NewClimate Institute, World Resources Institute, CDP, The Climate Group

Non-State and Subnational Action Guide

Integrating the impact of non-state and subnational mitigation actions into national greenhouse gas projections, targets and planning[1]

June 2019

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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 also go beyond them to further raise the ambition. It is therefore necessary that non-state and subnational actors are fully integrated into the national vision to ensure buy-in and to 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 to scale up their climate actions.[2] Globally, there is an acceleration of non-state (e.g. companies or investors) and subnational action (e.g., cities, states and regions) with a growing number of commitments and initiatives being announced and implemented, which can have a direct impact on national emissions trajectories, national policy implementation and the achievement of national targets. [3],[4] 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).[5] A better understanding of climate actions at different scales and by different actors in a country can help develop realistic and comprehensive targets, and effective policy planning to achieve these targets.

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 level). 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 which is not on the national level, such as cities, states, provinces and regions.

The term 'collaborative initiative' describes a joint undertaking of various actors, and can include government bodies, also from the national level. International collaborative initiatives involve actors from different countries. For example, the Climate and Clean Air Coalition is an international collaborative initiative with several national government partners, finance institutions, NGOs and many others.

Below are three example actors that were included in the practical applications for this guide:

[2] UNFCCC 2015, par. 135

[3] For example, Hsu et al. 2018, Global Covenant of Mayors for Climate and Energy 2018

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

[5] Some national governments include state-level action in their national projections, for example, Canada and the United States.

India pilot: WRI India analyzed the targets of different companies in the industrial sector, including various cement producers, to understand how they relate to India's national GHG emissions targets.

United States of America pilot: The initiative America's Pledge used the guide to aggregate mitigation efforts from its member cities, states and companies in the United States to understand their impact on US emissions projections.

Mexico pilot: Grupo Ecológico Sierra Gorda applied the methodology in Mexico to understand how the "Subnational mitigation actions for forest regeneration and the implementation of planned grazing mitigation action" compares to national emissions and national sector policies.

More detail on the definition and links to databases of non-state and subnational action is available in chapter 3.1.

National governments may be unaware of the various mitigation actions undertaken by companies, investors, cities, states and regions; unsure about the extent to which those actions help achieve national targets or go beyond them; or unable to reflect the impact of those actions in national greenhouse gas (GHG) projections, target setting and planning. Monitoring of historic GHG emissions automatically, though implicitly, reflects all emissions reductions efforts undertaken within a country, including those not driven by national governments.[6] But, explicit consideration of non-state and subnational mitigation actions can lead to accurate and comprehensive projections, and inform effective planning and policies. 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.

Further, 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 shall report on progress made in implementing and achieving NDCs.[7] However, current policy projections that help estimate future emission pathways often focus on national policies and do not explicitly account for other actions.

National government, subnational and non-state action together can lead to ambitious emission reductions above and beyond those achieved by national policies alone, and mutually reinforce each other.[8] 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. Additionally, a comprehensive understanding of how non-state and subnational actions fit within overall national targets and policies can help build realistic emission projections that consider the potential impact of intended national actions along with those of non-state and subnational actions.

However, policy makers face many challenges when attempting to identify, quantify and integrate the impact of non-state and subnational action into their own models and GHG emission projections and planning. These include data availability and data gaps, lack of harmonised data and common indicators, uncertainty about the attainment of targets, and converting non-state and subnational actions and national policies into common metrics, among others. This document aims to offer solutions to these

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

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

[8] UN Environment 2018, UNEP 2016a

challenges by providing information to policymakers and other stakeholders to carry out assessments of the impact of non-state and subnational climate action.

1.2 Purpose of the guide

The purpose of the guide is to assist national policymakers and analysts in determining the impact of non-state and subnational actions and commitments. This knowledge can inform and improve the development of future national GHG trajectories and climate relevant policies. The methodology contained in this guide (henceforth referred to as "methodology") provides steps for users to identify, quantify, aggregate, and integrate the impact of non-state and subnational mitigation action into mitigation assessments, projections and scenarios which may support policy development, policy evaluation and target setting.

Application of the methodology may provide additional benefits. Improving awareness and understanding of the emission reduction potential from non-state and subnational action and commitments may boost national governments' confidence that current targets can be met, and may support development of more ambitious national mitigation targets. The guide may also improve coordination and communication between national, non-state and subnational actors for efficient implementation and aligned decision-making. This will help national governments set informed targets and put in place the right policies to enable action and ambition by non-state and subnational actors. It can also be used to assess the impact of voluntary non-state and subnational action on specific policy targets, for example, a national energy efficiency scheme, renewable energy targets or the electric vehicle uptake. It may offer insights into whether non-state or subnational policies are effective or are likely to enjoy a broad mandate if enacted at the national level. Another side effect can be learnings on innovative policies implemented at subnational level, which, through a detailed analysis via this guide can be well understood and potentially translated to or replicated at national level.

This forward-looking guide is fundamentally different from existing national GHG related guidance in the context of reporting under the United Nations Framework Convention on Climate Change (UNFCCC)[9], which covers past/current emissions by all actors within a country's jurisdiction including non-state and subnational actors. It is not intended as a means to attribute achieved emissions reductions to specific non-state or subnational actors. Instead, the guide helps to determine the potential of existing (and pledged) non-state and subnational action on GHG emissions, which, if realized, will be reflected as reductions in emissions over time in the national GHG inventory.

By applying the methodology to the national or sectoral context, it can help policymakers answer the following questions, among others:

- What non-state and subnational climate actions are occurring in the country?
- Which of those actions 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?

[9] 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

- Which of these actions reinforce existing national and sectoral policies, which go beyond, and by how much?
- How can non-state and subnational action contribute to meeting or overachieving NDC mitigation targets?
- How can non-state and subnational action enable setting new, more ambitious NDC targets?
- What insights can an analysis of potential impacts from non-state and subnational action provide for future national and international policies?

1.3 Intended users

This guide is intended primarily for national government agencies, research institutions and non-governmental organizations (NGOs), but 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 agencies**: Identify, quantify and integrate the impact of non-state and subnational mitigation action 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 action in comparison to national policies or the NDC, and provide support to decision makers.
- **Non-state and subnational actors**: Identify and assess the mitigation potential of non-state and subnational mitigation action 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 this guide to improve their understanding of actions being taken by non-state and subnational actors, and identify sectors where more action is occurring. A university undertaking national emissions projections may want to use this guide to improve emission scenarios by incorporating the impact of subnational and non-state actions.

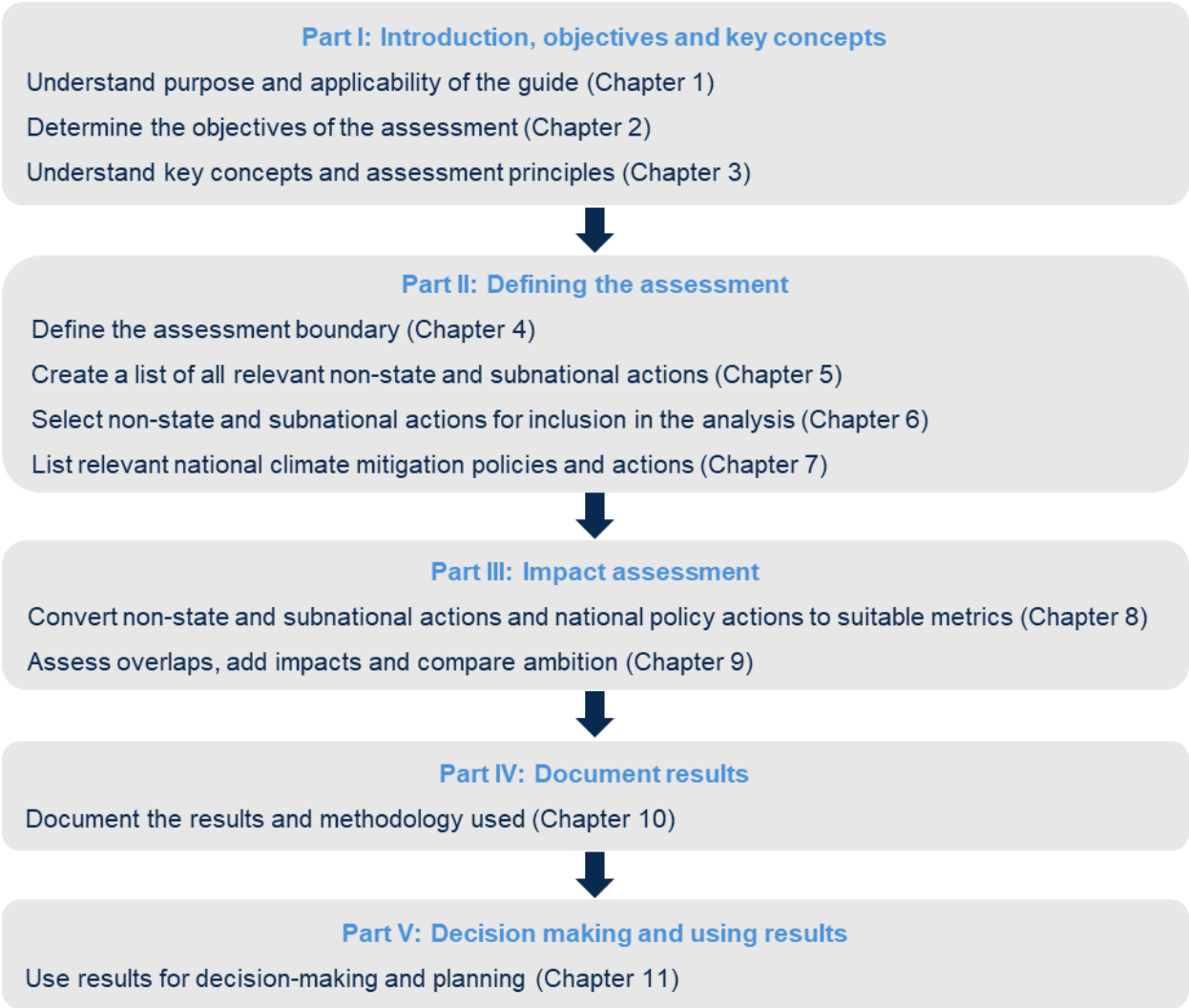
1.4 Scope and applicability of the guide

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. Part IV covers reporting of results and Part V discusses the use of assessment results for decision making.

It details a general process for users to follow when conducting an assessment, but it does not prescribe specific calculation methodologies, tools or data sources. Chapter 8 provides more information on

possible methods that can be used to determine emission reduction potentials for specific non-state and subnational actions.

Figure 1.1: Overview of steps in the guide



In order to respond to various user objectives, the guide provides tailored options outlined in a stepwise approach (Figure 1.1). This allows users to skip through parts that are less relevant for their analysis. The guide also contains examples and case studies that illustrate its applicability.

While this guide suggests a specific methodology for conducting the assessment, users may consider an alternative order of steps. For example, users can apply Chapters 0 and 7 in any order. Changing the order of steps should only be considered on a case-by-case basis depending on the objective of the assessment.

The guide focuses on subnational and non-state 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 those with broader sustainable development benefits including emissions reduction (Box 1.2: Sustainable development impacts of non-state and subnational actions). For example, collaborative international initiatives to improve air quality also reduce GHG emissions. Adaptation is

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

Box 1.2: Sustainable development impacts of non-state and subnational actions

Sustainable development impacts describe 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 for health, or rural job creation and enhanced agriculture exports, which can further help with poverty reduction. For more information on how to assess these broader impacts, refer to the ICAT *Sustainable Development Methodology*.

The guide is intended for ex-ante (forward-looking) assessments to understand the expected future impacts of non-state and subnational action. Ex-post assessments are not included in this guide, although they can also be helpful for guiding future plans and/ or tracking the performance of past actions. The forward-looking approach means that the methodology can be applied on an ongoing basis as new non-state and subnational actions are implemented, and more information becomes available.

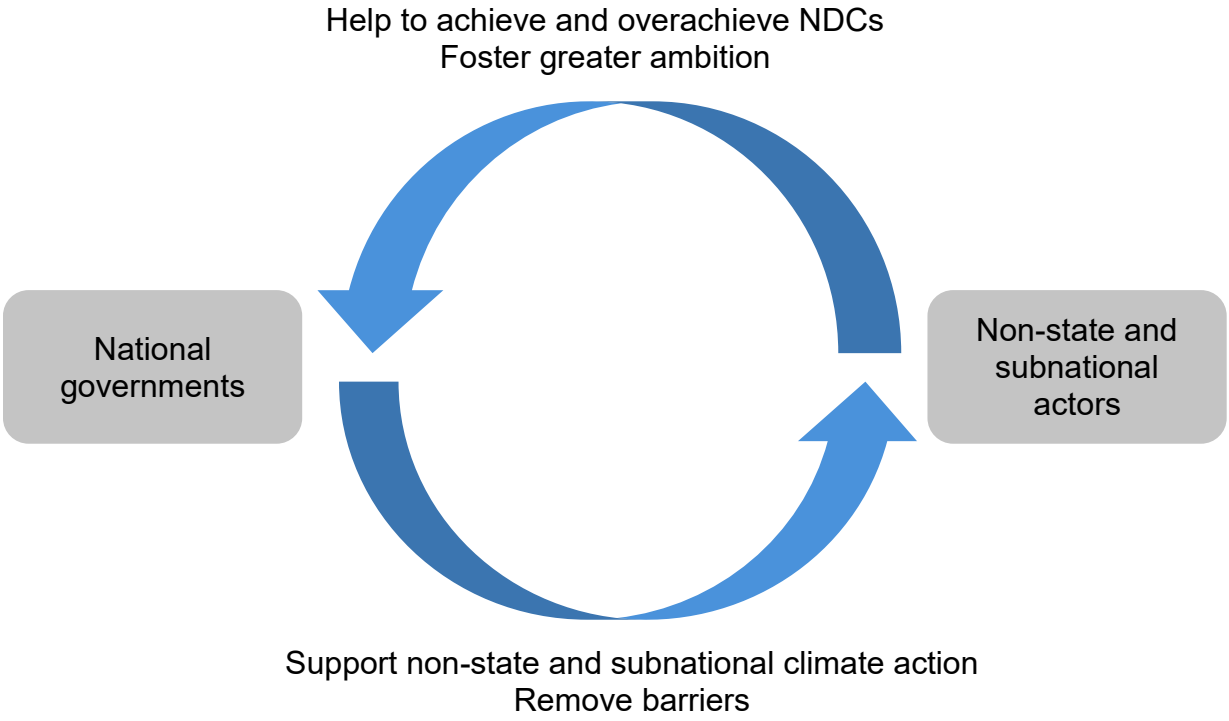
The guide is framed by the global context that increasingly recognizes and promotes interaction between national governments and non-state and subnational actors. For example, the Paris Agreement explicitly encourages governments to work more closely with these actors.[10] The guide aims to support and 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 (voluntary) non-state action within their country?
- Which 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 action 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 action. At the same time, when non-state and subnational actors take action, they contribute to meeting national goals.

[10] 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* that represent recommended steps to follow when assessing and reporting impacts. Key recommendations are intended to assist users in producing credible impact assessments that pursue high quality and are based on the principles of relevance, completeness, consistency, transparency, comparability and accuracy.

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

Users that want to follow a more flexible approach may choose to use the guide without adhering to the key recommendations. The ICAT *Introductory Guide* provides further description of how and why key recommendations are used within the ICAT guidance documents, as well as more information about following either the "key recommendations" or "flexible approach" when using the guide. Refer to the *Introductory Guide* before deciding on which approach to follow.

1.6 Relationship to other ICAT guidance documents

This guide is part of the Initiative for Climate Action Transparency (ICAT) series of methodologies for assessing impacts of policies and actions, available at https://climateactiontransparency.org/icat-guidance. It is intended to be used in parallel with any other ICAT guidance documents that users choose to apply, including:

- Sector-level methodologies for assessing greenhouse gas impacts of policies and actions in the energy, transport, agriculture and forestry sectors

- Sustainable development methodology on how to assess the environmental, social and economic impacts of policies and actions
- Transformational change methodology on how to assess the transformational impacts of policies and actions
- Stakeholder participation guide on how to carry out effective stakeholder participation when designing and assessing policies and actions, as well as non-state and subnational action
- Technical review guide on how to review assessment reports, covering the impact of non-state and subnational actions, and greenhouse gas, sustainable development and transformational impacts

The series of ICAT guidance documents is intended to enable users that choose to assess the greenhouse gas 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 ICAT *Introductory Guide* for a more detailed description of how to apply the ICAT guidance documents in combination.

1.7 Process for developing the guide

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

The first draft was developed by the project team with inputs from a Technical Working Group. The Technical Working Group consisted of experts and stakeholders[11] from a range of countries identified through a public call for expressions of interest. The Technical Working Group contributed to the development of the technical content for 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 US – to ensure that it can be practically implemented.

This version of the guide was informed by the feedback gathered from that experience and includes case studies from those applications. Other parallel work that has also informed this version include the Global Covenant of Mayors 2018 Global Aggregation Technical Note[12] and the Data-Driven-Yale, PBL and NewClimate Institute's Global Climate Action from cities, regions and businesses report[13].

[11] Listed at www.climateactiontransparency.org

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

[13] For more information, please see https://datadrivenlab.org/wp-content/uploads/2018/08/YALE-NCI-PBL_Global_climate_action.pdf

ICAT's Advisory Committee provides strategic advice to the initiative. More information about the guide 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.

2. Objectives of Assessing the Impact of Non-State and Sub-national Action

This chapter provides an overview of objectives users may have in assessing the impacts of non-state and subnational climate actions. Determining 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 a tailored approach based on users' objectives for undertaking the assessment. It is a *key recommendation* to determine the objectives of the assessment at the beginning of the impact assessment process. Examples of objectives for assessing the impacts of non-state and subnational actions are discussed below. Box 2.1 includes specific objectives of practical applications of the guide. The chosen objective(s) will inform how the user applies various steps within the guide. Some objectives may only require aggregation while others may require further integration into national emissions trajectories such as projection models or scenarios. In practice, many objectives will require both bottom-up aggregation and integration into existing models and scenarios.[14] Analyses can be targeted, i.e. focusing on one or more aspects of non-state action (such as the impact of cement companies' voluntary targets on industrial sector emissions) or comprehensive, i.e. assessing impact of all non-state and subnational actions on national emissions.

Aggregating the impact of non-state and subnational action

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 considered in the assessment (see Chapter 3). Users can aggregate the impact, for example, to:

- Understand the landscape of non-state and subnational effort, e.g., the types of actions being undertaken and the type of actors that are involved (see Sections 4.1 and 4.3). This information can be utilized in a variety of ways, such as to determine opportunities for engagement with non-state and/or subnational actors, to promote new action or determine the extent of adoption of a policy/action among regional public and private non-state and subnational actors (e.g. cities, businesses) and thus the implicit mandate/consensus around types of actions.
- Determine the combined expected impact of all non-state and subnational actions in a country/sector. Although aggregation alone does not evaluate how this impact contributes to the national level. This can, for example, inform efforts to further encourage or strengthen such actions. Users can also tailor their assessments to focus on collective impact of specific types of actions or actors. For example, the guide can be used to learn about the collective impact of actions by local governments in the transport sector.

[14] Cf. America's Pledge 2018; Data-Driven Yale; NewClimate Institute; PBL 2018

Integrating the impact in emissions projections or targets and policy planning

Top-down integration is the process of incorporating the impact of non-state and subnational actions into national/sectoral projections and scenarios (see Chapters 3 and 0). Users can apply the methodology, for example, to:

- Determine the contribution of non-state and subnational action towards achieving the national/sectoral climate change target or NDC targets. Economy-wide or sectoral targets are achieved through policies and actions at multiple levels and through involvement from multiple actors. Users may want to assess the specific contribution of non-state and subnational actions in realizing the national target.
- Determine the level of national action needed to achieve the NDC target while taking into account the contribution of subnational and non-state action. Users can assess the gap between the impact of subnational and non-state action and the national targets. Policymakers and others can use this understanding to inform strategies and initiatives to bridge the gap. In instances where subnational and non-state action 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 toward enhanced ambition.
- Understand the potential of non-state and subnational action 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 target(s). Users for example may want to incorporate the impact of subnational renewable energy (RE) goals as they revise the national RE 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 action impacts the ambition set out in specific policies, for example, users can assess the extent to which non-state and subnational action contribute to a national policy to phase out HFCs.

Box 2.1: Examples of assessment objectives based on practical application

Fulfilling America's Pledge: How States, Cities, and Businesses Are Leading the United States to a Low-Carbon Future 2018: Comprehensive assessment of how cities, states and businesses are driving the United States toward a low-carbon future. The assessment combines both elements of sector specific bottom-up aggregation and integration into an integrated assessment model.

Piloting of this guide in India: Assess the GHG emission reduction impact from voluntary business commitments in the industrial (cement) sector in India. The analysis focuses on bottom-up aggregation.

Global Climate Action from Cities, Regions, and Businesses 2018: Assessment of the impact of cities, regions and businesses on global GHG emissions by 2030, including in 10 key countries. The assessment combines both bottom-up aggregation of individual commitments/ international cooperative initiatives and top-down integration.

Piloting of this guide in Mexico: Comparison of the impacts of a state-based nationally appropriate mitigation action in the agriculture and forestry sector to national targets. The analysis, conducted by the Grupo Ecológico Sierra Gorda, assesses the contribution of the NAMA to Mexico's nationally determined contribution and other national goals.

Depending on the selected assessment objective, users may skip through parts of the guide that are less relevant for their assessment. In some cases, alternative methods not discussed in the guide may also be applicable. For example, if a user would like to focus on aggregating the impact of city-level targets, they may instead consider applying the methodological approach used by the Global Covenant of Mayors in their annual aggregation assessment, which is targeted specifically at this kind on sub-nation actor and draws from typically available data in cities.[15] The results of that assessment, however, may be incompatible with the additional steps in this guide on integration into national projections and scenarios.

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

[15] See: Authors tbd. (forthcoming) Technical Note: Global Covenant of Mayors Emission Scenario Model.

3. Key Concepts, Steps and Assessment Principles

This chapter introduces key concepts contained in this guide, 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.

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 the UNFCCC, the terms, "*non-Party stakeholder*" or "*observer organization*" distinguish individual national government authorities that are signatories (party) to the Convention from other actors and groups of actors including entities within the United Nations system, intergovernmental organizations, and non-governmental organizations. Within the literature, and throughout the broader climate action community, many categorizations are used for individual actors as well as groups of actors. The term "*non-state actor*" is particularly common and may cover the broad landscape of actors including civil society, economic actors, and also subnational or sub-state actors. The Global Climate Action Portal 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 those at the level of nation, 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 these categories do not have clear boundaries and often overlap. Furthermore, collaborative efforts may involve actors from different categories, and may also include (national) governments.

For the purposes of this guide, the phrase "*non-state and 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, business, trade unions, and investors; civil society, and international organizations. Subnational actors include any form of government which is not a national government, such as cities, states, provinces and regions.

Non-state and subnational action

This guide is specifically focused on mitigation action, and uses the generic term "action" for all mitigation efforts by non-state and subnational actors. In that regard, non-state and subnational action is any kind of

activity that reduces GHG emissions, and is led by non-state and subnational actors[16]. This means that the guide also considers actions which may have other impacts but also reduce GHG emissions, for example through energy efficiency improvements, renewable energy expansion and other non-GHG actions. 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, and with or without national governments). Some actions can be legally binding, for example a state government setting a GHG emissions reduction target, while others are voluntary, e.g. a company committing to 100% renewables.

A huge variety of individual and collaborative actions exist (Table 3.1) 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: Examples of individual and collaborative actions

Individual actions
Non-state action
• Iberdrola, a Spanish utility, aims to reduce direct CO_2e emissions by 91% from 2007 to 2050 through increased energy efficiency and renewable energy installations • ACC, India (a cement company) aims to reduce operational CO_2e emissions intensity by 35% per tonne of product from 1990 to 2017 through increased energy efficiency • ANZ Bank of Australia issues green bonds worth USD 470 million for projects in renewable energy and energy efficiency in buildings • 3M sets an internal carbon price by 2017 • BNP Paribas sets aside EUR 100m for investment in start-ups working on innovative solutions for energy transition • Mahindra Lifespace Developers Limited (an Indian investor) aims to reduce operations CO_2e emissions intensity by 10% per square meter from 2012 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 is committed to reduce methane emissions from the oil and gas sector by 45% by 2025 • The Oriental Region of Morocco has pledged to increase the share of renewables for the community to 42% by 2020

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

- The state of California sets a goal to reduce petroleum consumption by cars and trucks by 50% by 2030
- Uppsala County in Sweden aims to reduce CO_2 emissions from government business travel, patient travel, and commuting by 10% by 2018 based on 2014

Collaborative action

- The RE100 initiative where a group of companies from different countries commits each to procure 100% of their electricity consumption from renewable energy[17]
- The CCAC Agriculture Initiative where several international organizations and countries aim at reducing methane and black carbon emissions from key agricultural sectors by sharing and implementing best practices[18]
- 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 (EBRD) and United Nations Environment Programme Finance Initiative (UNEP FI), aims to scale up energy efficiency financing and work with institutional and public financiers to deploy climate finance to clients

Source: UNFCCC's Global Climate Action Portal NAZCA. For more information, see: http://climateaction.unfccc.int/

Given the wide range of quality seen in these actions, it is important to develop criteria to determine suitability of actions for inclusion in the assessment (see Chapter 0) and clearly indicate which actors or initiatives are retained for the final analysis.

Further, actions can also be categorized in terms of targets and policies – which can be either economy-wide or sector-specific (see Section 4.3). And, these can pertain to GHGs or non-GHGs. Targets can be represented as base year absolute target, fixed level target, base year intensity target, and baseline scenario target (Table 3.2). However, often targets lack detailed information on base year, or other reference levels (see Section 5.3 on how to address data gaps). Policies refers 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.

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

[18] Further information on the CCAC Agriculture Initiative is available at: http://www.ccacoalition.org/fr/node/76

Table 3.2: Types of targets taken 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 GDP, 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 (BAU) 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 emission 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.

Table 3.3: Types of policies taken by national governments

Type of policy or action	Description
Regulations and standards	Regulations or standards that specify abatement technologies (technology standard) or minimum requirements for energy consumption, pollution output, or other activities (performance standard). They typically include penalties for noncompliance.
Taxes and charges	A levy imposed on each unit of activity by a source, such as 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 thereof from a government to an entity for implementing a practice or performing a specified action.

Voluntary agreements or actions	An agreement, commitment or action 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. These 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	A programme that establishes a limit on aggregate emissions of various pollutants from specified sources, requires sources to hold permits, allowances, or other units equal to their actual emissions, and allows permits to be traded among sources. These programmes are also referred to as emissions trading systems (ETS) or cap-and-trade programmes.
Research, development, and deployment (RD&D) policies	Policies aimed at supporting technological advancement, 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 of new technologies, processes or practices at a broad scale (e.g., those that reduce emissions compared to existing technologies, processes or practices).
Financing and investment	Public or private sector grants or loans (e.g., those supporting development strategies or policies such as a development policy loans (DPL) or development policy operations (DPO) which includes loans, credits and grants).

Commitment to adopt a target

Most non-state and subnational actions are voluntary, in particular those led by non-state actors. In other cases, action may be in the form of, or in response to, a policy or regulatory mandate which can result in overlaps between actions. These commitments may have been publicly announced[19] and may be in an implementation phase or they may still be in development. For instance, under the "Science Based Targets Initiative," companies commit to develop a science-based target within 24 months after their public announcement.[20] While this guide can be applied to both actions that are underway and planned actions, i.e., 'commitments to develop targets', users also have the following options to treat actors with planned actions:

- Exclude all *(highly conservative assumption)*

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

[20] Further information on the Science Based Targets Initiative is available at: /http://sciencebasedtargets.org/

- Assume the actor's target would align with an NDC (or national) GHG target until they formally prepare their own target *(conservative assumption).* This is based on the assumption that eventually all national government targets (including the NDC) would trickle down to the actors at different levels, including cities, businesses etc. While this may mean different levels of ambition per actor, the NDC level can be assumed to be the average across all.

National actions

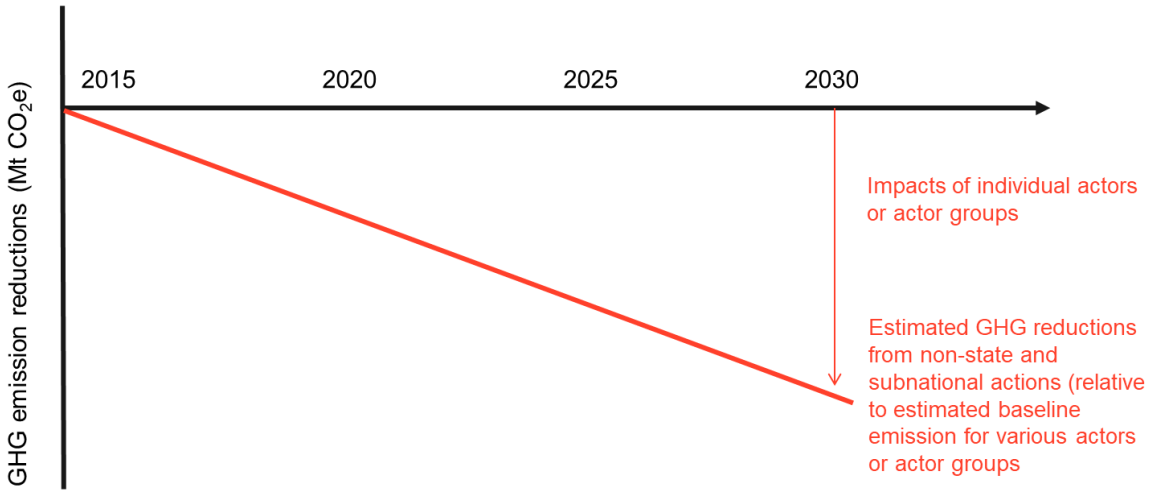
National actions are interventions taken or mandated by a national government, which may include policies, laws, directives, decrees, regulations, standards, incentives and other types of policy instruments aimed to achieve a specific target.[21] These also apply to non-state and/or subnational actors within the national jurisdiction.

Bottom-up aggregation

Bottom-up aggregation is the process of adding the individual impacts of non-state and subnational actions to determine total potential impact of 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 – for example, a certain number of leading cities or companies are taking action that combined will reduce emissions by X t CO_2e by a given year. GHG reductions can either be calculated on a cumulative basis over a defined time period or an annual basis for a given year. The aggregation should include adjustments to avoid any overlaps between non-state and subnational actions, to avoid overestimating the collective impact. The aggregated GHG reduction estimate can be presented without comparison to any reference scenario or can be compared to national GHG emissions, historical or projected, or a national GHG target (Figure 3.1). However, it is important to note that this result cannot simply be assumed to be additional to national action as potential overlaps have not been determined. Carefully selecting a baseline scenario and/ or estimating the baseline scenario for each individual action or sector will be important so as not to overestimate the resulting GHG reductions (also see below). 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 overlaps. Accounting for this type of overlap may require integration with more sophisticated integrated assessment models or the development of simplifying assumptions to assess overlap and recognize limitations.

[21] WRI 2014b

Figure 3.1: Bottom-up aggregation of estimated GHG reductions from non-state and subnational action



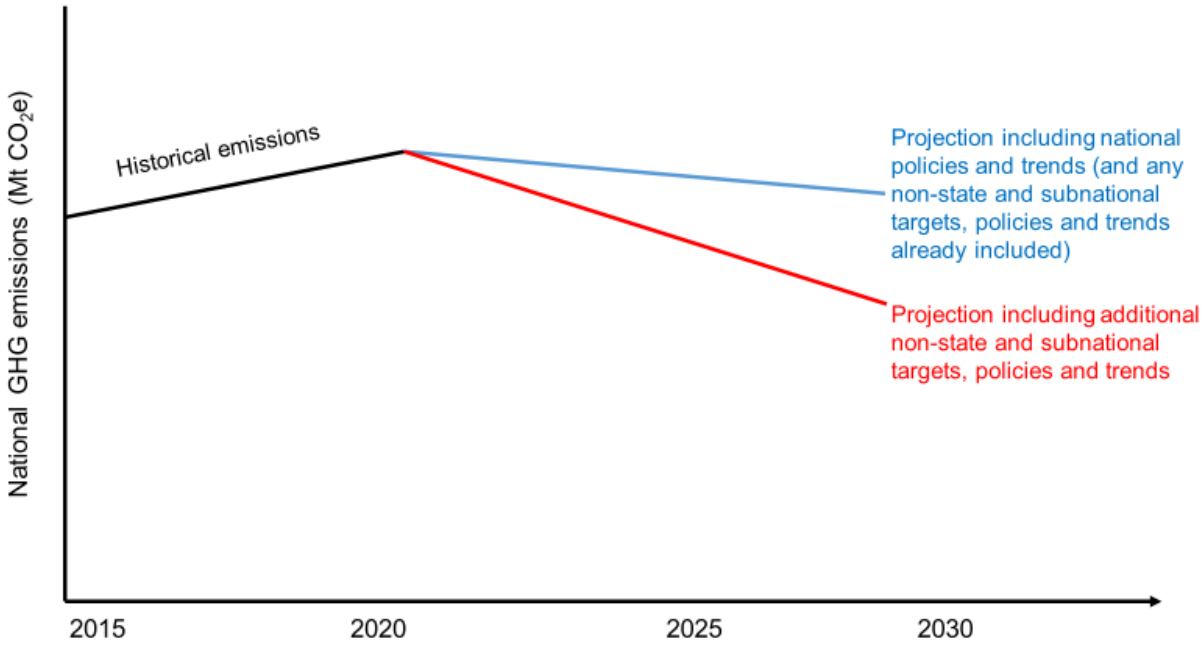
Top-down integration

Top-down integration is the process of incorporating the impact of non-state and subnational actions into national projections and scenarios, often based on existing 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 projection or model. The projection may only reflect the impacts of national policies and targets as well as various socioeconomic drivers and trends, such as GDP, population, and energy prices. In addition, it may already include the impacts of selected non-state and subnational actions and trends. 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 that should be reflected in the projection. The national emissions projection should be adjusted to reflect the impacts of non-state and subnational actions not already included in the original projection. The result is a revised GHG emissions projection that incorporates the impacts of non-state and subnational action (Figure 3.2), which could also be referred to as ‘current policies plus non-state and subnational action scenario’ (cf. Hsu *et al*. 2019).

The difference between the original projection and the updated projection reveals the potential impact of non-state and subnational action in the country. The updated projection can be used to set a more ambitious 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.

Figure 3.2: Integrating the impacts of non-state and subnational action into national GHG emissions projections



Baselines

For the bottom-up approach described above, baselines are required to provide a reference for the impact of the actions. Different approaches can be used to calculate baselines (Box 3.1):

- Individual baselines for specific actors can be determined, independent of the baselines that may exist for the country or sector for example as part of its NDC. This method could be challenging if many actors are involved and varying assumptions are adopted.
- Generic baselines for specific actor groups in a sector can be chosen. For example, utilizing industry sector projections from the IEA World Energy Outlook for companies operating in the same sector.
- Simple assumptions on emissions of individual actors can be taken, for example by adopting the growth rate for the national or regional economy, or extending historical growth rates into the future.
- A constant emission level is used as a baseline, for example base-year emissions.

Baselines from different sources may be inconsistent. It is critical to keep this in mind for example when comparing the results to a mitigation target expressed as a reduction below a baseline, e.g. a BAU.

Box 3.1: Examples of baselines

Fulfilling America's Pledge: How States, Cities, and Businesses Are Leading the United States to a Low-Carbon Future 2018: Sector baseline emissions from models and external sources for selected sectors (e.g. Biennial Report for non-CO_2 emissions). Converted all actions to metrics for input to model. Aggregate baseline used for comparison of scenario with non-state and subnational action to scenario limited to national action.

India pilot: Developed own baselines for each industrial company included, based on GHG intensity and production projections. Sum of all companies' differences between scenario with companies' targets and baseline per company is assumed to be the total impact of the companies' targets. This is then deducted from the total national emissions to identify the remaining national emissions under the achievement of the companies' targets.

Global Climate Action from Cities, Regions, and Businesses 2018: Used economy-wide baselines ("current policy projections") to compare the impact of non-state and subnational action on national emissions, and sector specific baselines for selected international cooperative initiatives. One example of a sector baseline is projections for the forestry sector, where a global reference scenario was used to calculate the global reductions implied by the initiative. These reductions were then distributed to the countries based on their historical emissions in the sector, and deducted from the national emissions projections.

3.2 Overview of steps

This guide is organized according to the steps a user follows in assessing the impacts of non-state and subnational action (Figure 3.3). Steps are organized by chapters. Depending on when the guide is applied and the assessment objectives, users may skip certain steps. For instance, some steps are only applicable when the assessment objective is to integrate the impact of non-state and subnational actions into national greenhouse gas projections, targets and planning (see Chapter 2). These are indicated in Figure 3.3 (also see Figure 3.4). Unless specified, the step is applicable for both categories of assessment objectives – aggregating and integrating. Detailed information on which steps users can skip is provided in individual chapters in Part II.

Figure 3.3: Overview of key steps

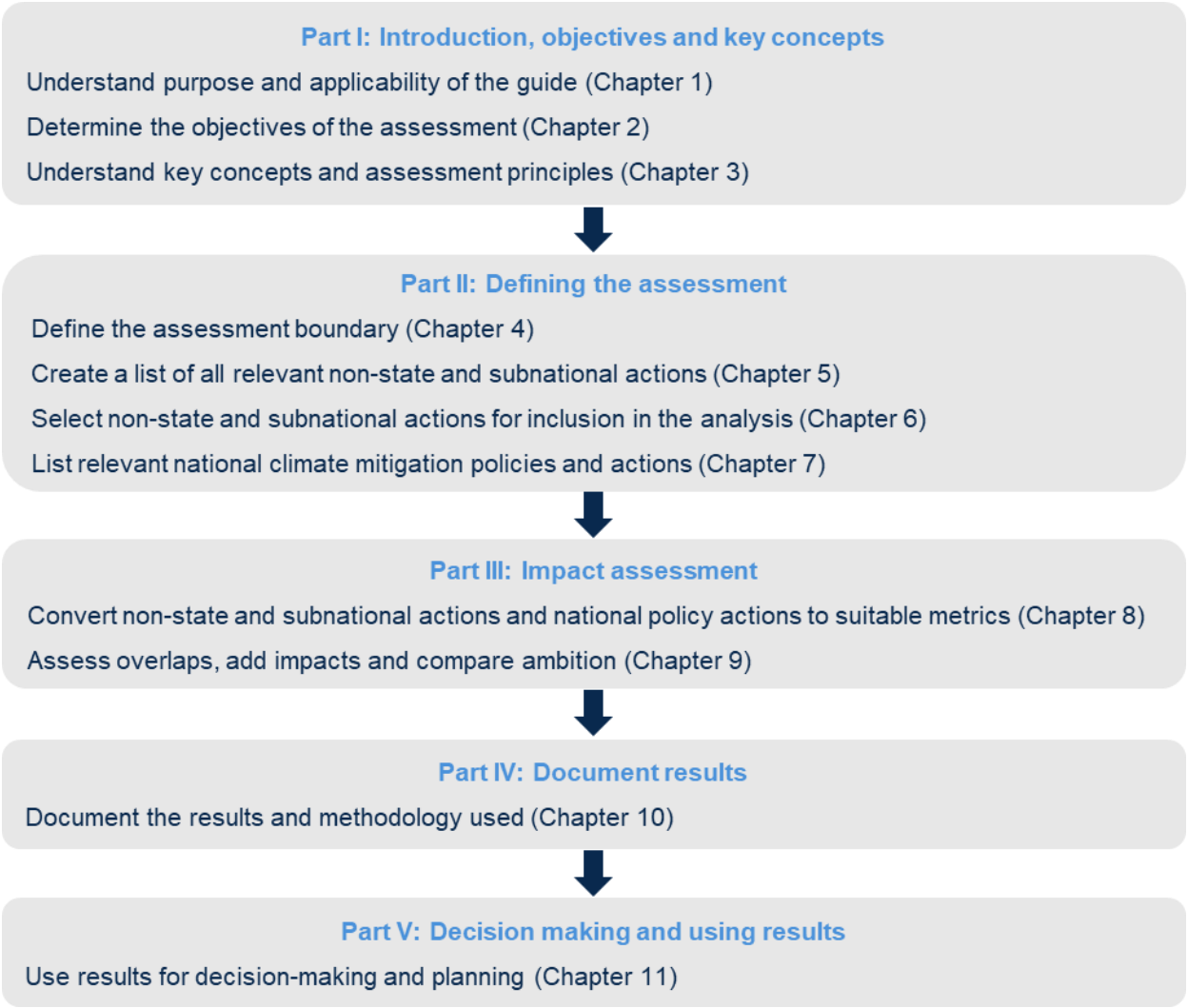


Figure 3.4: Steps for the India application

Part I: Introduction, objectives and key concepts

Objectives of the assessment: Identify, quantify and integrate the impact of Non State Action (50 Companies) and Cement Sector on India's NDC

Part II: Defining the assessment

The assessment boundary: Direct and electricity-related emissions from 50 corporations and the cement sector. These corporations are captured in the list of actors to be included in the assessment.

Relevant national climate mitigation policies and actions were listed. The national communication and biennial update report was found particularly useful for this exercise.

Part III: Impact assessment

Convert non-state and subnational actions and national policy actions to $MtCO_2e$ by projecting production and intensity.

The analysis ran different scenarios to reflect uncertainties and different assumptions on the likelihood of achievement of the company targets. It used the Climate Action Tracker assessment and the WRI OCN model as a starting point for national emissions.

Part IV: Report results

Modeling Scenarios	India Emission 2020			India Emissions 2030		
	India Emissions	Non-State Action	% Impact	India Emissions	Non-State Action	% Impact
India Emissions (EPS)	3381	3361	0.6	5005.32	4934	1.4
India Emissions (OCN) – Current Policy	2904	2885	0.7	5158.375	5087	1.4
India Emissions (OCN) – Enhanced Policy	2772	2752	0.7	4122.834	4052	1.7
India Emissions (Climate Action Tracker)-INDC	33.2	3282	0.6	4570	4499	1.6

Part V: Decision making and using results

Preparing a case study of the assessment to be published and shared publicly

3.2.1 Planning the assessment

It is important to plan the steps, responsibilities and resources needed to meet the objectives for assessing non-state and subnational impacts. The time and human resources required to use the 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 has already been collected.

Planning stakeholder participation

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

- Help ensure that important non-state and subnational policies are included in the assessment, and accurately accounted for
- Providing a mechanism through which stakeholders who are engaged in non-state and subnational actions can share information that may help determine the likelihood (see Chapter 0) or any possible overlaps between actions (see Chapter 0)
- 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 its results
- Providing a mechanism through which stakeholders are provided with an opportunity to raise issues related 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 enhance 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 and selecting relevant non-state and subnational actions to assess (Chapter 0 and 0), assessing overlaps and comparing ambition (Chapter 0), reporting results (Chapter 10) and decision making and using results (Chapter 11).

Before beginning the assessment process, consider how stakeholder participation can support the objectives and include relevant activities and associated resources in the 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 the assessment of GHG and sustainable development impacts in the same sector.

It is important to ensure conformity with national legal requirements and norms for stakeholder participation in public policies as relevant, as well as requirements of specific donors and of international treaties, conventions and other instruments that the country is party to. These are likely to include requirements for disclosure, impact assessments and consultations, and may include specific requirements for certain stakeholder groups (e.g., UN Declaration of the Rights of Indigenous Peoples, International Labour Organisation Convention 169) or specific types of policies and actions (e.g.,

UNFCCC guide on safeguards for activities reducing emissions from deforestation and degradation in developing countries).

During the planning phase, it is recommended to 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 policy makers). Appropriate approaches should be selected to engage with the target stakeholder groups, including through their legitimate representatives. To facilitate effective stakeholder participation, consider 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 secure adequate protection of stakeholders' rights related 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 analyze 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: Stakeholder Participation During The Assessment Process summarizes the steps in this guide where stakeholder participation is recommended along with specific references to relevant information in the *Stakeholder Participation Guide*.

Planning technical review (if relevant)

Before beginning the assessment process, consider whether technical review of the assessment report will be pursued. The technical review process emphasises 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.[22] These principles underlie the step-by-step approach presented in the following chapters. It is a *key recommendation* to base the assessment of non-state and subnational action impacts on the principles of relevance, completeness, consistency, accuracy, comparability and transparency.

- **Relevance**: Ensure that the assessment appropriately reflects the incremental (additional) GHG impacts of non-state and subnational action and serves the decision-making needs of policymakers. Users should apply this principle when selecting the desired level of accuracy and completeness among a range of methodological options.
- **Completeness**: Include all significant non-state and subnational mitigation impacts in the mitigation assessment boundary. Disclose and justify any specific exclusions. To support users

[22] Adapted from the GHG Protocol *Policy and Action Standard* (WRI 2014b).

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: Overview of Databases and Studies).

- **Consistency**: The step-by-step approach provides recommendations on how to overcome the many differences in accounting approaches for non-state and subnational action, as well as data collection and calculation methods. It is recommended to consistently use this approach to allow for meaningful performance tracking over time. Eventually this may lead to more consistent accounting approaches, data collection and calculation methods of non-state and subnational action itself. 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 action (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 as to the integrity of the reported information. Users should pursue accuracy to the extent possible, although this will be informed by a number of factors including: the objective; the availability of data; the type of actions to be assessed and levels of uncertainty
- **Comparability**: Current non-state and subnational action and initiatives are very difficult to compare, owing to different methodologies, data sources, assumptions, objectives and reporting formats. This document offers information to enhance comparability. Users should exercise caution when comparing the results of non-state and subnational action. Differences in reported emissions 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 timeframe 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.[23] 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. Similarly, 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 addition to the above principles, users may also want to apply the principle of **conservativeness** when uncertainty is high and can no longer be practically reduced, or when a range of possible values or probabilities exists. A conservative approach may mean that users exclude certain actions from the assessment if data is insufficient, or if overlaps cannot be determined. If the user sets an objective to assess the maximum potential impact and therefore wants to include the maximum number of actions, any assumptions used to estimate impact, determine the likelihood of achievement, or potential overlaps

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

should be recorded. Presenting a range of results, consisting of various scenarios reflecting different assumptions, is recommendable to illustrate the sensitivity of the results to the assumptions.

Given the often voluntary and sometimes uncertain nature of non-state and subnational action, users should also consider being conservative (cautious) about their estimates. Just how cautious estimates should be depends on the objectives and the intended use of the results as well as on data/information availability. This document provides further information on what approach to use and when to be cautious in the step approach outlined in Part II of this guide.

In practice, users of this guide may encounter trade-offs between principles when developing an assessment of non-state and subnational action. For example, governments may find that achieving the most complete assessment requires using less accurate data for a portion of the assessment, which would trade off overall accuracy. Conversely, achieving the most accurate assessment may require excluding sources or effects with low accuracy, compromising overall completeness. Users should balance trade-offs between principles depending on their objectives. Over time, as the accuracy and completeness of data increases, the trade-off between these accounting principles will likely diminish.[24]

3.4 Common challenges around quantification, aggregation and integration

Users may encounter multiple challenges when trying to identify, quantify, aggregate, and integrate the impact of non-state and subnational action into national or sectoral targets and mitigation planning. The approach described in this guide addresses these challenges in relevant steps 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.

Table 3.4: Common challenges around the quantification of non-state and subnational action

Challenge	Description	Chapters with information on how to address the challenge
Lack of clarity regarding non-state and subnational action targets	Some non-state and subnational targets are very vague, contain no quantitative information, and therefore, may be difficult to translate in terms of their expected mitigation impact. The ambiguity can lead to uncertainty about the impact of non-state and subnational mitigation action.	Chapters 3 and 0

[24] WRI 2014b

Overlaps, double counting and additionality of actions[25]	Overlap among 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 level (e.g., national energy efficiency target and state energy efficiency policy for residential and industrial sectors). As a result, the combined effect of those actions could be less (or more) than the sum of the individual effects of implementing them separately. National government and subnational/non-state actors may also take credit for the same reductions and count them as progress toward their individual goals/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 action to contribute to exceeding existing national mitigation efforts or closing the "emissions gap"[26], the impact of non-state and subnational action needs to be additional. Often non-state and subnational actors formulate their actions in response to climate policy, but state them together with a package of other things as 'commitment to climate action'. This can again result in double-counting. In the case of multinational actions, it can be difficult to distribute the impacts to specific countries. The impact may not be equally distributed across the countries. Users may need to make assumptions to estimate distribution if country-level information is unavailable, which may affect accuracy of the assessment. Complex interactions will be difficult to capture with simple bottom-up tools, and may require integrated modelling exercises to be fully captured.	Chapters 4, 8, 0 and 10
Differences in baselines, timeframes and reference scenarios	Users may find that non-state, subnational and national action all have different baselines, timeframes and reference scenarios making comparisons challenging.	Chapters 3 and 0

[25] 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.

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

Data availability, completeness and usability	Users may want to calculate the impact of non-state and subnational action when insufficient, outdated or no data is available, or the data is not accurate enough to quantify the impact.	Chapter 0, 7 and 8
Uncertainty in results	A number of factors such as lack of data, opaque underlying assumptions, and the voluntary nature of non-state and subnational action, can lead to high uncertainty in results.	Chapters 3, 0 and 0
Scope 3 emissions	Scope 3 or 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 0

PART II: DEFINING THE ASSESSMENT

4. DEFINING ASSESSMENT BOUNDARY

This chapter provides steps on 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, greenhouse gases, and types of indirect emissions are included in the assessment; and whether any action types may traverse national boundaries or involve national governments (e.g. this might be the case for some cooperative initiatives)
- Specify the temporal boundary of the assessment

Non-state and subnational actions can encompass a very large number of actions and targets taken by businesses, cities, states and provinces across all sectors, sometimes reaching beyond national boundaries. Table 4.1 illustrates the variety of non-state and subnational action in the US as an example. Depending on their objectives, users should define the boundary of the assessment. Table 4.2 provides some additional examples of cooperative initiatives, their sector and geographic focus.

Table 4.1: Examples of climate-friendly targets and actions adopted by U.S. states, cities, and businesses

States	Cities	Businesses
GHG Target/Cap		
Legally binding GHG emission targets	Climate change goal formally adopted or in process	Internal carbon price
Carbon pricing		Science-based GHG reduction target
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	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 process	Corporate energy efficiency improvements through Better Buildings Challenge
Energy efficiency resource standard or goals	Energy efficiency procurement policy	Industrial EE improvements through Better Plants Program
Adopt “best-in-class” building energy codes	Adopted the 2015 IECC building code/adopted 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 program	
Efficient vehicle requirement for public fleet procurement	Bike sharing program	
Integrating transport and land use in comprehensive plans	Sustainable transportation plan	
Dedicated funding streams for public transit	Fuel efficiency requirement for public fleets	
Financial incentives for high efficiency vehicles	Codified VMT/transportation-related GHG targets	
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	
	Adopted technologies to help coordinate freight transport	
Forestry and land use		
Property tax programs to support sustainable forests	Urban heat island goals	
Conservation easement tax credits		

Cost-sharing programs to improve forest systems		
Wildfire protection incentives		
Methane		
Landfill gas energy project incentive	Zero-waste goal	Joining EPA's Natural Gas Star program
Rules and incentives to reduce food waste		Joining EPA's Methane Challenge
Coal mine methane standards		Taking actions that reduce food waste 50%
Methane standards for existing oil and natural gas facilities		
Setting methane emission reduction targets		
HFCs		
HFC management program (stronger than EPA)		Supermarkets committing to reduce HFC emissions and use

Source: (America's Pledge, 2017).

Table 4.2: Examples of international cooperative actions, sectors and regions

Name of initiative	Sector	Region
2030 Architecture Challenge	Buildings	Global, but U.S. focus
Airport Carbon Accreditation (ACI)	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; PBL, 2018a)

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

recommendation to clarify the temporal boundaries of the assessment: What is the target year of the assessment, will the results for interim years be helpful as well?

In addition, for users who selected an objective that requires integration, they may want to decide at this stage if they will compare their results against a scenario of national governments' pledges alone or other counterfactual, or whether they have the capacity and technical support to integrate results into a global assessment model (see Chapter 9 for more on integration). Deciding at the start of the assessment what to compare against at the end, will inform the steps and calculations during the assessment. This choice should be made carefully given its impact on the results of the assessment. Examples of possible counterfactuals are:[27]

- 'No policy' scenarios that specify no action from a noted base year or a given set of policies (e.g. the baselines of the IPCC Fifth Assessment Report)
- 'Current policy scenarios' that are based on national policy implementation (such as the IEA World Energy Outlook's Current Policies Scenario).
- Scenarios based on sector production growth (cf. India pilot)
- A scenario based on Nationally Determined Contributions (NDCs). These contributions are pledges made at the international level that may not have been translated into national policies, and therefore lead to a different emissions outcome than the current policies scenario.

The term 'business-as-usual' (BAU), is ambiguous and may refer to a range of scenario definitions. If the user refers to a BAU, it is important to clarify how this is defined (e.g. the cut-off date for included policies)

In addition, it is a *key recommendation* to also specify the assessment period. Assessments over a long time period, e.g. through 2050, may require users to consider different types of actions and may inform which actors and actions will be included in the analysis. If the objective is to understand the expected contribution of the policy or action toward achieving a country's NDC, it may be appropriate to align the assessment period with the NDC implementation period (e.g., ending in 2030). Similarly, to align the results with the achievement of SDGs under the 2030 Agenda for Sustainable Development, users may define an assessment period ending in 2030. To align with longer-term trends and planning, users may select an end date such as 2040 or 2050.

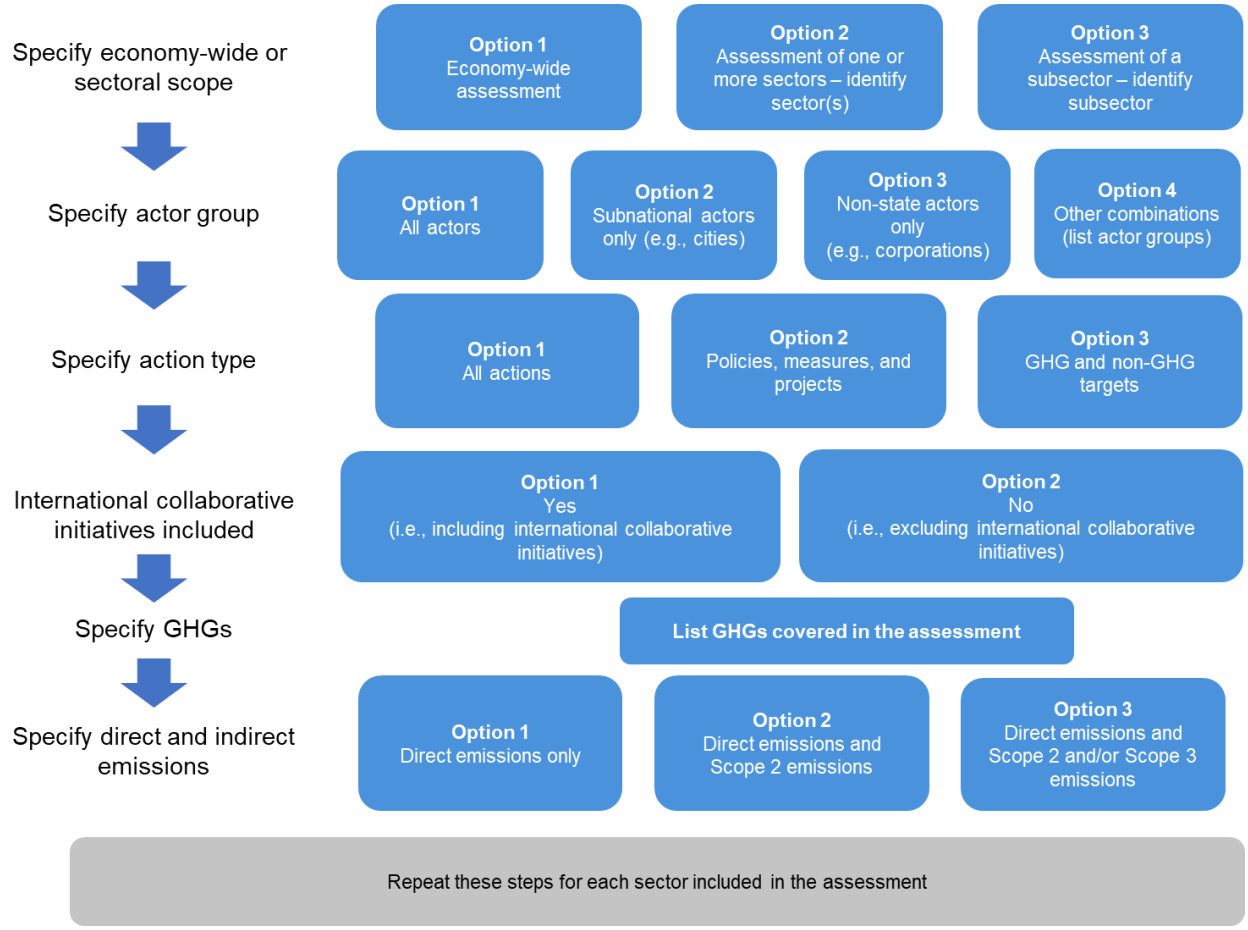
4.1 Choose which sectors and subsectors to include

Users should identify whether the assessment is economy-wide or is applicable to specific sectors. Economy-wide assessments also include sector-specific actions. Users can consider defining sectors and sub-sectors according to IPCC categories (Figure 4.1), or could follow the categorization followed 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.[28] This will ensure that the coverage can truly be considered economy-wide.

[27] See also Hsu, A. *et al* 2019. "A research roadmap for quantifying non-state and subnational climate mitigation action".

[28] This relates to the concept of 'key source analysis' in the IPCC guidelines for national GHG inventories, which identifies sources that contribute to 95% of the total emissions or 95% of the trend of the inventory in absolute terms.

Figure 4.1: Defining the assessment boundary



4.2 Choose which actor groups to include

Users should first identify which actor groups the assessment will include. The scope 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
- International cooperative initiatives
- Others

Users may choose to focus on one group of actors such as cities or states or businesses. Alternatively, users may wish to focus more broadly on all actor groups. Depending on the objectives and data availability, specific sub-groups may be targeted such as cities of a certain size, or businesses within a specific economic sector (Figure 4.1).

4.3 Choose which action types to include

Users should determine which types of actions by the selected actor groups are included in the analysis (Figure 4.1):

- GHG reduction targets (absolute and intensity), which usually do not specify as to how emissions will be reduced
- Sectoral (non-GHG) targets such as targets for renewable energy or forests, and/or
- Specific policies, measures, and projects taken 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 GHG emission reduction targets, or commitments, may have uncertainty around 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 greater uncertainties.

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, while companies' targets are often not binding in nature 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 specify whether international cooperative initiatives are included in the assessment (Figure 4.1). International collaborative actions, in particular with commitments spanning across geographical boundaries, may prove challenging as an accurate disaggregation of impacts by individual countries will depend on sufficient information availability. Users may want to include these initiatives for a comprehensive indication of potential impact, or exclude them to minimize uncertainty. Users also need to decide whether they want to include the international cooperative initiative's overall target (which may involve ambitious membership goals of many initiatives for example) or evaluate the current contribution of an initiative (based for example on current membership numbers).

Users may also want to decide if actions to reduce emissions from sources that are excluded from national totals in inventories (e.g., emissions from international aviation and maritime transport) should be included in the assessment. 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 types of GHGs and indirect emissions to include

Users should also specify the greenhouse gases and types of indirect emissions included within the identified (sub)sector(s) in the assessment (Figure 4.1).

Greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur 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.

Specifying which direct and indirect emissions are included in the assessment is necessary to clearly define the scope of the assessment and prevent any possible double counting between multiple

subnational and non-state actors. Direct emissions are presumed to be accounted for, but users should specify whether and which indirect emissions will be included in the assessment. 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) (WRI and WBCSD, 2004):

- Scope 1 (direct emissions): 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 further divided into Scope 2 and Scope 3 emissions.

- Scope 2: Indirect emissions resulting from the use of purchased electricity, heat, or steam.
- Scope 3: All other indirect emissions that occur in the company's value chain (e.g., employee commuting, outsourced production activities, use of sold products).

A city or subnational GHG inventory classifies emissions into scopes relative to the city or subnational geopolitical boundary (adapted from WRI, C40 and ICLEI 2014):

- Scope 1: GHG emissions from sources located within the city or subnational boundary
- Scope 2: GHG 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: All other GHG 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.

Users may want to restrict the analysis to scope 1 (direct) emissions of selected actor groups to avoid complications arising from indirect emissions. Alternatively, users may want to address scope 2 emissions but not scope 3 emissions. Narrowing the assessment boundary would be a conservative approach which is likely to underestimate the aggregated impacts from non-state and subnational actions, but would avoid uncertainties and possible double counting between actor groups.

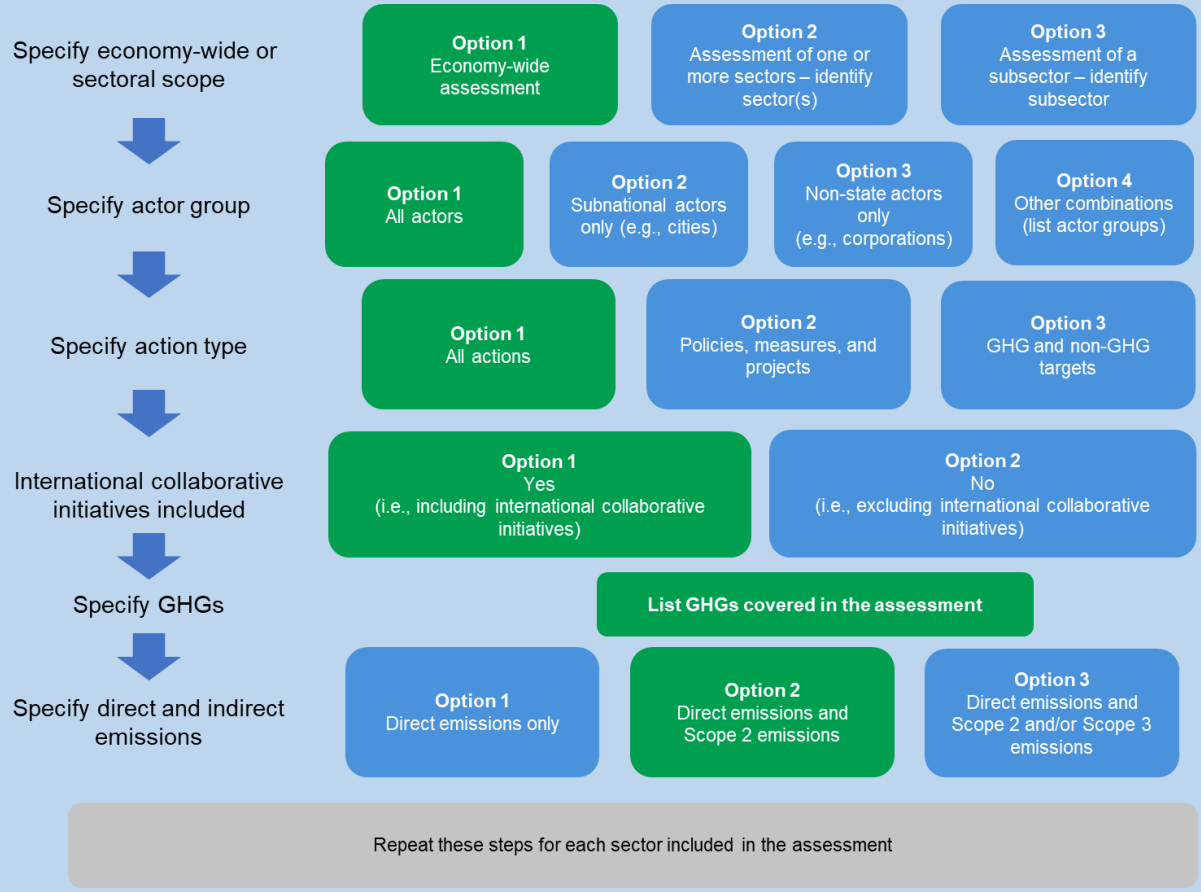
In contrast to non-state and subnational inventories, national GHG inventories categorize emissions by source. For example, emissions from fossil fuel combustion across sectors (e.g., the cement, iron and steel, and aluminium sectors) are listed under a single category. Similarly, industrial process emissions are aggregated and reported in a single category, though 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 iron and steel industry is accounted under electricity generation in national inventories whereas the iron and steel company will account these as scope 2 emissions.

These differences in emissions accounting present a challenge. For the sake of simplicity, this guide therefore suggests to follow the IPCC categories which lists GHG emissions by (direct) sources of

emissions and removals by sinks (Figure 4.2),[29] but to carefully consider the effect of mitigation actions on reducing electricity use and related (indirect) emissions. For example, international collaborative actions from companies in the waste sector should be accounted for in the waste sector, while any effect those actions may have on electricity generation should be accounted for in the energy supply sector. Some examples are further illustrated in Box 4.1: Examples of determining the assessment boundary based on the objective of the assessment. Users may also want to carefully note any details related to direct and indirect emissions of a given non-state or subnational action, if provided by those actors, as this may be valuable information for use in later steps to determine any gaps or overlap.

Box 4.1: Examples of determining the assessment boundary based on the objective of the assessment

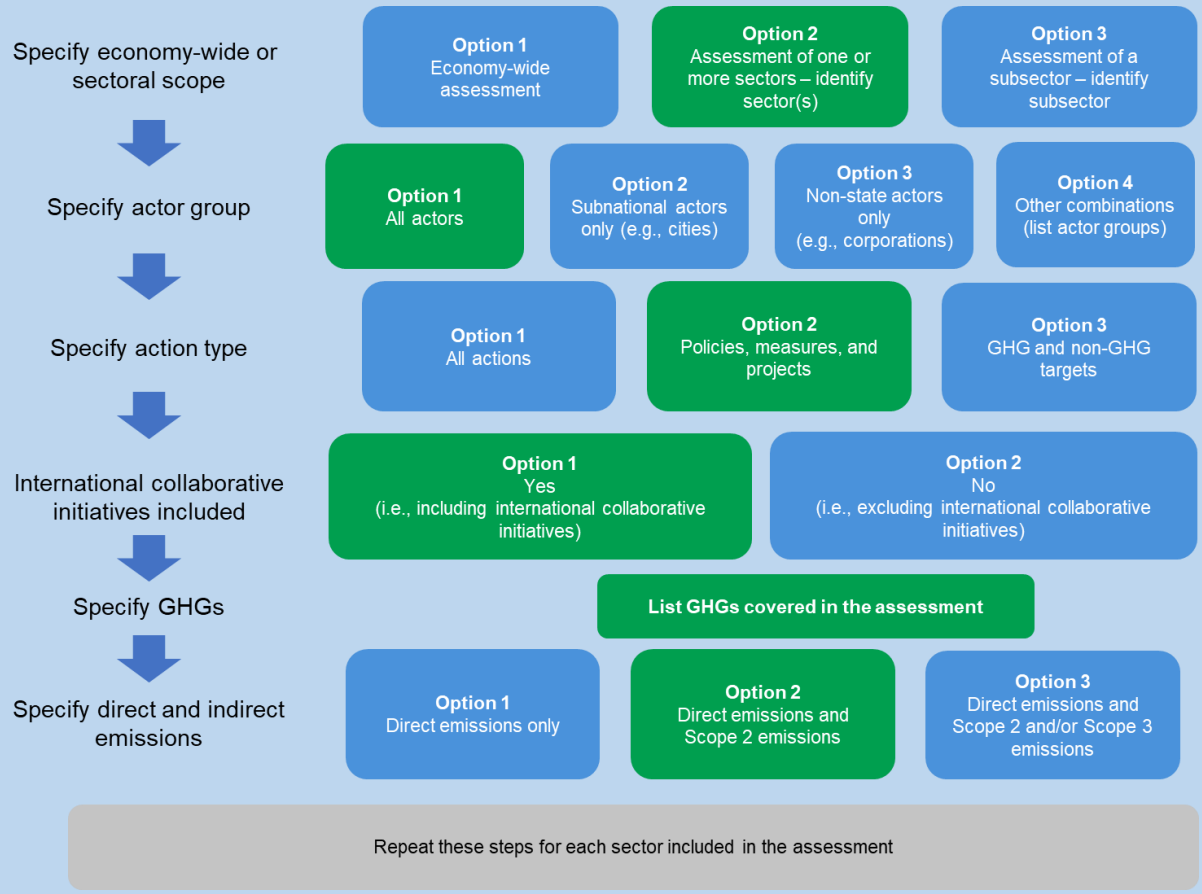
Objective of assessment: Identify, quantify and integrate the impact of non-state and subnational action to revise overall national emissions projections for 2030. Users should go through the steps for all relevant sectors and subsectors identified in the 2006 IPCC guidelines for national greenhouse gas inventories. Also see the proposed step wise approach marked in green below.



Objective of assessment: Identify, quantify and integrate the impact of non-state and subnational action when designing a roadmap to decarbonize the national transport sector by 2050. Users should apply the steps for the transport sector (direct emissions) and the energy supply sector (indirect emissions

[29] IPCC 2006a

resulting from the production of electricity consumed by electric vehicles). Also see the proposed step wise approach marked in green below.



Objective of assessment: Identify, quantify and integrate the impact of non-state and subnational action on energy efficiency of passenger cars sold nationally by 2030. Users should apply the steps only to this specific subsector (road transportation). Also see the proposed step wise approach marked in green below.

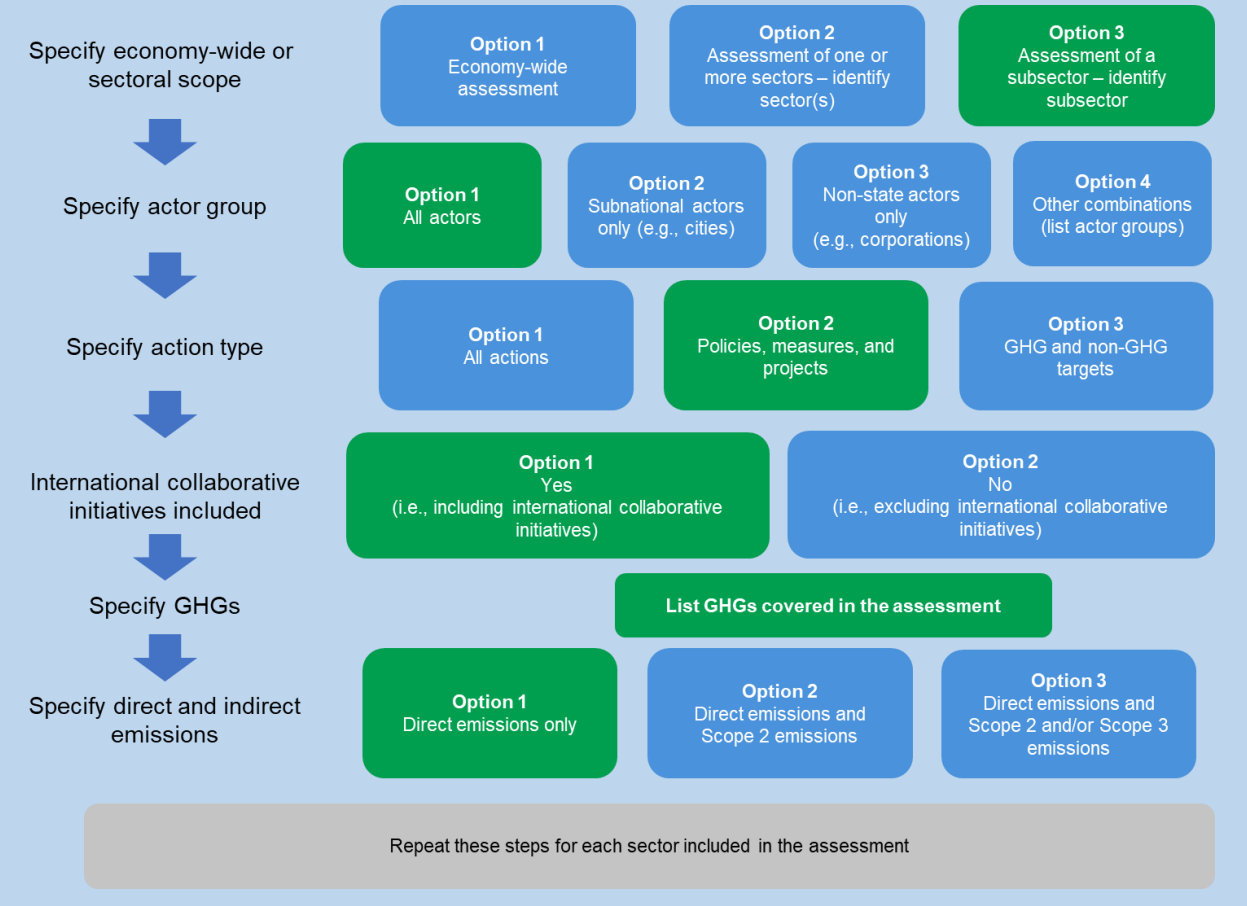
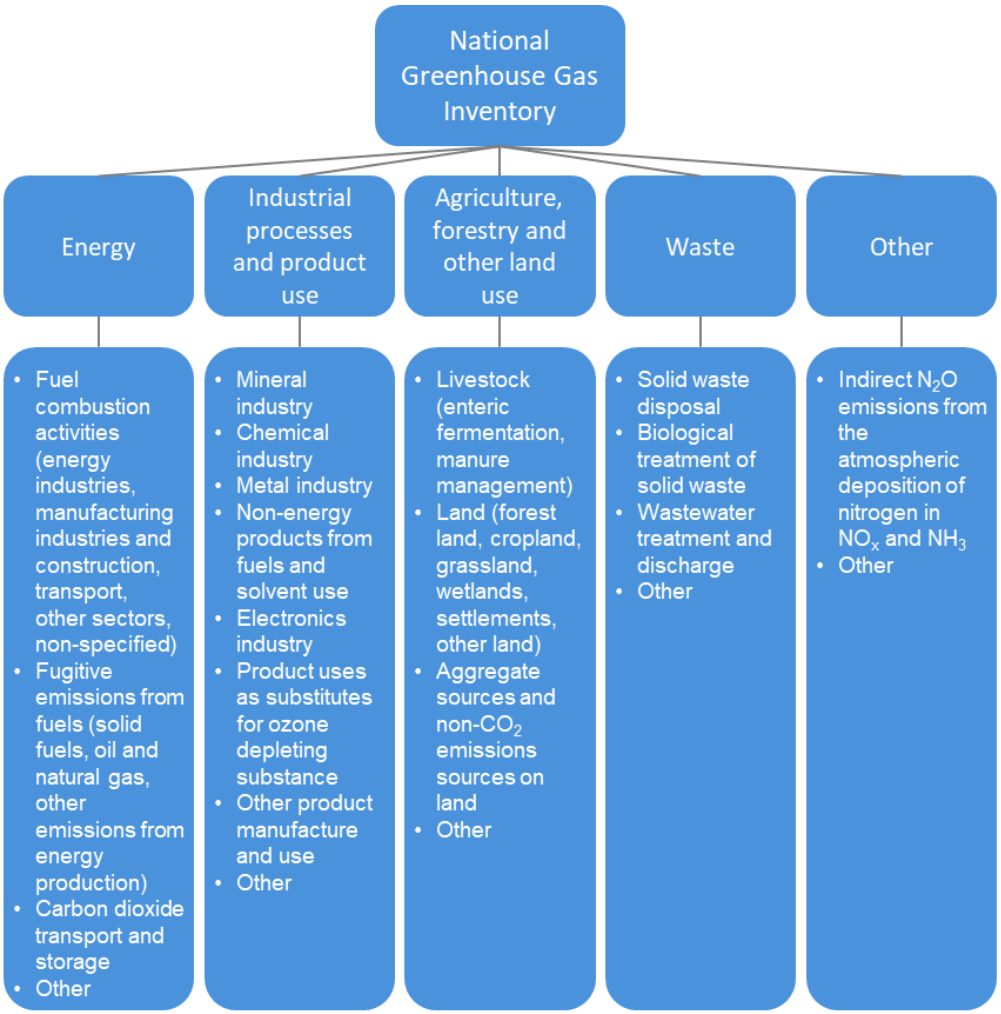

Specify economy-wide or sectoral scope
Option 1 Economy-wide assessment
Option 2 Assessment of one or more sectors – identify sector(s)
Option 3 Assessment of a subsector – identify subsector
Specify actor group
Option 1 All actors
Option 2 Subnational actors only (e.g., cities)
Option 3 Non-state actors only (e.g., corporations)
Option 4 Other combinations (list actor groups)
Specify action type
Option 1 All actions
Option 2 Policies, measures, and projects
Option 3 GHG and non-GHG targets
International collaborative initiatives included
Option 1 Yes (i.e., including international collaborative initiatives)
Option 2 No (i.e., excluding international collaborative initiatives)
Specify GHGs
List GHGs covered in the assessment
Specify direct and indirect emissions
Option 1 Direct emissions only
Option 2 Direct emissions and Scope 2 emissions
Option 3 Direct emissions and Scope 2 and/or Scope 3 emissions
Repeat these steps for each sector included in the assessment

Figure 4.2: Main categories of GHG emissions by sources and removals by sinks



Source: IPCC 2006b.

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.

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 assumptions to organize actions and fill data gaps
- Wherever statistical techniques are used to fill data gaps, document the methods used and data points that are estimated

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 within the assessment boundary. This list should reflect the assessment boundary and therefore may include all relevant non-state and subnational action, or a specific subset based on the target actor group and action types included in the assessment boundary. Users should collect data on actions that reflect the definition provided in Section 3.1. Box 5.1 provides further points to consider when creating the list.

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 0. In this case, users should proceed to Chapter 7 and upon completion of those steps, come back to this chapter.

Box 5.1: How to recognize non-state and subnational action

Users should seek out actions for their assessment that will ultimately result in a reduction of GHG emissions. Action types include: general statements calling for action, quantifiable targets for reducing emissions, commitments, plans and strategies, and concrete policies and programs A number of key elements may be helpful to keep in mind as users identify relevant actions, although, not all actions may necessarily contain all elements, and not all elements may be known:

- Documentation of the action includes a clear mention of climate change, mitigation, GHG emissions reductions, or support for specific or general climate policy
- The description of the action itself clearly aims to reduce GHG emissions
- The action is focused on a specific activity or technology known to reduce GHG emissions
- 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 something that may be considered additional to business as usual or normal practice
- Ideally, the action specifies intended impact using known, comparable metrics and clarifies any assumptions as this will reduce limitations in the assessment

In addition, different assessments may require different types of data. For example, a comprehensive assessment with an objective to determine the impact of non-state and subnational action on the country's overall emissions pathway will require information on base year emissions of those non-state and subnational actions. These can also be estimated if no information is provided directly by non-state and subnational actors.[30] If an action does not specify a base year, a user can assume one based on the year the action was established.

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 on the year the action was established or adopted, the base year and target year, latest inventory year and inventory emissions, as well as qualitative information such as the current status, or reported progress and their bindingness may also be required. If 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 related to the origin or impetus for the action being established. For example, if a business action is in response to a regulatory requirement or if a subnational action may be contribution toward a target of a higher-level jurisdiction. If such information exists, it may be helpful to determine whether there are any overlaps in Chapter 0. For subnational commitments, it may be useful to collect information on which region a city is located in, for example, to avoid double counting of impacts due to geographical overlap (cf. America's Pledge, Global Climate Action from Cities, Regions, and Businesses).

If users' objective is to perform a comprehensive assessment, they may want to separate non-state and subnational energy supply targets ("end-use" targets) from non-energy supply targets ("production-related" targets) to support the overlap analysis in Chapter 0.

5.2 Organize data

Error! Reference source not found. provides a template for organizing the collected information. To create the list, users should start with available data from national and international sources, and can add more categories as needed. 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. To support users with this task, a list of the most widely and internationally-accepted data sources for non-state and subnational action currently available can be found in Appendix A: Overview of Databases and Studies. Most of these 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 5.2 provides tips for collecting information on non-state and subnational action, including how to organize the data collection process and where to look for information. The identification of non-state action is an iterative process and should be updated with each ex-ante assessment.

[30] For information on how to quantify base year emissions, users may refer to the Greenhouse Gas Protocol Mitigation Goal Standard.

Therefore, it is recommended that users also include information on where and how the information has been collected. Depending on the scope of the analysis, it will be helpful to structure the data collection and use adequate tools to make it machine readable and easy to filter and process data further. Finally, users should keep in mind that the column "Action retained for further analysis" in **Error! Reference source not found.** is included as a placeholder for further analysis and is to be filled in subsequent steps.

Table 5.1: Template for information gathering on non-state and subnational action[31]

Actor	Sector(s) targeted (based on IPCC main categories or existing climate models or tools)	Geographic coverage (global, national, regional, city)	Commitment or action? (legally binding?)	Base year emission	Target (incl. base/ target year; assumptions if available/ needed)	Is progress monitored? (Optional)	Data sources	Action retained for further analysis?
Example: City of Amsterdam	Energy	City level	Commitment (not binding)	n/a	Install 75,000 MW of renewable energy capacity by 2020	Unclear	Global Climate Action Portal (NAZCA)	To be filled after completing the next step (see next chapter)
Safran (French multinational company)	Industrial process and product use	Global	Commitment (not binding)	18,920 tCO_2e	Reduce operational CO_2e emissions by 5% from 2015 to 2018	Yes	CDP	To be filled after completing the next step (see next chapter)

Box 5.2: Tips for collecting information on non-state and subnational action

Clarify data needs. Users should decide which data is required for the analysis they wish to conduct, 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 those platforms, users may want to consider capturing further details regarding how data was generated or collected to support judgements throughout the assessment process regarding how likely a non-state or subnational action is to have an impact or overlap with other actions, including those at the national level.

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

[31] Table 5.1 is for representative purposes only; collection requirements may vary dependent on the objective and requirements for the analysis.

Prepare any necessary tables, spreadsheets and other tools to organize information. Users may want to tailor tables and templates to the national circumstances and the objectives of their assessment. Over the long-run, users may want to consider ways of automating data collection. While this would require a heavy initial effort, it could prove useful to replicate or repeat assessments over a given time period.

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

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

Develop a running list of contact information to gather additional details as needed. Once an initial set of information is collected, users may need to contact specific national and other actors or networks for further details.

In some cases, users may find it useful to already develop/ apply a tiering (ordering) system to avoid later double counting of emissions reduction impacts (Box 5.3). This is especially the case if users conduct a comprehensive assessment. Alternatively, users could also proceed with this analysis at a later stage (see also Section 8.1).

Box 5.3: Example of a tiering approach

From Global Climate Action from Cities, Regions, and Businesses Report 2018: A distinction between policies that are quantifiable, top-down goals and targets (tier 1) versus underlying incentives and programmes that might be mechanisms to help achieve those targets but which on their own are difficult to quantify (tier 2) was made. For example, a city RE goal in the U.S. was considered “tier 1” policy and was quantified. Incentive programmes for RE, siting laws, green tariff programmes with local utilities, and other programmes a city may be pursuing at the same time were considered “tier 2” and were not quantified since a) they are often subsumed by the tier 1 policy in terms of quantification and b) accounting for all such programs and incentives and converting them into metrics was beyond the scope of the analysis.

5.3 Data gaps

Data availability may be a significant challenge for some users and may refer to the challenge of not having access to/ finding out about relevant non-state and subnational action and/ or incomplete data only. Application of the methodology will require the development of a dataset that may not exist at the outset of the assessment process. While there are many benefits to developing new datasets as noted below, users may need to consider the time, resources and support that may be needed to collect the necessary data. The amount of data available may inform the overall objective and scope of the assessment and may impact how well the assessment adheres to the principles.

In some cases, users may find that existing sources provide insufficient information and may also wish to collect new data from the target group of non-state and subnational actors. This may extend the time required for the assessment process, but may result in more accurate and up-to-data data. Options on how to address these situations include the following:

- Using national sources for multilevel information exchange (for example the National Environmental Information Exchange Network[32] in the United States or Fossil Free Sweden)
- Conducting extended stakeholder consultations, or surveys, to fill information gaps. For example, users can consult industry associations for non-state action within a given sector. These also offer additional opportunities for engagement with the private sector.
- Conducting literature reviews (national and international)
- Reviewing existing programmes by multilateral development organizations, such as the World Bank, UN or multilateral development banks which all work with subnational and non-state actors and can provide valuable data. One example is the World Bank's recently established City Climate Planner Certificate Programme training which aims to help city practitioners develop the skills to design, plan and implement green growth initiatives in their cities. Each of those future initiatives could feed into the analysis or a database.[33]
- For initiatives, consulting the initiative's secretariat
- For Global Climate Action Portal (NAZCA), consulting individual data providers

Some countries may wish to create their own national database for non-state and subnational actions, covering all sectors (Box 5.4). This can be especially relevant for policymakers aiming to carry out comprehensive assessments. In addition, such a database could serve to further motivate non-state and subnational actors to set (more ambitious) climate mitigation goals. It is also helpful for policymakers who aim to identify opportunities for future engagement with those actors. Establishing a database could require significant effort, time and capacity but could be highly valuable if users plan to repeat assessments over time.

Box 5.4: Example of a national database

One such example of a national database is "Fossil Free Sweden" (FFS), established by the Swedish government as a national replica of the international movement formalised in the Lima Paris Action Agenda (LPAA). Similarly, rather than a purely data gathering undertaking, it represents an attempt to gather a critical mass of non-state and subnational stakeholders (bottom-up movement) around a common goal and eventually help the government to make more ambitious decisions. It has, however, more relaxed requirements for signing up compared to Global Climate Action Portal (NAZCA) and other major international databases on non-state and subnational action (non-state and subnational actors sign up themselves). Although the initial purpose of the FFS is wider than creating a list of non-state and subnational actions and integrate the impact of those actions in national emissions planning,

[32] For more information, please consult: http://www.exchangenetwork.net/

[33] For more information, see: http://www.worldbank.org/en/topic/climatechange/brief/city-climate-planner-certificate-program

a database of this kind could help national policymakers find a way around data gaps in existing international databases.

Users may also be able to liaise with UN Environment Programme, UNFCCC or individual data providers to get a starting point for their own database and by doing so avoid duplicating effort. However, users should consider that the more loosely defined such a national database is, the less useful it might be as a source for the quantification and integration of mitigation actions into national GHG planning and processes.

If there is insufficient information, users might want to redefine the objectives and/or scope of the analysis (going back to Chapter 4), or, if this is not possible, pay close attention to the impact a lack of information will have on the wider uncertainty considerations of non-state and subnational action.

While this guide focuses on mitigation action, the data collection process might also be an opportunity to collect information around adaptation, resilience, and finance activities as well, if that is a goal of the user, since many data providers are likely to work across mitigation, adaptation and development activities.

Incomplete data can pose a serious challenge for further data analysis. Data requirements are higher for actions other than emissions reduction targets and incomplete data is common. For example, to calculate additional emissions reduction from a city that pledges to increase its share of renewable electricity generation, information about the city's energy mix, baseline share of renewables, intended share of renewables as result of its action and city-specific emissions factors that can be used to convert megawatts of renewable electricity generation into emissions avoided are among the core information required.

To solve data gaps, statistical interpolation techniques may be used. For example:

- Developing models to project future emissions pathways on the basis of estimated population or GDP growth
- Applying a 'nearest neighbours' approach that estimates baseline emissions by comparing a city to nearby cities that do report emissions data (cf. Global Covenant of Mayors 2018)
- Extrapolate commitments to actors that have signed on to a platform but have not specified their own particular emissions target (cf. America's Pledge 2018)

It is *recommended* that wherever statistical techniques are used to fill data gaps, users document the methods used and data points that are estimated. 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.[34]

[34] See Hsu, A. *et al* 2019. "A research roadmap for quantifying non-state and subnational climate mitigation action".

6. Selecting Non-State and Subnational Actions for Inclusion in the Analysis

This chapter provides criteria that will help users decide which of the actions identified in Chapter 0 to include in the assessment, in line with the assessment principles. It explains on how to determine the suitability of each non-state and subnational action based on the availability of information and the likelihood of the action achieving its target(s). The chapter also discusses the distribution of international collaborative actions among countries. In practice, this chapter serves to fill the "Action retained for further analysis" column in ***Error! Reference source not found.*** *that was illustrated in Chapter 0.*

Checklist of key recommendations

- Determine suitability of non-state and subnational action for further analysis
- Determine the likelihood that non-state and subnational action targets will be achieved
- Determine whether the collaborative action is already covered by an individual non-state and subnational action before distributing emissions reductions from international collaborative actions to countries

6.1 Check against criteria for suitability

Not all actions are equally suitable for inclusion into the users' analysis. It is therefore a *key recommendation* to evaluate actions against criteria to determine the suitability of non-state and subnational actions for further analysis. Table 6.1 provides criteria to help users determine the suitability of actions. These criteria also include those referenced by the Marrakesh Partnership for Global Climate Action. Users should examine each of the different non-state and subnational actions and commitments in their initial list of relevant non-state and subnational actions to determine if:

- There is quantitative information available about each action to allow further assessment
- The action is likely to be achieved
- The action will have impact of relevant magnitude

Actions which do not meet these criteria should be excluded from further assessment. Users should also document which criteria and assumptions were used to assess each non-state and subnational action. This will also help users to easily modify the analysis when information changes over time or when additional data or information becomes available.

Box 6.1 provides some examples of suitable or unsuitable non-state and subnational actions.

Table 6.1: Criteria for determining suitability

Criteria	Comment/explanation
Availability of quantitative information	Key requirement to quantify non-state and subnational actions and commitments in subsequent steps. Information need not necessarily be GHG- or energy-metric related, but it should be measurable and convertible to energy- or emission-related metrics. Metrics are defined as a standard of measurement.

	Targets should represent specific, clear and quantifiable forward-looking outcomes related to an energy and/or emission impact. Questions to determine whether enough quantitative information is available include: • Is a timeframe/target year specified? • Does the action aim for a specific outcome? • Is the target energy or emission related? • Does the target apply to a specific geographic location? (especially relevant for corporate goals) • Is it a numerical target? • If not, it is still reasonably possible to convert the target into a numerical one?[35] (See also Chapter 8) • Is baseline level data available or can be estimated?
Likelihood of achievement (see Section 6.2 for more detail)	Another requirement is a high likelihood (very likely, likely) that the non-state or subnational action target will be achieved. Commitments can also be included if there is reasonable confidence that these will materialize into actions. A qualitative assessment can help determine if/which commitments should be considered, include: • Why was the action initiated? • Is there clear ownership behind the commitment? • Who is the actor accountable to? • Are there any plans for the monitoring of targets? For example, Global Climate Action Portal (NAZCA) primarily lists “commitments to action” and one of its listing criteria is that the action 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 being allocated to initiate and then implement the activity? • Are there regular political cycles or particular change in administration that could undermine or strengthen a subnational commitment? • Are there indications on the financial health of a company that could undermine its commitment? • Is there regulatory support for the action? Is it legally binding? Alternatively, a quantitative assessment of likelihood may be carried out (e.g. by checking progress on each target individually. This approach might be burdensome if a huge number of actions need to be checked for likelihood of implementation) or full implementation of all actions may be assumed.

[35] To do this for targets, users may refer to the GHGP Mitigation Goal Standard (2014); for policies or actions, users may refer to the Policy and Action Standard (2014).

Magnitude of impact	Actions should achieve a relevant magnitude of GHG impact. Users can approximate potential emissions reductions and label actions as major, moderate, or minor. This will already be known for actions with stated GHG emissions targets, while other actions may require more subjective assessment. It is not necessary to accurately calculate GHG effects in this step, but a determination of the relative magnitude should be classified as major, moderate, or minor based on evidence to the extent possible. Evidence may include prior results from existing literature or experience, consultation with experts and stakeholders, or other methods. If evidence does not exist, expert judgment should be used. Below is a description of the classification categories of potential magnitude of impact – major, moderate, or minor impact (Adapted from WRI 2014b):

Magnitude	Description
Major	The impact is strongly associated with the effectiveness of the policy or action, and/or the change in GHG emissions or removals is likely to be significant in size.
Moderate	The impact is associated with the effectiveness of the policy or action, and/or the change in GHG emissions or removals could be significant in size.
Minor	The impact is inconsequential to the effectiveness of the policy or action, and/or the change in GHG emissions or removals is insignificant in size.

Box 6.1: Examples of suitable and non-suitable non-state and subnational actions

A subnational action which targets energy efficiency of appliances by increasing energy efficiency up to the level of current best practice can meet the criteria because even if there is no direct quantitative target, the user can deduct quantitative targets (given the availability of studies applying best-practices with regards to energy efficiency of appliances).

A non-state action focusing on information sharing through distribution of awareness material on why certain land use practices are harmful for the climate does not meet the criteria. This action should not be considered by users as it is not impact- or results-oriented and has no quantitative target, unless behavioural studies of that action can be linked to mitigation impacts. This does not mean that such initiatives could not have an important impact on climate change mitigation; they can be significant interventions that enhance enabling environments to facilitate other actions. However, their impact is very difficult to attribute and quantify.

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

In addition to determining the suitability of non-state and subnational action, considering their likelihood to achieve the targeted outcome is also important. It is a *key recommendation* to determine the likelihood that non-state and subnational action targets will be achieved. This assessment should be based on available information and facts, such as literature, prior experience/ performance, modelling results, risk

management methods, consultation with experts and stakeholders, or other methods. It is important to note however, that while increasing attention is being directed at this topic, there is no consensus or common methodology to determine likelihood and any type of likelihood assessment therefore is still highly subjective and dependent on the scope and goals of the overall analysis.

When determining likelihood, users may want to look for qualitative information about whether the action: (1) is difficult to immediately reverse; (2) builds support over time; and (3) expands the populations they impact (Levin, Cashore, Bernstein, & Auld, 2012) as these may be signs the action is likely to meet its target. If relevant evidence does not exist, users should use their own expert judgment. Alternatively, a quantitative assessment of likelihood may be carried out (e.g. by checking progress on each target individually, which however might be not feasible if a huge number of actions need to be checked for likelihood of implementation) or full implementation of all actions may be assumed.

Error! Reference source not found. provides information on how to determine likelihood and which level of likelihood to consider. The colour coding provides recommendations on whether or not to include the non-state and/or subnational target *(green = include, orange = include under some conditions, red = do not include).* Box 6.2 illustrates how to determine likelihood using examples.

Table 6.2: Assessing the likelihood of non-state and subnational action targets

Likelihood	Description
Likely	Strong reason to believe the non-state or subnational action's target will be achieved. This may be determined based on indications such as: action is already at an advanced stage, funding is available, clear ownership and responsibilities exist (clear ownership with overall responsibility to deliver results, including mobilizing the necessary capacity and resources), action is results/impact oriented, (internal) incentives system exists, monitoring system is in place, GHG inventory data has shown progress is underway, non-state/subnational actions are embedded in a public policy or planning instrument, and/or the action has a clear implementation period.
Possible	Some reason to believe 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. The final decision of whether or not to include a possible non-state or subnational action depends on the level of accuracy and conservativeness (caution) users aim for in their assessment.
Unlikely	Few reasons to believe the non-state or subnational action's target will be achieved. This may be determined based on indications such as: action is not (yet) underway, overambitious target, unclear ownership or assigned responsibility, and/or there is limited or no funding available. However, over ambition by itself should not be a disqualifying reason.

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

Box 6.2: Examples of determining likelihood

Examples (generic): Company A has consistently set and achieved 5-year emission reduction targets since 2005. Its most recent reporting indicates it is on-track to achieve its 2020 target and it has committed to setting a science-based target in the near-term. It has an incentive scheme attached to

the achievement of its targets, which are agreed upon at board-level. Company A is *very likely* to achieve its target and the reductions should be included in the assessment.

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

Applied examples

From Global Climate Action from Cities, Regions, and Businesses Report 2018: International cooperative initiatives were chosen based on the following qualitative criteria[36]:

First step:

- The initiative is likely to have a major impact on GHG emissions
- The initiative has a quantifiable target

Second step:

- High likelihood of implementation, indicated by recent reporting, and other regular updates

From India pilot

In addition to the qualitative approach laid out in this guide, this pilot also verified whether companies were on track to meet their voluntary targets. This was done by establishing a threshold (here 30% of the overall target) under which actions were excluded from the analysis.

From Fulfilling America's Pledge 2018: How States, Cities and Businesses Are Leading the United States to a Low-Carbon Future

No explicit likelihood assessment was carried out. However, this pilot conducted an implicit assessment by excluding certain types of policies from the bottom-up aggregation to keep results conservative. For example, city-level GHG targets were not included, however to the extent that the city had underlying commitments to achieve these goals in specific sectors (e.g. RE and efficiency commitments) these were included as they were more concrete.

In addition, two scenarios- an "existing action" scenario and a "pledges" scenario were developed, which allowed for a differentiation between the impact of actions that were more certain would be achieved vs. less certain (e.g. legally binding actions vs. aspirational corporate targets).

An additional filter that users may want to use is a function-output-fit (FOF) approach, which measures whether climate actions produce outputs that are consistent with their targets.[37] According to the FOF

[36] For more information also see "Methodology for quantifying the potential impact of international cooperative initiatives", an annex to the 2018 Global Climate Action Report, available at: https://newclimate.org/wp-content/uploads/2018/09/Methodology-for-Quantifying-Potential-Impacts-of-ICIs.pdf.

[37] Chan et al. 2016; Chan et al. 2015

approach, an impact is likely to occur if non-state or subnational 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. For example, an international collaborative initiative action that declares stopping deforestation in supply chain as its objective (function) could be expected to engage with companies and their supply chains (output). If the initiative however only produces knowledge (and nothing else), it may be considered active, but its output would not fit its declared objective and it would be less likely to result in impact. This kind of analysis provides an additional tool to determine likelihood of mitigation impact.

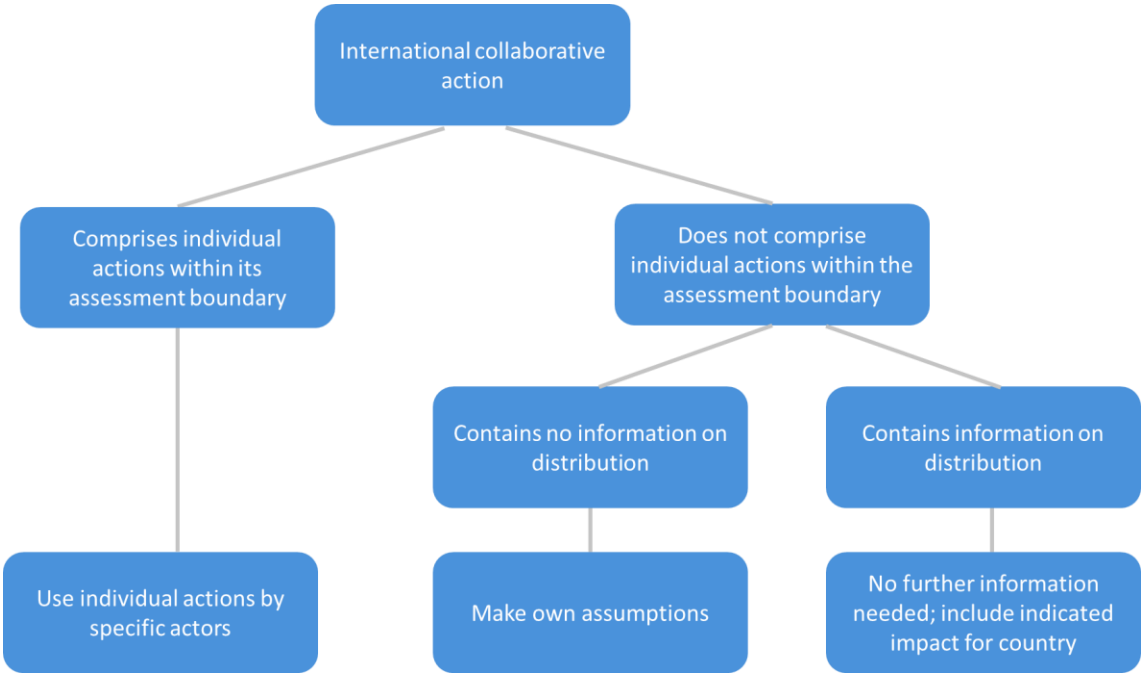
6.3 For international collaborative actions, distribute impact to countries

To determine the impact of international collaborative actions from the users' list for the relevant country, users will need to break down the anticipated effect of the collaborative action to the country level. To do so, users have options which are detailed in Figure 6.1. If a conservative assessment approach is chosen here, which only looks at current membership of an initiative rather than evaluating the initiative's overall goal, it may be the case that collaborative actions only cover individual actions that are already included in the assessment and the initiative could therefore be dismissed. In addition, often, the individual action will be more specific than the collaborative target.[38] It may still be valuable to review data sources on international collaborative action in order to help identify specific actions within the assessment boundary. It is therefore a *key recommendation* to determine whether the collaborative action is already covered by an individual non-state and subnational action, before distributing emission reductions resulting from international collaborative actions to countries.

If users aim to evaluate the potential impact from the overall target of the initiative for a specific country, a different approach is needed. In this case, users will need to quantify the potential impact from the initiative's overall goal for their specific assessment boundary and disregard individual non-state and subnational actions that may already be covered by the initiative. This chapter provides a list of assumptions users might use to distribute impacts to countries when no detailed information is provided by the initiative.

[38] For example, Credit Agricole, a French financial institution, has signed up to the RE100 initiative aiming to procure 100% of electricity from renewable sources. At the same time, its commitment to the collaborative action is also covered under individual actions, as "Supply 100% of total electricity consumption from renewables by 2016 from 46% in 2015."

Figure 6.1: Distribute aggregated impact to countries



If an international collaborative action does not contain specific information clarifying how impacts are distributed to the country level users may want to apply assumptions to estimate distribution. This may be subjective and therefore use of assumptions may impact the level of conservativeness of the assessment, but may still be useful depending on the objective. All assumptions should be recorded. These actions may in fact be specific means to implement and achieve larger overarching targets for specific actors. For example, a commitment by a city under an international collaborative action to increase the share of bicycle travel may be a means of achieving and overarching emissions reductions target. Assumptions may vary, depending on whether the international collaborative action focuses on non-state or subnational action.

For international collaborative actions that bring together *non-state* actors, assumptions may include:

- Number of installations/facilities
- Asset value
- Volume of production or value added
- Relevancy of the (sub)sector compared to the users' national emissions inventory

Assumptions that may be used to distribute the impact of international collaborative actions that bring together multiple *subnational* actors include:

- Equal distribution across countries (e.g., same amount of additional renewable energy)
- Distribution relative to size of country (e.g., via population or GDP)
- Distribution relative to size of indicator within country (e.g., rate of deforestation)

In many cases however, international subnational collaborative initiatives already contain information on the distribution to countries. Users may also want to look at the UN Environment's Cities and Regions

Pipeline which brings together information on international collaborative mitigation initiatives by cities and regions and lists them per country. This pipeline also features information on cities and regions' quantified GHG reduction commitments for 2020, 2025, 2030, etc. up to 2050.[39]

Box 6.3 provides examples on how to apply these assumptions in practice.

Box 6.3: Examples of distributing impact of international collaborative action to country

Example one (generic): An international subnational collaborative action has the objective to install 50 GW of solar PV capacity by 2020 globally and meets the suitability criteria for inclusion outlined in Section 6.1. The action includes 50 cities with a projected total number of inhabitants equal to 100 million by 2020, out of which 10 million inhabitants are projected to be in country A. The potential impact in country A would thus be 5 GW. This is a simplified example that assumes results are equally distributed to all participant countries. This approach has limited accuracy, but may still be useful if the user wants to capture the high end of potential impact. An international cooperative action aims to restore 20 million hectares of degraded land and deforested lands globally by 2020. To distribute the impact among countries, the user could split the potential impact of the initiative by using historical FAO data on afforestation and reforestation. Specifically, the user could calculate the share of afforestation or reforestation rates (in Mha/year) in the global total afforested/ reforested area and use it to split the total target of the initiative (in Mha to be afforested/reforested). For example, looking at an example participating country, China, its afforestation rate was 1.497 Mha/year and 0.29 Mha/year for reforestation.[40] In comparison, the world's afforestation rate was 5.622 Mha/year and its reforestation rate 5.348 Mha/year.[41] The share of global afforestation rate for China is thus 26.6% and for reforestation 5.4%. Applying this to the international cooperative action, the estimated impact for China would be 5.32 million hectares of afforested land and 1.08 million hectares of reforested land by 2020. While this example demonstrates the approach to distribute impact, it includes the assumption that effort may be proportional to the current rates of afforestation and deforestation while the initiative may impact countries' behaviour and shift current rates.

Example from the Global Climate Action from Cities, Regions, and Businesses Report 2018) [42]: The Under2MOU, or Memorandum of Understanding on Subnational Global Climate Leadership, is an initiative that brings together subnational governments committed to ambitious climate action. Each signatory commits to reduce their GHG emissions trajectory to the levels consistent with the Paris Agreement's goal to limit temperature rise below two degrees Celsius (2°C), i.e., to 80-95% below 1990 levels or to below 2 tCO_2e per capita by 2050.

For the quantification of the potential impact of the Under2MOU initiative, the signatory regions within selected key countries were listed and their 2015 base year emissions based on historical data and WEO current policy scenario growth rates established. Quantification of Under2MOU evaluates the potential mitigation impact of the initiative, with an aspirational membership goal of 250 signatories by

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

[40] FAO 2015.

[41] FAO 2010.

[42] For more information also see "Methodology for quantifying the potential impact of international cooperative initiatives", an annex to the 2018 Global Climate Action Report, available at: https://newclimate.org/wp-content/uploads/2018/09/Methodology-for-Quantifying-Potential-Impacts-of-ICIs.pdf.

2020. If a participating region has not submitted an Annex with a clear emissions reduction target as part of their Under2MOU pledge, the analysis was based on the Under2MOU's general target (80-95% reduction below 1990 levels by 2050). This is an ambitious assumption particularly for cities that expect significant growth. The emission reduction rate was assumed to decrease linearly between the start year and 2020/2030, unless the region had stated intermediate goals for those years.

It was assumed that regional emissions can be approximated by multiplying the share of the region in the country's population by the country's overall emissions. In other words, it was assumed that regions' inhabitants have the same average emissions per capita as the country average. Then the regions' emissions reduction targets were compared with their current policy emissions pathways (CPS) to estimate the additionality of their Under2MOU commitments. It was assumed that the signatory regions will follow an emissions pathway (current policy scenario - CPS) at the same rate as their country's CPS. For Indonesia and Mexico, the countries' CPS is assumed to follow the same emissions pathway as their global region's CPS trajectory (e.g. – Southeast Asia for Indonesia, Central America for Mexico). The country's CPS was downscaled to a subnational region level using the regions' population and assuming all regions have the same average per capita emissions in the country.

Once the CPS' were downscaled, the potential emissions reduction that would be achieved through the CPS and the Under2MOU were compared. In this way, the additional emissions reduction contributions from cities were estimated for both 2020 and 2030. Those contributions were then added up back to the country level. Since the evaluation of Under2MOU includes the potential impact of aspirational membership goals, the final estimated emission reduction impacts were scaled up, by assuming that additional members have the same average impact as current members. The initiative's membership is assumed to remain constant, at 250 members, from the period between 2020 and 2030.

Companies operating globally

Targets from multinational companies that lack distribution-specific details are a special case. Users should consider that most large businesses operate cross-border and many do not specify targets per sector/country which can create difficulties when wanting to determine the specific impact of those actions in a country. In this respect, company targets can be similar to international collaborative actions. If detailed information (e.g., at facility level), cannot be obtained directly from companies, or cannot reasonably be deducted (e.g., a company aims to reduce emissions from a specific product which is only produced/sold in one specific country), users should either exclude these targets at this stage due to a lack of information or be cautious when adding targets in Chapter 8. Box 6.4 illustrates some examples.

Box 6.4: Examples of distributing impact of individual multinational company action to country

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

Multinational company B with operations across the world has committed to decrease its scope 1 emissions in Europe by 30% by 2020 compared to today's emissions. A user interested in conducting the assessment for European country C could determine the total emissions of company B in country C and then assume a 30% reduction of the current emissions of company B by 2020.

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 action to avoid double counting potential impacts.

Checklist of key recommendations

- List all relevant national climate mitigation policies and actions that relate to the objectives of the assessment and/ or transparently document an existing counterfactual scenario or model that is used for the top-down integration.

7.1 List all relevant national climate mitigation policies and actions

Having determined the suitability for each non-state and subnational action and commitment in the country, it is a *key recommendation* to list all relevant national climate mitigation policies and actions that relate to the objectives of the assessment. This may include policies that do not directly target GHG emission reductions (e.g. Energy Conservation Building Codes, Standards and Labelling), but which can contribute to GHG emissions reductions. If the user is pursuing an aggregation exercise to determine the full impact of non-state and subnational action, or the additionality of non-state and subnational action to the national level, users may use this list to inform any overlap calculations between non-state, subnational and national action in the absence of an existing counterfactual (e.g. a current national policy scenario). However, this step may also be relevant for integration assessments for the development of different national-level scenarios to compare results against, if such scenarios do not already exist. If a user is pursuing an objective that will require integration, users may want to undertake this step before collecting relevant non-state and subnational action as described in Chapters 0 and 0. Users may also want to collect details, assumptions and data associated with those projection models to determine to what extent non-state and subnational action may already be included.

This step may not be necessary if a user wanted to conduct an aggregation assessment or revise a specific sector/subsector target.

For assessment objectives that require the identification and analysis of several national climate mitigation policies and actions, this list should build on the previous assessment steps and reflect the data needs of the assessment. Table 7.1 presents recommendations on what information users should gather at a minimum. Users should list all sectors and/or subsectors targeted by the identified national policies and actions, based on the IPCC main categories, as well as specific targets including reference levels/target years and metrics used. Users should also apply the same suitability criteria used for determining whether non-state and subnational actions should be included in the analysis (Section 6.1).

In addition, comprehensive assessments with an objective to determine the impact of non-state and subnational action on overall emissions projections may require information on the effect of climate mitigation policies and actions on a country's emission pathway, which can also be modelled if no information can be obtained; see Box 7.1. Alternatively, users can consult other ICAT GHG methodologies on how to calculate the GHG emission impacts of various policies.

Box 7.1: How to quantify a country's emission pathway under mitigation policies and actions

Generic example: For a country with the relative target below a certain reference or baseline, such as 25% below current policies levels in 2030 for country A, the first step is to quantify the current policies emissions in 2030. For NDCs, some countries report the estimated emission levels of current policies in the submitted (I)NDCs or other national submissions to the UNFCCC. If country A reports its current policies emission level in 2030 to be 500 $MtCO_2e$, then the target emission level would be 500 $MtCO_2e$ * (1 – 25%) = 375 $MtCO_2e$.

When a country does not report its current policies emission levels, the definition of its current policies needs to be looked at to calculate the current policies emission levels. If a current policies scenario assumes a constant GHG emission intensity per GDP, the current policies emission level in 2030 can be calculated as: [current policies GHG emissions in 2030] = [GHG emissions in the base year (as per defined in the NDC document] * [GDP growth rate between the base year and 2030].

The GDP growth projections can be taken from both national sources as well as from international sources such as the International Monetary Fund.

Example from the Global Climate Action from Cities, Regions and Businesses Report[43]: As a starting point, this analysis uses a "Current national policies" (CP) scenario, which considers only currently implemented national and federal policies. To cover the uncertainty of future projections, two current national policy scenario projections are taken into account, one that is conducted by NewClimate Institute and one produced by PBL Netherlands Environmental Assessment Agency. Both are supplemented with LULUCF and agricultural sector projections from the International Institute for Applied Systems Analysis (IIASA). The CP scenario projections considered main energy and climate policies implemented as of July 2017.

The "Current national policies plus individual actors' commitments" (CP+NSA) scenario is the main scenario in this analysis and builds upon the CP scenario. In addition to national policies, it considers the recorded and quantifiable commitments made by individual sub-national and non-state actors (e.g., regions, cities and companies). This scenario assumes full implementation, meaning certain reductions based on an assessment of their likelihood of implementation are not discounted. Specific policies, actions or implementation barriers to meeting these targets were not analyzed further. This scenario considers and quantifies the overlaps across commitments.

[43] For more information also see "Methodology for quantifying the potential impact of individual commitments", an annex to the 2018 Global Climate Action Report, available at: http://datadriven.yale.edu/wp-content/uploads/2018/08/Methodology-for-Quantifying-Potential-Impacts-of-Individual-Commitments.pdf

Table 7.1: Template for information gathering on national climate mitigation policies and actions

Relevant national policies and actions	Share of emissions of the sector	(Sub)sector(s) targeted	Target (incl. base/ target year and metrics used, if available)	Is this an NDC target (included in the NDC)? *	Is the policy NDC specific/ does it contribute to achieving the NDC?*	Impact on national emission projections	Data sources
Example: Reduce emissions from coal power plants	10%	Energy	Reduce GHG emissions from coal power plants by 30% by 2030	yes	yes	n.a.	Environment Ministry

* If users have chosen assessment objectives that are not directly related to the country's NDC, they do not need to fill this column

To fill the list, users first need to gather information on national climate mitigation policies and actions. Table 7.2 provides an overview of options on how to gather that information. Users should list all data sources used to compile the data.

Table 7.2: Options for gathering information on national climate mitigation policies and targets

Option	Applicable for which assessment objective	Resource requirements and process
Consult existing relevant national registries	All	Some countries might have databases that list climate mitigation policies that could be checked first. The 'Climate Change Laws of the World' database44 might also be a useful tool, covering climate and climate-related laws in 164 countries and available online. Not resource intensive.
Look at most recent and relevant national climate reports such as Biennial Reports (BRs)/Biennial Update Reports (BURs), NDCs if applicable[45]	All	Many national climate reports under the UNFCCC such as BRs/BURs, national communications or NAMAs include information on climate policies that could be used. In many cases, a country's NDC might also provide information on GHG emission reduction targets at national and/or sector level.

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

[45] 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

		Not resource intensive.
Consult dedicated national body (if applicable)	All comprehensive assessments; Targeted assessment resources permitting	Some countries have an (inter-) ministerial body or similar body with oversight on climate mitigation (and who might also steer the NDC process in the country), which could be approached. Not resource intensive.
Consult relevant line ministries	All relevant ministries for comprehensive assessments; One specific ministry for targeted assessment, resources permitting	For more accurate results, users could consult relevant ministries (depending on exact objective/scope of the assessment) to verify if information contained in BRs or BURs is up-to-date or whether there are any important policies in the pipeline. Official government road maps can also be a relevant source of possible mitigation action, especially in developing countries. Resource intensive.
Literature review and/or consultation with (local) consultancies and research organizations	Possibly for all, depending on resources	Literature reviews can provide some additional information and analysis which might be difficult to obtain by discussing with ministries alone. In addition, more and more organizations collect and provide information on national climate mitigation policies and actions and their effect on national emission pathways. One such example is the Climate Action Tracker which might constitute another valuable source of information.[46] Resource intensive.
Other stakeholder consultations (e.g., sector experts, UNFCCC focal points, Global Climate Action (NAZCA) data providers)	Possibly for all, depending on resources	To fill remaining data gaps, users could consult with (sector specific) experts. One challenge here is that they first must be identified. Resource intensive. For less resource intensive options, users could consult the country's UNFCCC focal point.[47]

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[46] Further information is available at: http://climateactiontracker.org/

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

PART III: IMPACT ASSESSMENT

8. CONVERTING NON-STATE AND SUBNATIONAL ACTIONS AND NATIONAL POLICIES TO SUITABLE METRICS

This chapter explains how to process collected data to convert the diverse range of non-state and subnational climate mitigation targets to suitable metrics for comparison to national policies or inclusion into existing climate models. Options are also provided to determine emission reduction potentials. By doing so, users will be able to determine the impact of non-state and subnational actions.

In addition, the chapter discusses relevant metrics, detailed steps for each IPCC sector (description and conversion tables, including examples) and how to proceed for comprehensive assessments.

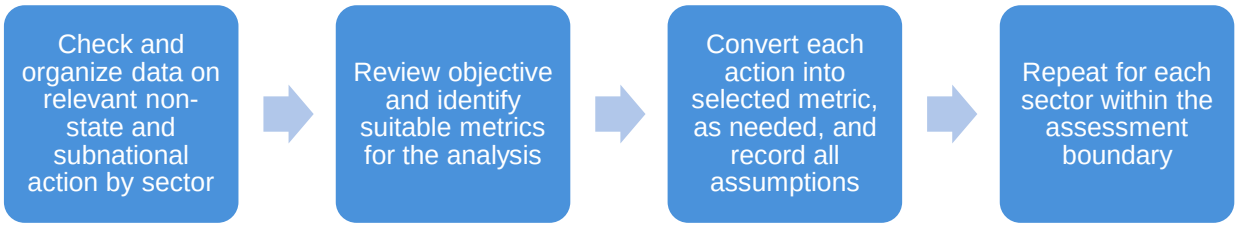
Checklist of key recommendations

- Identify suitable metrics and convert non-state and subnational actions to those metrics
- Identify metrics that work for existing climate mitigation models and/or scenarios and check whether non-state and subnational actions need to be converted to emission reduction potentials

8.1 Preparing for data processing and identifying suitable metrics

Users will need to process collected information on non-state and subnational action into a comparable form for the analysis. Particularly for complex exercises, the more complete and clear the outputs of previous steps are, the easier it will be to conduct the following analysis. This requires a number of steps as shown in *Figure 8.1* below.

Figure 8.1: Steps to process data



If the user has not already done so, the data collected on non-state and subnational actions should be organized by sector. Any data gaps that still exist should be highlighted as these actions may require additional processing (for example, to determine missing base year emissions if still unknown) or may require assumptions to be made.

Users should also review their objective at this time. To quantify the impact of non-state and/or subnational actions, many users conducting targeted assessments will not need to translate non-state and subnational actions to GHG emission reduction potentials, especially if their primary interest (objective of assessment) is to revise specific sector or subsector-level targets which are not expressed as emission reduction. In fact, in some cases, users can compare the impact of non-state and subnational actions and national policies at the level of a non-emissions based metric, for example, the share of renewable energy or energy efficiency improvements in a certain sector. In other cases, users can take

non-emissions based metrics as a result of the analysis conducted with this guide and integrate them in climate mitigation models or scenarios which are already being used in the country, including those under development. It is therefore a *key recommendation* to identify metrics that work for existing climate mitigation models and/or scenarios and check whether non-state and subnational actions need to be converted to emission reduction potentials.

In the case of comprehensive assessments involving integration into national emissions pathways, users should also review the metrics used in their selected models from Chapter 7 (See Section 8.3). This may also involve discussions with modelers to identify the best metrics and format these metrics need to be in in order to incorporate the aggregated impacts into the model. For example, America's Pledge team calculated and showed the TWh of RE demand from state and city targets. However, they then needed to convert this to % of RE demand for each state to plug into their economy-wide model used to calculate emission reductions (GCAM). In other words, the suitable metrics for comparison to national policies vs. inclusion in existing models could be very different. Non-state and subnational climate actions may use a variety of target types and metrics which may differ from those used in national policies or climate models.[48] Thus, they are not all equally suitable for calculating emission reduction potentials, a comparison to national policies, or the inclusion into existing climate models. It is therefore a *key recommendation* to identify suitable metrics for the specific assessment's objective and convert non-state and subnational actions to those metrics.

It is important to be able to recognize the types and characteristics of actions that may be encountered when using this guide. Actions containing absolute GHG emission reduction target types may include: base year emissions target; fixed-level target; base year intensity target; and baseline scenario target. Other targets such as non-GHG targets, and emission reductions to be achieved by policies, actions, or projects may also be encountered. See Chapter 3 for additional details. Compounding the challenges of establishing a uniform metric for aggregation and integration, actions may differ in the characteristics by time frame, geographical boundary, scope of emissions, and target level.

Characteristics of suitable metrics for users aiming to determine emission reduction potentials include:

- Absolute values (e.g., decrease emissions to under 2 tonnes CO_2e per capita by 2050)
- Energy or emissions related (e.g., procure 5 MW of energy consumption from renewable energy sources by 2030)

In practice, users should revisit the lists they put together in Chapters 0 and 7 and check against the characteristics detailed above to determine which targets are already in the form of a suitable metric and which ones need to be converted. Energy or emissions related metrics, in addition to absolute values are critical to determine emission reductions against a certain base year or target year.

In the pilot for the Indian industry sector, the analysts for example for companies who do not have targets until 2030, assumed that the companies would be reducing at the same percentage rate beyond 2020 as per the target committed until 2020.

In addition, users may have found several targets belonging to the same actor. Users may want to categorize the actions as "primary" and "secondary," or "tier 1" and "tier 2" (if not already done) where

[48] Climate models may be understood as mathematical representations of the climate system and the transfer of energy through the system.

primary or tier 1 actions are those in of higher subnational jurisdictions such as regions, states or other designation and secondary or tier 2 actions are from actors within tier 1 jurisdictions such as counties, cities, businesses and corporations. Actions within sectors could then be further organized by geographical location to help users identify relationships where overlaps are likely. In case targets can be converted to the same metric, it is advised to only use the most ambitious target (also see Section 5.3) to avoid overlaps.

8.2 Examples of suitable metric by sector

This section provides examples of metrics for various sectors. As users go through their list of actions, any that need to be converted into comparable metrics should be processed. This processing may take considerable time as users may need to collect supplemental information such as emission factors, sector specific data, economic or demographic data, etc. All additional data points and assumptions should be used consistently within sectors and should be documented for each action that is processed. The subsections and tables below, provide examples of how actions may be processed for each sector.

In the style of the IPCC guidelines of GHG inventories, this guide considers agriculture, forestry and other land use, energy-related emissions by sector and subsector, industrial processes and product use, and waste. The grouping of sub-sectors in this chapter varies from the IPCC guidelines to give the user easier access to relevant information. Where the objective of the analysis requires close alignment with national GHG inventories, it is recommended to keep the IPCC guidelines and the national GHG inventory process in mind while conducting the non-state and subnational action aggregation.

8.2.1 Agriculture, forestry and other land use

Non-state actors, including private sector entities, are playing an increasingly large role for climate change mitigation and adaptation in many sectors, including in the agriculture, forestry and other land use (AFOLU) sector.[49] Across international cooperative initiatives agriculture was the third most frequently covered sector in 2018, after energy efficiency and transport, and is also covered under many more forestry oriented collaborative actions (UN Environment, 2018).

A general challenge for the sector when quantifying mitigation action is the time delay between the action (e.g., planting a tree) and its impact on emissions. Users need to keep this in mind when aiming to quantify the emission reduction potential and comparing it to the NDC or existing climate efforts. In addition, countries have different definitions for what constitutes a forest. Users should adjust their calculations to reflect the definition and forest types used in focus country as this will impact carbon sequestration rates.

Table 8.1 provides an overview of some common non-state and subnational targets in this sector, their conversion to suitable metrics, and a few options to calculate emission reduction potentials including necessary data points and assumptions. In addition, **Error! Reference source not found.** provides an overview of data sources which can be consulted for specific data points users might need for the analysis, if national data is not available. **Error! Reference source not found.** describes an example of determining the emission reduction potential of an international cooperative action in the agriculture sector.

[49] UNFCCC 2016; Hsu et al. 2016

Table 8.1: Examples of metrics for the agriculture, forestry and other land use sector

Agriculture, forestry and other land use sector		
Examples of non-state/subnational climate mitigation targets	**Suitable metrics for comparison to national policies or inclusion into existing climate mitigation models/ scenarios**	**Options for the conversion to emission reduction/ sequestration potential**
Restore X ha of forests	Total forest area (ha); Afforestation/reforestation rate (kha/year) Assumptions: • Density of restored forest (equal to average)	Look up the CO_2 emission reduction potential of one ha of forest (how much CO_2 domestic forests sequester annually) and multiply by the amount of ha forest to be restored (simplistic approach). Data needs (use FAO resources): • Total CO_2 emission/ha • CO_2 emissions 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.*[50]
Stop deforestation (from supply chains)	Put deforestation rate to zero; all other variables remain unaffected	*Stopping deforestation means zero emissions and no further conversion is needed at this point.*
Zero degradation	Put degradation to zero; all other variables remain unaffected	*Zero degradation means zero emissions and no further conversion is needed at this point.*
Reduction of X% CO_2 emissions from deforestation	Total CO_2e emissions from deforestation ($MtCO_2e$); Assumptions: • Base year	Convert by looking at total CO_2e emissions from deforestation domestically. Assumptions: • Base year
Decrease CO_2e emissions from agriculture by X% compared to 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)	Convert from relative reduction to absolute target by looking at total CO_2e emissions from agriculture and projected emission growth rates Data points needed (use national emissions projections, or if not available World Bank Data, US 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 (tonne/person); total	Look at the emissions caused by agriculture destined to food production. Then look at the share of sustainable food production and its CO_2e impact. Users should then

[50] A tool to calculate emissions removals from reforestation is available at: http://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/reforestation-tools; another method is described here, although it has a limited geographical coverage: http://calfire.ca.gov/Grants/downloads/Methods_for_Evaluating_GHG_Emission_Reductions.pdf;

	sustainable food production (tonne/person) Assumptions: • Definition of sustainable food production (e.g., certified food; certified production only; type of certification)	translate the relative target into an absolute one, calculate the estimated CO_2e emissions and compare to CO_2e of estimated non-sustainable food production. Assumptions: • Definition of sustainable food production (e.g., certified food; certified production only; type of certification) Data points needed (use World Bank, UN World Populations Prospects if no national data is available): • Food production per person (tonne/person) • Demographic development • Share of sustainable food production in country (x%) and its CO_2e impact (tCO_2e/person)

Box 8.1: Relevant international sources of information for agriculture, forestry and other land use sector

FAO database (FAOSTAT), Available at: http://www.fao.org/faostat/en/#home

Other relevant FAO resources to get information among others on forest cover, forest carbon stock, reforestation/afforestation and deforestation rates:

- **Global Forest Resources Assessment 2015. Available at:** http://www.fao.org/3/a-i4808e.pdf
- State of the World's Forests 2016. Available at: www.fao.org/3/a-i5588e.pdf

World Bank open data covering several metrics including forest cover**, agriculture, food production). Available at:** http://data.worldbank.org/indicator

US EPA global GHG emissions data covering emissions by gas, sector, country as well as trends. Available at: https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

*UN World Population Prospects***. Available at:** https://esa.un.org/unpd/wpp/

Additional information on methods and tools:

IPCC Guidelines on Forest Land provides methods for estimating carbon stock changes and greenhouse gas emissions and removals associated with changes in biomass and soil organic carbon on forest lands and lands converted to forest land. Available at: www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/Chp3/Chp3_2_Forest_Land.pdf

Tools to calculate emission reductions from reforestation. Available at: www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/reforestation-tools and http://calfire.ca.gov/Grants/downloads/Methods_for_Evaluating_GHG_Emission_Reductions.pdf

Box 8.2: Example of how to determine the emission reduction potential of an international cooperative action in the agriculture sector

An international cooperative action aims to mobilize 100 million USD for sustainable forestry, out of which 5 million would be mobilised in the user's country. Assuming the user wants to look at the effect of non-state and subnational action on the overall forest volume content domestically, the area of forest restored is the suitable metric for comparison with national policies here.

Users can convert the 5 million USD mobilised into ha of forests restored. This could be done by using domestic data, if available, on the average amount of investment needed to restore 1 ha of forest or, if no data is readily available, using international sources that provide such data while acknowledging that it may not be the most accurate data for their context. For example, users could check restoration projects financed by developments banks, assuming that efficiency of resources remains unvaried or from surveys of companies and non-profits engaged in restoration. So, for instance, 100 USD is needed to restore a hectare of forest in the country, 5mn USD can restore 5,000,000/100= 50,000 ha.

8.2.2 Energy and industrial processes and product use

The following sub-chapters look separately at energy supply, industry, buildings and transport and provide specific steps on how to convert energy related non-state and subnational action targets to suitable metrics and illustrates some options on how to estimate their emission reduction potentials.

Energy supply

Accounting for approximately 35% of global GHG emissions in 2010, the energy supply sector is the largest contributor to global GHG emissions among all sectors.[51] The energy supply sector, together with the transport sector, is one of the most frequently targeted by subnational and non-state mitigation action.[52] In some instances, these targets are energy demand or consumption specific but can be translated into energy supply targets (which need to be met for consumption targets to be achieved). A range of suitable metrics in the energy supply sector exists to compare them to national policies, include them into existing climate mitigation models or convert them to emission reduction potentials (Table 8.2). Box 8.3 provides an overview of data sources that can be consulted if national data is not available. Box 8.4 describes an example of determining the emission reduction potential of a non-state initiative in the energy supply sector.

Table 8.2: Examples of metrics for the energy supply sector

Energy supply		
Examples of non-state/ subnational climate change mitigation targets	**Suitable metrics for comparison to national policies or inclusion into existing climate mitigation models/ scenarios**	**Options for the conversion to emission reduction potential**
Increase the share of electricity generated from RE to X (% or absolute amount in MW) / Procure X amount or % of total energy supply by renewables	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	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 the emission reduction potential, users can derive different estimates of emission impacts depending on whether RE electricity displaces natural gas first, then oil and then coal (low estimation[53]) or coal first, then oil and then gas (high estimation)

[51] Bruckner et al 2014.

[52] Yale University 2015.

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

	consumed (no idle capacities)
	Data points needed:
	• To convert % to MW or the other way around:
	  ○ full load hours, either average over all technologies or technology specific, if available
	  ○ total electricity generation
		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 Economic Outlook/Statistics if no national data is 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 (USD/MWh)	Cost of one unit of RE generated (USD/MWh) Assumptions: • Linear cost trend (costs do not change if more RE capacity is installed)	Recommended to use an existing model if available due to the many complex assumptions needed to calculate realistic emission reduction potentials.
Reduce electricity consumption by X% compared to base/target year reference	Total electricity demand (MWh) Assumptions: • Consumption is equal to supply	Look at total projected electricity consumption and convert relative target to an absolute one. To calculate the emission reduction potential, please 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 is available): • Projected demand for electricity (in MW) • Total CO_2 emissions from generated electricity ($MtCO_2$) • National fuel mix • Emission factor for fossil fuels

Box 8.3: Relevant international sources of information for energy supply sector

- IEA statistics which include indicators such as carbon intensity of electricity generated with oil, gas and coal, Available at: http://www.iea.org/statistics/
- IEA's World Energy Outlook 2018 including estimates about energy demand, renewable energy under the New Policies and 450 scenarios, Available at: https://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, Available at: https://www.iea.org/etp/
- IRENA Roadmap for a Renewable Energy Future, Available at: http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_edition_report.pdf

- IPCC emission factor database, Available at: http://www.ipcc-nggip.iges.or.jp/EFDB/main.php
- World Bank Open Data covering several metrics including renewable energy consumption and renewable electricity output, Available at: http://data.worldbank.org/indicator
- IPCC Guidelines on 'Energy', Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html

Box 8.4: Example of how to calculate emission reduction potential of a non-state initiative in the energy supply sector

In this example, a user wants to look at the effect of non-state and subnational action on the overall necessary RE capacity installed (in MW) to determine additional demand from RE targets, whether this demand can be met by current RE generation capacity, and the associated emission reduction potential. The user includes a non-state initiative in its assessment which aims to engage 100 companies to procure 100% of their energy demand by RE. Four of these companies will be mobilised in the user's country (both the company offices and the utility from which the company sources its power are physically located in the user's country). The user collects data on current RE generation capacities and RE procurement levels of the four companies. The user then converts the four companies' targets into (additional) RE generation capacity requirements by subtracting how much they already procure through RE from the 100% target, compares the results to current capacities and, in case, add this amount to future domestic RE generation capacity requirements.

To calculate the emission reduction potential for this difference, the user can derive different estimates of emission impacts depending on whether RE displace natural gas first, then oil and then coal (low estimation) or coal first, then oil and then gas (high estimation) using emission factors for example from the IEA's World Economic Outlook (WEO) data. More 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-intense. At the same time, non-state and subnational actions targeting the sector are rather rare, but growing.

The sector contributed to approximately 21% of GHG emissions in 2010 with one of the biggest contributions coming from the production of steel and cement. The industry sector includes energy-related emissions as well as non-energy emissions from industrial processes and product use.[54]

Table 8.3 provides information on how to convert common non-state and subnational mitigation targets into suitable metrics for comparison to national policies or inclusions into existing climate mitigation models and outlines options for calculating emission reduction potentials. Box 8.5 provides an overview of data sources that can be consulted if national data is not available.

[54] IPCC 2014a.

Table 8.3: Examples of metrics for the industry sector

Industry sector		
Examples of non-state/ subnational climate change mitigation targets	**Suitable metrics for comparison to national policies or inclusion into existing climate mitigation models/scenarios**	**Options for conversion to emission reduction potential**
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 emission reduction potential can be calculated per tonne (or unit of industry product) first and, by multiplying with 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 trends
Adopt best practice industry standards	Specific steel/cement intensity per tonne (or capita income/population) Assumptions: • 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 to projected CO_2e emissions per tonne produced following non-best practice industry standards. To determine emission reduction potentials, multiply the amount of CO_2e saved per unit of product with 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, X%	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)

Box 8.5: Relevant international sources of information for industry sector

- IPCC emission factor database, Available at: http://www.ipcc-nggip.iges.or.jp/EFDB/main.php
- IEA's *technology roadmap for the chemistry industry,* Available at: https://www.iea.org/publications/freepublications/publication/TechnologyRoadmapEnergyandGHG
- UN World Population Prospects, Available at: https://esa.un.org/unpd/wpp/
- Additional information on methods and tools:
- IPCC *guidelines on 'Industrial Processes and Product Use'*, Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol3.html
- WBCSD Cement Sustainability Initiative *containing data on cement and a detailed roadmap for the sector*, Available at: http://wbcsdcement.org/

Buildings

Several non-state actor and subnational actions are increasingly targeting the building sector which represents one of the key sectors for climate mitigation. The building sector 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.[55]

Table 8.4 provides information on how to convert common non-state and subnational mitigation targets into suitable metrics for comparison to national policies or inclusions into existing climate mitigation models and outlines options for calculating emission reduction potentials. Box 8.6 provides an overview of data sources which can be consulted if national data is not available.

Table 8.4: Examples of metrics for the building sector

Buildings		
Examples of non-state/ subnational climate change mitigation targets	**Suitable metrics for comparison to national policies or inclusion into existing climate mitigation models/scenarios**	**Options for conversion to emission reduction potential**
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:	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, otherwise users could consult international sources such as the IAE's World Economic Outlook. In addition, the data availability for commercial and public buildings is usually better and so the user could start with those. To determine the emission reduction potential, users need to 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

[55] IEA 2016a.

	• Total (projected) national floor area • Heating and cooling requirements	• 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 is 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 points needed: • Current renovation rate (%)	Look at the average buildings intensity of new built vs retrofitted buildings. Determine the CO_2 emission savings for a renovated building compared to a non- renovated one, based on the difference in the buildings intensity and calculating for 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. Users should then assume that additional renovations will proportionally reduce the CO_2 emissions. Assumptions: • Additional renovations will proportionally reduce CO_2 emissions • Linear trend in the buildings' intensity • Number of buildings remains unchanged • National fuel mix remains unvaried Data points needed (use IEA's Energy Technology Perspective or other IEA resources if no national data is available): • Total (projected) buildings' intensity (kWh/m^2) • National fuel mix • Emission factors

Box 8.6: Relevant international sources of information for buildings sector

- IEA's *World Energy Outlook 2018 with data trends on buildings emissions by fuel and final energy consumption by end-use*, Available at: https://www.iea.org/weo2018/
- IEA's *Energy Technology Perspectives 2016 including estimates about floor area growth and floor area per household and buildings' energy consumption*, Available at: http://www.iea.org/etp/
- IRENA *Roadmap for a Renewable Energy Future with data on share of modern renewable energy in building energy use,* Available at: http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_edition_report.pdf
- IPCC *emission factor database*, Available at: http://www.ipcc-nggip.iges.or.jp/EFDB/main.php

- IPCC *Guidelines on 'Energy'*, Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html

Transport

The transport sector is a popular target for both subnational and non-state actors. Together with the energy supply sector, it represents the sector most often targeted by non-state actions.[56]

The sector accounted for approximately 14.3% of global GHG emissions in 2010.[57] Approximately 15% of transport emissions in 2014 were associated with bunkers i.e., emissions from fuels used for international aviation and maritime transport which 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.[58] Although a user could assess the impact of non-state and subnational action related to bunkers as a distinct exercise.

Table 8.5 provides information on how to convert common non-state and subnational mitigation targets into suitable metrics for comparison to national policies or inclusions into existing climate mitigation models and outlines options for calculating emission reduction potentials.

Table 8.5: Examples of metrics for the transport sector

Transport sector		
Examples of non-state/ subnational climate mitigation targets	**Suitable metrics for comparison to national policies or inclusion into existing climate mitigation models/scenarios**	**Options for conversion to emission reduction potential**
X% reduction in average car fuel consumption	Average fuel consumption by cars (in km/l) Data points needed: • Current average fuel consumption by cars (km/l)	Look at the projected fuel consumption of an average car. Calculate the relative % reduction of fuel consumption and the corresponding fuel consumption avoided. Then determine the corresponding CO_2 emission 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. Assumptions: • Average km travelled by car remain unvaried Data points needed (use resources from the list of information sources in Box 8.7 if no national data available): • Projected fuel consumption of average car (km/l) • Number of projected cars on road • National fuel mix • Emission factors

[56] Yale University 2015.

[57] Sims et al. 2014.

[58] IEA 2016b.

Increase the number of EV domestically to X%	Number of EVs (in thousand) Data points needed: • Current number of EVs • Average final energy consumption of EVs (kJ/pkm)	Look at 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 to traditional cars. Then convert the relative EV target to an absolute one, multiply the difference in final energy consumption with the number of EVs and converting to CO_2e emissions, by using emission factors, to determine potential savings from fossil fuels. Users should then calculate additional electricity demand from the increase in EVs, and multiply this with the grid emission factor, and hold this against the savings from fossil fuel to determine the overall emission reduction potential. Assumptions: • Distance travelled by traditional and EV cars are equal • Distance travelled remains unchanged or follows linear growth trend Data points needed (use resources from the list of information sources in Box 8.7 if no national data available): • Projected number of vehicles sold (incl. 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 current share of freight land transport and the average freight rail distance ridden (as well as average CO_2 emissions per unit distance). The user should then look at road freight transport, average distance and average CO_2 emissions per unit distance. Finally, look at projections about freight transport and on this basis, calculate and compare emissions to determine emissions savings potential. Data points needed (use resources from the list of information sources in Box 8.7 if no national data available): • Average final energy consumption from train operations (kJ/tkm) • Total freight land transport traffic volume • Fuel mix • Emission factors
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 existing rail share of passenger travel and train distance travelled (as well as average CO_2 emissions per unit distance). The user should then look at road passenger travel, average distance and average CO_2 emissions per unit distance. Finally, look at projections about passenger travel and on this basis, calculate and compare emissions to determine emissions savings potential.

		Data points needed (use resources from the list of information sources in Box 8.7 if no national data 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 X%	Modal split (as share of bus/train etc. in public transport)	Look at existing share of public transport, relative to total passenger transport and distance travelled (as well as average CO_2 emissions per unit distance). The user should then look other passenger travel transport, average distance and average CO_2 emissions per unit distance. Finally, look at projections about public transport travel and on this basis, calculate and compare emissions to determine emissions savings potential. Data points needed (use resources from the list of information sources in Box 8.7 if no national data 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 proceed per technology due to different efficiencies of different public transport modes.

Box 8.7: Relevant sources of information for 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*, Available at: https://www.iea.org/weo2018/
- IEA's Energy Technology Perspectives 2016 *which contains, among others, information on trends in energy demand from the transport sector, emissions intensity of new EVs and developments in passenger and freight transport*, Available at: http://www.iea.org/etp/
- IRENA Roadmap for a Renewable Energy Future *with information on renewable energy share in transport for key countries*, Available at: http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_2016_edition_report.pdf
- IPCC emission factor database, Available at: http://www.ipcc-nggip.iges.or.jp/EFDB/main.php
- World Bank Open Data covering several metrics, Available at: http://data.worldbank.org/indicator
- Additional information on methods and tools:
- IPCC Guidelines on 'Energy', Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html

- ICCT 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*, Available at: http://www.theicct.org/global-transportation-roadmap-model
- SloCat *Transport Greenhouse Gas Emissions Research Briefs*, Available at: 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 Emission Transport*, Available at: http://www.ppmc-transport.org/wp-content/uploads/2016/04/Global-Macro-Roadmap-Consultation-Draft-March-2017.pdf

8.2.3 Waste

The waste sector is of particular importance to subnational actors, in particular cities as they are ultimately the actors who have to deal with waste-related issues. Non-state actors can be an important source of waste on the other hand. Looking at existing databases on non-state and subnational action, few non-state and subnational actors and initiatives currently target the waster sector. In 2010, the sector contributed to approximately 3% of global GHG emissions, due mainly to wastewater handling (54%) and solid waste disposal on land (43%) and followed by waste incineration.[59]

Table 8.6 provides an overview of suitable metrics for inclusion into existing national models that look at waste as well as the conversion of non-state and subnational action targets into emission reduction potentials. **Error! Reference source not found.** provides an overview of data sources which can be consulted if national data is not available.

Table 8.6: Examples of metrics for the waste sector

Waste sector		
Examples of non-state/subnational climate change mitigation targets	**Suitable metrics for comparison to national policies or inclusion into existing climate mitigation models/scenarios**	**Options for conversion to emission reduction potential**
Recover methane emissions from waste	Eliminate methane emissions. Assumptions: • All methane emissions from waste can technically be recovered	If all methane emissions from waste can be recovered, then 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). By multiplying both, users have the potential emission reduction potential. Users also need to take into account previous years' wastes (using a 1st order decay equation)[60] Assumptions:

[59] IPCC 2014a.

[60] For more information on how to calculate emissions reduction potential from waste, please see the IPCC guidelines on waste.

		• Linear growth trend in waste intensity (composition of waste remains unvaried) • The decrease in X amount of waste will proportionally reduce CO_2e emissions Data points needed (use UN or IPCC resources if no national data is available): • Waste intensity
Decrease amount of waste by X tonne (decrease GHG emissions from waste by X amount/X %)	Remaining amount of waste (in kt)	First calculate the CO_2e emissions of 1 kt of waste, by multiplying it with the waste intensity. To determine the emission savings potential from the decrease in waste, multiply the absolute reduction in waste (in kt) with projected CO_2e emissions of 1 kt of waste. Assumptions: • Linear growth trend in waste intensity (composition of waste remains unvaried) • The decrease in X amount of waste will proportionally reduce CO_2e emissions • Ignore emissions from decay of waste on landfills from previous years • It is assumed there is no change in recycling or re-use Data points needed (use UN or IPCC resources if no national data is available): • Waste intensity

Box 8.8: Relevant international sources of information for waste sector

- UN Environment/International Solid Waste Association's *Global Waste Management Outlook,* Available at: http://www.iswa.org/nc/home/news/news-detail/browse/1/article/press-release-global-waste-management-outlook-gwmo/109/
- IPCC *report on waste management*, Available at: https://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter10.pdf
- IPCC emission factor database, Available at: http://www.ipcc-nggip.iges.or.jp/EFDB/main.php
- Additional information on methods and tools:
- IPCC *Guidelines on 'Waste'*, Available at: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol5.html
- California's landfill methane emissions calculation tool, Available at: https://www.arb.ca.gov/cc/protocols/localgov/localgov.htm

8.3 Comprehensive assessments

Users aiming for a comprehensive assessment will need to go through all identified sectors in Chapter 4 and perform the steps outlined above. Comprehensive assessments are likely to focus on emission

reduction potentials from non-state and subnational action. Box 8.9 provides an example on how this assessment might look like in practice.

Box 8.9: Determining emission reduction potentials in a comprehensive assessment

The objective of the assessment is to quantify the emission reduction potential from all non-state actors on the emission pathway of country X. In this step, the user should quantify the earlier identified suitable non-state actions. In the example below, the user has identified one major suitable industry company target and another in the energy sector. The user should proceed with the calculation by sector. Users should bear in mind that at this stage, base years and target years are not harmonised and overlaps have not been checked for, therefore users will *not* yet be able to add up emission reduction potentials.

Actor	**(Sub)sector(s)**	**Target (including reference levels, target year and assumption(s) if available)**	**Base year emissions in user country's boundary (tCO_2e)**	**Estimated emissions in target year in user country's boundary (tCO_2e)**	**Estimated emission reduction potential in user country's boundary (tCO_2e) for stated target year**	**Notes**
Information provided	*Identified by user*	*Information provided*	*Information provided*	*Information calculated by user*	*Information calculated by user*	*Assumptions made by user*
Company A	Energy supply	25% renewable electricity excl. large hydro in 2030 (10% renewables in 2005 base year)	9,000,000 (in 2005)	In year 2005, 90% of electricity is generated by fossil fuel, accounting for 9,000,000 tCO_2e in total. In 2030, 75% is generated by fossil fuel. To calculate the emissions in 2030: x= 0.75*9,000,000= 6,750,000 tCO_2e	2,250,000 (in 2030)	Between 2005 and 2030 no changes assumed in total electricity generation levels and the fuel mix for electricity generation from non-renewables.

In the above example of Company A, the user calculates the emissions in the target year provided by company A, 7,500,000 tCO_2e in 2030. However, users should note that the result is sensitive to the assumptions taken ("Notes" column). For example, if the user assumed a 20% increase in total electricity generation by the target year, the target GHG emission level would be 6,750,000 * (1 + 20%) = 8,100,000 tCO_2e, meaning that the absolute emissions reduction impact compared to the base year would be much smaller (900,000 tCO_2e compared to 2,250,000 tCO_2e). Similarly, if the user assumed a 10% reduction in emission intensity for electricity generated from non-renewable sources by 2030 due to the renewables mainly replacing coal, the target GHG emission level would be 6,750,000 * (1 – 10%) = 6,682,500 tCO_2e and the resulting absolute emissions reduction impact would be 2,317,500 tCO_2e compared to the base year.

In the example below, the user has information about the target and base year emissions in the user country's boundary. To calculate the emissions in the target year and associated emission reduction potential, the user needs to determine the share of operational emissions as part of total emissions. To do

so, users should check the data source to see if the company has provided that information if they had not noted that down previously. In case no information has been detailed, users can assume that a company's operational emissions cover its total scope 1 and 2 emissions Again, the estimated target year emissions and emission reduction potential are sensitive to assumptions, in this case that the non-operational emissions remain unvaried ("Notes" column).

Actor	**(Sub)sector(s)**	**Target (including reference levels, target year and assumption(s) if available)**	**Base year emissions in user country's boundary (tCO_2e)**	**Estimated emissions in target year in user country's boundary (tCO_2e)**	**Estimated emission reduction potential in user country's boundary (tCO_2e) for stated target year**	**Notes**
Information provided	*Identified by user*	*Information provided*	*Information provided*	*Information calculated by user*	*Information calculated by user*	*Assumptions made by user*
Company B	Industry	Reduce operational CO_2e emissions by 100% from 2015 to 2021	4,580,000	Scope 1+2 emissions cover 70% of emissions and account for 4,580,000 tCO_2e. Operational emissions in base year are thus 0.7*4,580,000= 3,206,000 tCO_2e Emissions in the target year will thus be 4,580,000-3,206,000= 1,374,000 tCO_2e	3,206,000	Operational emissions cover a company's total scope 1 and 2 emissions; non-operational emissions remain unvaried

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9. Assessing Overlaps, Adding Impacts and Comparing Ambition

This chapter provides steps for adding non-state, subnational and national climate mitigation actions, while avoiding double counting, and comparing their respective ambition level and impact on emission pathways.

Checklist of key recommendations

- Check for potential 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
- Harmonize the assessment's target year (temporal boundary) with the non-state and subnational target years when comparing ambition

9.1 Relationship and interactions between actions

Based on the converted (or suitable) metrics identified and/or the emission reduction potentials calculated in Chapter 8, users should check for overlaps, i.e. actions that target the same emissions, to avoid double counting of impacts. Users should also assess the relationships and interactions between actions to understand where these actions reinforce each other to achieve the same outcome. It is a *key recommendation* to check for potential overlaps between various non-state and subnational actions in the same sector,[61] across sectors and between non-state/subnational actions and national policies to avoid double counting and record any justifications to include or exclude specific actions in the assessment.

Table 9.1 specifies types of relationships between national policies and non-state/subnational actions with a specific focus on cases of double counting and how users can avoid it *(A and B stand for different non-state, subnational and/or national policies/actions, C stands for their overlap and D for the combined effect of A and B together).* If overlaps exist, the ambition of overlapping actors' GHG reductions should be compared, assuming that one actor adds to the effect of another if its ambition is higher. Overlaps do not necessarily always constitute a problem, in some cases actions can work in the same direction and reinforce each other rather than decrease the overall impact ('amplification effect'). It should be noted that some double counting may be inevitable when actions pull in the same direction, e.g. city actions and business actions in the buildings sector. There is no one size fits all approach to determine overlaps and the analysis should be carried out on a case by case basis.

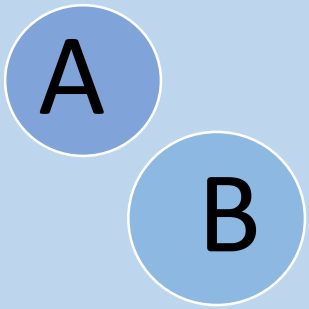
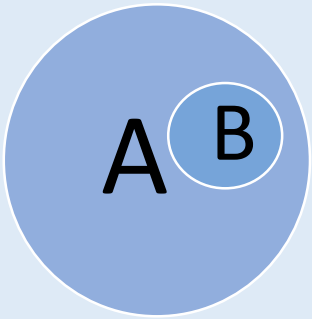
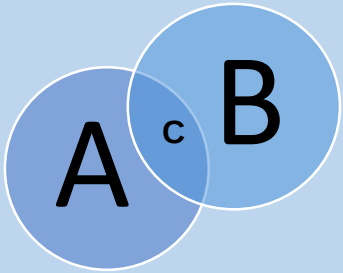
Users should also consult with relevant stakeholders on how the different actions and policies qualify, that is, if they are independent, overlapping, reinforcing or overlapping and reinforcing. In addition to the examples illustrated in main text of this guide and depending on resource availability, users might also want to have a look at the studies in the Annex that quantify non-state and subnational action and how they handle this issue. In general, the more diverse the different targets (use of different metrics, discussed in Chapter 8) and the sector, the lesser the chances for overlap between the different targets. The more overlaps users identify, the more cautious they should be when adding impacts. Box 9.1 and

[61] This can include checking for overlaps at collaborative action level

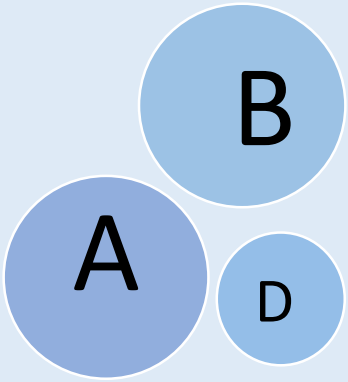
Box 9.2 provide examples for addressing overlaps and for calculating emissions coverage overlaps among actors.

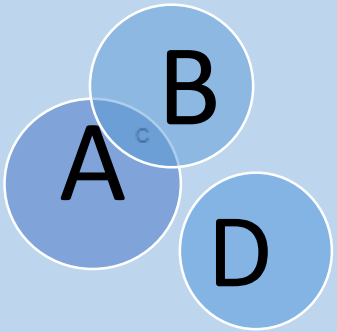
Users should also report results as well as the approach used to determine overlaps.

Table 9.1: Type of relationships between policies and non-state and subnational actions[62]

Type	Description	What to do
Independent 	Multiple national policies/actions do not interact with the non-state and subnational action being assessed. The combined effect of implementing the policies and non-state and subnational action together is equal to the sum of the individual effects of implementing them separately (A + B). In practice, users will encounter this situation in a very limited number of cases.	No further action required. Users will be able to compare actions once data is harmonised (all targets are harmonised against a specific target year/base year if applicable).
Encompassing 	Some national policies/actions may fully encompass the actions of non-state and subnational actions. In this case, there is full overlap and the encompassed action may be considered an additional indication that the broader action is likely to be achieved.	Users should not include the encompassed action in the final aggregation.
Overlapping 	Multiple national policies and non-state and subnational actions interact, and the combined effect of implementing the policies and non-state and subnational action together is less than the sum of the individual effects of implementing them separately (A + B – C). This includes policies/actions that have the same or complementary goals (for example national energy efficiency standards for buildings and non-state action aimed at	Overlap should be determined and subtracted from overall assessment. Carefully check if the potential combined impact is realistic/possible. Never include an impact that could not be realistic. If in doubt, users should consult with sector experts. In case of overlaps between regional and city-level actions, it can be recommended that the

[62] Adapted from WRI 2014b and based on Boonekamp 2006.

	reducing the GHG impact of buildings), as well as actions that have different or opposing goals (such as a national fuel subsidy and a non-state initiative calling for a price on carbon) and actions/initiatives that replace the same emissions (e.g. the targets of a solar and a wind initiative both striving for a certain share of electricity generation could together account for a higher share of generation than there are non-renewables to replace). This also includes actions that are counted twice, i.e., when the same company/city/etc.is subscribed to two different initiatives with a similar target; or listed both as singular action and within one initiative. An indication for a potential overlap is the use of the same metric for different targets.	actions of cities that are located in regions with action should entirely be excluded to avoid double-counting, unless those city-level actions are significantly more ambitious than the actions of the regions they are located in. In case of overlaps between company-level and region/city-level actions, the share of company emissions generated in cities/regions with action needs to be quantified. If cities/regions with action account for x% of national total GHG emissions, a simplified approach would be to assume that x% of the impact from company-level actions are overlapping.
Reinforcing  	Multiple national policies and non-state and subnational actions interact, and the combined effect of implementing the policies and non-state and subnational actions together is greater than the sum of the individual effects of implementing them separately (A + B + D). An example could be a business initiative aimed at decreasing deforestation and a national policy aiming to discourage the use of uncertified forest-risk commodities. Both the initiative and the policy pull in the same direction and might mutually reinforce each other.	The combined effect should be calculated and added to the overall impact.
Overlapping and reinforcing	Multiple policies and non-state and subnational actions interact, and have both overlapping and reinforcing interactions. The combined effect of implementing the policies and non-state and subnational actions together may be greater than or less than the sum of the individual effects of implementing them separately.	Overlap should be calculated and added or subtracted from the overall impact; combined effect should also be calculated and added.

	An example could be a non-state target to increase the amount of RE procured and a national policy aimed at increasing the amount of RE generated within the country. Both the non-state 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.	

9.2 Identify relationships between actions and calculate overlap

To avoid double counting impact, users should quantify potential overlap between actions. Overlap may be estimated by comparing the calculated impact of each action against other actions where boundaries or interaction may be suspected. The methodology applied to calculate overlap may require a number of assumptions of potential interaction and these should be recorded. For example, some city-level actions may help larger jurisdictions achieve the intended impact of their actions, and therefore, may not be considered additional in terms of overall impact, even though they are important contributions. In another example, actions by private corporations may in fact be responding to a governmental mandate, or public action and therefore may not necessarily be considered additional. All potential relationships between actions should be examined to calculate overlaps.

9.2.1 Calculate overlaps within each sector

For each sector, users should calculate overlaps among actor groups included in the analysis. If subnational actions are included in the analysis, users may want to begin with these actors, followed by non-state actors. If subnational actions are not included, users may go directly to calculate overlaps of non-state actors. Calculations for overlap should be repeated for each sector included in the assessment.

Subnational actions

As a first step, users may want to calculate the overlaps between subnational actors such as regions with GHG targets and cities with GHG targets. Users may assume that all electricity consumed by cities (Scope 2) is generated in regions in which the cities are located and may apply additional assumptions to calculate overlaps. Also see Box 9.1 for an example of how to account for overlaps at the subnational level.

- **Full overlap**: Users may assume 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. In this case, the action of the smaller jurisdiction would not be included in the final aggregation as there is full overlap.
- **Partial overlap**: If cities within the assessment boundary are known to have highly ambitious targets compared with larger jurisdictions, users may want to assume there is some additional impact and that overlap is not complete. In this situation, users would compare the actions of

cities and larger jurisdictions and 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 an action of its own, the entirety of the subnational actions' calculated impact may be included in the final aggregation.

Non-state actions

As a second step, users should determine the geographic overlaps between the actions of non-state actors including end-use companies and electric 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 time and data on geographical details 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 level to determine which GHG emissions pools they exist), they could calculate overlaps following a similar set of assumptions to subnational actions.

- **Full overlap**: In this case, users may determine that non-state actions are the result of public actions, such as public policies to guide businesses toward climate action. If the action of the governing jurisdiction is included in the assessment, full overlap can be assumed, and the non-state actions' impact 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 toward achievement of the governing jurisdictions' action, and should also be excluded from the final aggregation.
- **Partial overlap**: Users may encounter relationships between non-state and subnational action where 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 want to 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 action as users will not be able to determine which subnational GHG emissions pools they may overlap with. In some sectors, geographical data may be available, but in many cases, it may not be specific 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 uncertainty of results. Users might want to make a case by case decision, depending also on the objectives and scope of the assessment. One simplified approach, if no facility level data is available, could be to assume that the percentage of GHG emissions for the overlap between energy end-use companies with GHG targets and sub-nationals with targets is the same as that between sub-nationals and the national target (*non-state / subnational = subnational / national*). Therefore, if the net coverage of GHG emissions by sub-national actors with commitments in a country is xx% of national total GHG emissions, the same percentage may be assumed for the overlap between end-use companies and subnational actors. In practice, users would calculate the percentage that cities and regions cover in total national emissions.

Then assume that this same percentage of Scope 1 plus Scope 2 GHG emissions from all energy end-use companies with targets overlaps with subnational GHG emissions.

Separately, the 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 production by electric and gas utilities (Scope 1), and the use of electricity by other sectors (Scope 2).

Users could assume that the overlap rate for electricity-generating companies is equal to the net coverage rate of electricity-related GHG emissions by subnational actors and energy end-use companies. However, the shares of Scope 2 emissions in energy end-use companies' total Scope 1 plus Scope 2 emissions may not be available. In this case, users may use the median values for companies with the data available. In practice, sum electricity related GHG (scope 2) emissions of energy end use companies and subnational actors and calculate their combined share in the given country's national power sector emissions. Then assume that this this same percentage overlaps with the electricity generating companies GHG emissions. If subnational actions are excluded, users could look at non-state action for each sector in aggregate and consider potential overlaps with the national level.

Users might also find it useful to consult with sector specific experts to back up assumptions.

International cooperative actions

As a third step, users should calculate overlaps of any international cooperative action included in the assessment. As noted in Chapter 0, users could take the approach to exclude international cooperative actions from the analysis if their objective is to evaluate initiatives based on current membership only and the current membership includes individual non-state or subnational actions already included in the user's assessment. In other cases, the activity described in the international cooperative action may be an implementing element of a broader GHG emissions reduction action, and can therefore also be excluded. For example, an international 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 international cooperative initiative may help the cities achieve their broader action, but may not necessarily be additional. In case the participating cities do not have broader actions that would encompass this specific activity, the expected emissions reduction impact from the international cooperative initiative can be included in the aggregation. In most other cases where the impact from initiatives is calculated based on current membership, it can be safely assumed that the potential from the international cooperative actions is such that it encompasses all individual non-state and subnational action in the same sector. In these types of analyses, the impact from individual non-state and subnational actions in the same sector should *not* be added to the impact from the international cooperative initiative.

However, as described above, cooperative initiatives can also be evaluated for their potential impact (the initiatives' overall target), which usually includes their aim to increase the number of actors taking action. In a non-conservative approach, users may wish to include such cooperative initiatives and consider the additional impact if they achieve their intentions to grow the number of actors. In this case, users should estimate the potential impact of these additional actors and include their potential in the aggregation assessment. To decrease uncertainty, users may want to calculate overlap ranges where the lower range of reductions corresponds to the highest possible overlaps between initiatives, i.e. a situation where initiatives do the "least additional work while still reaching their respective targets". The upper range

corresponds to assuming the initiatives are completely “additional” to each other, i.e. achievements from one initiative do not diminish ambition of another.

Three main types of overlaps at the initiative level may exist and need to be checked (also see 3 for an example):

1. Same actors with targets in more than one initiative: This type of overlap may occur when one non-state and/or subnational actor is participating in one or more initiative in the same sector. Such overlaps are not subject to uncertainty; users do not have to calculate a range of possible reductions assuming varying degrees of overlap, as there is complete certainty that this overlap is definite and thus needs to be subtracted
2. Initiatives targeting the same emissions: This type of overlap occurs when different initiatives in the same sector have targets that overlap directly, as they are expressed in the same metric; targets that aim to achieve the same goal (through undefined means); or targets that could potentially compete with each other. While these targets are in principle complementary, quantifying their potential impact is only possible by taking into account the potential overlap between the two.
3. Targets that are not sector specific: Another type of overlap users should consider is between subnational initiatives and all other types of initiatives (in other sectors), if applicable. Various cities and regions have set unspecific GHG emission reduction targets, usually expressed in a percentage reduction to be achieved by a certain target year and relative to a certain base year but are unclear about how those might be achieved (in which sector). Thus, other international collaborative actions in relevant sectors, if implemented, could simultaneously contribute to the achievement of those unspecific targets.

9.2.2 Consider possible reinforcing impacts

In most cases, actions will be independent, encompassing, or overlapping. In rare instances, actions may reinforce each other to produce impact beyond the intended impact of each action combined. For example, two or more actions aimed at helping businesses set climate targets, are operating in the same pool of actors and could potentially overlap, but at the same time, they may drive more businesses to take on more ambitious targets than originally intended. Depending on the situation, users could set assumptions about the number of estimated businesses that are expected to take on targets as being larger than the combined number from both actions independently. This would allow the user to examine a more far-reaching scenario of the potential impact of the actions if more businesses, for example, took on more targets. This approach is, however, very hypothetical and all assumptions should be clearly explained. Reinforcing actions might additionally lead to an increase in the likelihood of their implementation.

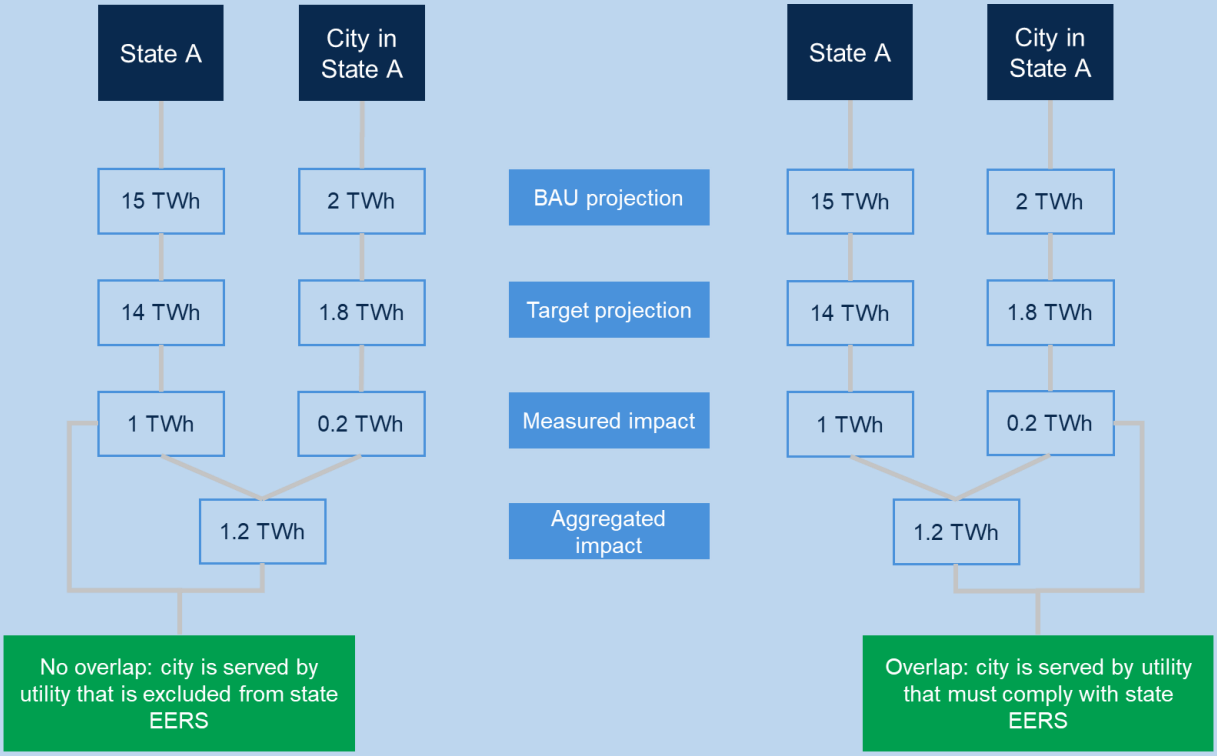
In all cases, assumptions should be carefully recorded. If relationships or overlap are unknown, users may want to pursue a conservative approach and assume full overlap of all actions taking place within larger jurisdictions with actions even if they may appear more ambitious. A conservative approach may help compensate for unknown activity of non-actors within the same jurisdiction who could in fact increase emissions during the action time period.

Note that overlap considerations and calculations between non-state/ subnational action and national government action are further described in Section 9.4.1.

Box 9.1: Examples of how to address overlaps at the subnational level

Generic example: Province A has committed to a 30% target share of RE in their total final energy consumption by 2020, and it can use electricity imported from other provinces to meet its commitment. Province B has a renewable electricity generation goal of 30%, and it 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 and the risk of double counting is high. To parse out this kind of double counting, additional data collection and quantitative analysis is recommended. In this case, users will need detailed data on electricity sales between the provinces. Many regional governments now document their yearly electricity imports and exports. In the absence of data, it is recommended to provide a realistic range of RE generation.

Example for overlap calculations at the subnational level from Fulfilling America's Pledge Report 2018[63]:



In this example, 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 two cities in these states also have their own energy savings goals. For the city in state A, the city's utility is excluded from compliance toward the state's policy, and thus no overlap is assumed. The resulting aggregate figure adds together both the city and state level impacts. In state B, however, the city resides within a utility region that must comply 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 total is equal to the state total. This

[63] For more details, please see: https://www.bbhub.io/dotorg/sites/28/2018/09/Fulfilling-Americas-Pledge_Technical-Appendix.pdf

example represents a simplified version of the approach and does not apply to all sectors included in the assessment.

Box 9.2: Examples of how to address overlaps at the non-state level

Example from the Global Climate Action Report 2018[64]

To calculate the geographic overlap between non-state actions, the Global Climate Action Report team first quantified the overlaps between energy end-use companies with GHG targets and sub-national actors with GHG targets. It followed the assumption laid out in Section 9.2.1. Therefore, if the net coverage of national total GHG emissions by sub-national actors with commitments in a country is x% of national total GHG emissions, it was assumed that the same x% of emissions under end-use companies' commitments are overlapping with subnational actors' commitments. This simplified approach was taken because there was no data available on which subnational jurisdictions the companies' emissions were generated in (the CDP dataset provided country-specific emissions data per company).

In a further step, the overlap between electricity-generating companies with commitments and all other sub-national and non-state actors with commitments was quantified. This overlap is calculated to avoid double counting of emissions from electricity production by electric and gas utilities (Scope 1), and the use of electricity by other sectors (Scope 2).

It was assumed that the overlap rate for electricity-generating companies is equal to the net coverage rate of electricity-related GHG emissions by subnational actors and energy end-use companies. For the calculations, the share of electricity-related GHG emissions in total emissions of a region is assumed to equal the national average; the shares of Scope 2 emissions in energy end-use companies' total Scope 1 plus Scope 2 emissions were often not available, so the median values for companies with available data was used (also see table below**Error! Reference source not found.**). Country-level total GHG emissions from electricity generation in 2015 were estimated based on IEA World Energy Balances.

Share of Scope 2 emissions in total Scope 1 plus Scope 2 emissions from cities by region

Country	Value	Source
Brazil	12%	Median of 14 cities data from CDP (2017)
China	45%	Authors' estimate from Liu (2016) on four major cities (Beijing, Shanghai, Tiangjin, Chongqing) in 2009
EU	34%	Median of 53 cities data from CDP (2017)
India	20%	Authors' estimate from Ramachandra et al. (2015) on seven cities (Delhi, Mumbai, Hyderabad, Chennai, Kolkata, Bangalore, Ahmedabad) in 2009-2010
Indonesia	57%	Median of 2 cities data from CDP (2017)
Japan	50%	Median of 2 cities data from CDP (2017)
Mexico	26%	Median of 5 cities data from CDP (2017)

[64] For more information, please see: https://newclimate.org/wp-content/uploads/2018/09/Methodology-for-Quantifying-Potential-Impacts-of-Individual-Commitments.pdf

South Africa	63%	Median of 5 cities data from CDP (2017)
USA	43%	Median of 81 cities data from CDP (2017)

The overlaps between companies with renewable electricity consumption targets (but without GHG emissions reduction targets) and all other actors are considered differently from the actor groups described above. Here two extreme cases t\were defined to fully account for the uncertainty of their additionality. The maximum overlap case assumes that these consumption targets result in no additional renewable electricity generation—this considers cases where consumption targets are met by purchase agreements with electric utilities, which are selling renewable electricity that would have been generated anyway. The other case assumes that these consumption targets are entirely met by additional renewable electricity generation and replacing fossil fuel-fired power generation.

Box 9.3: How to address overlaps between international cooperative initiatives - Examples

Example from the Global Climate Action Report 2018[65]

Specific examples for the three main types of overlaps described earlier:

1) Same actors with targets in more than one initiative: This often occurs when cities set an emission reduction target under the C40 initiative and/or the Global Covenant of Mayors, while their corresponding regions simultaneously sets a reduction target under the Under2MOU initiative; or when certain companies are subscribed to more than one business initiative.

   The effect of this potential double-counting was taken out by checking for each country (or on the global level for the business initiatives) which instances of multiple memberships occur and selecting the most ambitious commitment. For example, if a city is found to be part of both the C40 and the Under2MOU initiative, and its target is not substantially more ambitious under the C40, then its potential for reduction is counted in the Under2MOU because this one has a larger coverage (regions instead of cities).

2) 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. While these targets are in principle complementary, quantifying their potential impact is only possible by taking into account the 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 the 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” impacts their potential maximum impact when both are assumed to be implemented.

3) Targets that are not sector specific: To estimate the overlaps involved, it was estimated that subnational collaborative actions can overlap by:

[65] For more information, please see: https://newclimate.org/wp-content/uploads/2018/09/Methodology-for-Quantifying-Potential-Impacts-of-ICIs.pdf

- Initiatives in the sustainable energy sector, e.g. RE collaborative actions
- Initiatives in the buildings sector,
- Initiatives in the non-CO_2 sector,
- Initiatives targeting energy efficiency, and
- Initiatives in the road transport sector,

In cases/ countries, where there is potentially significant overlap between subnational initiatives and other sector initiatives, simple assumptions of either no additional effect or 50% additional effect were applied to derive an uncertainty range. For other cases/ countries, where other quantified sector initiatives do not have large overlaps with cities/regions initiatives, overlaps are calculated by subtracting the impacts of buildings, transport, renewables, and energy efficiency initiatives from the cities/regions impact.

9.3 Aggregate impacts

Users should repeat calculations for overlaps for all sectors within the assessment boundary and should aggregate the results. The formula for aggregation should include adding all quantified impacts from actions by non-state and subnational actors and subtracting the overlaps. At this stage, users will now have a total estimate of the impact of non-state and subnational actors within the assessment boundary.

The calculation for aggregation can be summarized as follows:

$$\sum tot,\ counterfactual\ incl.\ NSA\ (\mathrm{t}) = \sum tot,\ counterfactual\ (t) * \frac{\sum tot\ (base\ year) - \sum NSA\ (base\ year)}{\sum\ tot\ (base\ year)} + \sum NSA(t)$$

Where

$\sum tot,\ counterfactual\ including\ NSA\ (\mathrm{t})$: total GHG emissions under counterfactual/ chosen scenario plus individual actors' commitments" scenario in year t,

$\sum tot,\ counterfactual(\mathrm{t})$: total GHG emissions under the counterfactual/ chosen scenario in year t,

$\sum NSA(\mathrm{t})$: total GHG emissions from non-state and subnational actors in set base year as a result of achieving pledged commitments, accounting for overlap between non-state and subnational actors.

If the objective of the assessment was to determine the landscape of climate action by non-state and subnational actors (bottom-up aggregation), and identify key sectors and action areas, the user has completed the exercise. As part of an optional sensitivity analysis, users might want to provide some uncertainty ranges of the results. They could for example establish thresholds relating to the actions' implementation rate (also see Box 9.4).

Box 9.4: Aggregation of impacts under different scenarios - Examples

Example from the India pilot

The assessment provides three scenarios. In a first scenario, it is assumed that all targets will be fully achieved. The second scenario assumes a 75% rate of implementation and a third scenario assumes a 30% achievement rate.

However, it is important to note that dependent on the chosen counterfactual and if a top-down integration is also part of the assessment, the results of the assessment so far might not have accounted for

potential overlap with national actions (e.g. those independent of current national policies) and therefore may not be considered independent or additional to national action without further analysis.

9.4 Analyze aggregation results and compare ambition

Once overlaps have been determined and impacts have been aggregated, users will be able to analyze results and compare the total impact (ambition[66]) of non-state and/or subnational action to the national level. This can be done in three basic ways and will differ in the level of complexity and potential limitations. Depending on the objective of the assessment, further analysis may be necessary. To incorporate uncertainty of assumptions, this step can be done for different scenarios, where those exist.

9.4.1 Compare aggregated impact to a national-level target or policy

For assessment objectives that aim to determine how non-state and subnational action will help achieve a specific national target or action, users should already have identified the appropriate metric in Chapter 8 and the aggregation results should be in that metric. This may be a cumulative amount for a given time period, or maybe a single annual sum for a given individual target year depending on the action selected (also see Table 9.2 and Table 9.3.). For overlaps with national/ governmental policies, and if no already modelled counterfactual is chosen, users need to consider and calculate overlaps between non-state and subnational actions and national actions on a case by case basis (manually). One example is illustrated in Box 9.5. Given the sometimes complicated task of manually determining the overlaps between national policies and non-state/ subnational actions, users are advised to use existing models or counterfactuals that already include relevant policies, wherever possible.

It is a *key recommendation* to harmonize the target year with the non-state and subnational target years when calculating potential impact so that results are comparable. For the sake of simplicity, in the absence of data, this guide recommends to not assume any additional impact of the actions after they have reached their goals. In other words, if an action aims to achieve a certain emission reduction in 2020, but the user is looking for the action's emission reduction potential in 2030, the user should assume that the reduction potential achieved in 2030 is equal to the one of 2020, under the condition that the baseline remains unvaried. Also see Box 9.6 for an example. Users should bear in mind however that some 'autonomous' improvement', due to market developments, technological improvements or population change for example , in certain sectors might take place even without the non-state or subnational action being implemented. Alternatively, users may assume that once the target year has been reached, actors follow a 'no-policy' emissions pathway or an NDC emissions pathway.

This guide suggests users complete a table to clearly indicate the difference in ambition levels (Table 9.2 and Table 9.3). This can be done by looking at specific metrics from the national action, such as in the example below. The tables also indicate which comparison in ambition is relevant for which assessment objective.

[66] Ambition level is used a benchmark relative to climate change mitigation goals (such as those expressed in NDCs for example).

Table 9.2: Compare ambition at the metric level

(Sub)Sector/ National Level	Potential of non-state/ subnational action without overlap in a specific (sub)sector or at national level (A)	Corresponding current (sub)sector or national policy scenario/ counterfactual (B)	Combined effect of non-state/ subnational action and (sub)sector or national policy incl. overlap (C = maximum of A and B)	Additional impact (or gap) from non-state action at (sub)sector or national level (D)	National or (sub)sector requirements under NDC (E)	Gap between NDC requirements and combined impact of all actions (E-C)
Relevant for which objective of assessment	All	All	Determine how non-state and subnational action contribute to the (sub)sectoral or national climate change plan; Determine opportunities for engagement; Improve climate mitigation projections or revise target(s);	For all assessments that relate to the NDC	Determine opportunities for engagement; Improve climate mitigation projections or revise target(s);	
Example: Renewable energy	10 GW added by 2020	7 GW added by 2020	10 GW added by 2020	3 GW added by 2020	12 GW added by 2020	2 GW by 2020

Table 9.3: Compare ambition at the emission level

(Sub)Sector / National Level	Emission reduction potential of non-state/ subnational action without overlap (A)	GHG emission reductions resulting from current sectoral/ national policy scenario (B)	Combined effect of non-state/ subnational action and (sub)sector or national policy incl. overlaps (C)	Additional impact (or gap) from non-state action at (sub)sector or national level (D=C-maximum of A and B)	National or (sub)sector requirements under NDC (E)	Gap between NDC requirements and combined impact of all actions (E-C)
Relevance for which assessment objectives	All	All	Determine how non-state and subnational action contribute to the (sub)sectoral or national climate change plan; Determine emissions gap at the (sub)sector or national level; Determine opportunities for engagement; Improve climate mitigation projections or revise target(s); Determine untapped (sub)sector or nationwide emission reduction potential to decide how to meet national climate change targets		For all assessments that relate to the NDC	Determine emissions gap at the (sub)sector or national level; Determine opportunities for engagement; Revise NDC; Determine untapped (sub)sector or nationwide emission reduction potential to decide how to meet the NDC
Example: Electric Vehicles	20 $MtCO_2e$ by 2030	60 $MtCO_2e$ by 2030 (sectoral/ transport sector)	70 $MtCO_2e$ by 2030	10 $MtCO_2e$ by 2030	80 $MtCO_2e$ by 2030	10 $MtCO_2e$ by 2030

Box 9.5: Addressing overlaps between non-state/ subnational action and government policies

Example from Fulfilling America's Pledge 2018: **How States, Cities and Businesses Are Leading the United States to a Low-Carbon Future**. To account for overlap between city-level targets and state renewable portfolio standard (RPS) policies, a "net percentage/rate" approach was used. Under this approach, incremental demand from city goals in a given model year is counted and added on to state RPS demand to produce an aggregate total. For example, a city with a 50 percent goal for the year 2025 in a state with a 40 percent RPS rate in the same year would have a net 10 percent that can be applied to the city's load in order to calculate additional RE demand.

The two primary assumptions associated with this approach are as follows:

1. The approach assumes that all load serving entities (LSEs) within a state are in compliance with any RPS requirements, and thus city demand that exceeds the ambition of state goals can be counted as additional rather than being dampened by potential non-compliant LSEs. This assumption is based on historic RPS achievement on the part of states and LSEs as well as consultations with experts at both the U.S. National Renewable Energy Laboratory (NREL) and Lawrence Berkley National Laboratory (LBNL).
2. The approach further assumes that city-wide targets are met with a combination of a) baseline renewable energy generation (e.g. generation already required to meet RPS compliance) and b)

additional procurement, whether through local generation, utility contracts, or some other mechanism. In other words, the renewable energy demand resulting from city targets is not entirely additional to RPS demand, and is first met with the same renewable energy credits (RECs) and underlying generation used for state RPS compliance before being "topped-off" with additional procurement to reach the target renewable energy mix. No assumption is made in regard to the specific mechanism by which cities procure additional renewable energy (e.g. local PV installations, REC purchasing, green tariff utility products) except that the RECs associated with the additional procurement are retired at the city-level and not re-sold. The assumption that demand resulting from city-level targets is not entirely additional to state RPS demand is based on consultations with experts at NREL and the Centre for Resource Solutions (CRS), with the understanding that it is intentionally simplistic, may not reflect the on-the-ground reality for a specific city's context, and is intended only for the purposes estimating impact in aggregate.

Box 9.6: How to address different target years

Example from the Global Climate Action Report 2018:

For subnational that only report one target year, a constant rate of reduction until the target year was assumed, after which it was assumed that emissions have the same trend as the current policies scenario. For subnational actors that have multiple targets, the report interpolates from either the inventory or baseline emissions, whichever is available, up to the first target year (i.e., 2030). If a longer-term target (i.e., 2050) is available, it interpolates from the first target year (i.e., 2030) to the second target year (i.e., 2050) by assuming different rates of reduction between the target years.

9.4.2 Compare aggregated impact to a national-level scenario

For comprehensive assessments where users aim to compare the overall emission reduction potential from non-state and subnational action at national level to a current national policy scenario, or other economy-wide emissions projections or counterfactuals, users require information on national/sectoral emission projections and/or GHG implications of national policy scenarios. If there is currently no such information available or has been gathered as part of Chapter 7, users could consult international scientific analysis for reference scenarios which track the effects of current policies on national emissions, such as those developed by the Climate Action Tracker for some selected countries.[67]

9.4.3 Integrate results and metrics from assessment into a climate systems model

As explained in Chapter 3, results may be integrated into an existing model. This approach is more complex and comprehensive but would allow users to fully account for overlaps between sectors and also account for other extraneous systems interactions, such as non-climate actor activity, energy supply-demand interactions and technological advancement. In this case, users could apply the results of the aggregation assessment into climate systems models that could analyze the total impact of non-state, subnational and national action and fully account for overlaps.

[67] Further information is available at: http://climateactiontracker.org/

Users would need to adapt specific results of the impact of sectoral climate action by non-state and subnational action into the corresponding metric used in the climate systems model. In this approach, users would only add non-state and subnational action if they are not already included in the model. Examples of such models include the Global Change Assessment model (GCAM)[68], an open-source integrated, economy-wide modelling tool or the Targets IMage Regional Energy (TIMER) model[69], among others.

[68] For more information, please consult: http://www.globalchange.umd.edu/gcam/

[69] For more information, please see: https://www.pbl.nl/en/publications/2001/TheTargetsIMageEnergyRegionalTIMERModelTechnicalDocumentation

PART IV: REPORTING RESULTS

10. REPORTING RESULTS

Reporting the results, methodology, and assumptions used is important to ensure 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 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, all assumptions and results.

The detail and breadth of reporting should depend on the objectives and resources available to users carrying out the assessment. More complex and comprehensive assessments will thus require more reporting. Throughout the different chapters, this guide has provided explanation on which information users should be collecting. The recommended information to report is listed below. Where two or more ICAT documents are applied during the assessment, the general information and policy description only need to be reported once.

General information

- The person(s)/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 3: Key concepts, steps and assessment principles

- Whether the analysis is a top-down integration, bottom-up aggregation, or a combination

Chapter 4: Define assessment boundary

- Which actor groups are included in the assessment
- Which action types are included in the assessment
- The timeframe (temporal boundary) of the assessment
- Which sector(s) and subsector(s) are included in the assessment

- Which greenhouse gases are included in the assessment
- Which types of indirect GHG emissions are included in the assessment

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

- A list of all relevant non-state and subnational actions identified, and relevant data needed for further analysis (dependent on the objectives of the assessment)
- The method used for data collection

Chapter 6: Select non-state and subnational actions for inclusion in analysis

- Which non-state and subnational actions from the list in Chapter 0 were found to be suitable for further inclusion into the assessment
- The likelihood for non-state and subnational action targets to be achieved
- How aggregated collaborative actions were distributed to the country while ensuring that the collaborative action is not already covered by an individual non-state and subnational action
- The criteria and assumptions used to assess suitability and likelihood of each non-state and subnational action

Chapter 7: List relevant national climate mitigation policies and actions

- A list of relevant national climate mitigation policies and actions that relate to the objectives of the assessment
- All data sources used to compile the data

Chapter 8: Convert non-state and subnational actions and national policies to suitable metrics

- Which metrics were used for non-state and subnational actions and national policies
- For each of the non-state and subnational actions, whether actions were included into existing models/tools (and which ones) and/or whether emission reduction potentials were calculated (and the approach used for calculating those)

Chapter 9: Assess overlaps, add impacts and compare ambition

- The approach 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 assumptions made
- The results from the overlap analysis
- Combined projected impact of non-state/subnational action (at the metric and/or emission reduction level)

10.2 Additional information to report, if relevant

Other information, depending on the objective of the analysis, may include:

- The impact of non-state and subnational action on the national/sectoral emission pathway (based on current policy scenario)
- The impact of non-state and subnational action on the national/sectoral emission pathway required under the NDC
- The emissions gap between the combined impact of non-state/subnational action and the NDC
- Additional CO_2e savings potential of non-state/subnational action
- Any limitations of the analysis
- Any challenges faced during the assessment
- Any potential for increased ambition
- Any other relevant information

Table 10.1 provides an example which can serve as a template for users for documentation on the different steps outlined in this guide. The template is designed for the most comprehensive assessment users might want to conduct. Users can remove the rows which are not applicable to their assessment and tailor the template to their specific country context. Box 10.1 shows an example from one of the practical applications.

Table 10.1: Simplified template to report assessment results

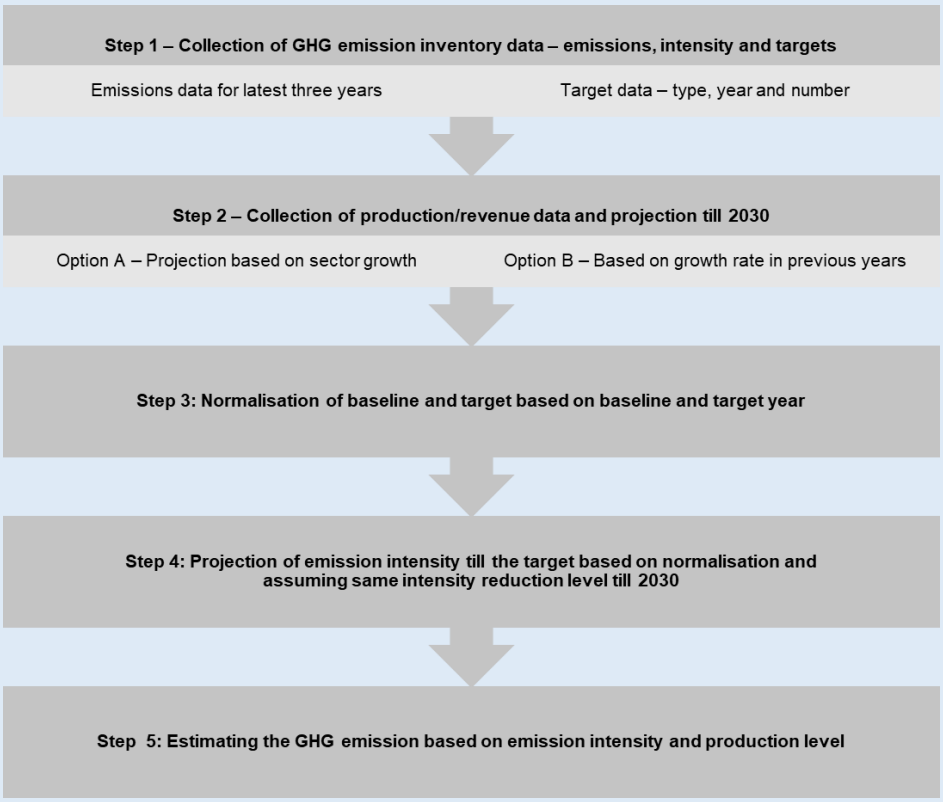
Example Assessment	
Objective(s)	
Assessment boundary	
Method for data collection	
Link to list of retained non-state and subnational action	
Link to list of relevant national policies	
Which common metrics were chosen	
Approach to determine overlaps	
Combined projected impact of non-state/subnational action	
Impact on national/sectoral emission pathway (current policy scenario)	
Impact on national/sectoral emission pathway required under the NDC	

Emissions gap between combined impact of non-state/subnational action and NDC	
Additional CO_2e savings potential of non-state/subnational action	

Box 10.1: Reporting assessment results - Example

Example from the India pilot:

Key recommendation	Response
The objective(s) and intended audience of the assessment	The assessment is aimed at quantifying the Non State Action – Corporates and Cement Sector for achieving the INDC Target
The year the assessment was developed	2018
Whether the reported assessment is an update of a previous, assessment, and if so, links to any previous assessments	No, this is the first assessment
The ex-ante period under assessment	2015-2030
Stakeholder participation process	Corporates and Cement Sector (50 Companies)
Specify whether the assessment is economy-wide or sectoral (if sectors, include sector(s) covered)	The assessment is Sectoral Assessment of Industrial Sector – 50 Corporates and Cement Sector
The action type(s) covered under the assessment	The action types covered are energy efficiency, renewable energy, offsets, and other efficiency improvements targeted for reduction in Scope 1 and Scope 2 Emissions.
The target actor group(s) included in the assessment	Industries (Mixed Sector) and Cement Sector
Whether international	No

collaborative initiatives are included	
GHG emissions included in the assessment	Scope 1 and Scope 2 Emissions
The likelihood of achievement of all actions	Action (100%), Likely (75%) and Not Likely (25%)
Other relevant information	No
Data sources	Corporate Reports, GreenCo Data and Cement Sector GHG Inventories
Calculations and assumptions for all conversions of potential impacts to common metric	
Data source for national scenario, target, or action if integrating the results through comparison	WRI OCN data and Climate Action Tracker India's emissions INDC Scenario, Enhanced Policy Scenario and Current Policy Scenario
Approach to overlaps	No overlaps between individual company action, manual evaluation between non-state and national actions/ policies
GHG emissions reduction potential resulting from	0.59% -0.72% in 2020 and 1.40-1.75% in 2030

national scenario, target, or action	
Combined effect of non-state and subnational action accounting for overlaps	0.59% -0.72% in 2020 and 1.40-1.75% in 2030
Additional impact or gap from non-state and subnational action	0.59% -0.72% in 2020 and 1.40-1.75% in 2030

PART V: DECISION MAKING AND USING RESULTS

11. USE RESULTS FOR DECISION-MAKING AND PLANNING

This chapter discusses how assessment results may be interpreted, linking those back to the objectives set in Chapter 2. In addition, the specific use for decision-making will likely depend on the results obtained in Chapters 8 and 0.

Users should consider both the objectives and 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 action nationally, users could determine the gap in ambition level, revise policy design 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 provides examples from practical applications of the guide.

Table 11.1: Examples of how to use results for decision-making

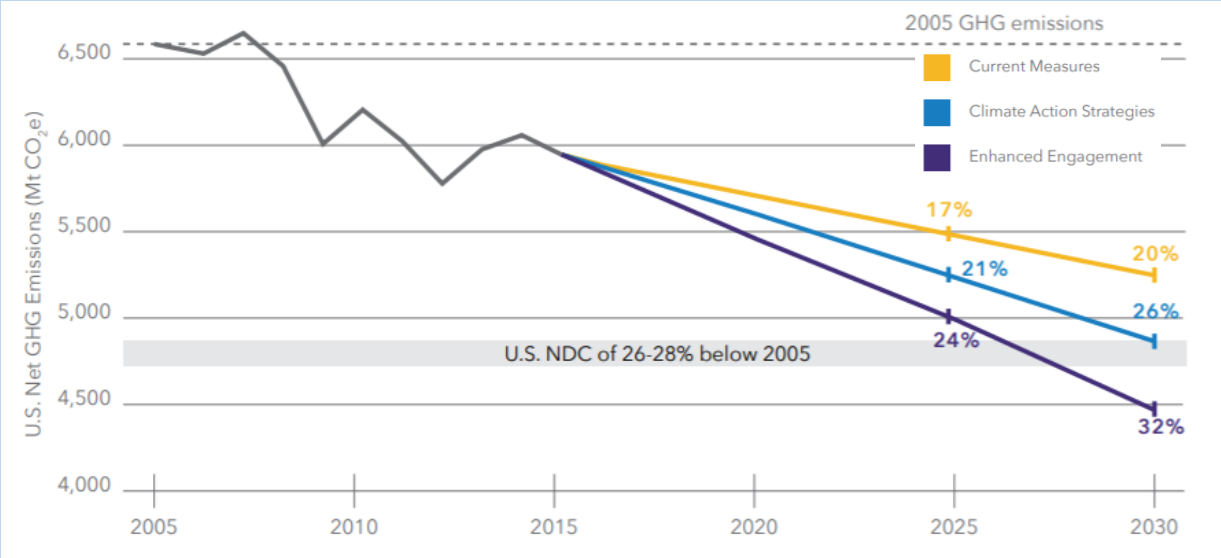
Assessment objective	Options for using results
Understand the landscape of non-state and subnational effort	• Gather insights into the types of actions being undertaken, type of actors that are involved • Determine opportunities for engagement with non-state and/or subnational actors, for e.g., engage with actors in those 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/sector	• Further encourage or strengthen such actions • Better understand collective impact of specific types of actions or actors
Determine the contribution of non-state and subnational action towards achieving national/sectoral climate change target or NDC targets	• Better understand how non-state and subnational action is supporting national/sectoral climate change plans or the NDC • Use to inform future policy design • Inform possible revision of national/sectoral climate policy targets • Consider inclusion into future NDC cycle • Enhance the credibility of national climate mitigation targets
Determine the level of national/sectoral action needed to achieve the NDC target while taking into account the contribution of subnational and non-state action	• Assess the gap between the impact of subnational and non-state action and the national/sectoral targets • Inform strategies and initiatives to bridge the gap, e.g., where regulation and/or incentive setting could yield best results based on an analysis of leading vs lagging sectors (and non-state actors/subnational actors)

	• Incorporate subnational and non-state actions into national GHG inventories to ensure impacts are measured and recognized at the national level
Understand the potential of non-state and subnational action to enable the country or sector to achieve a more ambitious target	• Adjust and revise national/sectoral climate change targets upwards • Identify leading sectors (and non-state actors/ subnational actors) • Identify lagging sectors (and non-state actors/ subnational actors) • Engage with non-state and subnational actors, for example, with a view 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 into future NDC cycle • Enhance (inter)national credibility of targets
Determine how non-state and subnational action impacts the ambition set out in specific policies	If non-state and subnational action was found to be more ambitious, users could: • Determine at what point in time 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 action was found to be less ambitious, the user could: • Determine gap in ambition level • Recommend revising policy design • Engage with relevant non-state and subnational actors

Box 11.1: Using results - Examples

Example from Fulfilling America's Pledge 2018

The assessment results demonstrate the extent of non-federal action taking place in the U.S. and the potential impact of these impacts in key sectors. Moreover, the analysis shows the potential impact if non-federal actors in the U.S. step up their efforts in-line with current leaders.



Source: America's Pledge, 2018a

The assessment communicates to the public that non-federal actors in the U.S. can – in fact – make a substantial impact in reducing aggregate national emissions. The assessment was used to illustrate the impact of how existing and pledged non-federal actions can deliver in specific sectors—for example, by increasing the amount of renewable electricity generated or electric vehicles on the road.

The analysis has helped identify where certain action taken by a small number of actors are having a big impact (e.g. HFCs) and areas where certain actions are being taken and are not leading to a big impact, but at the same time highlights where there is a lot more potential for non-federal actors to deliver enhanced ambition to reduce emissions.

A similar version of the assessment may be repeated in the future as new ambitious actions are adopted and further opportunities are created. It may also serve as a foundation for more targeted, region-specific analysis that can better serve local stakeholders.

Example from assessing the subnational mitigation action in the land use sector in Mexico

The results of this evaluation are being shared with the multiple actors of the NAMA, including the climate change office of the Ministry of Environment, the National Forestry Commission, Ministry of Agriculture and Rural Development and participating states to motivate and strengthen regenerative actions and the orientation of sector policies, to better understand the collective GHG impacts of the subnational actions, to inform future design of the actions, to support a possible revision or increase of sector goals and to achieve a regenerative transformational change of the sectors.

In addition, it will be important that users share the results of their assessment with the relevant stakeholders to ensure that they can be integrated into decision-making. This does not have to include the release of disaggregated data that could be linked to individual actors, but could be organized by sectors or some other classification. Which steps to take to ensure this is being done will be dependent on who is carrying out the assessment and for which purpose. One option to increase the likelihood that the results reach the right people is to involve the targeted audience from the very beginning of the assessment.

Users should also bear in mind that policymakers may be hesitant to revise climate mitigation targets because often they can only partly control non-state and subnational action. However, in some cases the commitments may already be robust enough to include and in future it is likely that the robustness of the data used and therefore the expected impact will improve. Through incentive settings and other regulatory means, policymakers may have significant influence on non-state and subnational actors, or the other way around and which should be seen as an opportunity rather than a risk.

At the same time, it is important to underline that the integration of non-state and subnational action should not be used by policymakers to scale back on government-led action. Rather, the positive reinforcing relationship between non-state/subnational and national actions should be further emphasised. Users should ensure policies developed at the national level incentivize and are complementary to subnational, non-state policies rather than make 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.

APPENDIX A: OVERVIEW OF DATABASES AND STUDIES

The appendix provides an overview of the most comprehensive global databases on non-state and subnational action as well as an overview of literature (methodologies) on the quantification of non-state and subnational action, including their approach 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 action

Name of data source	Type of actors covered	Geographic focus	Sectors covered	Targets covered	Data sources	Is action tracked/how?	Frequency of updating	Link to database
Global Climate Action Portal (NAZCA)	Companies, cities, regions, investors, CSOs, cooperative initiatives	World	All sectors and major themes	Broad (Emissions reduction, energy access & efficiency, renewable energy, resilience, use of carbon price, private finance, transport, buildings, forest, short term pollutants, innovation, agriculture, other - 12,000+ commitments/actions)	CDP, carbonn 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. NAZCA 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 and Energy Action plans	Cities	World	All sectors	Broad (Emissions reduction, adaptation, secure and sustainable and affordable energy to implement EU climate and energy objectives)	Covenant of Mayors Monitoring and Reporting Framework	Cities need to report every two years on implementation progress to the Covenant of Mayors	Ongoing basis, frequency unclear	http://www.covenantofmayors.eu/actions/monitoring-action-plans_en.html
Climate Initiatives Platform	International Climate Initiatives (ICI)	World	Finance, Transport, Agriculture and Forestry, Cities and Regions, Waste, Industry, Emissions,	Broad (from specific emissions reductions to implementation/capacity building initiatives, in total 200+	UNEP/UNEP DTU	Specific monitoring and reporting section (self-reported) – though often information is (not yet) available	Ongoing basis, continuously (ICI focal points able to update	http://climateinitiativesplatform.org/index.php/Welcome

			Energy, Adaptation, Other	initiatives, over 70 of which are on NAZCA)			information themselves)	
Portal on Cooperative Initiatives	International Cooperative Initiatives (ICI)	World	Agriculture, Buildings, Cities, EE, Energy Supply, Finance, Forestry, Industry, Int. Aviation, Int. Mar. Transport, Land Use, SLCP, Transport, Waste, other	Broad (from capacity building, to research, to technological 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 (from reduced emissions, to people affected, knowledge dissemination to fundraising) Almost 200 initiatives or climate actions and initiatives, e.g., those launched at the 2014 UN Climate Summit, and mobilised 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, both addressing mitigation and adaptation.	https://www.die-gdi.de/uploads/media/Working-Paper-216-Chan-et-al.pdf http://www.tandfonline.com/doi/pdf/10.1080/14693062.2016.1248343
Investor platform for climate action	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 CC	Not directly on the database although many of the actions track progress	Unclear	http://investorsonclimatechange.org/initiatives/
CDP website	Companies, cities	World	Consumer discretionary, consumer staples, energy, financials, health care, industrials, IT, materials,	Absolute and intensity emission reduction targets	Self-reported data from companies and cities; CDP reporting frameworks	Not directly in the database, but often incl. in single responses from cities/ companies and in CDP specific reports	Regularly (depending on programme/ initiative)	https://data.cdp.net/ and https://cdp.net

			telecoms, utilities					
carbonn Climate registry	Cities, States and Regions	World	Renewable Energy, Transportation, Green Infrastructure, Buildings, Waste,	Broad (from environmental education, to emissions reductions to energy intensity improvements (600+ reporting entities)	ICLEI, Local government climate roadmap, dac, Plan de Accion Climatica Municipal, carbonn Japan Project, EcoMobility Alliance, Earth Hour City Challenge	Reporting entities are encouraged to submit 'Status' updates on their mitigation & adaptations actions	Regularly, frequency unclear	http://carbonn.org/

Table A.2: Overview of literature on the quantification of non-state and subnational action, including approach to overlaps

Source	Approach	Type of actors covered	Types of sectors covered	Impact on emissions ($MtCO_2e$)	Target year	Approach to overlaps	Reference Scenario/baseline	Geographic focus	Link to source
Global Climate Action from Cities, Regions, and Businesses (Data-Driven Yale; NewClimate Institute; PBL, 2018b)	Collect individual commitments in 9 key countries and the EU; collect and select 21 ICIs; quantify emission reduction impact of both	Regions, cities, business, international cooperative initiatives (ICI)	All, with the exception of forestry, waste and non-CO_2 sectors	Individual commitments: 1550 – 2200 $MtCO_2e$ current policies scenario, 200 – 700 $MtCO_2e$ 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 + the EU)	http://datadriven.yale.edu/wp-content/uploads/2018/08/YALE-NCI-PBL_Global_climate_action.pdf
Implementing Climate Ambition:	Considered all reporting cities,	Cities	All	1,400 $MtCO_2e$ (2030), 2,800	2030 and 2050	Calculated	No policy scenario	Global	https://www.globalcovenantofm

Global Covenant of Mayors 2018 Global Aggregation Report (Global Covenant of Mayors for Climate and Energy, 2018)	estimated economy-wide emission reductions			$MtCO_2e$ (2050)					ayors.org/wp-content/uploads/2018/09/2018_GCOM_report_web.pdf
Fulfilling America's Pledge: How States, Cities, and Businesses are Leading the United States to Low-Carbon-Future (America's Pledge, 2018a)	Considered individual commitments in the U.S. Estimated the economy-wide GHG emission impact of the 3 scenarios.	States, cities and businesses	All	500 (cities and regions), 0.26 $MtCO_2e$ (businesses)	2025	Included (both at sector level between actions, and between non-state/ subnational and national/ federal level)	Current Measures, Climate Action Strategies and Enhanced Engagement Scenario	U.S.	https://www.bbhub.io/dotorg/sites/28/2018/09/Fulfilling-Americas-Pledge-2018.pdf
Assessment of US city reduction commitments, from a country perspective (PBL, 2017)	Analyze the aggregated impact of the 25 largest U.S. cities and scale up results to the 200 largest US cities. This is compared to the reductions against the national US NDC target.	Cities	All	5 – 30 $MtCO_2e$	2025	Considered	Current national policies and NDC scenario	U.S.	https://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-assessment-of-us-city-reduction-commitments-from-a-country-perspective-1993.pdf
States, cities and businesses leading the way: a first look at decentralized	Collect initiatives from cities, regions and businesses in	Cities, regions, companies	All, with the exception of forestry, waste and non-CO_2 sectors	12 – 14% below 2005 by 2025, 340 – 540 $MtCO_2e$	2025	Calculated (first between states and cities, second between companies and	Relative to a current administration scenario	U.S.	https://newclimate.org/wp-content/uploads/2017/

commitments in the US (NewClimate Institute and The Climate Group, 2017)	the US, calculate emission reductions compared to a current administration scenario, calculate overlaps					electric utilities, lastly between electric utilities and all other actors)			09/states-cities-and-regions-leading-the-way.pdf
Climate commitments of subnational actors and businesses (UNEP, 2015)	Select most ambitious initiatives, calculate emissions reductions that they will deliver, consider overlap between initiatives and with pledges made by nat. governments	Cities, regions, companies	EE, efficient cook stoves, methane and other SLCPs, reduced deforestation & afforestation, agriculture	2,500 – 3,300	2020	Calculated (between different initiatives, both between sectors and within same sectors)	Relative to a business-as-usual 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
Towards a new climate diplomacy (Hsu, Moffat, *et al.*, 2015)	Look at individual commitments; tailor methodology to calculate emissions reduction impact, estimate double counting; compare with BAU from IPCC	Cities, regions, companies, NGOs, IOs and CSOs	EE, RE, reduced deforestation and afforestation	2,540	2020	Not calculated (exclude international cooperative initiatives because of concerns about double counting; otherwise case-by-case basis)	Relative to BAU from 5th assessment report of IPCC	World (drawing on commitments made at the New York Climate Summit 2014)	http://www.nature.com/nclimate/journal/v5/n6/full/nclimate2594.html

Better partnerships (CISL and Ecofys, 2015)	Select five international cooperative initiatives; apply three different scenarios to analyze potential impact and carry out interviews with stakeholders from the different 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)	http://www.ecofys.com/files/files/ecofys-cisl-2015-wtg-better-partnerships.pdf
Climate action outside the UNFCCC (Roelfsema *et al.*, 2015)	Select international cooperative initiatives, calculate emissions reduction using a tailored methodology for each initiative; Comparing projected emissions of the initiatives to the emission levels pledged by parties under the UNFCCC	Cities, companies	Transport, methane and other SLCPs, fluorinated gases, shipping & 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 (IIASA, 2015), and harmonised to the 2010 global emission level from the UNEP Gap Report	World (international initiatives)	http://www.pbl.nl/sites/default/files/cms/pbl-2015-climate-action-outside-the-unfccc_01188.pdf
International climate	Screen 174 initiatives,	Cities, regions, companies	EE, Efficient cook stoves,	5,000 – 11,000	2020/2030	Calculated (overlaps with	Reference scenario	World (international initiatives)	https://www.umweltb

initiatives – A way forward to close the emission gap? (Graichen *et al.*, 2016)	select those suitable for further quantitative & qualitative analysis. Assess mitigation impact of selected initiatives and break down impact on a nat. level; add impact of initiatives to estimate emission reduction beyond current pledges		RE, transport, methane and other SLCPs, fluorinated gases, reduced deforestation and afforestation			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)	based on the full implementation of all INDCs		undesamt.de/sites/default/files/medien/1968/publikationen/2016-11-29_discussion_paper_clean_version_final.pdf
The business end of climate change (CDP and We Mean Business, 2016)	Based on five international initiatives (chosen on a set of predefined criteria), estimate impact of each of those, calculate overlaps	Companies	All sectors covered by the five initiatives	3,200 – 4,200	2030	Calculated (overlap across the five different initiatives)	IPCC Fifth Assessment Report (2014)	World (global initiatives)	https://newclimateinstitute.files.wordpress.com/2016/06/business-end-of-climate-change.pdf
Global Aggregation of City Climate Commitments (ARUP and C40 Cities, 2014)	Look at 228 cities. Establish rules for standardizing reporting of GHG reductions; collect GHG emission	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	World (drawing from the set of predefined cities)	http://www.c40.org/researches/global-aggregation-of-city-climate-commitments-

	target and inventory data where available; Combine the results for all cities to provide an estimate of total city committed reduction						baseline year, allocate emissions equally per person as the population increases)		methodology
Climate Leadership at the Local Level: Global Impact of the Compact of Mayors (Compact of Mayors, 2015)	Based on self-reported data by 360 Compact of Mayors cities, calculate the difference between BAU scenario and target scenario in a given year.	Cities	Overall emissions reduction per year	500 (2020) – 740 (2030) – 950 (2050) per year	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
Compact of States and Regions Disclosure Report 2015 (The Climate Group, CDP 2015)	Based on self-reported data by 44 regions to the Compact of States and Regions. 'Target' GHG emissions were projected based on reported GHG targets reported up to 2050. Actual GHG emissions and interim targets were included	Regions	Overall emissions	1,200	2030	Not calculated	Relative to BAU – based on per capita GHG emission (2010) and official population projections to 2050. For years where population projections were not available, population was estimated using a compound annual growth	World (joined the Compact of States and Regions)	https://www.theclimategroup.org/sites/default/files/archive/files/Compact-of-States-and-Regions-Disclosure-Report-2015.pdf

	where available. Then calculate the cumulative difference between BAU emissions and 'target' emissions for each reporting government from 2010 to the date indicated (i.e., 2020 and 2030).						for the related period.		
Compact of States and Regions Disclosure Report 2016 (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 International Energy Agency's (IEA) Energy Technologies 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, in this case 2010, and by projecting the level of GHG emissions savings that could be achieved by the disclosing governments (Compact Target Scenario) against two reference scenarios. Scenarios are calculated using data and analysis from the IEA's Energy	World (joined the Compact of States and Regions)	https://www.theclimategroup.org/sites/default/files/downloads/compact_report_2016_.pdf

							Technologies Perspectives 2014 (ETP 2014) report that refers to the 4 Degrees Scenario (4DS) and 6 Degrees Scenario (6DS).		
Annual Disclosure – 2017 update	Based on self-reported data from 101 states, provinces and regions around the world	Regions	Overall emissions	2190	2050	Calculated (between neighbouring states).	Calculated – Compared to the IEA's 2017 Reference Technology Scenario (RTS). The RTS considers current commitments by countries to limit emissions, including Nationally Determined Contributions (NDCs	World	https://www.theclimategroup.org/sites/default/files/disclosure_update_2017_digital.pdf
Scaling up: From local to global action. (Hsu, Xu, *et al.*, 2015)	Nine city and regional climate action case studies; estimate impact for each of the cases and compare to BAU model of the country where the	Cities & Region	Carbon tax, industry, transportation, forestry and land use, EE, waste, RE, emission trading	1,090	2020	Calculated (None)	Relative to BAU emission pathway (assuming linear pathway) of the relevant country	Canada, Brazil, US, South Africa, Germany, China, India, Algeria	http://www.stanleyfoundation.org/publications/report/WhitePaperScalingUp12-2015.pdf

	specific city/ region sits in.								
The business end of climate change (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	Considering but not calculated	IPCC Fifth Assessment Report (2014)	World (global initiatives)	https://newclimateinstitute.files.wordpress.com/2016/06/business-end-of-climate-change.pdf
Advancing Climate Ambition: How city-scale actions can contribute to global climate goals (Erickson and Tempest, 2014)	Select all cities considered by the UN's World Urbanization Prospects. Calculate abatement potential in each year as difference in emissions between reference scenario and urban action scenario.	Cities	All, systemic impact	3,700	2030	Not calculated	Relative to reference scenario (RS), based on IEA's Energy Technology Perspectives 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	World	https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-WP-2014-06-C40-Cities-mitigation.pdf

							emissions, e.g. transportation.		
Implementing circular economy globally makes Paris targets achievable. (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	http://www.ecofys.com/files/files/circle-economy-ecofys-2016-circular-economy-white-paper.pdf

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: *List of steps where stakeholder participation is recommended in the impact assessment*

Step of non-state and subnational impact assessment	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 action	• Ensure that the objectives of the assessment respond to the needs and interests of the stakeholders	Chapter 5 – Identifying and analysing stakeholders
Chapter 3 – Key concepts, steps and assessment principles • 0 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 or may influence the policy or action • Coordinate participation at multiple steps for this assessment along with participation in subsequent decision making using assessment results	Chapter 4 – Planning effective stakeholder participation Chapter 5 – Identifying and analysing stakeholders Chapter 6 – Establishing multi-stakeholder bodies/structures Chapter 9 – Establishing grievance redress mechanisms
Chapter 0 – Create 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 where they exist to develop a rich database • Identify credible sources of information for engagement in subsequent steps	Chapter 5 – Identifying and analysing stakeholders Chapter 8 – Designing and conducting consultations
Chapter 0 – Select non-state and subnational actions for inclusion in the analysis	• Ensure a more credible determination of likelihood of achieving targets specified under non-state and subnational actions • Fill information gaps where they exist to develop a rich database • Identify credible sources of information for engagement in subsequent steps	Chapter 8 – Designing and conducting consultations
Chapter 7 – List relevant national climate	• Enhance completeness by developing a list of relevant national policies and actions with inputs	Chapter 5 – Identifying and analysing stakeholders

mitigation policies and actions	from a diverse range of stakeholders depending on resources	Chapter 8 – Designing and conducting consultations
Chapter 0 – Assess overlaps, add impacts and compare ambition	• Ensure that stakeholder inputs are sought on interactions between different actions in the same sector, across sectors, as well as between non-state and subnational actions and national policies • Integrate stakeholder insights on magnitude of impacts, and the ambition of national or sectoral target or policy or projection with regards to the impact	Chapter 5 – Identifying and analysing stakeholders Chapter 8 – Designing and conducting consultations
Chapter 10 – Reporting results	• Raise awareness around 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
Chapter 11 – Use 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 diverse perspectives are considered when planning and designing future course of action based on assessment results	Chapter 7 – Providing information Chapter 8 – Designing and conducting consultations

APPENDIX C: DEVELOPING CLIMATE ACTION DATASETS

This appendix[70] discusses possibilities and challenges of creating country-specific climate action datasets (CAD) of non-state and subnational actions. It also proposes solutions for future development and application of datasets. It is based on the experience of creating two country-specific datasets (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 dataset that can be filtered for any country. An attempt was made to demonstrate the potential value of such datasets for a range of national policymakers. During the first phase of development, two contrasting examples of Morocco and the United States were selected. As a developing economy with limited non-state and subnational climate action data, the challenge in Morocco was to look beyond what was readily available and develop alternative means to quantify the non-state climate action underway within its borders. It also provided an interesting case study given its recent role in international climate affairs, as host of COP22, and its future ambitions. By contrast, the developed economy of the United States presented a wealth of non-state and subnational climate action data, which was 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 datasets were aligned with the guide and focused exclusively on non-state and subnational mitigation actions. Future development of country-specific climate action datasets could also include relevant climate finance and adaptation action.

C.1 Benefits of country-specific datasets

The construction of country-specific climate action datasets can effectively supplement the guide by streamlining the process for policymakers, ensuring consistency and accuracy of data, and removing tedious analyzes by performing data standardisation in advance. A climate action dataset can:

- **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 dataset requires the careful consolidation of disparate data from multiple sources. By gathering and formatting data in advance, the dataset would collectively save a substantial amount of time.
- **Ensure data are accurate and up-to-date.** A country-specific dataset can be regularly updated, and year-on-year comparisons of climate action data can spot inconsistencies and improve the overall accuracy of the dataset.
- **Provide essential and contextualizing information.** While 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 emissions reductions, grid emission factors, industry classification, population, etc.) required to derive meaningful insights. By providing all necessary information, a country-specific dataset could save policymakers additional time, allowing them to focus resources on achieving the objectives of the assessment and interpreting the results.

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

- **Simplify the most challenging aspects of the guide.** It is possible to integrate some aspects of the guide directly into a country-specific dataset, 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 what the impact of completed climate actions will be 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 dataset, the time spent in quantifying the impact of individual actions is greatly reduced.
- **Directly inform global datasets**. A robust process for developing and maintaining country-specific datasets 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 datasets could directly inform the UNFCCC's Global Climate Action Portal (NAZCA) 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 datasets 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 datasets could serve as *the* foundation for understanding how to track, measure, and rate the impacts of non-state and subnational climate action in the coming years.

C.2 Challenges in building country specific datasets and potential solutions

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

C.2.1 Gathering climate action data

While there are many available resources that aggregate non-state and subnational climate actions (see Section C.4 Overview of existing global datasets), 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 the country-specific datasets. At the same time, there are methods that currently exist that can support in this effort. Primarily on the corporate side, there exist databases of corporate sustainability (CSR) reports (e.g., GRI, Corporate Register) from companies that have traditionally fallen outside of the scope of analysis due to their size (e.g., SMEs) or ownership type (e.g., privately held). Applying technologies and a lexicon to crawl these reports and pin-point 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, e.g. following the eXtensible Business Reporting Language (XBRL) standard. While fully integrated into financial reporting, little headway has been made in the adoption of these reporting formats 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 due to their heterogeneous characteristics and the lack of quantitative data made publicly available. Full integration of cooperative climate actions into country-specific datasets 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 emission 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 it easier to compare. This will be especially challenging for cooperative actions, as well as corporate actions that are not clearly defined or easily localised within a national border. In these cases, it may be necessary to convert data to common terms for integration into country-specific datasets; while in cases where enough quantitative data is not available, understanding the impact of the actions by other means may be needed.

One of the main challenges in constructing the country-specific climate action datasets is localizing corporate targets made by companies with operations in diverse geographies. 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 only cover 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 specifically defined for the target. Additionally, the inherent challenges of Scope 3 reporting do not currently allow for a similar country-level Scope 3 emissions breakdown. While 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 localize impact of these

types of targets will be challenging unless more specific information on target coverage and implementation and Scope 3 geographic breakdowns is collected.

Additionally, though construction of country-specific datasets 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, etc., and
- expanded use of country-based data points, including Scope 3 breakdowns.

Covering data gaps

In instances 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 dataset. These estimates can help to establish base year emission values, when undisclosed, or 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.[71] It is also exploring modelling for cities to be able to provide reasonable estimates for non-reporting cities; these methods can likely be extended to states and regions using macro-level population, economic and other related variables. It can potentially minimize some of the data gap implications by offering a more complete dataset. Data users will always have visibility into which values have been estimated and how, to determine for themselves whether to include these in their analyses.

For countries where there is not a significant amount of action data available, it would still be possible to provide national governments with key insights through additional analysis of asset-level data from 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 (for instance, using data reported to CDP through its corporate climate change questionnaire under the question related to initiatives for emission reductions), could support policymakers in targeting emission reduction options based on asset improvements and 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 other related business developments that can be

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

integrated into national-level emissions forecasting. In case of electric utilities for example, a view of the plants coming online with details around capacity, technologies, fuel types, etc., 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 dataset

Once constructed, maintaining and updating country-specific datasets will present unique challenges requiring careful consideration, and thorough planning. This would require dedicated staff to manage the dataset, as well as clear communication channels between different data sources, initiatives, and campaigns to ensure periodic updates of relevant data. It will need to be ensured that entities and actions are easily identifiable to avoid redundant entry and double counting. This could be especially challenging for companies whose names often appear differently due to differences in legal and public name or due to 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 dataset 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 dataset 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 dataset 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 is dependent upon 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 the database is accessible to national policymakers, analysts and other decision-makers tasked with reducing national GHG emissions. This entails removing costs, in as much as possible, to the source data. It also requires 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 dataset construction indicates that there is little willingness from data providers to make their data public. As a result, issue 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 to no cost to national government representatives. To establish a business-model supportive of continued upkeep and maintenance, access may be fee-based for other non-state stakeholders that wish to analyze 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. Additionally, users should be able to export pre-filtered portions of the database (e.g., data relevant to their country) to Excel in order 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 datasets

A detailed breakdown of the methodology used to construct the datasets is explained below.

Once the available climate action data were gathered and input to the dataset, 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 (i.e. commitment/action, emissions reduction/renewable energy, etc.) 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, and for targets with geographic coverage beyond national borders (e.g. those made by 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 dataset, including evaluating the *progress monitoring*, *accuracy*, *likelihood*, and *overlap* of climate actions.

C.3.1 Gather and input data

Construction of the country datasets primarily relied on data collected through CDP's disclosure platform and TCG/CDP's Compact of States and Regions for reasons of data access and expedience. There are other relevant sources of climate action data (see C.4 Overview of existing global datasets), but in most cases, the key data points required to calculate the impact of actions—though likely collected—are not made publicly available. Similar difficulties were encountered in trying to calculate the impact of cooperative initiatives that might be relevant to the two selected countries.

On a fundamental level, the country specific datasets are consistent with ***Error! Reference source not found.***, in which each row includes a description of the action being taken and some basic contextualizing information, including geographical and IPCC sectorial 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 out the rest of the dataset.

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 realised. 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 are 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 emission 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 localised), converting renewable energy actions to associated emission reductions, and disaggregating multinational corporate actions to countries' boundaries.

In constructing the dataset, several limiting characteristics of the currently available climate action data become obvious. The first is that there is much more data 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. There are efforts underway 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 as many have international operations. As such, information on the climate actions of multinational corporations headquartered in developed economies can still provide insight about impacts in less developed economies, though due to limited data availability on the exact geographic distribution of these climate actions within a company's global operations, calculations are assumption dependent.

The second limitation relates to IPCC sectoral coverage. In the country datasets developed, most actions relate to energy use, with fewer relating to transport, buildings, waste, land use, and forestry, which 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, which 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 datasets, 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. While this level of detail is less relevant to comprehensive 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 was gathered or evaluated from the following sources:

- **CDP corporate data –** Beginning with CDP's 2016 corporate response data, first all US-based and Morocco-based companies were identified for inclusion in respective country specific dataset. Then all companies that reported emissions in the US or in Morocco, regardless of where their headquarters are located, 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 CDP's 2016 cities response data were included.
- **CDP/TCG states and regions data –** 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 cCR 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 dataset.

C.3.2 Determine suitability

Once all available climate actions were collected, it was necessary to further review their suitability for inclusion in the dataset. At the most basic level, for a climate action to be considered for inclusion in the country dataset, it must be forward-looking, quantifiable, and provide sufficient information to estimate its anticipated target year impact in terms of emissions reduced. Thus, most of the actions included in the two datasets are emission reduction or renewable energy targets. As mentioned above, the data used was 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 the purposes of this dataset development. 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 that these commitments may have.

For actors with multiple, overlapping commitments, the most relevant action was identified, which was generally the one covering the largest scope of emissions over the longest period. However, in cases where an actor had a more (or less) ambitious mid-term target as well, it was factored into the projected impact of the climate action in 2020, 2030, etc. For actors that reported multiple action types (i.e., absolute emissions reduction, intensity emissions reductions, renewable energy, etc.), 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 emission reduction targets that only cover scope 3 emissions, which cannot as easily be localised 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 datasets, actions were excluded from further consideration for the following reasons:

- **Evaluate all actions by actor and exclude superseded actions –**
    - For actors with multiple climate actions, near-term actions were excluded if a longer-term action was available. However, if there was a mid-term action that was not merely a linear interpolation of the long-term action, both mid-term and long-term actions were used to present more accurate projections.
    - For actors with multiple action types—for example, an absolute emissions reduction, an intensity emissions 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 tCO_2e impact of renewable energy and electricity commitments, 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 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.
- **Exclude scope 3 actions –** The analysis was limited to scope 1 and scope 2 emissions reductions. As such, 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.
- **Remove non-US-based companies** – For the US dataset, it was necessary to remove non-US-based companies from the US dataset because disaggregating the global impact of all actions from companies that disclose emissions in the US would have required evaluation of over 1700 actions. Given the time constraint, the analysis was limited to US-based companies. In the future, integration of non-USA 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 was collected through CDP disclosure platforms, which asks about active targets, all items were defined as actions.
- **Geographic coverage –** For cities and regions, these are defined by whether an action is city- or region-wide, or limited to their local or regional government. 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 is explicitly mentioned in comments for the target. Actions reported by companies engaged in certain GRI business activities were assigned to the "Industrial processes and product use" sector. Deforestation actions were assigned the "Agriculture, forestry, and other land use" sector, and waste diversion was assigned the "Waste" sector.
- **Action Type –** The dataset for each country includes:
    - Absolute emissions reduction
    - Intensity emissions reduction
    - Renewable energy
    - Deforestation
    - Emissions 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 for 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/impact were adjusted to reflect this anticipated result.
- **Convert 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 current grid emission factor based on IEA data for each country. This assumption, however, is not conservative and further work should be done to supplement it. As currently done, purchase of renewable electricity (RE) can result in no additional RE being brought to the grid, but simply in a re-allocation of existing RE to certain consumers. Although providing a market signal, this is still considered incipient in face of other costs to significantly impact new RE capacity. As such, the current method provides the most optimistic emission

reductions that can be achieved by given commitments. A different method needs to be devised to provide the lower-bound, conservative estimate of emission 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 dataset.

- **Remove 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 percent 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 scope 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 localised impact in the user's country, assuming the emissions reduction is proportionally 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. Projecting the impact of actions past their target year in line with a variety of potential scenarios (e.g., no additional action, same level of ambition moving forward, more/less ambition, etc.), future global and local impacts for continued action were estimated, with the caveat that the farther projections go beyond the target year the less accurate they are likely to be. For actors with mid-term 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 if an actor anticipates their action will follow a linear, logarithmic, exponential, variable, sporadic, or even uncertain progression would allow for more informed assumptions and accurate estimates of the overall impact an action might have. It would also help to contextualize annually reported progress information.

C.3.7 Additional information

- **Optional information on progress monitoring –** The monitoring progress policy of the data provider 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. For instance, this is especially important for confirming the base year emissions covered by a reduction target, as those 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 an action as well as the past performance of similar actions by the same actors. These two indicators were analyzed independently and then combined with equal weight to assign a likelihood score to the action.

  Current progress is reported to CDP as percentage of the target achieved over the percent 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 was 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. By 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 one (e.g. 75/50) are capped at one. This approach simplifies emission reductions to a linear pathway, which may not be the case in reality. However, more specific assessments are not possible due to insufficient granularity of data.

  The past performance of an actor was determined by comparing the number of past actions that were either completed 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 one). For instance, a company has reported four targets as successfully completed, with two of the four completed early. Additionally, they have reported three targets have reached their target end date (i.e., 100% complete in time). This means the ratio of their 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 one, the sum of both scores is divided by two, 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).

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

Table C.1: Levels of likelihood assigned to individual actions

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

- **Overlap –** Any information used to identify situations where there may be overlap between anticipated impacts. This could be the 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 dataset but may not be entirely independent. The country datasets 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 datasets is a significant challenge in these exercises. Additionally, development of an approach to normalize multiple emissions reduction targets to a holistic actor-level target could help improve and simplify understanding of target overlap in certain circumstances.

C.4 Overview of existing global datasets

There are several major sources for data on non-state and subnational actions, such as the Global Climate Action Portal (NAZCA), Covenant of Mayors, carbon*n*, Climate Registry, CDP, and Climate Initiatives Platform (see Appendix A: Overview of Databases and Studies). Some pertain to individual actions made by one type of actor, while 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 the ICAT series of guidance development in July 2017 with descriptions and figures updated in May 2019.

Global Climate Action Portal (NAZCA)[72]

The UNFCCC's Global Climate Action Portal (NAZCA), which is mentioned in the Paris Decision text, aggregates both individual and cooperative climate actions by non-state and subnational actors (UNFCCC, 2015). All NAZCA 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, NAZCA draws from multiple[73] sources and presents basic descriptions of actions reported through their data providers with some contextualizing details about the stakeholders taking action.

As of May 2019, there are over 19,947 actions on the portal from 12,396 stakeholders including 9,378 cities, 2,431 companies, 363 investors, 126 regions, and 98 civil society organizations. 9,612 of these 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 emissions reduction, energy access and efficiency, renewable energy, resilience, transport, building, forest, and innovation. The current geographic distribution of commitments on NAZCA heavily favours developed countries, specifically those in North America or Europe. While it is currently the most comprehensive collection of non-state and subnational climate action data, and is officially recognized as part of the process outlined in the Paris Agreement, it provides basic descriptions of the actors and actions that is 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.

Climate Initiatives Platform (CIP)[74]

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

- General – Includes link to website, geographical coverage, type of initiative, lead organization
- Description – Includes description, goals, 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

Covenant of Mayors for Climate and Energy[75]

An initiative with 9,664 signatories as of May 2019, the Covenant is a substantial database of European cities' commitments and climate action plans. New signatories pledge to reduce CO_2 emissions by at

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

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

[74] https://climateinitiativesplatform.org

[75] https://www.covenantofmayors.eu/

least 40% by 2030 (earlier signatories may have less ambitious targets) and to adopt an 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, 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.

carbon*n* Climate Registry[76]

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 report 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, for example, 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. There is a higher level of information provided by local and subnational governments in the United States, Europe, and Japan, as well as Tanzania, Mexico, and Thailand. Recently, ICLEI and CDP have partnered to present one unified process for subnational climate action reporting.

CDP[77]

Over 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 CDP's 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 reduction, 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 CDP's Climate, Water, and Forest questionnaires. CDP's geographic coverage is greater 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.

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[76] https://carbonn.org/

[77] https://www.cdp.net

ABBREVIATIONS AND ACRONYMS

AFOLU	agriculture, forestry and other land use
APPC	Alliance of Peaking Pioneer Cities
BAU	business as usual
BR	Biennial Report
BUR	Biennial Update Report
CDKN	The Climate and Development Knowledge Network
CRS	Centre for Resource Solutions
DIE	Deutsches Institut für Entwicklungspolitik (German Development Institute)
DTU	Technical University of Denmark
EE	energy efficiency
FAO	Food and Agricultural Organisation of the United Nations
FFS	Fossil Free Sweden
GDP	gross domestic product
GGBP	Green Growth Best Practice Institute
GHG	greenhouse Gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories
GWP	global warming potential
HFCs	hydrofluorocarbons
ICAT	Initiative for Climate Action Transparency
ICI	International Climate Initiative
IEA	International Energy Agency
IRENA	The International Renewable Energy Agency
IPCC	Intergovernmental Panel on Climate Change
LEDS	low emission development strategy
LULUCF	land use, land use change and forestry
MRV	measuring, reporting and verification
NAMA	nationally appropriate mitigation action
NAZCA	Global Climate Action Portal, formerly the Non-State Action Zone for Climate Action (NAZCA)

NDC	Nationally Determined Contribution
NREL	U.S. National Renewable Energy Laboratory
OECD	Organisation for Economic Co-Operation and Development
RE	renewable energy
REC	renewable energy credit
RPS	renewable portfolio standard
SLCP	short-lived climate pollutants
UNEP	United Nations Environment
UNFCCC	United Nations Framework Convention on Climate Change

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 report	A report, completed by the user, that documents the assessment process, methods and results related to the impact of non-state and subnational action
Ex-ante assessment	The process of assessing expected future impacts of non-state and subnational actions or of national policies and actions (i.e., a forward-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 (IPCC 2006). The user can apply their own expert judgment or consult experts. Expert judgment can be strengthened through expert elicitation methods to avoid bias.
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)
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 action 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
Monitoring period	The time over which the non-state and subnational actions are monitored
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 and subnational government.

Non-state commitments	Planned non-state action that has been publicly announced but unlike non-state mitigation action, implementation has not yet started.
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 those that have the same or complementary goals (such as national and subnational energy efficiency standards for appliances), as well as counteracting or countervailing policies that have different or opposing goals (such as a national fuel tax and a subnational fuel subsidy).
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, among others
Current policy scenario	A scenario that represents the events or conditions most likely to occur in the presence of the current mix of policies or actions.
Positive impacts	Impacts that are perceived as favourable from the perspectives of decision makers and stakeholders
Proxy data	Data from a similar process or activity that are used as a stand-in for the given process or activity
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 the policy
Subnational actor	Any form of government which is not a national government.
Subnational commitments	Planned subnational action that has been publicly announced but unlike subnational mitigation action, implementation has not yet started.
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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