries alone. In general, increasing numbers of organizations are collecting information on mitigation policies and actions, and their effect on national emissions pathways, and are making it available in the form of online, open, searchable portals. The Climate Watch platform and the Climate Action Tracker are two such examples.[48] Climate Change Laws of the World is a global database that includes climate-related laws from 164 countries.[49]

- Consult research organizations, consultancies and other stakeholders – for example, researchers from independent organizations, sector experts, UNFCCC focal points[50] and Global Climate Action portal data providers. This can also be a resource-intensive

[47] BRs and BURs are submitted by Annex I and non-Annex I countries, respectively, to the UNFCCC secretariat, and contain information about national climate mitigation policies. Submitted BRs and BURs are available at: http://unfccc.int/national_reports/biennial_reports_and_iar/submitted_biennial_reports/items/7550.php and http://unfccc.int/national_reports/non-annex_i_natcom/reporting_on_climate_change/items/8722.php; the interim NDC registry is available at: http://www4.unfccc.int/ndcregistry/Pages/Home.aspx.

[48] See: www.climatewatchdata.org and http://climateactiontracker.org.

[49] Further information on the Climate Change Laws of the World database is available at: www.lse.ac.uk/GranthamInstitute/climate-change-laws-of-the-world.

[50] UNFCCC focal points for each country are available at: http://unfccc.int/parties_observers/parties/national_focal_points/items/9336.php.

undertaking, and challenging if it first involves identifying and finding the right set of experts and stakeholders.

An approach combining the options above and using robust assumptions can help address data gaps and contradictions in the assessment. For example, assessments with an objective of determining the impact of non-state and subnational actions on overall emissions projections will require information on the effect of national mitigation policies and actions on a country's emissions pathway. This effect can be quantified if the information is not readily available (Box 7.2).[51]

BOX 7.2

Quantifying a country's emissions pathway under mitigation policies and actions

Suppose a country has a relative target below a given reference or baseline, such as 25% below expected emissions with current policies only, in 2030. The first step is to quantify baseline emissions in 2030 – that is, emissions for a "current policies" scenario. Some countries report estimated current policies emissions in their NDCs or other national submissions to UNFCCC. Supposing that the country has reported its current policies emissions in 2030 to be 500 $MtCO_2e$, then the target year emissions would be 500 $MtCO_2e \times (1 - 25\%) = 375\ MtCO_2e$.

But, if a country has not reported its current policies emissions in the target year, users should look at the definition of its current policies to calculate target year emissions for this scenario. If a current policies scenario, for example, assumes emissions growing at a constant rate (same as the GDP growth rate), target year emissions can be calculated as:

Current policies GHG emissions in 2030 = GHG emissions in the base year (as defined in the NDC) × GDP growth rate between the base year and 2030

GDP growth projections for the period can be obtained from national sources, as well as international sources (e.g. the International Monetary Fund). If GDP projections include a range, these can be used to calculate the range of estimated emissions in the target year.

[51] See WRI (2014a) and WRI (2014b) for further information on quantifying impacts, and determining baselines and projections for different kinds of targets, respectively.

PART III

Impact assessment

8 Harmonizing non-state and subnational actions and national policies for comparison

This chapter explains how to process collected data to convert the diverse range of non-state and subnational climate mitigation targets into common metrics so that they can be compared with national policies or included in existing climate models. It also discusses options to determine potential emissions reductions from actions (i.e. their estimated impact), depending on the action type. The chapter provides relevant metrics and steps for various sectors to estimate potential impact. Not all sectors may be applicable for every user.

This chapter should be applied in conjunction with Chapter 9 because overlap analysis may exclude some actions, and users will not need to translate these into common metrics. In other cases, users may need to first harmonize metrics to be able to assess overlaps.

Checklist of key recommendations

- Identify comparable metrics suitable for users' assessment objectives, and express non-state and subnational actions in these metrics to facilitate comparison
- Estimate the potential emissions reductions for non-state and subnational actions to facilitate comparison across the economy

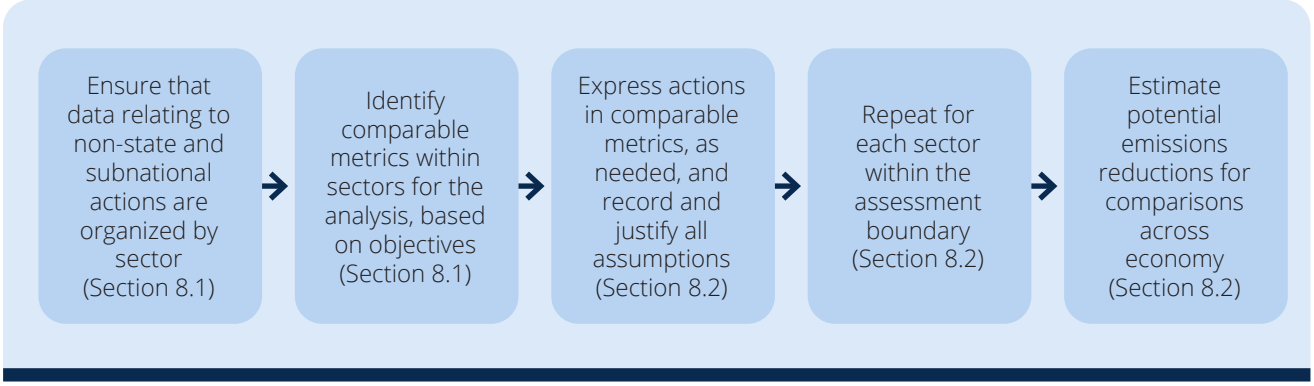
8.1 Preparing for data processing and identifying comparable metrics

Non-state and subnational climate actions include a variety of target types and metrics, which may differ from those used in national policies or climate models. There may be differences in the time frame of their targets, the geographical boundary and the scope of emissions targeted, which make comparisons difficult. Users need to translate the collected information on non-state and subnational actions in Chapter 6 into a comparable form for further analysis. This step ensures that users are comparing "like" entities. This means that it is important to express targets in common metrics, harmonize base years and target years, and estimate potential impacts in terms of common indicators (e.g. emissions reductions). The more complete and clear the outputs of previous steps are, the easier it will be to conduct the following analysis.

The data collected on non-state and subnational actions should already be organized by sector from the steps described in Chapter 6. Any data gaps that still exist should be highlighted, because these non-state and subnational actions may require additional processing (e.g. to determine missing base year emissions) or may require reasonable assumptions to be made. Users should transparently record their assumptions and provide justifications.

FIGURE **8.1**

Overview of steps in the chapter



Users should also consult Chapter 9 on assessing overlaps. They should translate into common metrics, and estimate the impacts for, only those actions that are not excluded from the analysis after addressing overlaps. Therefore, users may need to go back and forth between this and the next chapter because some actions may first need to be expressed in a common metric to assess overlaps and decide whether to include or exclude them.

It is a *key recommendation* to identify comparable metrics suitable for users' assessment objectives, and express non-state and subnational actions in these metrics to facilitate comparison. Users should translate the actions within a sector into comparable metrics based on their objectives. This should be repeated for each sector in the assessment boundary. For example, users interested in quantifying the impact of non-state and subnational actions without any comparison can choose to express the potential impact in emissions or other appropriate metrics for the sector (e.g. TWh of energy generation, forest area restored, number of zero-emission vehicles sold). Users quantifying the impact of non-state and subnational actions at a (sub)sector level to compare with existing sector targets (e.g. in NDCs) can also represent the impact in common metrics relevant to the sector. The metric does not need to be GHG emissions reductions if the sector- or subsector-level target is not expressed as an emissions reduction target. A non-emissions metric (e.g. renewable energy capacity installed) would be appropriate if the impacts of both non-state and subnational actions and the (sub)sector/national target are expressed in this metric. However, for determining emissions reductions against a base year, users need to use energy or emissions-related metrics.

For assessments involving integration into national emissions pathways or national emissions mitigation targets, users will need to convert non-state and subnational actions into comparable emissions impacts. If using models to facilitate economy-wide impacts, users should also review the metrics used in their selected models in Chapter 7. They can consult modellers to identify the best metrics to represent the bottom-up aggregated impacts, which can then be integrated into the model for comparison at the national level. For example, the Fulfilling America's Pledge report calculated the TWh of renewable energy demand from state and city targets. This was converted into percentage of renewable energy demand for each state to plug into the economy-wide model used to calculate emissions reductions.

Users may also need to harmonize time periods of non-state and subnational actions with the assessment period and the national targets. It is suggested that users adopt conservative assumptions to ensure that they are not overestimating impacts. Any assumptions made to harmonize policies and actions with the assessment period should be transparently recorded, with justification explaining the underlying rationale. For any targets that end before 2030, the Fulfilling America's Pledge report assumed that the subnational actors hold their GHG levels constant between the target year and 2030 (i.e. no further reductions were assumed).

8.2 Harmonizing metrics and estimating potential emissions reductions in various sectors

Any actions that need to be converted into comparable metrics should be processed. This processing may take considerable time because users may need to collect supplemental information such as emission factors, sector-specific data, or economic or demographic data. All additional data points and assumptions should be used consistently within sectors and should be documented for each action that is processed. Some examples of how actions may be processed for each sector are provided below. Appendix D provides a list of data sources for sectors and subsectors that may be consulted if appropriate national data are not available.

Users may also want to estimate the potential impact of each action within a sector in terms of emissions reductions. They can, however, choose to represent the impact in terms of non-emission, sector-appropriate metrics, depending on their objective. When comparing impacts of non-state and subnational actions across sectors in an economy-wide assessment, or comparing with national targets, users should estimate the potential impact in terms of a common indicator such as emissions reductions. The difference between the base year value and the target year value of the metric of interest (e.g. emissions, energy intensity, number of electric vehicles, forest area restored) represents impact. Impact (expressed in terms of emissions reductions) is estimated using the following equation:

Potential impact (emissions reduced) = emissions in target year – emissions in base year

When considering a large number of non-state and subnational actions, emissions in the target year are calculated using the stated target value, if it is available. This value is often not determined from

scratch; instead, the non-state or subnational actor's target is taken at its face value. However, users can discount these targets based on their likelihood of achievement, as appropriate, which would help avoid overestimating impacts (discussed in Box 6.3 for the India corporate actions assessment).

The target may not always be expressed in an emissions metric. This section provides guidance on how to harmonize metrics across actions and how to convert a given metric into emissions to calculate the impact in terms of potential emissions reductions.

At this stage, users should not aggregate respective potential emissions reductions because base years and target years are not harmonized across non-state and subnational actions and national policies, and overlaps have not been addressed. Some actions may overlap and/or interact with each other and with national policies in a way that does not result in unique GHG emissions reductions (i.e. they may not be additional actions). Only additional actions should be aggregated to obtain additional reductions across the sector or economy. See Chapter 9 for further guidance on addressing overlapping and reinforcing interactions.

Quantifying potential impact involves estimating GHG reductions from each action relative to individual baseline scenarios that represent what would have happened in the absence of the action. Users should carefully select a baseline scenario and/or estimate the baseline scenario for each individual action or sector so as not to overestimate the resulting emissions impact.

Different approaches can be used to calculate baselines. For example, a constant emissions level can be used (e.g. base year emissions), or assessments can consider emissions growing at a certain rate informed by the historical or projected growth rate of the economy. Baselines for specific actors can also be determined; for example, the International Energy Agency's World Energy Outlook has industry sector projections that can be used as baselines for companies in the same sector. The India corporate actions assessment developed a baseline scenario for each company based on its GHG intensity trend, business projection and applicable emissions reduction mandates from existing policies. The Global Climate Action report developed economy-wide baselines with emissions projections assuming existing policies only ("current policy projections") to estimate the impact of non-state and subnational actions. Sector-specific baselines were used for international cooperative initiatives (e.g. a global reference scenario with emissions projections for the forestry sector).

When comparing the non-state and subnational impacts with a national mitigation target expressed as a reduction below a baseline (e.g. 12% absolute reduction by 2030 relative to a BAU scenario), it is important to consider the possibility that the baselines may not be consistent and to align the baselines for a true comparison. Care should also be taken to reduce the risk of using unsupported baselines that serve to maximize the impact. Stakeholder inputs and expert judgment can be very helpful in this context. Users may consult the *Policy and Action Standard*, the *Mitigation Goals Standard*, and sector-specific guidance on assessing impacts of policies and actions being developed under ICAT for further information on determining baselines for different kind of targets and policies.

It is a *key recommendation* to estimate the potential emissions reductions for non-state and subnational actions to facilitate comparison across the economy.

8.2.1 Agriculture, forestry and other land use

Non-state actors, including private sector entities, are playing an increasingly large role in the AFOLU sector.[52] In 2018, agriculture was the third most frequently covered sector across international cooperative initiatives, after energy efficiency and transport.[53] General challenges for the sector when quantifying impacts include the time delay between the action (e.g. planting a tree) and its impact on emissions removal/sequestration, and lack of data availability for the required time period. Users should consider these challenges when quantifying the sequestration potential and comparing it with the NDC or existing national climate efforts. Further, countries have different definitions for what constitutes a forest. Users should adjust their calculations to reflect the definition and forest types used in their country of focus, because this will impact carbon sequestration rates. See also the ICAT *Forest Methodology* and the ICAT *Agriculture Guidance*.

Table 8.1 provides an overview of some common non-state and subnational targets in this sector, their conversion to comparable metrics, and a few options to calculate sequestration potentials, including necessary data points and assumptions. Box 8.1 describes a hypothetical example of determining the sequestration potential of an international cooperative initiative in the agriculture sector.

[52] Hsu et al. (2016); UNFCCC (2016).

[53] UNEP (2018).

TABLE **8.1**

Agriculture, forestry and other land use sector

Examples of non-state and subnational actions	Metrics for comparison with national policies or for inclusion in existing models/ scenarios	Options for determining sequestration potential
Restore X ha of forests	Total forest area (ha); afforestation/reforestation rate (kha/year) Assumption: • density of restored forest (equal to average)	Identify the CO_2 sequestration potential of 1 ha of forest (how much CO_2 domestic forests sequester annually) and multiply by the area of forest (in ha) to be restored (simplistic approach). Data needs (use FAO resources): • total CO_2 emissions/ha • CO_2 sequestered/ha • forest density (m^2/ha) • carbon stock per type of forest (tC/ha). For a more sophisticated approach, users should follow the IPCC guidelines on forest land.[a]
Stop deforestation (from supply chains)	Put deforestation rate to zero; all other variables remain unaffected.	Stopping deforestation means zero emissions, and no further quantification is needed at this point.
Zero degradation	Put degradation to zero; all other variables remain unaffected.	Zero degradation means zero emissions, and no further quantification is needed at this point.
Reduce CO_2 emissions from deforestation by X%.	Total CO_2e emissions from deforestation ($MtCO_2e$) Assumption: • rate of deforestation from base year	Determine sequestration potential by checking total CO_2e emissions from deforestation domestically. Assumptions: • rate of deforestation from base year
Decrease CO_2e emissions from agriculture by X% compared with base/target year reference	Total CO_2e emissions in base year and projected CO_2e emissions in target year Assumptions: • specific sources of CO_2e reductions (if applicable) • projected growth in agriculture activity	Convert from relative reduction to absolute target by checking total CO_2e emissions from agriculture and projected emissions growth rates. Data points needed (use national emissions projections; if these are not available, use World Bank Data, U.S. EPA global anthropogenic GHGs): • emissions growth rate for agriculture ($GtCO_2e$) • CO_2e emissions from agricultural processes and products
Increase sustainable food production by X%	Total food production (t/person); total sustainable food production (t/person) Assumption: • definition of sustainable food production (e.g. certified food, certified production only, type of certification)	Check emissions caused by agriculture for food production. Then look at the share of sustainable food production and its CO_2e impact. Then translate the relative target into an absolute one, calculate the estimated CO_2e emissions and compare with CO_2e emissions for estimated non-sustainable food production. Assumption: • definition of sustainable food production (e.g. certified food, certified production only, type of certification). Data points needed (use World Bank, United Nations World Populations Prospects if no national data are available): • food production per person (t/person) • demographic development • share of sustainable food production in country (X%) and its CO_2e impact (tCO_2e/person).

Abbreviations: FAO, Food and Agriculture Organization of the United Nations; U.S. EPA, United States Environmental Protection Agency

[a] A tool to calculate emissions removals from reforestation is available at: www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/reforestation-tools; additional methods, with limited geographical coverage, are described at: https://ww2.arb.ca.gov/resources/documents/cci-quantification-benefits-and-reporting-materials.

BOX **8.1**

Determining emissions reduction potential of international cooperative initiatives in the agriculture sector

Consider a hypothetical example of an international cooperative initiative that aims to mobilize $100 million for sustainable forestry, out of which $5 million will be mobilized in the user's country. The user wants to assess the effect of the initiative on restoring forests in the country. Forest area restored is an appropriate metric for comparison with national policies.

The user can convert $5 million mobilized into hectares (ha) of forest area restored. This can be done by using domestic data, if available, on the average amount of investment needed to restore 1 ha of forest. If national data are not readily available, the user can consider international sources that provide such data, while clearly noting that they have done this and acknowledging that these may not be the most accurate data for their context, if applicable. For example, the user could check restoration projects financed by development banks in comparable countries, assuming that efficiency of resources is the same across countries. Alternatively, survey companies and non-profit organizations engaged in restoration may have data.

If the data show that $50 is needed to restore a hectare of forest in the country, $5 million can restore 5,000,000/50 = 100,000 ha of forest.

8.2.2 Energy and industrial processes and product use

Energy supply, industry, buildings and transport are individually discussed below to show how to convert energy-related non-state and subnational targets to comparable metrics. Options to estimate their potential impact in terms of emissions reductions are also described.

Energy supply

The energy supply sector is the largest contributor to global GHG emissions.[54] Together with the transport sector, it is one of the sectors that is most frequently targeted by non-state and subnational actions.[55] Actions may include energy demand or consumption-specific targets, or targets in other metrics that can be translated into energy supply targets – that is, energy supply needed for the targeted demand or consumption to be achieved (Table 8.2). Box 8.2 describes an example of determining the emissions reduction potential of a non-state action in the energy supply sector. Appendix D provides an overview of international data sources that can be consulted if national data are not available. See also the ICAT *Renewable Energy Methodology*.

[54] Bruckner et al (2014).

[55] Yale University (2015).

TABLE **8.2**

Energy supply sector

Examples of non-state and subnational actions	Metrics for comparison with national policies or for inclusion in existing models/ scenarios	Options for determining potential emissions reductions
Increase the share of electricity generated from RE to X (% or absolute amount in MW) Procure X (amount or %) of total energy supply from RE	RE electricity generation capacity installed (MW); share of RE electricity in national grid Assumptions: • Potential RE electricity generation from additional capacities installed is equal to additional RE electricity consumed (no idle capacities). Data points needed to convert % to MW or MW to %: • full load hours, either average over all technologies or technology-specific, if available • total electricity generation.	If capacity (MW) target, convert to generation (TWh) using full load hours. If % target, convert to generation (TWh) using total electricity generation in target year. To calculate potential emissions reductions, users can derive different estimates of emissions impacts depending on whether RE electricity displaces natural gas first, then oil and then coal (low estimation[a]) or coal first, then oil and then gas (high estimation). Assumptions: • RE electricity installed is equal to RE electricity generated. • National fuel mix remains unvaried (once the change in RE has been accounted for). Data points needed (use IEA World Energy Outlook/Statistics if no national data are available): • projected electricity generation and fuel mix • emission factors for fossil fuels.
Drive down the cost of RE and/or its generation by X amount ($/MWh)	Cost of one unit of RE generated ($/MWh) Assumption: • linear cost trend (costs do not change if more RE capacity is installed).	Suggest using an existing model, if available, due to several complex assumptions needed to calculate realistic emissions reduction potential.
Reduce electricity consumption by X% compared with base/target year reference	Total electricity demand (MWh) Assumption: • Consumption is equal to supply.	Check total projected electricity consumption and convert relative target to an absolute one. To calculate the emissions reduction potential, follow the process detailed in the earlier examples. Assumptions: • Consumption is equal to supply. • National fuel mix remains unvaried. Data points needed (use IEA resources if no national data are available): • projected demand for electricity (in MW) • total CO_2 emissions from generated electricity ($MtCO_2$) • national fuel mix • emission factor for fossil fuels.

Abbreviations: IEA, International Energy Agency; RE, renewable energy

[a] This is due to their different carbon contents.

BOX **8.2**

Calculating potential emissions reductions from an international cooperative initiative in the energy supply sector

An international cooperative initiative aims to engage 100 companies to procure 100% of their energy demand from renewable energy (RE). Four of these companies will be mobilized in the user's country, and both the company and the utility from which the company sources its power are physically located in the country. The user wants to understand whether the additional demand from RE targets can be met by existing RE capacity, and the impact of the initiative in terms of potential emissions reductions. The user should first collect data on current RE installed capacity and RE procurement levels of the four companies. The next step is to convert the targets of the four companies into additional RE to be procured. This is done by subtracting what they already procure through RE from the 100% target. This value is compared with current RE capacity in the country to obtain the additional demand from RE procurement targets of the four companies. If the additional procurement needed to meet the target is less than the current RE capacity, the additional demand can be met by the existing capacity in the country, provided everything else remains constant.

To calculate the potential impact in terms of emissions reductions, the additional RE capacity needed should be converted to emissions displaced. The user can derive different estimates of emissions impacts depending on whether RE displaces natural gas first, then oil and then coal (low impact), or coal first, then oil and then gas (high impact), using appropriate emission factors for different fuels (e.g. from the International Energy Agency's – IEA's – World Energy Outlook data). Location-specific information on the marginal grid mix can be collected and applied in this assessment for improved accuracy.

Industry

The industry sector is very diverse and emissions-intensive, and non-state and subnational actions targeting the sector are growing. The industry sector includes energy-related emissions as well as non-energy emissions from industrial processes and product use.[56]

Table 8.3 provides information on how to convert common non-state and subnational mitigation targets into metrics suitable for comparison with national policies or for inclusion in existing climate mitigation models. It also outlines options for calculating potential impact in terms of emissions reductions from such actions. Appendix D provides an overview of international data sources that can be consulted if national data are not available.

Buildings

Non-state and subnational actions are increasingly targeting the building sector, which accounts for 32% of global energy consumption, half of global electricity consumption and around 18% of GHG emissions, making it a key sector for GHG mitigation.[57] Table 8.4 provides information on how to convert common non-state and subnational mitigation targets into suitable metrics for comparison with national policies or for inclusion in existing climate mitigation models. It also outlines options for calculating emissions reduction potentials. Appendix D provides an overview of international data sources that can be consulted if national data are not available. See also the ICAT *Buildings Efficiency Guide*.

[56] IPCC (2014).

[57] IEA (2016a).

TABLE **8.3**

Industry sector

Examples of non-state and subnational actions	Metrics for comparison with national policies or for inclusion in existing models/ scenarios	Options for determining potential emissions reductions
Decrease CO_2e intensity per tonne of steel/ cement produced	Absolute values from the reduction of CO_2e intensity per tonne of steel/cement produced	Look at projected CO_2e intensity per tonne of steel/cement produced and target values (% or fixed reduction). On this basis and using emission factors, the emissions reduction potential can be calculated per tonne (or unit of industry product) first and, by multiplying by projected production levels, for the entire sector. Data points needed: • projected growth for steel/cement production (in tonnes or per capita income/population) • projected steel or cement intensity (CO_2e per tonne per capita, etc.) • emission factors • if applicable, population and economic trends.
Adopt best-practice industry standards	Specific steel/cement intensity per tonne (or per capita income/ population) Assumption: • All steel/cement production could reasonably be compliant with best-practice industry standards. Data points needed: • best-practice industry standard specific information • if applicable, population trends.	Look at what best-practice standards mean for a specific industry sector (translate into CO_2e emissions per tonne or other unit of product) and compare with projected CO_2e emissions per tonne produced following non-best-practice industry standards. To determine emissions reduction potentials, multiply the amount of CO_2e saved per unit of product by total amount of projected production. Data points needed: • best-practice industry standard specific information • projected growth for steel/cement production (in tonnes or per capita income/population) • projected steel or cement intensity (CO_2e per tonne per capita, etc.) • emission factors • if applicable, population trends.
Decrease total CO_2e emissions from steel/cement production by X (amount or %)	Total reduction in CO_2e emissions per tonne of steel/ cement produced	Look at projected CO_2e emissions per tonne of steel/cement produced. Then multiply by projected total amount of production and subtract the targeted decrease (% or fixed reduction). Data points needed: • steel or cement CO_2e emissions • projected growth for steel/cement production (in tonnes or per capita income/population).

TABLE **8.4**

Building sector

Examples of non-state and subnational actions	Metrics for comparison with national policies or for inclusion in existing models/ scenarios	Options for determining potential emissions reductions
Improve energy performance of buildings by X%	Energy performance of buildings (kWh/m^2) Assumptions: • linear trend in the energy consumption per m^2 • linear trend in the share between commercial and residential buildings. Data points needed: • total (projected) national floor area • heating and cooling requirements.	Look at projected average energy consumption of residential and commercial buildings, and divide by total floor area to determine estimated future energy performance of buildings. Where available, consult international sources such as the IEA's World Energy Outlook. In addition, data availability for commercial and public buildings is usually better, and so the user could start with those. To determine the emissions reduction potential, look at the country's projected energy fuel mix and from that information derive the potential GHG impact. Assumptions: • linear trend in the energy consumption per m^2 • national fuel mix remains unvaried • linear trend in the share between commercial and residential buildings. Data points needed (use IEA's Energy Technology Perspective or other IEA resources if no national data are available): • projected growth in floor area • total (projected) energy consumption from commercial and residential buildings (kWh/m^2) • national fuel mix • emission factors for oil, gas, coal.
Increase the renovation rate of buildings by X%	Renovation rate of buildings (%) Data point needed: • current renovation rate (%).	Look at the average buildings intensity of new built versus retrofitted buildings. Determine the CO_2 emission savings for a renovated building compared with a non-renovated one, based on the difference in the buildings intensity and calculations of how the energy was produced (taking into account the national fuel mix and emission factors). Then determine the additional number of projected renovated buildings by converting the relative renovation target to an absolute number. Assumptions: • Additional renovations will proportionately reduce CO_2 emissions. • Linear trend in the buildings intensity. • Number of buildings remains unchanged. • National fuel mix remains unchanged. Data points needed (use IEA's Energy Technology Perspective or other IEA resources if no national data are available): • total (projected) buildings intensity (kWh/m^2) • national fuel mix • emission factors.

Transport

The transport sector is a popular target for non-state and subnational actors. Apart from the energy supply sector, it is the sector most often targeted by non-state and subnational actions.[58] Transport emissions associated with bunkers – that is, emissions from fuels used for international aviation and maritime transport – are not accounted for within the boundaries of national GHG inventories and would therefore be outside the scope of this guide (which focuses on national emissions).[59] Users could choose to assess the impact of non-state and subnational actions relating to bunkers as a distinct exercise. See also the ICAT *Transport Pricing Methodology*.

Table 8.5 provides information on converting common non-state and subnational mitigation targets into metrics suitable for comparison with national policies or for inclusion in existing climate mitigation models. It also outlines options for calculating potential emissions reductions of these actions. Appendix D provides an overview of international data sources that can be consulted if national data are not available.

TABLE 8.5

Transport sector

Examples of non-state and subnational climate mitigation targets	Suitable metrics for comparison with national policies or inclusion in existing climate mitigation models/scenarios	Options for determining potential emissions reductions
Reduce average car fuel consumption by X%	Average fuel consumption by cars (in km/L)	Look at the projected fuel consumption of an average car. Calculate the relative % reduction in fuel consumption and the corresponding fuel consumption avoided. Then determine the corresponding CO_2 emissions reduction potential, taking into account projected fuel mix and emission factors, and multiply by the projected number of cars on the road and the average distance driven. Assumption: • Average km travelled by car remain unchanged. Data points needed (use internationally available data if no national data are available): • projected fuel consumption of average car (km/L) • projected number of cars on road, considering macroeconomic variables such as economic growth • national fuel mix • emission factors.

[58] Yale University (2015).

[59] IEA (2016b).

TABLE **8.5,** continued

Transport sector

Examples of non-state and subnational climate mitigation targets	Suitable metrics for comparison with national policies or inclusion in existing climate mitigation models/scenarios	Options for determining potential emissions reductions
Increase the number of EVs domestically to X%	Number of EVs (in thousands) Data points needed: • current number of EVs • average final energy consumption of EVs (kJ/PKM).	Look at the projected number of domestic vehicles on the road and their projected average final energy consumption. Then look at the average final energy consumption of EVs and determine the difference from traditional cars. Then convert the relative EV target to an absolute one, multiply the difference in final energy consumption by the number of EVs and convert to CO_2e emissions, by using emission factors, to determine potential savings from fossil fuels. Then calculate the additional electricity demand from the increase in EVs, and multiply this by the grid emission factor, and hold this against the savings from fossil fuels to determine the overall emissions reduction potential. Assumptions: • Distances travelled by traditional cars and EVs are equal. • Distance travelled remains unchanged or follows linear growth trend. Data points needed (use internationally available data if no national data are available): • projected number of vehicles sold (including EVs) • average projected final energy consumption of traditional cars and EVs • national fuel mix • emission factors.
Increase rail share of freight land transport to X%	Share of rail freight land transport Data points needed: • current rail share of freight land transport • total freight land transport traffic volume.	Look at the current share of freight land transport and the average freight rail distance ridden (as well as average CO_2 emissions per unit distance). Then look at road freight transport, average distance and average CO_2 emissions per unit distance. Finally, look at projections about freight transport, taking into account macroeconomic variables over time (e.g. economic growth, fuel prices, population). On this basis, calculate and compare emissions to determine emissions savings potential. Data points needed (use internationally available data if no national data are available): • average final energy consumption from train operations (kJ/tkm). • total freight land transport traffic volume • fuel mix • emission factors.

TABLE **8.5,** continued

Transport sector

Examples of non-state and subnational climate mitigation targets	Suitable metrics for comparison with national policies or inclusion in existing climate mitigation models/scenarios	Options for determining potential emissions reductions
Increase rail share of passenger travel to X%	Share of rail passenger travel Data points needed: • current share of rail passenger travel • total rail traffic volume.	Look at the existing rail share of passenger travel and train distance travelled (as well as average CO_2 emissions per unit distance). Then look at road passenger travel, average distance and average CO_2 emissions per unit distance. Finally, look at projections about passenger travel, taking into account macroeconomic variables. On this basis, calculate and compare emissions to determine emissions savings potential. Data points needed (use internationally available data if no national data are available): • average final energy consumption from train and road operations (kJ/tkm and PKM) • total rail traffic volume • fuel mix • emission factors.
Increase public transport by X (amount or %)	Modal split (as share of bus/ train, etc. in public transport)	Look at the existing share of public transport, relative to total passenger transport and distance travelled (as well as average CO_2 emissions per unit distance). Then look at other passenger transport, average distance and average CO_2 emissions per unit distance. Finally, look at projections about public transport travel. On this basis, calculate and compare emissions to determine emissions savings potential. Data points needed (use internationally available data if no national data are available): • average final energy consumption from public transport and other forms of transport • current share of public transport • fuel mix • emission factors. For more sophisticated calculations, users should deal with different technologies separately, because of different efficiencies of different public transport modes.

Abbreviations: EV, electric vehicle; PKM, passenger kilometres; tkm, train kilometres

8.2.3 Waste

The waste sector is of particular importance to cities because waste-related issues fall under their jurisdiction. Non-state actors, on the other hand, can be an important source of waste. Few non-state and subnational actors and initiatives currently target the waste sector.

Table 8.6 provides information on converting common non-state and subnational mitigation targets into metrics suitable for comparison with national policies or for inclusion in existing climate mitigation models. It also outlines options for calculating potential emissions reductions of these actions. Appendix D provides an overview of international data sources that can be consulted if national data are not available.

TABLE 8.6

Waste sector

Examples of non-state and subnational actions	Metrics for comparison with national policies or for inclusion in existing models/ scenarios	Options for determining potential emissions reductions
Recover methane emissions from waste	Eliminate methane emissions from waste sector in models. Assumption: • All methane emissions from waste can technically be recovered.	If all methane emissions from waste can be recovered, methane emissions from waste would be equal to zero. The emissions reduction potential can be calculated by looking at the projected amount of waste and the projected waste intensity (CO_2e/kt). Multiplying the two gives the potential emissions reduction potential. Users also need to take into account previous years' wastes (using a first order decay equation).[a] Assumptions: • The growth trend in waste intensity is linear (composition of waste remains unchanged). • The decrease in X amount of waste will proportionately reduce CO_2e emissions. Data point needed (use United Nations or IPCC resources if no national data are available): • waste intensity.
Decrease amount of waste by X tonne (decrease GHG emissions from waste by X amount or X%)	Remaining amount of waste (in kt)	First, calculate the CO_2e emissions of 1 kt of waste, by multiplying it by the waste intensity. To determine the emissions savings potential from the decrease in waste, multiply the absolute reduction in waste (in kt) by the projected CO_2e emissions of 1 kt of waste. Assumptions: • The growth trend in waste intensity is linear (composition of waste remains unchanged). • The decrease in X amount of waste will proportionately reduce CO_2e emissions. • Emissions from decay of waste on landfills from previous years are ignored. • There is no change in recycling or reuse. Data point needed (use United Nations or IPCC resources if no national data are available): • waste intensity (per capita per day).

[a] For more information on how to calculate emissions reduction potential from waste, see the IPCC guidelines on "Waste" (www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html).

8.2.4 Template for potential emissions reductions across actions/sectors

Table 8.7 illustrates how to convert hypothetical non-state actions in different sectors to comparable metrics and estimate impacts in terms of potential emissions reductions. This template can be replicated for additional actors and sectors. Here, users have information regarding the base year emissions and the target, which is used to estimate target year emissions and the emissions reduction impact against the base year emissions. It should be noted that the results are sensitive to assumptions that users make, and it is therefore critical that the assumptions are clearly recorded and justified. For example, for company A, if the user assumed a 20% increase in total electricity generation by 2030, the target year GHG emissions would be 8,100,000 tCO_2e. This means that the emissions reduction impact compared with the base year would be smaller. Similarly, if the user assumed a 10% reduction in emissions intensity for electricity generated from fossil fuels by 2030, the target year emissions would be lower than in the table, and the resulting emissions reduction impact would be higher.

TABLE **8.7**

Determining potential emissions reductions in an assessment

	Hypothetical example	Hypothetical example
Non-state actor	Company A	Company B
(Sub)sector(s)	Energy supply	Industry
Target (including reference levels, target year and assumptions, if available)	25% renewable electricity (excluding large hydro) in 2030 (no renewables in 2005 base year)	Reduce scope 2 emissions by 100% from 2015 to 2021
Base year emissions in user country's boundary (tCO_2e)	9,000,000 tCO_2e (in 2005)	2,000,000 tCO_2e in 2015
Estimated emissions in target year in user country's boundary (tCO_2e)	In 2005, 100% of electricity is generated by fossil fuels, accounting for 9,000,000 tCO_2e emissions. In 2030, 75% of electricity is generated by fossil fuels. Emissions in 2030 = 0.75 × 9,000,000 = 6,750,000 tCO_2e	There will be no scope 2 emissions in target year.
Estimated emissions reductions in target year (tCO_2e)	Emissions in base year – emissions in target year = 2,250,000 tCO_2e (in 2030)	Emissions in base year – emissions in target year = 2,000,000 tCO_2e (in 2030)
Notes (any assumptions and underlying rationale)	No changes assumed in total electricity generation levels and the fuel mix or emission factor for electricity generation from fossil fuel non-renewables between 2005 and 2030	

9 Assessing overlaps and estimating potential impacts

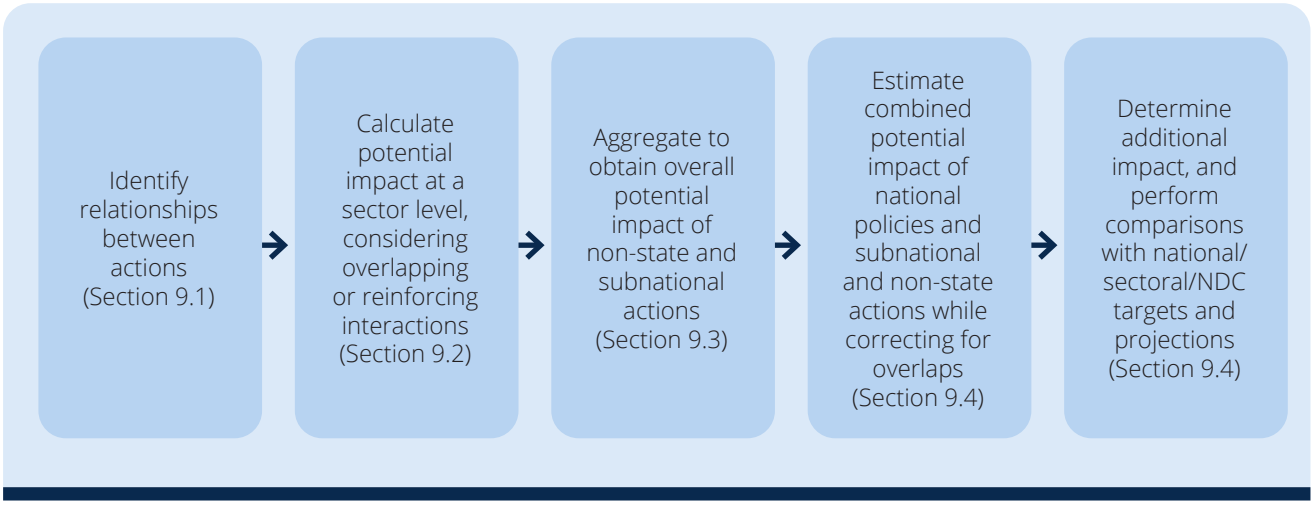
This chapter provides steps for adding non-state, subnational and national climate mitigation actions, while avoiding double counting, and comparing their combined potential impact with national/sectoral emissions pathways. It also discusses how to distribute the potential impact of international cooperative initiatives and actions of multinational companies among countries. Users may find it more efficient to apply Sections 9.1 and 9.2 together with Section 8.2, which includes guidance on harmonizing metrics and estimating potential impacts in terms of emissions reductions.

Checklist of key recommendations

- Understand interactions between multiple non-state and subnational actions and international cooperative initiatives within a sector and across sectors, and with national policies if determining additional impacts
- Calculate potential impact at a sector level, considering overlapping and reinforcing interactions across multiple actions
- Document all overlaps and record assumptions, along with the underlying rationale to include or exclude specific actions in the assessment
- Aggregate the potential impact of non-state and subnational actions within the assessment boundary
- Determine the potential additional impact of non-state and subnational actions after correcting for overlapping and reinforcing interactions with national policies. Also incorporate the influence of socioeconomic factors if using a model to determine additional impact.

FIGURE **9.1**

Overview of steps in the chapter



9.1 Identify relationships between actions

Users should identify the relationships and interactions between policies and actions to avoid double counting of impacts. These may be between national policies and non-state and subnational actions, or between multiple non-state and subnational actions in the same sector or across sectors. Policies and actions may be independent, fully or partially overlapping, reinforcing, or overlapping and reinforcing. Users should also consult with relevant stakeholders to enhance their understanding of how different actions and policies interact. This exercise may have started in Chapter 5 with organizing information on non-state and subnational actions.

Table 9.1 specifies different types of relationships that are possible between national policies and actions, and non-state and subnational policies and actions, and how to address these. In the table, A and B stand for the impact of different non-state, subnational and national policies and actions; C stands for their overlapping impact; and D stands for the additional or reinforcing impact of implementing A and B together. Generally speaking, the more diverse the targets and the sectors covered by policies and actions, the smaller the chance of overlap between them.

It is a *key recommendation* to understand interactions between multiple non-state and subnational actions and international cooperative initiatives within a sector and across sectors, and with national policies if determining additional impacts. This is needed to determine potential overlaps and avoid double counting.

9.2 Calculate potential impact, considering interactions between actions

This section provides guidance on calculating the potential impact of actions, taking into account their interactions with each other. Users can consult Appendix B of the *Policy and Action Standard* for further guidance on addressing interactions between actions.

Users are encouraged to be conservative in their approach to estimating potential impacts of overlapping and reinforcing actions, so that they do not overestimate the impacts. For example, if the overlap cannot be determined with confidence, users are advised to assume full overlap, with the total potential impact being less than the sum of the impacts of the individual actions. Users should also state the underlying rationale used to determine

TABLE **9.1**

Types of relationships between national policies and non-state and subnational actions

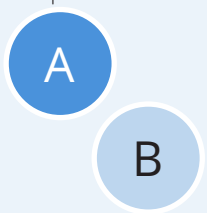
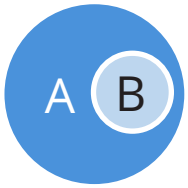
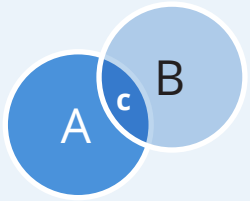
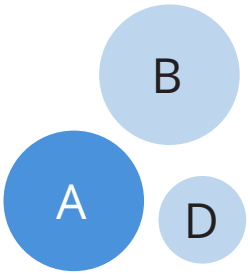
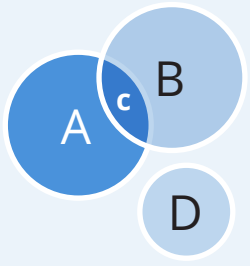
Type	Description	How to address this relationship
Independent 	There is no interaction between policies and actions: national, non-state and subnational. The combined effect of implementing these policies and actions together is equal to the sum of the individual effects of implementing them separately (A + B). That is, national policies and actions do not interact with non-state and subnational actions that are being assessed. In practice, users will encounter this situation in a very limited number of cases.	Users will be able to aggregate the impact of actions without quantification of overlaps once data are harmonized (e.g. different targets are harmonized for a specific target year/base year, as applicable).
Fully overlapping 	Some actions fully encompass other actions. Full overlap is an indication that the broader action is likely to be achieved.	Users should not include the encompassed action in the final impact assessment.

TABLE **9.1,** continued

Types of relationships between national policies and non-state and subnational actions

Type	Description	How to address this relationship
Overlapping 	Policies and actions interact, and the combined effect of implementing them together is less than the sum of the individual effects of implementing them separately (A + B – C). This may include: • policies or actions with the same or complementary goals (e.g. national energy efficiency standards for buildings and non-state action aimed at reducing GHG emissions from buildings; solar and wind initiatives in a country aiming to increase the share of renewable energy) • actions that are counted more than once because the same actor considers one target towards multiple initiatives, or the actor lists a target as an individual action as well as part of a cooperative initiative. Use of the same metric for different targets may indicate potential overlap.	Users should carefully check whether the potential combined impact is realistic or possible. Where there is doubt, users should consult sector experts to determine overlap. Overlap should be determined and subtracted from the overall impact. If quantification of overlap is not possible, users should take a conservative approach and assume complete overlap. For example, actions of cities located within regions with mitigation actions should be excluded to avoid double counting, unless these city-level actions are significantly more ambitious than the actions of the regions in which the cities are located.
Reinforcing 	Policies and actions interact, and the combined effect of implementing them together is greater than the sum of the individual effects of implementing them separately (A + B + D). An example could be an initiative promoting electric vehicles (EVs) and a policy to increase the share of renewable energy. Considered on its own, EVs may have a marginal impact on emissions unless the grid becomes green. The renewable energy policy can make the grid cleaner, thus potentially increasing the emissions impact of rising numbers of EVs.	The reinforcing effect should be calculated and added to the overall impact.
Overlapping and reinforcing 	Policies and actions interact, and have both overlapping and reinforcing interactions. The combined effect of implementing them together may be greater or less than the sum of the individual effects of implementing them separately. An example could be a company target to increase the procurement of renewable energy and a national policy to increase the share of renewable energy generation in the country. Both the company action and the national policy pull in the same direction, while their combined effect could either be greater than the sum of the individual effects or less.	Overlap should be calculated and subtracted from the overall impact; reinforcing effects should be calculated and added.

Source: Adapted from WRI (2014b), based on Boonekamp (2006).

the nature of interactions and potential impact, and document all assumptions for transparency and increased confidence in the assessment.

It is a *key recommendation* to calculate potential impact at a sector level, considering overlapping and reinforcing interactions across multiple actions. It is also a *key recommendation* to document all overlaps and record assumptions, along with the underlying rationale to include or exclude specific actions in the assessment. For example, some city-level actions may help larger jurisdictions achieve the intended impact of their actions and are therefore subsumed within the larger jurisdiction's overall impact. Actions by private corporations may be responding to a subnational or national government mandate and should be encompassed within that mandate.

Users should quantify the potential impact of actions within a sector and repeat this for each sector included in the assessment boundary.

9.2.1 Calculating potential overlaps

To avoid double counting of impacts, overlap can be estimated by comparing the calculated impact of each action in a sector with the impact of other actions that have potentially overlapping interactions.

Users should quantify overlaps between actions within a sector and across sectors, for each sector included in the assessment boundary. Within each sector, users should calculate overlaps among actions by each actor group included in the analysis. If subnational actions are included in the analysis, users may want to begin with these, followed by non-state actions. If subnational actions are not included, users may start directly by calculating overlaps of non-state actions. Organizing actions into tiers to highlight actions that may be subsumed under others and highlight geographical overlaps is a good starting point to further determine whether the impacts of actions are additional and unique (also see Section 5.2).

There is no single approach to assessing overlaps that fits all situations, and quantifying overlaps often requires several assumptions. Users may also find it useful to consult with sector-specific experts to determine reasonable, conservative assumptions.

Subnational actions

As a first step in calculating overlaps within a sector, users may want to calculate the overlaps between subnational actions, such as in regions and cities with GHG targets. There may be full overlap, partial overlap or no overlap:

- **Full overlap.** Users may assume that subnational action, regardless of the level of ambition, yields no additional effect if the scope of the action is within the scope of a larger jurisdiction with its own action. Full overlap means that the action of the smaller jurisdiction would not be included in the final aggregation.

- **Partial overlap.** If cities within the assessment boundary have highly ambitious targets compared with larger jurisdictions, users may assume some additional impact from cities' actions, resulting in partial overlap. Users should compare the actions of cities and larger jurisdictions; if the city target is more ambitious than the target of the larger jurisdiction, any additional impact – above and beyond the action of the larger jurisdiction – can be included in the final aggregation.

- **No overlap.** For cities and other subnational entities where no larger governing jurisdiction has a similar action of its own, the entirety of the calculated potential impact of the subnational actions may be included in the final aggregation.

To avoid double counting between scope 1 and scope 2 emissions, users may assume that all electricity consumed by cities (scope 2) is generated in the regions in which the cities are located and may apply additional assumptions to calculate overlaps.

A hypothetical example (Box 9.1) and an example from the Fulfilling America's Pledge report (Box 9.2) further illustrate how to address overlaps involving subnational actions.

Non-state actions

As a next step, users should determine the geographic overlaps between the actions of non-state actors (including companies consuming electricity and electricity-generating companies) and the actions of subnational actors. If subnational actions are excluded from the analysis, this step may not be necessary.

It is important to note that this step will require significant data on geographical location for non-state actions, which may not be easily available. If users can determine the geographic overlaps between business actors and subnational actors (not only for headquarter locations, but at the facility

BOX **9.1**

Hypothetical example of overlap in subnational actions

Province A has committed to a 30% target share of renewable energy in its total final energy consumption by 2020, and can use electricity imported from other provinces to meet its commitment. Province B has a renewable electricity generation goal of 30% and sells most of its renewables to province A. Although provinces A and B both meet their commitments in real and measurable ways, at the national level, the amount of renewable electricity generation may be smaller than simply adding individual renewable energy targets, and the risk of double counting is high. To identify this kind of double counting, additional data collection and quantitative analysis are recommended. In this case, users will need detailed data on electricity sales between the provinces. Many regional governments document their yearly electricity imports and exports. In the absence of data, it is recommended that users provide a realistic conservative range of renewable energy generation.

BOX **9.2**

Example of calculating overlap in subnational actions from Fulfilling America's Pledge report

The Fulfilling America's Pledge report addressed potential overlap in actions at state level in the following manner. It should be noted that this example represents a simplified version of the approach and does not apply to all sectors included in the assessment.

Assume that two states (state A and state B) have energy efficiency targets that would result in 1 TWh and 2 TWh of energy savings, respectively. In addition, at least one city in each state has its own energy savings goal.

For the city in state A, the city's utility is excluded from compliance with the state's policy, and thus no overlap is assumed. The resulting aggregate figure is obtained by adding the city- and state-level impacts. In state B, the city is located within a utility region that must comply with the state goal, and thus overlap is assumed to occur. In this case, the city's impact is seen as contributing to the state's, and the aggregate is equal to the state's impact.

No overlap: City is served by utility that is excluded from state energy efficiency target

Overlap: City is served by utility that must comply with state energy efficiency target

Source: America's Pledge (2018b).

level, to determine where GHG emissions occur), they can calculate overlaps following a similar set of assumptions as used for subnational actions:

- **Full overlap.** In this case, users may determine that non-state actions are the result of public actions, such as public policies that mandate climate action or guide businesses towards climate action. If the action of the governing jurisdiction is included in the assessment, full overlap can be assumed, and the impact of the non-state actions should be excluded from the final aggregation. In some cases, the private sector action may not be the result of public policy, but may still contribute to the achievement of the governing jurisdictions' action, and should also be excluded from the final aggregation.

- **Partial overlap.** The relationship between non-state and subnational actions may be such that a business or corporation may dramatically exceed the ambition of the governing jurisdiction. In this case, users may assume there is some additional impact and may include this in the final aggregation.

- **No overlap.** If a non-state action exists within a jurisdiction where there are no public actions by a governing body, the full effect of the actions' impact may be included in the final aggregation.

Without specific facility-level data, it may be impossible to calculate overlaps with subnational actions because users will not be able to determine which subnational GHG emission sources the actions may overlap with. In some sectors, geographical data may be available, but, in many cases, it may not be detailed enough to calculate overlaps with smaller subnational actors such as cities. In this case, users will need to make a best-guess estimate of potential overlaps, or otherwise exclude such non-state action to avoid inaccurate results. This can be decided on a case-by-case basis, depending also on the objectives and scope of the assessment.

Separately, overlaps between electricity-generating companies with commitments and all other non-state actors with commitments may be quantified. This overlap is calculated to avoid double counting of emissions from electricity generation by electricity utilities (scope 1), and the use of electricity by other sectors (scope 2). Users could assume that the overlap rate for actions of electricity-generating companies and non-state action on the demand side (e.g. efficiency improvements in companies) is equal to the share of electricity purchased by the non-state actors from the electricity-generation companies with a commitment. If a company purchased all its electricity from only one utility, there would be 100% overlap between the company and this utility.

Cooperative initiatives

Often, cooperative initiatives include individual non-state and subnational actions that are already included in the assessment boundary. Individual actions tend to be more specific than the target of the cooperative initiative. Users should calculate overlaps associated with cooperative initiatives included in the assessment boundary. The overlap may be between multiple cooperative initiatives or between cooperative initiatives and non-state and subnational actions:

- **Full overlap.** If the overlap is complete – for example, when the cooperative initiative includes non-state and subnational actions that are all also individually considered within the assessment boundary – the cooperative initiative should not be considered in the assessment, to avoid double counting. For example, Credit Agricole, a French financial institution, had a target to supply 100% of total electricity consumption from renewables by 2016 (up from 46% in 2015). The institution is also a part of the RE100 initiative, which aims to procure 100% electricity from renewable sources. This action should be counted only once in the assessment. It may still be valuable to review data sources for international cooperative initiatives to help identify specific actions within the assessment boundary.

  When the membership of a cooperative initiative includes individual non-state or subnational actors in the same sector that are already part of the assessment, users can assume full overlap and exclude the cooperative initiative, to be conservative. If the impact from individual non-state and subnational actions in the same sector is incorporated into the assessment, the impact from the cooperative initiative should not be added.

  In another situation, the activity described in the cooperative action may be part of a broader non-state or subnational action (e.g. GHG emissions reduction target) and should therefore also be excluded. For example, a cooperative action aims to increase the share of bicycle transportation in

cities. If the participating cities have broader emissions reduction actions or specific transport sector actions, the impact from the cooperative initiative may help the cities achieve their broader actions but may not necessarily be additional.

Users can also assume full overlap when actors with targets participate in more than one initiative in the same sector.

- **Partial overlap.** Where participating actors (e.g. cities) do not have broader actions encompassing the activity that is the focus of the cooperative initiative, the expected emissions reduction impact from the cooperative initiative can be included in the aggregation.

  Further, when different cooperative initiatives in the same sector have targets that overlap directly (as they are expressed in the same metric), aim to achieve the same goal or could potentially compete with each other, users should examine potential overlap between them.

  Another situation where users may encounter partial overlap is between subnational initiatives and all other types of initiatives (in other sectors). Various cities and regions have set GHG emissions reduction targets, usually expressed as a percentage reduction to be achieved by a target year and relative to a certain base year. But there is often no clarity on how the targets may be achieved and through actions in which sector(s). Cooperative actions in relevant sectors, if implemented, could simultaneously contribute to the achievement of these subnational targets.

- **No overlap.** When the activity described in the cooperative initiative is not part of any non-state or subnational action, the expected emission reduction impact from the initiative can be included in the aggregation.

Box 9.3 provides some examples of addressing overlaps between cooperative initiatives.

Distributing impacts of international cooperative initiatives

When the list of selected actions includes international cooperative initiatives, users should distribute the potential emissions reductions of these initiatives across individual countries and only consider the share relevant to their country. Figure 9.2 outlines the decision flow process for determining when this needs to be done:

- Where the cooperative initiative is already fully covered by individual non-state and subnational actions that comprise the cooperative initiative, it will be excluded from the assessment, because actions should be counted only once in the assessment.

- Where there is no overlap, users should evaluate the potential impact from the initiative for their specific country.

- Where there is partial overlap, users can evaluate the potential impact of the initiative's target for a specific country after disregarding the portion of the initiative covering individual non-state and subnational actions within the assessment boundary that overlap with the initiative. This is done because individual actions often carry more detailed information and it is preferable to include this, where feasible.

If an international cooperative initiative does not contain specific information clarifying how impacts are distributed to individual countries, users may need to make several assumptions to distribute the impact. Since these assumptions will influence the accuracy of the assessment, users should record all assumptions and the underlying rationale. Assumptions may vary, depending on whether the international cooperative initiative focuses on non-state or subnational action.

For international cooperative initiatives that bring together *non-state* actors (such as the Science Based Targets initiative – SBTi), users will need information about the number of installations or facilities, asset value, volume of production or value added, share of emissions from the (sub)sector compared with national emissions, and so on. If this information is not available, users can make rational assumptions about these quantities.

BOX **9.3**

Addressing overlaps between cooperative initiatives from the Global Climate Action report

Three main types of overlaps between cooperative initiatives are discussed below.

Same actors with targets under more than one initiative. This often occurs when cities set an emissions reduction target (e.g. under the C40 initiative and/or the Global Covenant of Mayors), while their corresponding regions simultaneously set a reduction target (e.g. under the Under2 MOU initiative – the Memorandum of Understanding on Subnational Global Climate Leadership). Another instance could be when companies subscribe to more than one business initiative.

The Global Climate Action report addressed the potential double counting in such cases by checking for instances of memberships in multiple initiatives for each country (or at the global level for business initiatives) and selecting the most ambitious commitment. For example, if a city is a part of both the C40 and Under2 MOU initiatives, and its target is substantially more ambitious in the Under2 MOU initiative, only the latter is counted.

Initiatives targeting the same emissions. The renewable energy initiatives in the United States and the European Union are examples of such kinds of overlap. In both cases, one initiative targets a certain percentage of power generation to come from solar by 2020 or 2030, and the other a certain percentage of power generation to come from wind power. Although these targets are in principle complementary, quantifying their potential impact is only possible by considering potential competition between the two. For instance, the upper range of reduction of the European Wind Initiative on its own could be calculated by assuming that wind power replaces first coal, then oil and then gas in the power mix. The same can be done for the Solar Europe Industry Initiative. But the sum of the two upper bounds of both initiatives is not equal to the upper bound of the two initiatives together, because they would then be replacing more coal than exists in the power mix. So, the fact that the two can compete in "replacing fossil fuels" affects their potential maximum impact when both are assumed to be implemented.

Targets that are not sector-specific. Subnational cooperative initiatives may overlap with initiatives in the sustainable energy sector (e.g. renewable energy cooperative initiatives), road transport sector, buildings sector or non-CO_2 sector, or initiatives targeting energy efficiency.

Where there is potentially significant overlap between subnational and sector initiatives, the Global Climate Action report made simplified assumptions of either no additional effect or 50% additional effect to derive an uncertainty range. In other instances, where quantified sector initiatives do not have large overlaps with city/regional initiatives, overlaps were calculated by subtracting the impacts of buildings, transport, renewables and energy efficiency initiatives from the city/regional impact.

Source: Data-Driven Yale, NewClimate Institute and PBL (2018c).

FIGURE **9.2**

Distributing aggregated impact to countries

When distributing the impact of international cooperative initiatives that bring together multiple subnational actors, users can assume equal distribution across countries (e.g. the same amount of additional renewable energy installed in each participating country). Alternatively, they can assume distribution of impacts relative to the size of country, in terms of population or GDP, or relative to the size of a relevant indicator for the country, such as the rate of deforestation. The UNEP Cities and Regions Pledges Pipeline provides information on international cooperative initiatives by cities and regions, listed by country. It also features information on cities' and regions' quantified GHG reduction commitments over time through 2050.[60] These assumptions entail a trade-off between accuracy and completeness. The most conservative approach is to not include initiatives in the assessment in the absence of information. Boxes 9.4 and 9.5 provide examples of applying these assumptions to determine potential impact for countries.

Distributing potential impacts of actions of companies operating globally

Targets of multinational companies are similar to international cooperative initiatives in that these businesses operate across national borders, and their targets often apply to operations in several countries. However, many do not specify targets per sector or country, and this can create difficulties in determining country-specific impacts. For example, HeidelbergCement has a target of reducing its direct (scope 1) GHG emissions by 30% per tonne of cementitious materials by 2030 from a 2016 base year. Because the company has operations in multiple countries, users will have to determine what portion of the target can be considered for their country. If detailed information (e.g. at facility level) cannot be obtained directly from companies or cannot be deduced reasonably (e.g. a company aims to reduce emissions from a specific product, which is only produced/sold in one country), users should adopt a conservative approach and exclude these targets, as a result of lack of information. Box 9.6 illustrates ways to distribute impacts in some hypothetical examples.

BOX **9.4**

Examples of distributing potential impacts of international cooperative initiatives to countries

Example 1: An international subnational cooperative initiative has an objective of installing 50 GW of solar photovoltaic capacity by 2020 globally. It meets the suitability criteria for inclusion outlined in Section 6.1. The initiative includes 50 cities with a projected total of 100 million inhabitants by 2020. Of these inhabitants, 10 million are projected to be in country A. Distributing the impact using the relative sizes of countries, expressed in population, would translate into 5 GW of potential impact in country A.

Example 2: An international cooperative initiative aims to restore 20 million ha of degraded land globally by 2020. To distribute the impact among countries, users can split the potential impact of the initiative by using historical data on afforestation from the Food and Agriculture Organization of the United Nations (FAO). First, users can calculate the share of afforestation annually in the global total afforested area. Second, this share is used to split the target across countries. For example, the user might be interested in estimating the potential impact of this initiative in China. Data from the FAO show that the afforestation rate in China is 1.497 Mha/year.[63] In comparison, the global afforestation rate is 5.622 Mha/year.[64] China is thus responsible for 26.6% of global afforestation annually. Applying this to the international cooperative initiative, the estimated impact for China is 5.32 million ha of afforested land. This approach assumes that the effort is proportional to the current rates of afforestation in respective countries; in reality, the initiative may impact countries' behaviour and lead to a shift in current afforestation rates.

[60] UNEP DTU Partnership publishes a continually updated pipeline, available at: http://web.unep.org/climatechange/resources/climate-initiatives-platform.

[61] FAO (2015).

[62] FAO (2015).

BOX **9.5**

Distributing impact – an example from the Global Climate Action report

The Under2 MOU is an initiative that brings together subnational governments committed to ambitious climate action. The signatory regions within selected key countries were listed, so that the potential impact of the initiative under the assessment could be distributed. The assessment assumed that regional emissions can be approximated by multiplying the share of national population residing in the region by the country's total emissions. In other words, it was assumed that the region's inhabitants have the same average per capita emissions as the country.

Regions' emissions reduction targets were then compared with their current policy emissions pathways to estimate the additionality of their Under2 MOU commitments. It was assumed that the regions follow the same current policy emissions pathway as their respective countries. Countries' current policy pathways were downscaled to the regional level using the regions' populations and the assumption that all regions have the same average per capita emissions.

Then, the potential emissions reduction impact for the downscaled current policy scenario for the region was compared with the Under2 MOU scenario. The additional emissions reduction contributions from cities were thus estimated. These contributions were finally added to the country level.

Source: Data-Driven Yale, NewClimate Institute and PBL (2018c).

BOX **9.6**

Examples of distributing impact of a multinational company action to a country

Example 1: Multinational company A has a company-wide target to improve energy efficiency by 40% across its operations. In this case, users can request or collect information on energy use in the country they are interested in and apply the 40% improvement to its operations within the country, assuming equal distribution across all countries.

Example 2: Multinational company B has committed to reduce its scope 1 emissions in Europe by 30% by 2020 compared with its current annual emissions. Users interested in conducting the assessment for a European country can first determine the total emissions of company B in their country of interest. Assuming equal distribution, they can then estimate a 30% reduction in the current emissions of company B by 2020.

9.2.2 Consider possible reinforcing impacts

In some instances, actions may reinforce each other to produce a combined impact that is greater than the sum of the intended impacts of each action individually. Reinforcing actions may additionally lead to an increase in the likelihood of implementation of individual actions. For example, two or more actions that aim to help businesses set climate targets, operating among the same set of actors, could potentially overlap; at the same time, they may drive more businesses to take on more ambitious targets than originally intended. Depending on the situation, users can estimate the number of businesses that are expected to adopt targets, which is higher than the number that would have adopted targets under each action operating independently. It is critical that the assumptions behind the estimated impact of potentially reinforcing actions are robust and grounded in reasonable evidence, to maintain the integrity of the assessment.

For considering interactions with national policies and accounting for associated overlaps, see Section 9.4.

9.3 Aggregate impacts

Next, users should add the potential impacts of non-state and subnational actions calculated for each sector within the assessment boundary (in Section 9.2) to arrive at the overall impact of non-state and subnational actions. This is represented by the solid red line in Figure 9.3. It is a *key recommendation* to aggregate the potential impact of non-state and subnational actions within the assessment boundary. Users can also aggregate the potential impact for legally binding and voluntary actions separately (e.g. as done in the Fulfilling America's Pledge report). This allows greater flexibility in interpreting results; the potential impact of legally binding actions provides a conservative value compared with the potential impact of both categories combined.

It should be noted that this value does not account for potential overlap with national policies, and therefore should not be considered additional to national action without further analysis. Users can correct for overlaps with national policies in Section 9.2 to obtain the additional impact. Section 9.4 provides further information on incorporating overlaps with national policies.

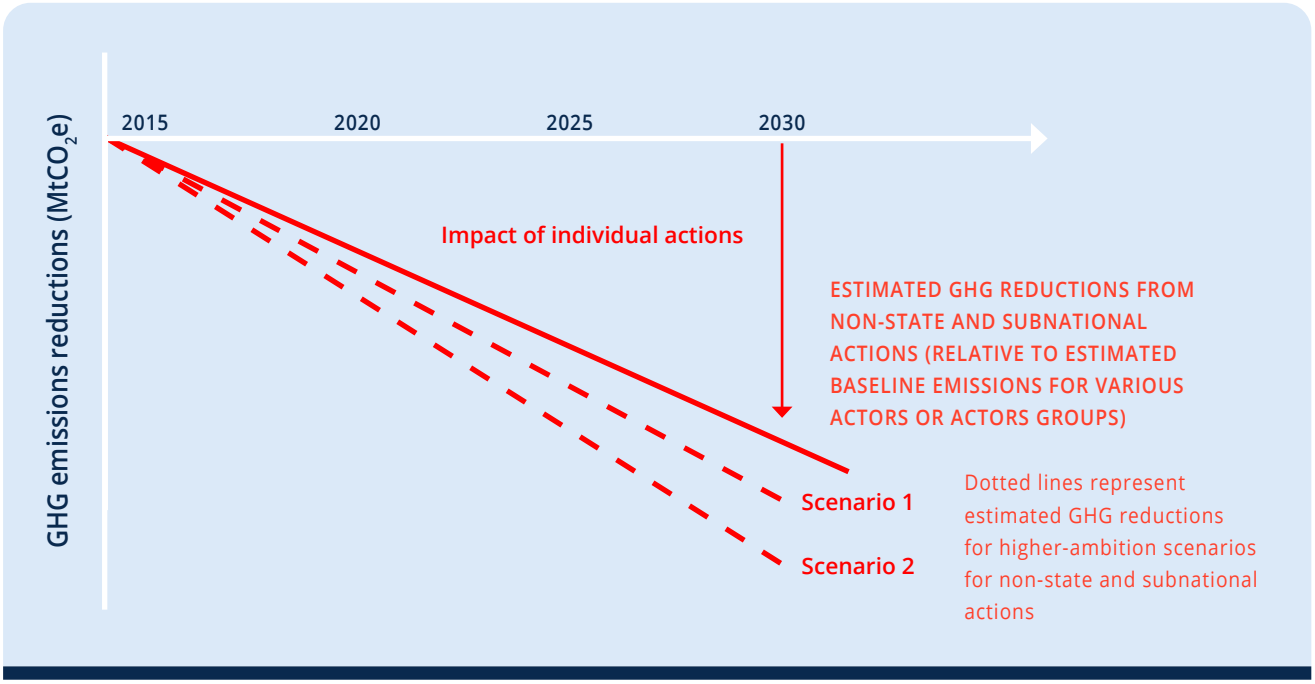
Depending on their objectives, users can further develop different scenarios for different levels of ambition in non-state and subnational actions, which can be compared with the estimated impact obtained above by bottom-up aggregation of existing and pledged actions (Figure 9.3). This is done by assuming increased (or reduced) ambition compared with existing actions, following the same logic to determine the nature of interactions and overlaps as used for existing actions, aggregating the impacts for each sector and then aggregating across sectors for each scenario.

For example, the Indian corporate actions study developed two scenarios pertaining to different ambition levels:

- increased ambition scenario, which assumes that the ambition level of all corporate actions within the assessment boundary increases by 10% after 2020
- reduced ambition scenario, which assumes that the ambition level decreases by 10% after 2020.

FIGURE **9.3**

Bottom-up aggregation of non-state and subnational actions



Similarly, the Fulfilling America's Pledge report estimated the impacts for two scenarios and for the current measures scenario through bottom-up aggregation. The two scenarios reflect increased ambition compared with the current measures scenario:

- The Climate Action Strategies scenario estimated the emissions reduction potential of 10 high-impact, near-term and readily available opportunities led by non-state and subnational actors.
- The Enhanced Engagement scenario estimated the emissions reduction potential if an even broader set of ambitious non-state and subnational actions were implemented.

9.4 Estimate potential additional impact of non-state and subnational actions, and perform other comparisons

Users who are interested in determining the potential additional impact of non-state and subnational actions should do so by considering overlapping and reinforcing interactions with national (sectoral) policies. It is a *key recommendation* to determine the potential additional impact of non-state and subnational actions after correcting for overlapping and reinforcing interactions with national policies; and to incorporate the influence of socioeconomic factors if using a model to determine additional impact. Users can consider each national (sectoral) policy individually and apply the same rationale for determining overlaps with national policies as for assessing overlaps for subnational actions. However, manually and individually determining the overlaps between national policies and non-state/subnational actions is quite complicated.

Where possible, users should use existing economy- or sector-wide models to explore interactions among various policies and actions at different scales. Using a model allows users to fully account for overlaps between sectors across the economy. A model also allows users to account for socioeconomic drivers and other extraneous systems interactions, such as non-climate actor activity, energy supply–demand interactions and technological advances. Referred to as top-down integration, it involves estimating the impacts of non-state and subnational actions, and incorporating these impacts into national projections and scenarios, often based on existing national models. The starting point is an up-to-date national GHG emissions projection or scenario that serves as the reference scenario for comparison, depending on the user's objectives. Examples of possible reference scenarios (baseline scenarios) for comparison include:

- a scenario based on current national policies, assuming no change in policies over time; this may include at least some existing subnational policies
- a scenario based on a certain rate of growth in the sector of interest
- a scenario based on fully implementing NDCs.

For example, if there is interest in determining how non-state and subnational actions modify the emissions trajectory of current national policies, users should start with a current national policies scenario, which requires information about the GHG implications of national policies or national emissions projections. The blue line in Figure 9.4 shows the current national policies scenario. The chosen model may already include such scenarios. However, if the information is not already available in the model or gathered as part of Chapter 7, users can consult internationally developed reference scenarios for their respective countries for similar scenarios.[63]

The national emissions projection should then be adjusted to reflect the impacts of non-state and subnational actions. The result is a revised GHG emissions projection that represents the combined impact of national policies, along with non-state and subnational actions, while taking into consideration overlapping and reinforcing interactions between them. This is represented by the red line in Figure 9.4. The difference between the original (blue) and updated (red) projections reveals the potential additional impact of non-state and subnational action in the country. The revised projection can then be used to inform a more ambitious national mitigation target that builds on the additional GHG mitigation efforts undertaken by non-state and subnational actors.

It is important to review which policies, targets and drivers are already included in the national projection or model. The projection may only reflect the impacts of national policies and targets, and

[63] Potential sources include Climate Watch (www.climatewatchdata.org); Climate Action Tracker (https://climateactiontracker.org); Deep Decarbonization Pathways Project (http://deepdecarbonization.org); and IEA World Energy Outlook scenarios (www.iea.org/weo).

various socioeconomic drivers and trends, such as GDP, population and energy prices. Models may already include some subnational actions, but other actions may need to be included as part of the assessment. Users should review which non-state and subnational actions are already included to avoid double counting.

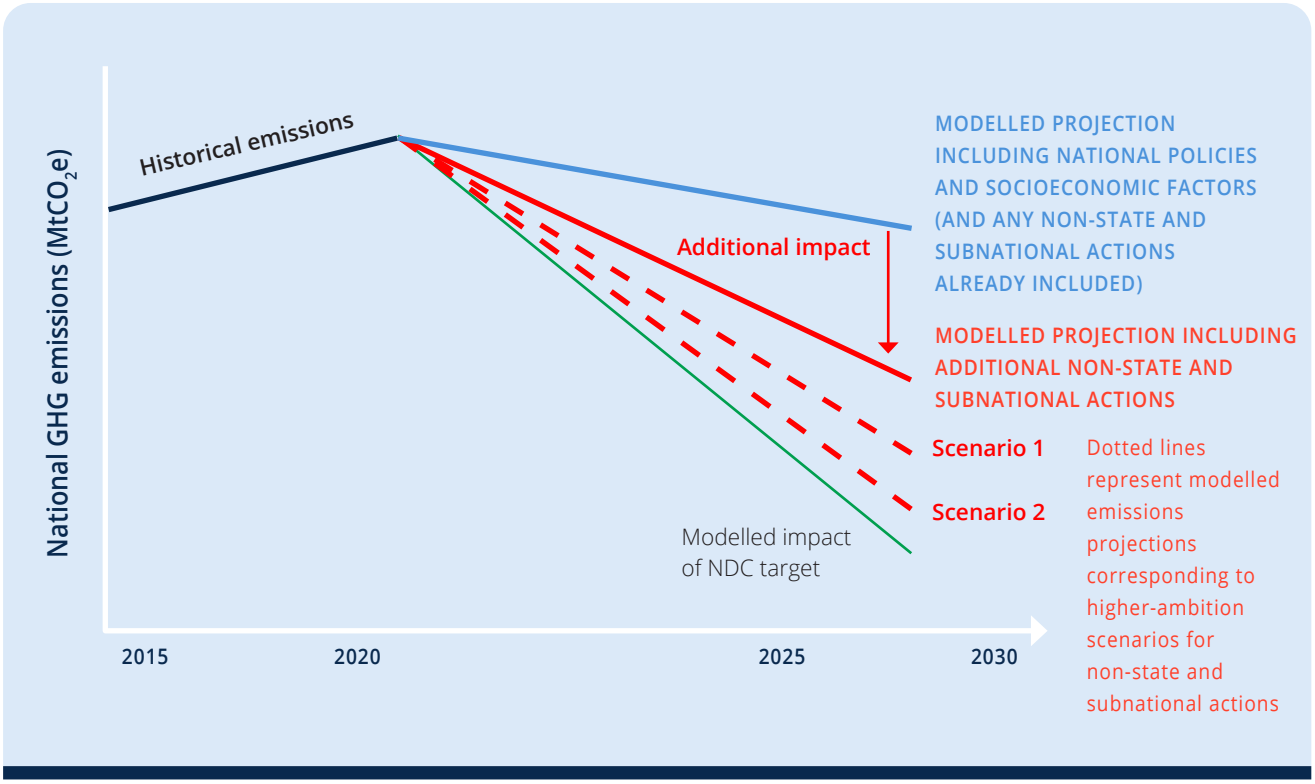
Users can input the results of the bottom-up aggregation assessment into models to determine the combined impact of non-state, subnational and national actions while accounting for interactions between them and incorporating the effect of socioeconomic drivers. The Fulfilling America's Pledge report, for instance, used a version of the Global Change Assessment Model that included a detailed representation of the United States economy and energy system at the state level. The model included the impact of non-state and subnational actions within each sector from the bottom-up aggregation exercise. It was helpful for analysing economy-wide interactions while taking care of overlaps and double counting between sectoral and national actions.

9.4.1 Other comparisons

Users may be interested in different types of comparisons. For example, some may want to understand the gap between NDC targets and the combined impact of national policies and non-state and subnational actions, or the additional impact from non-state and subnational actions at the sectoral level. Depending on their objectives, users can select one or more reference scenarios to understand the contribution of non-state and subnational actions. For example, in Figure 9.4, the difference between the red line (emissions projection representing non-state and subnational actions along with current national policies) and the green line (NDC target) is the emissions gap. Users can also model enhanced ambition for non-state and subnational actions (dotted red lines in Figure 9.4) – for example, to determine how to bridge the emissions gap. They can also model emissions projections for enhanced ambition at the national level, and analyse the extent to which the existing non-state and subnational actions can help achieve it.

FIGURE **9.4**

Modelled additional impact of non-state and subnational actions using top-down integration



PART IV

Reporting results

10 Reporting results

Reporting the results, methodology and assumptions used is important to ensure that the impact assessment is transparent, and gives decision makers and stakeholders the information they need to properly interpret the results. This chapter presents a list of information that is recommended to be reported, based on the steps in previous chapters.

Checklist of key recommendations

- Report information about the assessment process and the estimated non-state and subnational impacts (including the information listed in Section 10.1)

10.1 Recommended information to report

It is important that users carefully document and report the relevant data, analysis methods, assumptions and results.

It is a *key recommendation* to report information about the assessment process and the estimated non-state and subnational impacts (including the information listed below[64]). The detail and breadth of reporting depend on the objectives and resources available to users carrying out the assessment. More complex and comprehensive assessments will require more reporting. Throughout the chapters, this guide has explained which information users should be collecting. The recommended information to report is listed below.

General information

- The person(s) or organization(s) that did the assessment
- The date of the assessment
- Whether the assessment is an update of a previous assessment, and, if so, links to any previous assessments

Chapter 2: Objectives

- The objective(s) and intended audience(s) of the assessment

Chapter 4: Defining the assessment boundary

- Sector(s) and subsector(s) included in the assessment
- Actor groups included in the assessment
- Action types included in the assessment
- GHGs included in the assessment
- Types of indirect GHG emissions included in the assessment
- Assessment period

Chapter 5: Creating a list of all relevant non-state and subnational actions

- List of relevant non-state and subnational actions occurring within the assessment boundary
- Data needed for further analysis (dependent on assessment objectives)
- Documentation of all methods used for data collection and assumptions, with underlying rationale, to fill data gaps

Chapter 6: Selecting non-state and subnational actions for inclusion in the assessment

- Shortlisted non-state and subnational actions (from the list in Chapter 5) that are considered for further analysis
- Criteria for suitability and assumptions, with underlying rationale, to determine which actions should be included in further analysis
- If applicable, findings from the landscape analysis of non-state and subnational actions

[64] The list does not cover all chapters in this document because some chapters provide information or guidance that is not relevant to reporting.

Chapter 7: Listing relevant national climate mitigation policies and actions

- List of relevant national climate mitigation policies and actions that relate to the objectives of the assessment
- All data sources used to compile the list and related information
- The current policies scenario or model that will be used for the objectives that require integration into national policies, and which actions and sectors are included in it

Chapter 8: Harmonizing non-state and subnational actions and national policies for comparison

- Non-state and subnational actions, and national policies expressed in comparable metrics
- Depending on objectives, whether potential emissions reductions are calculated (as opposed to assessing impact in other sector-appropriate metrics) and the approach used for calculating potential emissions reductions of actions (if applicable)[65]

Chapter 9: Assessing overlaps and estimating potential impacts

- Approach used to determine overlaps between various non-state and subnational actions in the same sector, across sectors, and between non-state/subnational actions and national policies, to avoid double counting
- All methods used and assumptions made to determine overlaps, with underlying rationale, and data with sources
- If applicable, statement of how the impacts of international cooperative initiatives and actions of multinational companies are distributed to the country
- Results from the overlap analysis in terms of including or excluding specific actions in the assessment
- Assessment results, depending on objectives, which may include one or more of the following:
  - » potential impact of non-state and subnational actions, expressed in terms of emissions reductions or sector-appropriate metrics (accounting for overlapping and reinforcing interactions)
  - » national (sectoral) emissions projections, incorporating the impact of existing national policies, and non-state and subnational actions (accounting for overlapping and reinforcing interactions, and incorporating the influence of socioeconomic factors)
  - » potential additional impact of non-state and subnational actions, expressed in terms of emissions reductions or sector-appropriate metrics (accounting for overlapping and reinforcing interactions, and incorporating the influence of socioeconomic factors)
  - » potential additional impact of non-state and subnational actions, expressed in terms of emissions reductions or sector-appropriate metrics (accounting for overlapping and reinforcing interactions
  - » emissions gap to achieve the NDC target (difference between the emissions projection incorporating the impact of existing national policies and subnational and non-state actions, and the NDC emissions pathway)

10.2 Additional information to report, if relevant

- Any limitations of the assessment
- Any challenges faced during the assessment
- Potential for increased or decreased ambition
- Any other relevant information

[65] As noted in Chapter 8, users may want to estimate potential impact (in emissions reductions or other sector-appropriate metrics) in Chapter 9 instead so that they are doing this exercise only for those actions that are eventually included in the analysis, once overlapping and reinforcing interactions have been identified.

PART V

Decision-making and using results

11 Using results for decision-making and planning

This chapter discusses how to interpret assessment results and facilitate decisions that fulfil assessment objectives.

Users should consider both the objectives and the assessment results to inform decision-making. For example, if non-state and subnational mitigation actions are found to be less ambitious than existing national climate mitigation targets, and the objective was to understand the potential impact of non-state and subnational mitigation actions nationally, users could determine the gap in ambition level, revise national targets and policies, and/or engage with relevant non-state and subnational actors. In contrast, if non-state and subnational action targets are found to be more ambitious, the assessment could support an upward revision in national mitigation targets. Table 11.1 illustrates how results could be used for various objectives identified in Chapter 2. Box 11.1 illustrates how assessments can inform decision-making using two examples.

TABLE 11.1

Using assessment results for decision-making and fulfilling assessment objectives

Assessment objective	Ways for assessment results to inform decision-making
Understand the landscape of non-state and subnational effort	• Gather insights into the types of actions being undertaken and the type of actors that are involved • Determine opportunities for engagement with non-state and/or subnational actors (e.g. engage with actors in sectors where there is comparatively low impact from their actions or in sectors that are key for NDC implementation) • Promote new action by these actors
Determine the combined expected impact of all non-state and subnational actions in a country or sector	• Encourage or strengthen such actions • Better understand collective impact of specific types of actions or actors
Determine the contribution of non-state and subnational actions towards achieving national or sectoral climate change targets or NDC targets	• Better understand how non-state and subnational actions are supporting national or sectoral climate change plans or the NDC • Use to inform future policy design • Inform revisions of national or sectoral climate policy targets • Consider inclusion in future NDC cycle • Enhance the credibility of national climate mitigation targets
Determine the contribution of national or sectoral actions towards achieving national or sectoral climate change targets (e.g. the NDC target)	• Assess the gap between the impact of non-state and subnational actions and the national or sectoral targets • Inform strategies and initiatives to bridge the gap – for example, where regulation and/or incentive-setting could yield best results based on an analysis of leading versus lagging sectors (and non-state actors/subnational actors) • Incorporate non-state and subnational actions into national GHG inventories to ensure that impacts are measured and recognized at the national level

TABLE **11.1,** continued

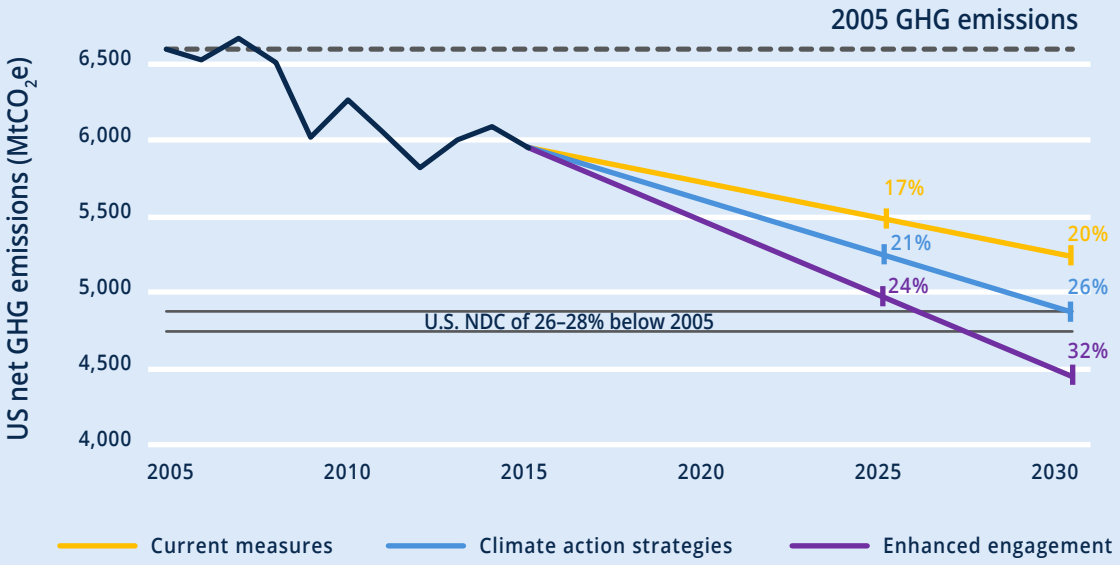
Using assessment results for decision-making and fulfilling assessment objectives

Assessment objective	Ways for assessment results to inform decision-making
Understand the potential of non-state and subnational actions to enable the country or sector to achieve a more ambitious target	• Adjust and revise national or sectoral climate change targets upwards • Identify leading sectors (and non-state and subnational actors) • Identify lagging sectors (and non-state and subnational actors) • Engage with non-state and subnational actors (e.g. to design targeted policy interventions) • Recommend revising sectoral climate change targets
Improve emissions projections or inform realistic economy/sector-wide emissions reduction target(s)	• Inform climate change target based on enhanced projections • Include in future NDC cycle • Enhance credibility of targets
Determine how non-state and subnational actions affect the ambition set out in specific policies	If non-state and subnational actions are found to be more ambitious, users could: • determine when non-state and subnational action is expected to go beyond the ambition set out in a policy instrument • determine which sectors contribute most to the rise in ambition • revise sectoral climate change targets. If non-state and subnational actions are found to be less ambitious, users could: • determine the gap in ambition level • suggest revising policy design • engage with relevant non-state and subnational actors.

BOX **11.1**

Using results from two examples to illustrate decision-making

Fulfilling America's Pledge report. The assessment demonstrates the extent of non-state and subnational actions in the United States, and their potential impact in key sectors. It also shows the potential impact if non-federal actors further step up their actions.



Source: America's Pledge (2018b).

The assessment shows that non-federal actors can have a substantial impact in reducing national emissions, and illustrates how existing and pledged non-federal actions can deliver in specific sectors – for example, by increasing the amount of renewable electricity generated or the number of electric vehicles on the road. It also identified actions taken by a small number of actors that are having a big impact (e.g. HFCs) and actions that are not leading to a big impact. The latter highlights where there is potential for non-federal actors to deliver enhanced ambition.

The assessment may be repeated in the future as new actions are adopted, or to incorporate targeted, region-specific analysis that can better serve local stakeholders.

Mexico subnational actions assessment. The assessment results were shared with multiple actors involved in the NAMA, including the climate change office of the Ministry of Environment, the National Forestry Commission, the Ministry of Agriculture and Rural Development, and participating states, to better understand the aggregate GHG impacts of the subnational actions, strengthen regenerative actions, inform future design of the actions, and support potential revision or enhancement of sector goals.

It is important that users share their assessment results with relevant stakeholders to ensure that the results can be integrated into decision-making. Stakeholders may include subnational policymakers, companies, other non-state actors, and decision makers at the national level. Discussion of results with stakeholders does not have to include the release of disaggregated data that could be linked to individual actors; instead, it could be organized by sectors or regions, for instance. Involving the targeted audience from the very beginning of the assessment also increases the likelihood that the results will reach the right people, instil confidence in the results and inform decision-making. For example, the Fulfilling America's Pledge assessment was an inclusive analytical effort with involvement from a broad set of stakeholders right from the start.

Further, decision makers will have greater confidence in the results when "suitable" actions – those with adequate data available to make realistic estimates and a stronger likelihood of achieving impacts – are included in the assessment, and any assumptions (with their underlying rationale) are transparently recorded. This will increase the possibility of results being used in decision-making.

Users should also bear in mind that policymakers may be hesitant to revise mitigation targets because often they can only partly control non-state and subnational actions. However, through incentive settings and other regulatory means, national policymakers may have significant influence on non-state and subnational actors, or the other way around, which provides an opportunity to align and reinforce actions at different levels. Learning from the data gaps encountered in the assessment, national policymakers can also help streamline the information available for non-state and subnational actions by recommending the type of quantitative information that individual actions should provide to enable realistic estimation of their potential impacts. Developing national databases of non-state and subnational actions will go a long way towards ensuring that accurate and reliable data relating to these actions become available over time.

At the same time, it is important to underline that the integration of non-state and subnational actions should not be used by policymakers to scale back federal action. Rather, the positive reinforcing relationship between non-state/subnational and national actions should be emphasized. Users should ensure that policies developed at the national level incentivize, and are complementary to, non-state and subnational policies, rather than making them moot. The opportunities linked to tapping into these potentials (e.g. more competitive economies, signalling transformation and giving positive inputs on the international stage) should be taken into account when considering how to use the results of the assessment.

APPENDICES

Appendix A: Overview of databases and studies

This appendix provides an overview of the most comprehensive global databases on non-state and subnational actions. It also provides an overview of literature (methodologies) on the quantification of non-state and subnational actions, including approaches to overlaps, that users may want to consult in support of applying the methodology.

TABLE **A.1**

Overview of databases for non-state and subnational actions

Name of data source	Type of actors covered	Geographic focus	Sectors covered	Targets covered	Data sources	Is action tracked, and how?	Frequency of updating	Link to database
Global Climate Action Portal	Companies, cities, regions, investors, CSOs, cooperative initiatives	World	All sectors and major themes	Broad (emissions reductions, energy access and efficiency, renewable energy, resilience, use of carbon price, private finance, transport, buildings, forests, SLCPs, innovation, agriculture, other – 12,000+ commitments/ actions)	CDP, carbon*n* Climate Registry, The Climate Group, Covenant of Mayors, UN Global Compact, Investors on Climate Change, Climate Bonds Initiative, Climate Initiatives Platform	Actors are encouraged to report on progress themselves through voluntary disclosure. The portal considers itself a platform that tracks non-state and subnational action.	Ongoing basis, frequency unclear	http://climateaction.unfccc.int/
Global Covenant of Mayors for Climate & Energy action plans	Cities	World	All sectors	Broad (emissions reductions; adaptation; secure, sustainable and affordable energy to implement European Union climate and energy objectives)	Covenant of Mayors Monitoring and Reporting Framework	Cities need to report every 2 years on implementation progress to the Covenant of Mayors	Ongoing basis, frequency unclear	https://www.globalcovenantofmayors.org/our-cities
Climate Initiatives Platform	ICIs	World	Finance, transport, agriculture and forestry, cities and regions, waste, industry, emissions, energy, adaptation, other	Broad (from specific emissions reductions to implementation/ capacity-building initiatives; in total, 200+ initiatives, >70 of which are on the Global Climate Action portal)	UNEP/UNEP DTU	Specific monitoring and reporting section (self-reported), although often information is not (yet) available	Ongoing basis, continuously (ICI focal points able to update information themselves)	https://climateinitiativesplatform.org/index.php/Welcome

TABLE **A.1,** continued

Overview of databases for non-state and subnational actions

Name of data source	Type of actors covered	Geographic focus	Sectors covered	Targets covered	Data sources	Is action tracked, and how?	Frequency of updating	Link to database
Portal on cooperative initiatives	ICIs	World	Agriculture, buildings, cities, energy efficiency, energy supply, finance, forestry, industry, international aviation, international maritime transport, land use, SLCPs, transport, waste, other	Broad (capacity-building, research, technology transfer)	UNFCCC	No	Ongoing basis, frequency unclear	http://unfccc.int/focus/mitigation/items/7785.php
Global Aggregator for Climate Actions (GAFCA)	Non-state and subnational	World (most are global initiatives)	Agriculture, cities, energy finance, forests, industry, resilience, transport	Broad (reduced emissions, people affected, knowledge dissemination, fundraising); almost 200 initiatives or climate actions and initiatives (e.g. those launched at the 2014 United Nations Climate Summit, and mobilized under the Lima–Paris Action Agenda)	DIE, LSE	Ex-post output effectiveness: analysis of "function–output–fit" to measure whether produced outputs are consistent with (self-)declared functions	Ongoing project – GAFCA is designed to be extendable to a large range of climate actions, addressing both mitigation and adaptation.	www.die-gdi.de/uploads/media/Working-Paper-216-Chan-et-al.pdf www.tandfonline.com/doi/pdf/10.1080/14693062.2016.1248343

TABLE **A.1,** continued

Overview of databases for non-state and subnational actions

Name of data source	Type of actors covered	Geographic focus	Sectors covered	Targets covered	Data sources	Is action tracked, and how?	Frequency of updating	Link to database
The Investor Agenda	Investors	World	Finance	Broad but along the following themes: measure, engage, reallocate, reinforce	PRI, IIGCC, CDP, INCR (Ceres), IGCC, UNEP FI, Asia Investor Group on Climate Change	Not directly on the database, although many of the actions track progress	Unclear	http://theinvestoragenda.org
CDP website	Companies, cities	World	Consumer discretionary, consumer staples, energy, financials, health care, industrials, IT, materials, telecoms, utilities	Absolute and intensity emissions reduction targets	Self-reported data from companies and cities; CDP reporting frameworks	Not directly in the database, but often included in single responses from cities/ companies and in CDP-specific reports	Regularly (depending on programme/ initiative)	https://data.cdp.net/ and https://cdp.net
carbon*n* Climate registry (unified reporting platform with CDP, beginning April 2019)	Cities, states, regions	World	Renewable energy, transport, green infrastructure, buildings, waste	Broad (environmental education, emissions reductions, energy intensity improvements; 600+ reporting entities)	ICLEI, local government climate roadmap, Durban Adaptation Charter, Plan de Acción Climática Municipal, carbon*n* Japan Project, EcoMobility Alliance, Earth Hour City Challenge	Reporting entities are encouraged to submit status updates on their mitigation and adaptation actions	Regularly, frequency unclear	http://carbonn.org/

Abbreviations: CSO, civil society organization; DIE, Deutsches Institut für Entwicklungspolitik (German Development Institute); ICI, international cooperative initiative; ICLEI, Local Governments for Sustainability; IGCC, Investor Group on Climate Change; IIGCC, Institutional Investors Group on Climate Change; INCR, Investor Network on Climate Risk; LSE, London School of Economics; PRI, Principles for Responsible Investment; SLCP, short-lived climate pollutant

Note: There may be overlaps between the databases in terms of coverage of non-state and subnational actors and actions. For example, the carbon*n* Climate Registry and the CDP cities data now have a unified reporting platform, and the Global Covenant of Mayors data set will also include data on some of the same cities.

TABLE **A.2**

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
Data-Driven Yale, New Climate Institute and PBL (2018a)	Collected individual commitments in 9 key countries and the EU; collected and selected 21 ICIs; quantified emissions reduction impact of both	Regions, cities, businesses, ICIs	All, except forestry, waste and non-CO_2 sectors	Individual commitments: 1550–2200 for current policies scenario, 200–700 for NDC scenario; ICIs: 15–21 $GtCO_2e$	2030	Calculated. Individual commitments: geographic overlap between regions and cities, between energy end use and subnational actors, between electricity-generating companies and all other actors with targets; ICIs: actors with target in more than one initiative, ICIs targeting same emissions, targets that are not sector-specific	Current national policies and NDC scenario	Global (and additional focus on 9 key countries + EU)	http://bit.ly/yale-nci-pbl-global-climate-action
Global Covenant of Mayors for Climate & Energy (2018)	Considered all reporting cities; estimated economy-wide emissions reductions	Cities	All	1,400 (2030), 2,800 (2050)	2030 and 2050	Calculated	No policy scenario	Global	https://www.globalcovenantofmayors.org/impact2018

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
America's Pledge (2018b)	Considered individual commitments in the US; estimated economy-wide GHG emissions impact of the 3 scenarios	States, cities, businesses	All	500 (cities and regions in US) by 2025	2025	Calculated (both at sector level between actions, and between non-state/ subnational and national/federal level)	Current measures, climate action strategies and enhanced engagement scenarios	US	www.bbhub.io/dotorg/sites/28/2018/09/Fulfilling-Americas-Pledge-2018.pdf
Roelfsema (2017)	Analysed the aggregated impact of the 25 largest US cities and scaled up results to the 200 largest US cities. This is compared with reductions under the national US NDC target.	Cities	All	5–30	2025	Calculated	Current national policies and NDC scenario	US	www.pbl.nl/en/publications/assessment-of-us-city-reduction-commitments-from-a-country-perspective
Kuramochi et al. (2017)	Collected initiatives from cities, regions and businesses in the US; calculated emissions reductions compared with a current administration scenario; calculated overlaps	Cities, regions, companies	All, except forestry, waste and non-CO_2 sectors	340–540 (12–14% below 2005) by 2025	2025	Calculated (first between states and cities, second between companies and electricity utilities, lastly between electricity utilities and all other actors)	Relative to a current administration scenario	US	https://newclimate.org/wp-content/uploads/2017/09/states-cities-and-regions-leading-the-way.pdf

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
UNEP (2015)	Selected most ambitious initiatives and calculated emissions reductions that they will deliver; considered overlap between initiatives and with pledges made by national governments	Cities, regions, companies	EE, efficient cook stoves, methane and other SLCPs, reduced deforestation and afforestation, agriculture	2,500–3,300	2020	Calculated (between different initiatives, both between sectors and within sectors)	Relative to a BAU scenario that takes account of current government policies	World (focusing on major initiatives)	http://apps.unep.org/redirect.php?file=/publications/pmtdocuments/-Climate_Commitments_of_Subnational_Actors_and_Business-2015CCSA_2015.pdf.pdf
Hsu et al. (2015a)	Looked at individual commitments; tailored methodology to calculate emissions reduction impact; estimated double counting; compared with BAU from IPCC	Cities, regions, companies, NGOs, IOs, CSOs	EE, renewable energy, reduced deforestation and afforestation	2,540	2020	Not calculated (exclude ICIs because of concerns about double counting; otherwise case-by-case basis)	Relative to BAU from IPCC Fifth Assessment Report (2014)	World (drawing on commitments made at the New York Climate Summit 2014)	www.nature.com/nclimate/journal/v5/n6/full/nclimate2594.html

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
CISL and Ecofys (2015)	Selected 5 ICIs; applied 3 scenarios to analyse potential impact; carried out interviews with stakeholders from the initiatives to support analysis	Companies	EE, fluorinated gases	No total	2020	Not calculated (because of case study approach)	Tailored to initiative	World (drawing on Climate Initiatives Platform)	www.cisl.cam.ac.uk/resources/low-carbon-transformation-publications/better-partnerships-understanding-and-increasing-the-impact-of-private-sector-cooperative-initiatives
Roelfsema et al. (2015)	Selected ICIs; calculated emissions reductions using a tailored methodology for each initiative; compared projected emissions of the initiatives with the emissions levels pledged by parties under UNFCCC	Cities, companies	Transport, methane and other SLCPs, fluorinated gases, shipping and aviation	2,500 (2020); 5,500 (2030)	2020, 2030	Calculated (between initiatives, which is assumed to occur with initiatives aimed at the same sector in the same country)	IMAGE 3.0 (PBL) baseline scenario, based on population and GDP assumptions from the SSP2 scenario (completed by the International Institute for Applied Systems Analysis in 2015), and harmonized to the 2010 global emissions level from the UNEP Gap Report	World (international initiatives)	www.pbl.nl/en/publications/climate-action-outside-the-unfccc

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
Graichen et al. (2016)	Screened 174 initiatives, and selected those suitable for further quantitative and qualitative analysis; assessed mitigation impact of selected initiatives and broke down impact on a national level; added impact of initiatives to estimate emissions reductions beyond current pledges	Cities, regions, companies	EE, efficient cook stoves, renewable energy, transport, methane and other SLCPs, fluorinated gases, reduced deforestation and afforestation	5,000–11,000	2020, 2030	Calculated (overlaps with other initiatives in the same sector, across sectors, and any specific policy or INDC elements in the country not considered in the global INDC scenarios before)	Reference scenario based on the full implementation of all INDCs	World (international initiatives)	www.umweltbundesamt.de/sites/default/files/medien/1968/publikationen/2016-11-29_discussion_paper_clean_version_final.pdf
CDP and We Mean Business (2016)	Based on 5 international initiatives (chosen on a set of predefined criteria), estimated impact of each; calculated overlaps	Companies	All sectors covered by the 5 initiatives	3,200–4,200	2030	Calculated (overlap across the 5 initiatives)	IPCC Fifth Assessment Report (2014)	World (global initiatives)	https://newclimateinstitute.files.wordpress.com/2016/06/business-end-of-climate-change.pdf

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
Arup and C40 Cities (2014)	Looked at 228 cities; established rules for standardizing reporting of GHG reductions; collected GHG emissions target and inventory data, where available; combined the results for all cities to provide an estimate of total city committed reduction	Cities	Overall emissions	454 (2020); 402 (2030)	2020, 2030	Not calculated	Relative to BAU (align emissions with population growth, assume emissions per capita remain constant after the study baseline year, allocate emissions equally per person as the population increases)	World (from the set of predefined cities)	www.c40.org/researches/global-aggregation-of-city-climate-commitments-methodology
Compact of Mayors (2015)	Based on self-reported data by 360 Compact of Mayors cities, calculated the difference between BAU scenario and target scenario in a given year	Cities	Overall emissions reductions per year	500 per year (2020); 740 per year (2030); 950 per year (2050)	2020, 2030	Not calculated	Relative to INDCs published in advance of COP21	World (member of Compact of Mayors)	https://data.bloomberglp.com/mayors/sites/14/2016/01/BR_AggregationReport_Final_SinglePages-FINAL-2016.pdf

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
The Climate Group (2015)	Based on self-reported data by 44 regions to the Compact of States and Regions, projected "target" GHG emissions based on GHG targets reported up to 2050; included actual GHG emissions and interim targets, where available; calculated the cumulative difference between BAU emissions and "target" emissions for each reporting government from 2010 to the date indicated (i.e. 2020 and 2030)	Regions	Overall emissions	1,200	2030	Not calculated	Relative to BAU – based on per capita GHG emissions (2010) and official population projections to 2050. For years where population projections were not available, population was estimated using a compound annual growth for the related period.	World (joined the Compact of States and Regions)	www.theclimategroup.org/sites/default/files/archive/files/Compact-of-States-and-Regions-Disclosure-Report-2015.pdf

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
The Climate Group and CDP (2016)	Based on self-reported data from 62 states, provinces and regions around the world	Regions	Overall emissions	210 (2020); 760 (2030); 2,510 (2050)	2020, 2030, 2050	Calculated using data and analysis from the IEA *Energy Technology Perspectives 2014* (ETP 2014) report. The ETP 2014's 4 Degrees Scenario (4DS) reflects pre-2012 intentions by countries to cut GHG emissions and boost energy efficiency.	Cumulative savings are estimated by adopting a common base year (2010) and projecting the GHG emissions savings that could be achieved by the disclosing governments (Compact Target Scenario) against 2 reference scenarios. Scenarios are calculated using data and analysis from the ETP 2014 report that refers to the 4DS and the 6 Degrees Scenario (6DS).	World (joined the Compact of States and Regions)	www.theclimategroup.org/sites/default/files/downloads/compact_report_2016stet.pdf

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
Annual Disclosure – 2017 update	Based on self-reported data from 101 states, provinces and regions around the world	Regions	Overall emissions	2,190	2050	Calculated (between neighbouring states)	Calculated – compared with the IEA's 2017 Reference Technology Scenario (RTS). The RTS considers current commitments by countries to limit emissions, including NDCs.	World	www.theclimategroup.org/sites/default/files/disclosure_update_2017_digital.pdf
Hsu et al. (2015b)	Using 9 city and regional climate action case studies, estimated impact for each and compared with BAU model of the country where the specific city/ region is located	Cities, regions	Carbon tax, industry, transport, forestry and land use, EE, waste, renewable energy, emissions trading	1,090	2020	Calculated (none)	Relative to BAU emissions pathway (assuming linear pathway) of the relevant country	Canada, Brazil, US, South Africa, Germany, China, India, Algeria	www.stanleyfoundation.org/publications/report/WhitePaperScalingUp12-2015.pdf
CDP and We Mean Business (2016)	Same as above, but calculating what would happen if every relevant business that could join in these initiatives actually did so	Businesses	Economy-wide, systemic	10,000	2030	Not calculated	IPCC Fifth Assessment Report (2014)	World (global initiatives)	https://newclimateinstitute.files.wordpress.com/2016/06/business-end-of-climate-change.pdf

TABLE **A.2,** continued

Overview of literature on quantification of non-state and subnational actions, including approach to overlaps

Source	Approach	Type of actors covered	Type of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference scenario/ baseline	Geographic focus	Link to source
Erickson and Tempest (2014)	Selected all cities considered by the United Nations World Urbanization Prospects; calculated abatement potential in each year as difference in emissions between reference scenario and urban action scenario	Cities	All, systemic impacts	3,700	2030	Not calculated	Relative to reference scenario (RS), based on IEA's 4DS scenario/ New Policies Scenario. RS: multiply urban population by activity drivers by energy intensity by GHG intensity of energy. From this scenario, the urban action scenario departs: apply technologies and practices in urban areas to reduce GHG emissions (e.g. transport).	World	www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-WP-2014-06-C40-Cities-mitigation.pdf
Circle Economy and Ecofys (2016)	No information	All	Circular economy, systemic	6,500–7,500	2030	Not calculated	Relative to BAU if all INDCs are implemented	World	https://assets.website-files.com/5d26d80e8836af2d12ed1269/5dea481576d89489dff8782e_ircle-economy-ecofys-2016-implementing-circular-economy-globally-makes-paris-targets-achievable.pdf.pdf

Abbreviations: COP21, 2015 United Nations Climate Change Conference; CSO, civil society organization; EE, energy efficiency; EU, European Union; ICI, international cooperative initiative; INDC, intended nationally determined contribution; IO, international organization; PBL, Netherlands Environmental Assessment Agency; SLCP, short-lived climate pollutant; US, United States

Appendix B: Stakeholder participation during the assessment process

This appendix provides an overview of the ways that stakeholder participation can enhance the impact assessment process, and the contribution of non-state and subnational actions to national/sectoral scenarios and policy development.

Table B.1 provides a summary of the steps in the assessment process where stakeholder participation is recommended and why it is important, explaining where relevant information can be found in the ICAT *Stakeholder Participation Guide*.

TABLE **B.1**

Steps where stakeholder participation is recommended in the impact assessment

Chapter/step in this document	Why stakeholder participation is important at this step	Relevant chapters in *Stakeholder Participation Guide*
Chapter 2 – Objectives of assessing the impact of non-state and subnational actions	• Ensure that the objectives of the assessment respond to the needs and interests of stakeholders	Chapter 5 – Identifying and understanding stakeholders
Chapter 3 – Key concepts, steps and assessment principles • Planning the assessment	• Build understanding, participation and support for the national or sectoral target/policy/projection among stakeholders • Ensure conformity with national and international laws and norms, as well as donor requirements related to stakeholder participation • Identify and plan how to engage stakeholder groups who may be affected by, or may influence, the policy or action • Coordinate participation at multiple steps of this assessment with participation in subsequent decision-making using assessment results	Chapter 4 – Planning effective stakeholder participation Chapter 5 – Identifying and understanding stakeholders Chapter 6 – Establishing multi-stakeholder bodies Chapter 9 – Establishing grievance redress mechanisms
Chapter 5 – Creating a list of all relevant non-state and subnational actions	• Ensure a complete list of relevant non-state and subnational actions from a diverse range of stakeholders • Fill information gaps to develop a rich database • Identify credible sources of information for engagement in subsequent steps	Chapter 5 – Identifying and understanding stakeholders Chapter 8 – Designing and conducting consultations
Chapter 6 – Selecting non-state and subnational actions for inclusion in the assessment	• Ensure a more credible determination of likelihood of achieving targets of non-state and subnational actions • Fill information gaps to develop a rich database • Identify credible sources of information for engagement in subsequent steps	Chapter 8 – Designing and conducting consultations

TABLE **B.1,** continued

Steps where stakeholder participation is recommended in the impact assessment

Chapter/step in this document	Why stakeholder participation is important at this step	Relevant chapters in *Stakeholder Participation Guide*
Chapter 7 – Listing relevant national climate mitigation policies and actions	• Enhance completeness by developing a list of relevant national policies and actions with inputs from a diverse range of stakeholders, depending on resources	Chapter 5 – Identifying and understanding stakeholders Chapter 8 – Designing and conducting consultations
Chapter 9 – Assessing overlaps and estimating potential impacts	• Ensure that stakeholder inputs are sought on interactions between different actions in the same sector and across sectors, and between non-state and subnational actions and national policies • Integrate stakeholder insights on the magnitude of impacts, and the ambition of national or sectoral target, policy or projection with regard to the impact	Chapter 5 – Identifying and understanding stakeholders Chapter 8 – Designing and conducting consultations
Chapter 10 – Reporting results	• Raise awareness about the assessment results for transparency and thereby credibility of the assessment • Inform decision makers and other stakeholders about impacts, and contribution of non-state and subnational actions towards national or sectoral mitigation scenarios/targets or policies, and build support for these	Chapter 7 – Providing information to stakeholders
Chapter 11 – Using results for decision-making and planning	• Share assessment results with stakeholders to allow them to be a part of decision-making and to enhance transparency • Ensure that diverse perspectives are considered when planning and designing future course of action based on assessment results	Chapter 7 – Providing information to stakeholders Chapter 8 – Designing and conducting consultations

Appendix C: Developing climate action data sets

This appendix[66] discusses possibilities and challenges for creating country-specific climate action data sets of non-state and subnational actions. It also proposes solutions for future development and application of data sets. It is based on the experience of creating two country-specific data sets (for Morocco and the United States) during the first phase of this guide, and, more recently, of developing the structure for a global climate action data set that can be filtered for any country. An attempt was made to demonstrate the potential value of such data sets for a range of national policymakers.

During the first phase of development, the two contrasting examples of Morocco and the United States were selected. As a developing economy with limited data on non-state and subnational climate actions, Morocco presented the challenge of looking beyond what was readily available and developing alternative means to quantify the non-state climate action under way within its borders. It also provided an interesting case study, given its recent role in international climate affairs, as host of COP22 (the 2016 United Nations Climate Change Conference), and its future ambitions. In contrast, the developed economy of the United States presented a wealth of non-state and subnational climate action data, which were challenging to sort and review. It gave an opportunity to develop procedures for processing and evaluating climate action data en masse.

In both cases, the data sets were aligned with this guide, and focused exclusively on non-state and subnational mitigation actions. Future development of country-specific climate action data sets could also include relevant climate finance and adaptation action.

[66] This appendix was prepared by CDP, with contributions from World Resources Institute, NewClimate Institute and The Climate Group.

C.1 Benefits of country-specific data sets

The construction of country-specific climate action data sets can effectively supplement this guide by streamlining the process for policymakers, ensuring consistency and accuracy of data, and removing tedious analyses by performing data standardization in advance. A climate action data set can do the following:

- **Gather and format climate action data** from a wide variety of sources. This task may prove quite difficult for national policymakers with limited time and/or resources, as the construction of a complete data set requires careful consolidation of disparate data from multiple sources. By gathering and formatting data in advance, the data set would save a substantial amount of time.

- **Ensure that data are accurate and up to date.** A country-specific data set can be regularly updated, and year-on-year comparisons of climate action data can spot inconsistencies and improve the overall accuracy of the data set.

- **Provide essential and contextualizing information.** Although many publicly available data sources provide basic information on climate actions, it is not always easy to find the essential and contextualizing information (e.g. base year emissions, scope of emission reductions, grid emission factors, industry classification, population) required to derive meaningful insights. By providing all necessary information, a country-specific data set could save policymakers additional time, allowing them to focus resources on achieving the objectives of the assessment and interpreting the results.

- **Simplify the most challenging aspects of this guide.** It is possible to integrate some aspects of the guide directly into a country-specific data set, which can significantly streamline assessments. These aspects include evaluations of suitability for inclusion,

likelihood of completion and overlap of reductions. This allows policymakers to focus more on the analysis of the impact of climate actions, as opposed to their categorization, while still giving them the final say on what is included in the assessment. Consistent evaluation of these aspects would also help to standardize the application of the guide by different policymakers.

- **Project and aggregate likely impact of climate actions** to target year and interim milestone years. With adequate data, it is possible to make informed projections of the impact of completed climate actions in their target year. It is also possible to estimate the impact in key milestone years (e.g. 2030, 2050), while offering insight into various scenarios on the level of ambition. These projections can then be aggregated in accordance with the objectives of the assessment. By including some of these basic calculations in a country-specific data set, the time spent in quantifying the impact of individual actions is greatly reduced.

- **Directly inform global data sets.** A robust process for developing and maintaining country-specific data sets would benefit a number of additional stakeholders at a time when climate actions and progress tracking are of crucial importance to the global response to climate change represented by the Paris Agreement. Maintenance of these data sets could directly inform the UNFCCC Global Climate Action portal platform, streamlining the process of data collection from multiple sources, ensuring prompt upload of new and updated information, improving the accuracy of the climate action data, and increasing the overall operation and functionality of the platform. Rich country-specific data sets could then be made available to other interested audiences, including investors, researchers and academics, providing relevant insight into the transition to a green and sustainable economy. With adequate maintenance and continued development, country-specific data sets could serve as *the* foundation for understanding how to track, measure and rate the impacts of non-state and subnational climate actions in the coming years.

C.2 Challenges in building country-specific data sets and potential solutions

Several challenges were identified through the exercise of developing country-specific data sets that will require continued attention in future data sets. These relate to the collection of data, maintenance of the data set, and eventual use of the data set by national policymakers.

C.2.1 Gathering climate action data

Although many available resources aggregate non-state and subnational climate actions (see Section C.4), these come with limitations in terms of their geographical coverage, and the availability and comparability of disparate data. Where there are significant gaps in the available climate action data, it may be necessary to use advanced modelling and supplementary data to provide relevant insight to policymakers.

Sourcing relevant data

A wealth of information is already publicly available; however, identifying where to look and unlocking the data from often non-machine-readable formats (e.g. PDF files) are key barriers to categorizing and including these data in country-specific data sets. At the same time, some current methods can support this effort. Primarily on the corporate side, databases of corporate sustainability reports (e.g. Global Reporting Initiative, corporate register) are available from companies that have traditionally fallen outside the scope of analysis because of their size (e.g. small to medium-sized enterprises) or ownership type (e.g. privately held). Applying technologies and a lexicon to crawl these reports and pinpoint pertinent disclosures can assist in scraping the data to extend coverage of the database. Additionally, as more organizations become active in this space, a growing number of aggregate databases containing potentially important details can be expected. By identifying and targeting these sources through machine-run web crawls, new developments and data sources can be sourced for data expansion.

Another future development is in the form of machine-readable reporting – for example, following the eXtensible Business Reporting Language (XBRL) standard. Although these reporting formats are fully integrated into financial reporting, little headway has been made in their adoption for non-financial data. However, as uptake increases, this will solve many of the current difficulties of data scraping.

Collecting relevant information about cooperative initiatives and campaigns is also challenging, because of their heterogeneous characteristics and the lack of quantitative data that are made publicly available. Full integration of cooperative climate actions into country-specific data sets would likely require case-by-case consultations with each initiative or campaign to better understand any available data and to make arrangements for data sharing.

Ensuring the accuracy, comparability and usability of climate action data

It is important to ensure during the collection process that adequate information is collected or available elsewhere to compare data from various sources. For action types that are already well established (e.g. cities' emissions reduction targets), there are likely to be different sources collecting comparable data. However, for less common action types, additional work will be required to make the data easier to compare. This will be especially challenging for cooperative actions, as well as corporate actions that are not clearly defined or easily localized within a national border. In these cases, it may be necessary to convert data to common terms for integration into country-specific data sets; in cases where enough quantitative data are not available, understanding the impact of the actions by other means may be needed.

One of the main challenges in constructing country-specific climate action data sets is localizing corporate targets made by companies with operations in diverse locations. For reduction targets that cover a company's global scope 1 and 2 emissions, the potential impact in each country can be approximated by reviewing a country-level emissions breakdown. When targets cover only a specific portion of a company's global scope 1 and 2 emissions, it may not be possible to extrapolate a country-level potential impact, unless a specific geography is defined for the target. Additionally, the inherent challenges of scope 3 reporting do not currently allow a similar country-level scope 3 emissions breakdown. Although many companies do define their targets along geographic boundaries, there are often more sensible, non-geographic reasons for defining a target's coverage. For instance, a target might cover a specific business division, subsidiary, activity or facility. These categories could transcend geographic boundaries in complex ways, making accurate projections of the localized impact of these types of targets challenging unless more specific information is collected on target coverage and implementation, and scope 3 geographic breakdowns.

Additionally, through construction of country-specific data sets and feedback received from pilots of the guidance documents, the following improvements to data quality, collection, standardization and organization have been suggested:

- data validation at point of entry via improved integration of emissions and target data
- mapping and standardization of data across major providers
- creation of unique target IDs for easier year-on-year identification
- greater availability of time-series data covering at least three years
- additional contextualizing information, such as baseline, revenue, production and asset-level data
- expanded use of country-based data points, including scope 3 breakdowns.

Covering data gaps

Where sufficient quantitative details are not available to fully describe a cooperative or corporate action, it may be necessary to model the corresponding emissions or to rely on supplemental data.

Use of modelling techniques can help estimate emissions to fill in gaps in the existing data set. These estimates can help to establish base year emissions values, when undisclosed, or the current level of emissions, to better assess trajectories. CDP has a transparent methodology for estimating corporate emissions using key business data, such as annual revenue.[67] It is also exploring modelling for cities, to provide reasonable estimates for non-reporting cities; these methods can likely be extended to states and regions using macro-level population, economic and related variables. Modelling can potentially minimize some of the data gap implications by offering a more complete data set. Data users will always be able to see which values have been estimated and how, to determine for themselves whether to include these in their analyses.

For countries that do not have available a significant amount of action data, it would still be possible to provide national governments with key insights through additional analysis of asset-level data from

[67] For further information, see: www.cdp.net/en/investor/ghg-emissions-dataset.

key industries. One of the principal characteristics of an asset-level database is its universal coverage. Two primary applications can be envisaged for the utilization of these data: techno-economic improvement potential and locked-in emissions forecasting. The former relates to the classification of the types of technologies employed and potential emissions savings through the deployment of best available technologies (BATs) or step-change upgrades. This type of analysis, coupled with economic detail pertaining to associated costs (e.g. using data reported to CDP through its corporate climate change questionnaire under the question relating to initiatives for emissions reductions), could support policymakers in targeting emissions reduction options based on asset improvements and could be a stepping stone to more complex modelling of asset data.

In addition, many market intelligence providers currently supplying asset-level data collect information about future constructions, planned closures and related business developments that can be integrated into national-level emissions forecasting. For example, in the case of electricity utilities, a view of the plants coming online with details around capacity, technologies, fuel types and so on, and those going offline can be used to model currently "locked-in" emissions (i.e. the guaranteed emissions stemming from currently producing assets), and future changes due to new constructions and plant closures.

C.2.2 Maintaining the data set

Once a country-specific data set has been constructed, maintaining and updating it will present unique challenges that require careful consideration and thorough planning. Dedicated staff to manage the data set will be needed, as well as clear communication channels between different data sources, initiatives and campaigns to ensure periodic updates of relevant data. Entities and actions will need to be easily identifiable to avoid redundant data entry and double counting. This could be especially challenging for companies whose names often appear differently because of differences in their legal and public names, or as a result of mergers and acquisitions. Readily available corporate identifiers are also most often at the securities level, applicable only to public companies.

Similarly, ensuring that changes to existing climate actions are reflected in the data set would require annual verification to check that already included actions are still valid, spot discrepancies and remove expired actions. Whether organized around an annual process or on a rolling basis, ensuring that a country-specific data set is up to date would require sound data management practices and persistent verification of data accuracy.

C.2.3 The user experience

Proper use of a country-specific data set could be facilitated through thoughtful design of the user interface that provides an engaging, transparent and flexible presentation of the data.

Future user accessibility – principles of data accessibility
Application of the methodology, and therefore improved emissions forecasting and more ambitious national emissions reduction targets depend on a transparent, structured and accessible database. Transparency will be ensured throughout the development process by documenting data sources, data-collection methods and analytical assumptions. The end user should therefore be able to understand what data are included in the database and make informed decisions about whether they wish to use certain data or not.

A clear data structure should be imposed to ensure that this transparency is preserved, and that the database is as usable as possible for application of the methodology. To this end, use cases of the data will help to assert the final structure, including relationships between data points, as well as the data points themselves. These will need to be vetted with data users to ensure applicability and accuracy, requiring several consultative engagements.

Finally, barriers must be removed to ensure that the database is accessible to national policymakers, analysts and other decision makers tasked with reducing national GHG emissions. This entails removing costs, as much as possible, to access the source data. It also requires that an online database be made available for users to efficiently access the data, with exportable functionality to support offline analyses. The experience gained through the sample data set construction indicates that there is little willingness from data providers to make their data public. As a result, issues of data ownership and hosting will need to be addressed, and any solution will likely require in-depth negotiations.

Database and front-end architecture
An online platform supported by a relational database for housing the emissions and commitment data, as well as user details, is needed. The platform

should be accessible via login, provided at little or no cost to national government representatives. To establish a business model that supports continued upkeep and maintenance, access may be fee based for other non-state stakeholders who wish to analyse the information available.

Online business intelligence/analytical functionality should be embedded to offer users options for easy analysis of the data using charts and graphs. Optimally, these could be saved locally or to an online workspace for later review. Users should also be able to export pre-filtered portions of the database (e.g. data relevant to their country) to Excel, to facilitate offline analysis.

Depending on the funding available, networking capabilities can also be constructed to share best practices and learn from others' experiences. In this way, the platform can serve as a hub for national government representatives, and provide a safe space to share and discuss.

C.3 Process to develop country-specific data sets

A detailed breakdown of the methodology used to construct the data sets is given below.

Once the available climate action data were gathered and input to the data set, analysis was performed to determine which actions would be the focus of further investigation and which would be excluded. This was carried out in accordance with the *suitability* standards of the guide, with an understanding of the idiosyncrasies of the data reported to CDP. Next, all suitable climate actions were categorized by type (e.g. commitment/action, emissions reductions/ renewable energy) and by coverage (i.e. geographic and IPCC sectoral), as prescribed in the guide. Then, calculations were made to determine the anticipated impact of various types of actions in their target year. For targets with geographic coverage beyond national borders (e.g. those of multinational corporations), additional calculations were made to estimate the disaggregated impact within the sample countries. Finally, linear projections were drawn to key milestones, such as 2020 and 2030, assuming the same level of ambition moving forward. Several additional aspects of the guide were integrated into the sample data set, including evaluating the progress monitoring, accuracy, likelihood and overlap of climate actions.

C.3.1 Gather and input data

Construction of the country-specific data sets primarily relied on data collected through CDP's disclosure platform and The Climate Group/CDP's Compact of States and Regions, for reasons of data access and expedience. There are other relevant sources of climate action data (see Section C.4), but, in most cases, the key data points required to calculate the impact of actions – although probably collected – are not made publicly available. Similar difficulties were encountered when calculating the impact of cooperative initiatives that might be relevant to the two selected countries.

On a fundamental level, the country-specific data sets are consistent with Table 5.1, in which each row includes a description of the action being taken and some basic contextualizing information, including geographical and IPCC sectoral coverage. For actions to be suitable for further calculation and analysis, however, their descriptions must include some essential information: base year, baseline emissions or renewable energy use, and target year. This information is organized into a table and serves as the foundation for building the rest of the data set.

In some cases, it was possible to calculate the anticipated impact of an action within the country based on just this information; however, in most cases, and especially for multinational corporations, additional information was needed to make more accurate estimates of an action's impact within the country's border. When considering the actions of subnational governments, it is relatively straightforward to define the geographical coverage of most actions. However, for large multinational corporations, it can be significantly more challenging to assess where their commitments will be realized. This is due to the nature of most corporate target-setting: targets are reported at the entity level, and information on divisional or geographical actions is generally not disclosed. It was also found that certain types of climate actions – primarily those of corporate actors – required additional information. For instance, to estimate the impact of corporate emissions reduction intensity targets, additional information supplied to CDP was used to estimate impact in absolute terms. Additional information was also necessary when removing scope 3 emissions from impact calculations (scope 3 was excluded because the impact of indirect value chain activities cannot be easily localized), converting renewable energy actions to associated emissions reductions, and disaggregating multinational corporate actions to countries' boundaries.

In constructing the data set, several limiting characteristics of the currently available climate action data became obvious. The first was that much more data are directly available for countries with more developed economies. At present, cities and states in developing economies are not as well represented as their counterparts in more developed economies. Efforts are under way to increase data availability in developing economies, which is likely to improve this situation over time. Geographical coverage is somewhat less of an issue for corporations, because many have international operations. As a result, information on the climate actions of multinational corporations headquartered in developed economies can still provide insight about impacts in less developed economies, although the limited data availability on the exact geographic distribution of these climate actions within a company's global operations means that calculations are assumption dependent.

The second limitation relates to IPCC sectoral coverage. In the country data sets developed, most actions relate to energy use, and fewer relate to transport, buildings, waste, land use and forestry; this could pose a problem for users interested in targeted assessments of these sectors. With further integration of additional data sources and cooperative initiatives, it may be possible to increase the sectoral coverage. As with localizing emissions of multinational climate actions, it can also be challenging to determine the exact IPCC sectors targeted by a community-wide or company-wide climate action, as well as the appropriate allocation of impacts when multiple sectors are indicated; this could make it more challenging to complete a targeted assessment following the methodology. For example, a community-wide emissions reduction target made by a city or state is likely to have impacts in multiple IPCC sectors, but, without a detailed breakdown of the associated base year emissions, it would be difficult to say with certainty what portion of the impact would affect, say, transport as opposed to buildings. With further development of country-specific data sets, it may be possible to use corresponding emissions inventories to estimate the impact across relevant IPCC sectors in the absence of more specific reporting on the anticipated impact across sectors. Although this level of detail is less relevant to economy-wide assessments, it could greatly increase the functionality of the guide for users interested in more targeted sectoral assessments.

Data for Morocco and the United States were gathered or evaluated from the following sources:

- **CDP corporate data.** Beginning with 2016 corporate response data from CDP, first all United States– and Morocco-based companies were identified for inclusion in the respective country-specific data set. Then all companies that reported emissions in the United States or in Morocco, regardless of the location of their headquarters, were identified, and their emissions reduction and renewable energy targets were included.

- **CDP cities data.** All relevant local government or community-wide emissions reduction and renewable energy commitments from the 2016 cities response data were included.

- **States and regions data from The Climate Group and CDP.** All relevant emissions reduction, renewable energy, and energy efficiency targets reported through the states and regions platform were included.

- **Covenant of Mayors.** All relevant commitments collected by the Covenant of Mayors for which it was possible to determine an absolute base year emissions value were included.

- **carbon*n* Climate Registry.** All relevant commitments available through the carbon*n* Climate Registry were evaluated, but it was not possible to determine absolute base year emissions figures based on publicly available information.

- **Climate Initiatives Platform.** Cooperative initiatives that focused on implementation, and reported participation or membership of either country, were identified. However, the identified initiatives did not provide sufficient information to include concrete climate actions in the country-specific data set.

C.3.2 Determine suitability

Once all available climate actions were collected, their suitability for inclusion in the data set was further reviewed. At the most basic level, for a climate action to be considered for inclusion in the country-specific data set, it must be forward-looking and quantifiable, and provide sufficient information to enable its anticipated target year impact to be estimated in terms of emissions reduced. Thus,

most of the actions included in the two data sets are emissions reduction or renewable energy targets. As mentioned above, the data used were primarily CDP data because the necessary baseline emissions or renewable energy use figures required for basic estimation of the overall impact of an action are disclosed directly. This is not to suggest that other data sources for individual or cooperative climate actions do not collect this information, just that it is not made publicly available and, therefore, could not be reasonably acquired for development of this data set. Furthermore, calculation of more robust estimates for the impact of renewable energy targets is likely to require further development of a methodology that more clearly considers the additionality the target represents within energy systems. In its current construction, however, policymakers wishing to forecast national renewable energy supply can compare the available renewable energy consumption/production targets with their own national data to identify net impacts of these commitments.

For actors with multiple, overlapping commitments, the most relevant action was identified; this was generally the one covering the largest scope of emissions over the longest period. In cases where an actor had a more (or less) ambitious midterm target as well, it was factored into the projected impact of the climate action in 2020, 2030, and so on. For actors that reported multiple action types (e.g. absolute emission reduction, intensity emission reduction, renewable energy), it was necessary to exclude those that overlap, with a preference for absolute emissions reduction targets, which do not require additional conversion or estimation to reach an impact value in terms of GHG emissions. It was also necessary to exclude corporate emissions reduction targets that only cover scope 3 emissions, which cannot as easily be localized within national boundaries, as well as those that explicitly define their scope outside the targeted national boundary.

To determine which actions would be the focus of further analysis in the country data sets, actions were excluded from further consideration for the following reasons:

- **Superseded actions, after evaluating all actions by actor**
  - » For actors with multiple climate actions, near-term actions were excluded if a longer-term action was available. However, if there was a midterm action that was not merely a linear interpolation of the long-term action, both midterm and long-term actions were used to present more accurate projections.
  - » For actors with multiple action types – for example, an absolute emission reduction, an intensity emission reduction and a renewable energy commitment – the general approach was to focus on the absolute emissions reduction target covering the greatest scope of emissions and for the longest term. When no absolute emissions reduction target was available, an estimated absolute impact for intensity targets, or impact of renewable energy and electricity commitments in terms of tCO_2e, was calculated where sufficient information was present. In some cases, multiple targets were retained if there seemed to be a significant difference in the coverage described by the targets.
- **Coverage not relevant to user.** All actions whose coverage was not relevant to the country were excluded. This is not always obvious in the quantitative information provided, thus requiring evaluation of the qualitative responses provided in the various comment fields in the CDP corporate questionnaire.
- **Scope 3 actions.** The analysis was limited to scope 1 and 2 emissions reductions, and actions limited to a scope 3 emissions category were excluded. Those that included scope 3 emissions in addition to scope 1 and 2 emissions were included, but required additional calculation to remove the impact of scope 3 emissions (see below).
- **Incomplete/incorrect information.** This primarily refers to instances where it is not possible to calculate an absolute emissions value. It may also include emissions reduction targets that cover less than 100% scope but do not specify where the action applies, or other instances where the information provided is unclear or seems incorrect.
- **Companies not based in the United States (for the United States data set).** It was necessary to remove companies not based in the United States from the United States data set because disaggregating the global impact of all actions from companies that disclose emissions in the United States would have required evaluation of more than 1,700 actions. Given the time constraint, the

analysis was limited to United States–based companies. In the future, integration of non–United States companies can be envisaged based on available information.

C.3.3 Categorize climate actions

Actions were categorized by the following fields referenced in the guide:

- **Action.** As most of the data were collected through CDP disclosure platforms, which ask about active targets, all items were defined as actions.
- **Geographic coverage.** Actions were defined by whether they were city- or region-wide, or limited to their local or regional government area. For companies, actions were listed as covering global corporate operations, unless more specific coverage was identified.
- **IPCC (sub)sector(s) targeted.** The default sector for most emissions reduction or renewable energy actions was "energy", unless buildings or transport were explicitly mentioned in comments for the target. Actions reported by companies engaged in certain Global Reporting Initiative business activities were assigned to the "industrial processes and product use" sector. Deforestation actions were assigned to the "agriculture, forestry, and other land use" sector, and waste diversion was assigned to the "waste" sector.
- **Action type.** The data set for each country includes
  - absolute emission reduction
  - intensity emission reduction
  - renewable energy
  - deforestation
  - emission reduction relative to another scenario.

C.3.4 Calculate target year emissions and impact

Next, anticipated target year emissions and impact were calculated. Each action type required its own method for calculation:

- **Target year emissions and impact for absolute emissions reduction targets.** Anticipated target year emissions for absolute reductions were calculated using the provided base year emissions and the target percentage reduction. Impact was calculated by subtracting the target year emissions from base year emissions.
- **Absolute emissions impact for intensity emissions reduction targets.** The anticipated target year emissions could only be estimated for intensity targets that provided additional information in the comments, allowing an absolute value to be calculated. Additionally, companies that report their intensity target will likely see an increase in absolute emissions. Their target year emissions and impact were adjusted to reflect this anticipated result.
- **Conversion of renewable energy actions to $MtCO_2$ impact value.** Impact for renewable energy targets was calculated by converting the anticipated increase in renewable electricity (MWh) to emissions reduced (tCO_2) using the current grid emission factor, based on IEA data for each country. However, this assumption is not conservative, and further work should be done to supplement it. As currently done, purchase of renewable energy can result in no additional renewable energy being brought to the grid, but simply in a reallocation of existing renewable energy to certain consumers. Although providing a market signal, this is still considered insignificant in the face of other costs to significantly affect new renewable energy capacity. As such, the current method provides the most optimistic emissions reductions that can be achieved by given commitments. A different method needs to be devised to provide the lower-bound, conservative estimate of emissions reductions from corporate renewable energy targets. A method is also needed to include and calculate the impact of renewable fuel use and subnational renewable targets, which were not included in the sample data set.
- **Removal of estimated proportion of scope 3 emissions from impact.** For corporate targets including some scope 3 emissions, these emissions were removed from the anticipated target year emissions before calculating impact. This was done by determining the percentage that scope 3 emissions represent of the current emissions covered by the target. Emissions equal to

this percentage were then removed from the corresponding anticipated impact value.

- **Zero deforestation commitments.** Following the guide, zero deforestation commitments do not result in any emissions and do not require conversion to tCO_2e.

C.3.5 Disaggregate impact

Next, the local impact of global targets was estimated by using the distribution of current reported emissions:

- **Calculate proportion of associated scope in user's country.** Using current scope 1 and 2 (location-based and market-based) emissions by country, it was possible to determine the current percentage of a company's emissions that are reported within the borders of the user country.

- **Multiply global impact of target by corresponding percentage of emissions in user's country.** By applying this percentage to the anticipated global impact, it was possible to estimate the localized impact in the user's country, assuming that the emission reduction is proportionately distributed.

C.3.6 Project linear impact to 2020, 2030, and so on

For all suitable climate actions, further analysis was conducted to determine their anticipated impact if achieved, and to project their impact to 2020, 2030, and beyond. Projections of the impact of actions past the target year, in line with a variety of potential scenarios (e.g. no additional action, same level of ambition moving forward, more/less ambition) and future global and local impacts for continued action, were estimated. A caveat is that the further projections go beyond the target year, the less accurate they are likely to be. For actors with midterm and long-term targets, impacts are split across the two targets in a "best fit" progression.

As the overall impact of an action will not be determined in the target year alone, more attention should be paid to the actor's anticipated implementation or "progress pathway" for individual actions. Knowing whether an actor anticipates that their action will follow a linear, logarithmic, exponential, variable, sporadic or even uncertain progression, or a progression conditional upon the realization of other variables (e.g. a desired percentage of economic growth), would allow more informed assumptions and accurate estimates of the overall potential impact of an action. It would also help to contextualize annually reported progress information.

C.3.7 Additional information

- **Optional information on progress monitoring.** The policy of the data provider for monitoring progress was noted.

- **Accuracy indication.** If many assumptions were made to calculate the anticipated impact, these were noted with a brief explanation. Additional internal consistency checks can confirm that key data points have been entered correctly. This is especially important for confirming the base year emissions covered by a reduction target, because these values are used to calculate the potential impact of the action.

- **Likelihood.** The likelihood of corporate climate actions was calculated by reviewing the currently reported progress of the action, as well as the past performance of similar actions by the same actors. These two indicators were analysed independently and then combined with equal weight to assign a likelihood score to the action.

  Current progress is reported to CDP as a percentage of the target achieved over the percentage of time completed. This ratio was used to indicate the likelihood that the target would be completed on time. For example, consider a target that has reached its halfway point (i.e. 50% of time complete). If this target were also 50% complete in terms of its emissions reduction or renewable energy goal, the ratio would be 50/50, and one point would be added to its likelihood score. In contrast, if it were only 25% complete, the ratio would be 25/50, and a half point would be added to its likelihood score. Targets with ratios higher than 1 (e.g. 75/50) are capped at 1. This approach simplifies emissions reductions to a linear pathway, which may not be the case in reality. However, more specific assessments are not possible because of insufficient granularity of data.

  The past performance of an actor was determined by comparing the number of

past actions that were completed either early or on time with the number of targets that reached their target end date plus those completed early (to cap the performance score at 1). For instance, consider a company that has reported four targets as successfully completed, with two of the four completed early. Additionally, they have reported that three targets have reached their target end date (i.e. 100% complete in time). This means that the ratio of the company's past performance is four achieved targets to five targets completed early or on time. As a result, 4/5 = 0.8 point is added to their likelihood score.

The overall likelihood was then calculated by adding the past and present performance scores together. As each score has a maximum value of 1, the sum of both scores is divided by 2, with the resulting decimal understood as the percentage of likelihood between 0 and 100. Based on these scores, different levels of likelihood were assigned to individual actions (Table C.1).

Although past performance may be an important indicator of future success, many other aspects of an actor's approach to sustainability could be incorporated into a more advanced likelihood indicator, such as governance, use of an internal carbon price, and recent investments. Research on this topic is currently under way and will be incorporated into future iterations of the likelihood indicator.

- **Overlap.** This refers to any information used to identify situations where there may be overlap between anticipated impacts. It could be overlap between the impact of a municipal action on a regional action, or an individual actor that has overlapping commitments that were unique enough to include in the data set but may not be entirely independent. The country data sets only indicate where overlap may be present between individual actions. The guide provides a more detailed approach for interpreting various scenarios where actions overlap. Improving the accuracy of how overlap is calculated and integrating it into country-specific climate action data sets is a significant challenge in these exercises.

TABLE C.1

Steps where stakeholder participation is recommended in the impact assessment

Score range	Likelihood
>87.5–100	Virtually certain
>75–87.5	Very likely
>62.5–75	Likely
>50–62.5	More likely than not
>37.5–50	About as likely as not
>25–37.5	Unlikely
>12.5–25	Very unlikely
0–12.5	Exceptionally unlikely
Unable to calculate past or current performance score	Unknown
Target reported 100% achieved	Complete
100% complete in time, but incomplete in achievement	Not achieved – X% complete

Additionally, development of an approach to normalize multiple emissions reduction targets to a holistic actor-level target could improve and simplify understanding of target overlap in certain circumstances.

C.4 Overview of existing global data sets

There are several major sources of data on non-state and subnational actions, such as the Global Climate Action portal, the Covenant of Mayors, the carbon*n* Climate Registry, CDP and the Climate Initiatives Platform (see Appendix A). Some pertain to individual actions made by one type of actor, whereas others include a wide variety of initiatives, ranging from specific actions to broad commitments from all kinds of actors. This scoping exercise was originally conducted during the first phase of development of the ICAT series of guidance documents in July 2017; descriptions and figures were updated in May 2019.

C.4.1 Global Climate Action Portal (formerly called NAZCA)[68]

The UNFCCC Global Climate Action portal, which is mentioned in the Paris Decision text, aggregates both individual and cooperative climate actions by non-state and subnational actors.[69] All Global Climate Action portal actions are required to be forward-looking, quantifiable and trackable, but otherwise fall into a wide range of themes, including land use, oceans and coastal zones, water, human settlements, transport, energy, and industry. As a data aggregator, the portal draws from multiple sources[70] and presents basic descriptions of actions reported through its data providers, with some contextualizing details about the stakeholders taking action.

As of May 2019, there were more than 19,947 actions on the portal from 12,396 stakeholders: 9,378 cities, 2,431 companies, 363 investors, 126 regions and 98 civil society organizations. Of these, 9,612 are "individual actions" that are unique to their associated actor, and 10,335 are "cooperative actions". These are classified under one or more themes, such as emission reduction, energy access and efficiency, renewable energy, resilience, transport, building, forest, and innovation. The current geographic distribution of commitments on the portal heavily favours developed countries, specifically in North America or Europe. While it is currently the most comprehensive collection of data on non-state and subnational climate actions, and is officially recognized as part of the process outlined in the Paris Agreement, it provides basic descriptions of the actors and actions that are generally available in more detail elsewhere. However, there are plans to enhance the Global Climate Action portal with additional contextualizing information and a basic "tracking" capability.

C.4.2 Climate Initiatives Platform[71]

A database of 259 initiatives managed by UNEP DTU Partnership, the Climate Initiatives Platform (CIP) provides the most comprehensive collection of information on international climate initiatives. CIP collects background information on each initiative, which is organized into the following categories:

- general – includes link to website, geographical coverage, type of initiative and lead organization
- description – includes description, goals and activities
- monitoring and impacts – includes several questions on objectives, planning and quantitative progress tracking
- participants – includes information on participants, funders and other involved organizations
- theme – categorized into one of 21 themes.

C.4.3 Covenant of Mayors for Climate and Energy[72]

An initiative with 9,664 signatories (as of May 2019), the Covenant is a substantial database of cities' commitments and climate action plans. New signatories pledge to reduce CO_2 emissions by at least 40% by 2030 (earlier signatories may have less ambitious targets), and to adopt an

[68] https://climateaction.unfccc.int

[69] UNFCCC (2015).

[70] CDP, carbon*n* Climate Registry, The Climate Group, the Investors on Climate Change, the United Nations Global Compact, the Covenant of Mayors, the Climate Bonds Initiative and the UNEP Climate Initiatives Platform.

[71] https://climateinitiativesplatform.org

[72] www.covenantofmayors.eu

integrated approach to tackling mitigation and adaptation in their cities. It collects a wealth of data from its signatory cities, including relevant background information, descriptions of reduction and adaptation commitments, a baseline emissions inventory, plans for achieving commitments, and monitoring and implementation progress. The Covenant primarily covers European cities, with the greatest number of commitments coming from Italy and Spain. There are a handful of cities reporting from across the Mediterranean in North Africa and the Middle East, as well as in the Caribbean and central Asia.

C.4.4 carbon*n* Climate Registry[73]

The carbon*n* Climate Registry (cCR) is a reporting platform for local and regional governments run by ICLEI (Local Governments for Sustainability). As of May 2019, 1,066 cities, towns, states and regions reported through the cCR on four key reporting areas:

- city information, such as population, census year, population forecast, city budget and predominant economic sector
- commitments, including boundary, type, target value, base year, target year and year of adoption
- emissions performance
- actions, such as type of actions, boundary, sectors, finance, year of adoption, quantified achievements of the action, and co-benefits.

With 1,982 climate change mitigation and energy targets reported, cCR is a valuable data source with its global reach and emerging coverage in developing countries. A higher level of information is provided by local and subnational governments in the United States, Europe, Japan, Tanzania, Mexico and Thailand. Recently, ICLEI and CDP have partnered to present one unified process for subnational climate action reporting.

C.4.5 CDP[74]

More than 7,000 companies, 620 cities, and 120 states and regions (via the Compact of States and Regions, co-run with The Climate Group) disclosed environmental data through CDP as of May 2019, making the CDP disclosure platform a rich source of information on how companies and subnational governments are driving environmental change. The data collected by CDP include details of emissions reductions, renewable energy, energy efficiency, deforestation, water resilience, carbon pricing commitments and targets. Additionally, companies, cities, states and regions report information on their emissions inventories, active climate actions, and long-term approach to sustainability through Climate, Water and Forest questionnaires. CDP's geographic coverage is greatest in regions such as North America, Western Europe and Japan, and is growing stronger in Brazil, China, South Korea, India, Turkey, Australia and South Africa.

[73] https://carbonn.org

[74] www.cdp.net

Appendix D: Sources of information for different sectors

This appendix provides a list of data sources for sectors and subsectors. These sources may be consulted if appropriate national data are not available when users are estimating the potential impact of actions and policies in terms of emissions reductions.

D.1 Agriculture, forestry and other land use sector

- FAO database (FAOSTAT) (www.fao.org/faostat/en/#home)
- Other relevant FAO resources for information on forest cover; forest carbon stock; and reforestation, afforestation and deforestation rates:
  - *Global Forest Resources Assessment 2015* (www.fao.org/3/a-i4808e.pdf)
  - *State of the World's Forests 2016* (www.fao.org/3/a-i5588e.pdf)
- World Bank open data covering several metrics, including forest cover, agriculture and food production (http://data.worldbank.org/indicator)
- United States Environmental Protection Agency global GHG emissions data, covering emissions by gas, sector and country, as well as trends (www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data)
- United Nations World Population Prospects (https://population.un.org/wpp/)
- Additional information on methods and tools:
  - IPCC guidance on forest land – provides methods for estimating carbon stock changes, and GHG emissions and removals associated with changes in biomass and soil organic carbon on forest lands and lands converted to forest land (www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Chp3_2_Forest_Land.pdf)
  - Tools to calculate emissions reductions from reforestation (www.environment.gov.au/climate-change/government/emissions-reduction-fund/publications/forest-tools-and-data)
  - Greenhouse Gas Protocol *Mitigation Goal Standard* – chapter on land sector accounting (https://ghgprotocol.org/mitigation-goal-standard)
  - *GHG Protocol Agricultural Guidance* (http://ghgprotocol.org/node/602/%20)

D.2 Energy supply sector

- IEA statistics, which include indicators such as carbon intensity of electricity generated with oil, gas and coal (www.iea.org/statistics)
- IEA's *World Energy Outlook 2018*, including estimates of energy demand and renewable energy under the New Policies and 450 scenarios (www.iea.org/weo2018)
- IEA's *Energy Technology Perspectives 2017* report, detailing energy transition pathways, including relevant data about energy demand and projected CO_2 emissions (www.iea.org/etp)
- International Renewable Energy Agency (IRENA) REmap Energy Demand and Supply by Sector (https://irena.org/Statistics/View-Data-by-Topic/Energy-Transition/REmap-Energy-Demand-and-Supply-by-Sector)
- IRENA Data & Statistics, which includes country data and an avoided emissions calculator (https://irena.org/Statistics)
- IPCC Emission Factor Database (www.ipcc-nggip.iges.or.jp/EFDB/main.php)
- World Bank Open Data, covering several metrics, including renewable energy consumption and renewable electricity output (http://data.worldbank.org/indicator)

- *Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects* (www.wri.org/publication/guidelines-quantifying-ghg-reductions-grid-connected-electricity-projects)
- IPCC guidelines on "Energy" (www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html)

D.3 Industry sector

- IPCC Emission Factor Database (www.ipcc-nggip.iges.or.jp/EFDB/main.php)
- IEA's technology roadmap for the chemical industry (https://dechema.de/en/industrialcatalysis.html)
- United Nations World Population Prospects (https://population.un.org/wpp/)
- Additional information on methods and tools:
  - IPCC guidelines on *Industrial Processes and Product Use* (www.ipcc-nggip.iges.or.jp/public/2006gl/vol3.html)
  - World Business Council for Sustainable Development Cement Sustainability Initiative, containing data on cement and a detailed roadmap for the sector (http://wbcsdcement.org)
  - Greenhous Gas Protocol emissions calculation tools (http://ghgprotocol.org/calculation-tools#sector_specific_tools_id)

D.4 Buildings sector

- IEA's *World Energy Outlook 2018* with data trends for buildings emissions by fuel and final energy consumption by end use (www.iea.org/weo2018)
- IEA's *Energy Technology Perspectives 2017*, including estimates about floor area growth and floor area per household, and buildings' energy consumption (www.iea.org/etp)
- IRENA *Roadmap for a Renewable Energy Future*, with data on share of modern renewable energy in building energy use (www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_edition_report.pdf)
- IPCC Emission Factor Database (www.ipcc-nggip.iges.or.jp/EFDB/main.php)
- *GHG Protocol Scope 2 Guidance* (http://ghgprotocol.org/scope_2_guidance)
- IPCC guidelines on "Energy" (www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html)

D.5 Transport sector

- IEA's *World Energy Outlook 2018*, which provides information on trends in energy demand by source in the transport sector and the renewable energy outlook for the transport sector (www.iea.org/weo2018)
- IEA's *Energy Technology Perspectives 2017*, which includes information on trends in energy demand from the transport sector, emissions intensity of new electric vehicles, and developments in passenger and freight transport (www.iea.org/etp)
- IRENA *Roadmap for a Renewable Energy Future*, with information on the renewable energy share in transport for key countries (www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_edition_report.pdf)
- IPCC Emission Factor Database (www.ipcc-nggip.iges.or.jp/EFDB/main.php)
- World Bank Open Data, covering several metrics (http://data.worldbank.org/indicator)
- Additional information on methods and tools:
  - IPCC guidelines on "Energy" (www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html)
  - International Council on Clean Transportation *Transport Roadmap 2012* – provides an Excel-based tool to assess emissions from transport and estimates changes in actual transportation activity by country and region, based on changes in forecasts of population, GDP and relative fuel (https://theicct.org/transportation-roadmap)
  - SloCat (Partnership on Sustainable, Low Carbon Transport) Transport Greenhouse Gas Emissions Research Briefs (http://slocat.net/node/1538)
  - Paris Process on Mobility and Climate *An Actionable Vision of Transport*

Decarbonization: Implementing the Paris Agreement in a Global Macro-Roadmap Aiming at Net-Zero Emissions Transport (www.ppmc-transport.org/wp-content/uploads/2016/04/Global-Macro-Roadmap-Consultation-Draft-March-2017.pdf)
  - Greenhouse Gas Protocol calculation tool for emissions from transport or mobile sources (http://ghgprotocol.org/calculation-tools#cross_sector_tools_id)

D.6 Waste sector

- UNEP and International Solid Waste Association *Global Waste Management Outlook* (www.iswa.org/nc/home/news/news-detail/browse/1/article/press-release-global-waste-management-outlook-gwmo/109)

- IPCC report on waste management (www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg3-chapter10-1.pdf)

- IPCC Emission Factor Database (www.ipcc-nggip.iges.or.jp/EFDB/main.php)

- Additional information on methods and tools:

  - IPCC guidelines on "Waste" (www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html)
  - *Protocol for the Quantification of Greenhouse Gas Emissions from Waste Management Activities* (https://ghgprotocol.org/sites/default/files/Waste%20Sector%20GHG%20Protocol_Version%205_October%202013_1_0.pdf)
  - California's landfill methane emissions calculation tool (www.arb.ca.gov/cc/protocols/localgov/localgov.htm)

Abbreviations and acronyms

AFOLU	agriculture, forestry and other land use
BAU	business as usual
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DTU	Technical University of Denmark
FAO	Food and Agricultural Organization of the United Nations
GDP	gross domestic product
GHG	greenhouse gas
Gt	gigatonne
GW	gigawatt
ha	hectare
HFC	hydrofluorocarbon
ICAT	Initiative for Climate Action Transparency
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
J	joule
kJ	kilojoule
kt	kilotonne
kWh	kilowatt-hour
L	litre
Mha	mega hectare
Mt	megatonne
MW	megawatt
MWh	megawatt-hour
NAMA	nationally appropriate mitigation action
NDC	nationally determined contribution
NGO	non-governmental organization
t	tonne
TWG	Technical Working Group
TWh	terawatt-hour
UNEP	United Nations Environment Programme
UNEP FI	United Nations Environment Programme Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
WRI	World Resources Institute

Glossary

Absolute value	The non-negative value of a number without regard to its sign. For example, the absolute value of 5 is 5, and the absolute value of –5 is also 5.
Assessment boundary	The scope of the assessment in terms of the (sub)sectors and GHG emissions included in the assessment
Assessment period	The time period over which GHG impacts resulting from a policy are assessed
Assessment report	A report, completed by the user, that documents the assessment process, methods and results relating to the impact of non-state and subnational action
Current policy scenario	A scenario that represents the events or conditions most likely to occur in the presence of the current mix of policies and actions
Ex-ante assessment	The process of assessing expected future impacts of non-state and subnational actions, or national policies and actions (i.e. a forward-looking assessment)
Ex-post assessment	The process of assessing historical impacts of non-state and subnational actions, or national policies and actions (i.e. a backward-looking assessment)
Expert judgment	A carefully considered, well-documented qualitative or quantitative judgment made in the absence of unequivocal observational evidence by a person or persons who have a demonstrable expertise in the given field.[75] Users can apply their own expert judgment or consult experts. Expert judgment can be strengthened through expert elicitation methods to avoid bias.
Impact assessment	The qualitative or quantitative assessment of impacts resulting from non-state and subnational actions, or from national policies and actions. This can be conducted either ex-ante or ex-post.
Independent non-state and subnational actions	Non-state and subnational actions that do not interact with each other or with national policies, such that the combined effect of implementing them together is equal to the sum of the individual effects of implementing them separately
Indicator	A metric that can be estimated and monitored over time to understand the impact of non-state and subnational actions, and track changes towards targeted outcomes
Intended impacts	Impacts that are intentional based on the original objectives of the policy or action. In some contexts, these are referred to as primary impacts.
Jurisdiction	The geographic area within which an entity's (such as a government's) authority is exercised

[75] IPCC (2006).

National policy or action	An intervention taken or mandated by a national government, which may include laws, regulations and standards; taxes, charges, subsidies and incentives; information instruments; voluntary agreements; implementation of new technologies, processes or practices; and public or private sector financing and investment
Negative impacts	Impacts that are perceived as unfavourable from the perspectives of decision makers and stakeholders
Non-state actor	Any actor other than a national or subnational government
Non-state commitments	Planned non-state action that has been publicly announced but, unlike non-state mitigation action, has not yet been implemented
Non-state mitigation action	Any kind of activity that is directly or indirectly aimed at reducing GHG emissions and that is led by non-state actor(s)
Overlapping non-state and subnational actions	Non-state and subnational actions that interact with each other or with national policies and that, when implemented together, have a combined effect less than the sum of their individual effects when implemented separately. This includes both actions that have the same or complementary goals (such as national and subnational energy efficiency standards for appliances), and counteracting or countervailing actions that have different or opposing goals (such as a national fuel tax and a subnational fuel subsidy).
Positive impacts	Impacts that are perceived as favourable from the perspectives of decision makers and stakeholders
Qualitative assessment	An approach to impact assessment that involves describing the impacts of a policy or action on selected impact categories in numerical terms
Quantitative assessment	An approach to impact assessment that involves estimating the impacts of a policy or action on selected impact categories in quantitative terms
Reinforcing non-state and subnational actions	Non-state and subnational actions that interact with each other or with national policies and that, when implemented together, have a combined effect greater than the sum of their individual effects when implemented separately
Specific impact	A specific change that results from a policy or action
Stakeholders	People, organizations, communities or individuals who are affected by, and/or who have influence or power over, a policy
Subnational actor	Any form of government that is not a national government
Subnational commitments	Planned subnational action that has been publicly announced but, unlike subnational mitigation action, has not yet been implemented
Subnational mitigation action	Any kind of activity that is directly or indirectly aimed at reducing GHG emissions and that is led by subnational actor(s)
Sustainable development impacts	Changes in environmental, social or economic conditions that result from a policy or action, such as changes in economic activity, employment, public health, air quality and energy security

Uncertainty

(1) Quantitative definition: Measurement that characterizes the dispersion of values that could reasonably be attributed to a parameter. (2) Qualitative definition: A general term that refers to the lack of certainty in data and methodological choices, such as the application of non-representative factors or methods, incomplete data or lack of transparency.

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