INITIATIVE FOR
Climate Action
Transparency

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

Non-State and Subnational Action Guidance

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

July 2018

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 realise the mitigation potential of a country.

Context for non-state and subnational action

The Paris Agreement recognises the importance of non-state and subnational actions and explicitly encourages non-state and subnational actors to scale up their climate actions.[1] Globally, there is an acceleration of non-state and subnational action 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. 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).[2] 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.

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.[3] 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 and devising policies, and understanding whether countries will be able to reach their NDC targets. 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.[4] 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

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[1] UNFCCC 2015, par. 135

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

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

[4] UNEP 2016a

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

Purpose of the guidance

The purpose of the guidance 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. The guidance 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 guidance 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 climate mitigation targets. The guidance 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.

This forward-looking guidance is fundamentally different from existing national GHG accounting guidance 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.

By applying the guidance 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?
- 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?

Intended users

This guidance is intended primarily for national government agencies, research institutions and non-governmental organisations (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 guidance, the term "user" refers to the person implementing the guidance.

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

- **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 guidance can accommodate a variety of objectives from a range of users (see Chapter 2). For example, a national government may want to apply the guidance 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 apply the guidance to improve emission scenarios by incorporating the impact of subnational and non-state actions.

Scope and applicability of the guidance

The following topics are discussed in the guidance:

- Objectives for conducting an assessment of non-state and subnational action impacts
- Key concepts and principles underlying the assessment of non-state and subnational action impacts
- Assessment steps to identify, quantify and integrate the impact of non-state and subnational action into national/sectoral greenhouse gas projections, targets and planning
- Reporting results

The guidance provides principles, concepts and procedures applicable to all types of non-state and subnational climate mitigation actions. 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.

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

While this guidance suggests a specific methodology for conducting the assessment, users may consider an alternative order of steps. For example, users can apply Chapters 5 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 guidance 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. For example, collaborative international initiatives to improve air quality also reduce GHG emissions (see Box 1.1 for further discussion). Adaptation is recognised as equally important, however due to significant differences in metrics and approaches, and since it is not currently considered in GHG emission projections, the guidance does not consider specific adaptation-related impacts of actions. These could potentially be explored in the future.

Box 1.1: 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 Guidance*.

The guidance 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 guidance, although they can also be helpful for guiding future climate plans. The forward-looking approach means that the guidance can be applied on an ongoing basis as new non-state and subnational actions are implemented, and more information becomes available.

The guidance is framed by the global context that increasingly recognises 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.[5] The guidance aims to support and inform these discussions without specifically addressing them. The following topics are therefore not included in the scope of this guidance:

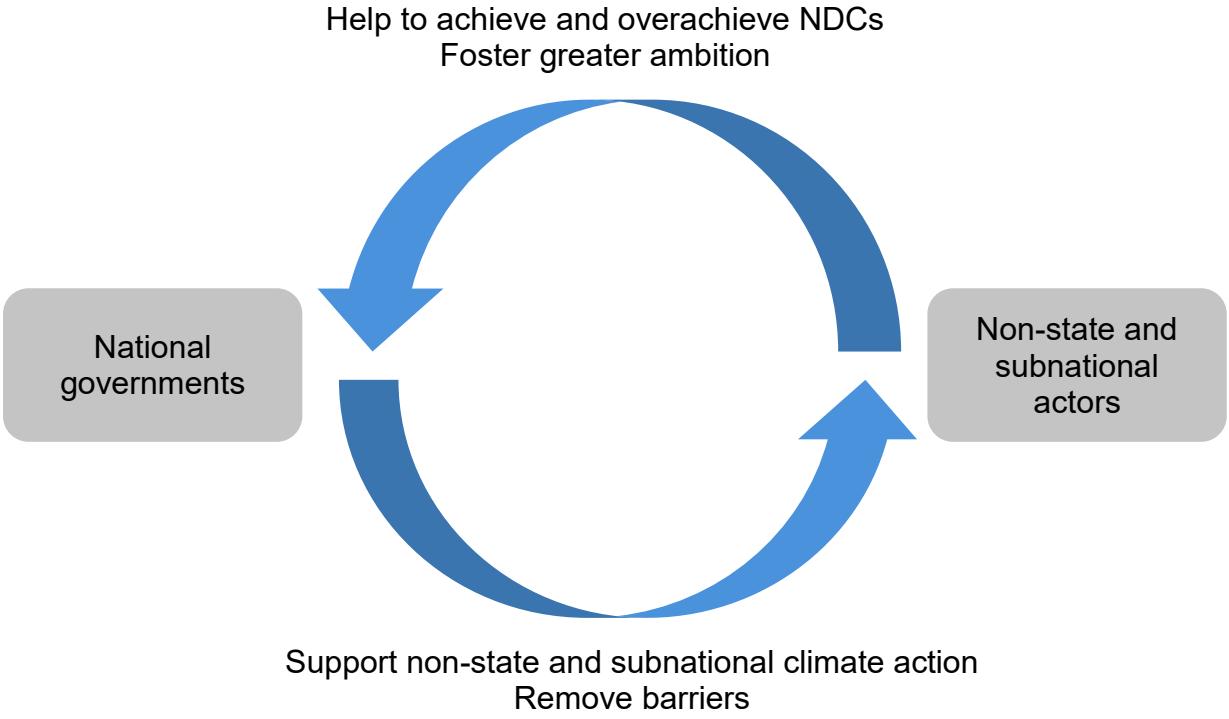
- What can governments do to promote (voluntary) non-state action within their country?
- Which options exist to engage non-state and subnational actors in the country?
- How can national governments and non-state and subnational actors work together more effectively?

[5] UNFCCC 2015, par. 119

- 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 guidance, users should bear in mind that national government and non-state and subnational action can mutually reinforce each other, as shown in Figure 1.1. 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.

Figure 1.1: Relationship between national and non-state and subnational climate action



Key recommendations

This guidance 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 guidance 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 guidance. Refer to the *Introductory Guide* before deciding on which approach to follow.

Relationship to other guidance

This guidance is part of the Initiative for Climate Action Transparency (ICAT) series of guidance for assessing impacts of policies and actions. It is intended to be used in parallel with any other ICAT guidance documents that users choose to apply, including:

- Sector-level guidance for assessing greenhouse gas impacts of policies and actions in the energy, transport, agriculture and forestry sectors
- Sustainable development guidance on how to assess the environmental, social and economic impacts of policies and actions
- Transformational change guidance on how to assess the transformational impacts of policies and actions
- Stakeholder participation guidance 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 guidance 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 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.

Process for developing the guidance

The guidance was developed through an inclusive, multi-stakeholder process convened by the Initiative for Climate Action Transparency. The development of this document is 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[6] 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 guidance through participation in regular meetings and written comments. A Review Group provided written feedback on the first draft.

This version of the guidance will be applied with ICAT participating countries on demand to gather feedback for its improvement and provide case studies for the final publication.

[6] Listed at www.climateactiontransparency.org

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

Recognising that governments have limited resources and that these can vary significantly across countries, this guidance 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. The chosen objective(s) will inform how the user applies various steps within the guidance. Some objectives may only require aggregation while others may require further integration into national emissions trajectories such as projection models or scenarios.

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 utilised in a variety of ways, such as to determine opportunities for engagement with non-state and/or subnational actors and to promote new action.
- 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 guidance can be used to learn about the collective impact of actions by local governments in the transport sector.

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 9). Users can apply the guidance, 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 realising 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.
- 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.

Depending on the selected assessment objective, users may skip through parts of the guidance that are less relevant for their assessment. In some cases, alternative methods not discussed in the guidance may also be applicable. For example, if a user would like to focus on aggregating the impact of city-level targets and has access to city inventory data, they may instead consider applying the methodological approach used by the Global Covenant of Mayors in their annual aggregation assessment.[7] The results of that assessment, however, may be incompatible with the additional steps in this guidance 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.

[7] See Kovac, A. and W. K. Fong. 2015. “Compact of Mayors Emissions Scenario Model.” Technical Note.

3. KEY CONCEPTS, STEPS AND ASSESSMENT PRINCIPLES

This chapter introduces key concepts contained in this guidance, 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 guidance.

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 organisation*" 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 organisations, and non-governmental organisations. Within the literature, and throughout the broader climate action community, many categorisations 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 Non-State Actor Zone for Climate Action (NAZCA) uses the following categories: cities, regions, companies, investors, civil society organisations 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 categorisations include: non-state; subnational; municipalities; non-federal; intergovernmental organisations, 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.

For the purposes of this guidance, 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 organisations. Subnational actors include any form of government which is not a national government, such as in cities, states, provinces and regions.

Non-state and subnational action

This guidance is specifically focused on mitigation action, and uses the generic term "action" for all mitigation effort 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. 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).

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 programs.

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 • 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 – national or international, non-state and/or subnational action

- The RE100 initiative where a group of companies from different countries commits each to procure 100% of their electricity consumption from renewable energy[8]
- The CCAC Agriculture Initiative where several international organisations and countries aim at reducing methane and black carbon emissions from key agricultural sectors by sharing and implementing best practices[9]
- The New York Declaration on Forests endorsed by national and subnational governments, companies, indigenous peoples, and civil society organisations 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 NAZCA platform. 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 6). Many of these actions are voluntary for the actor(s), 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 is one way that can result in overlaps between actions. While the examples above highlight actions that have been publicly announced[10] and are in an implementation phase, some commitments 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.[11] This guidance applies to both existing actions that are underway and planned actions.

Further, actions can also be categorised in terms of targets and policies – which can be either economy-wide or sector-specific (see Section 4.3). Further, 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). 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).

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

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

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

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

Table 3.2: Types of targets and their metrics

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 labeling 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).

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.[12] These also apply to non-state and/or subnational actors within the national jurisdiction.

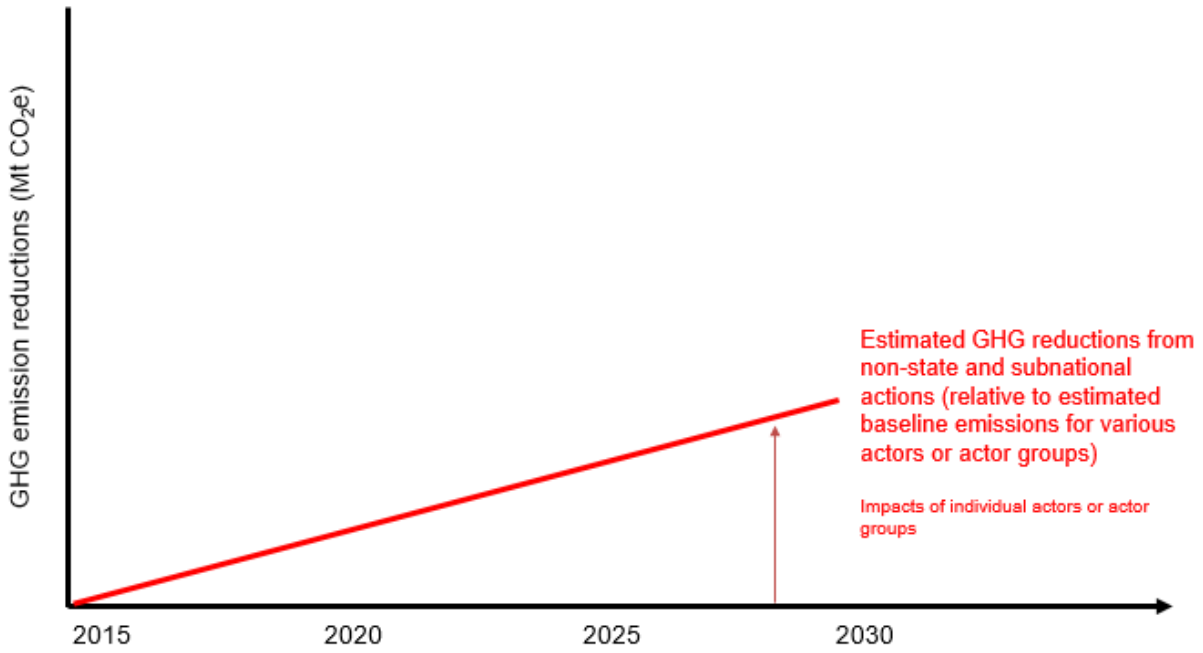
Bottom-up aggregation

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

[12] WRI 2014b

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. An important methodological challenge is selecting and estimating the baseline scenario for each individual action so as not to overestimate the resulting GHG reductions.

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



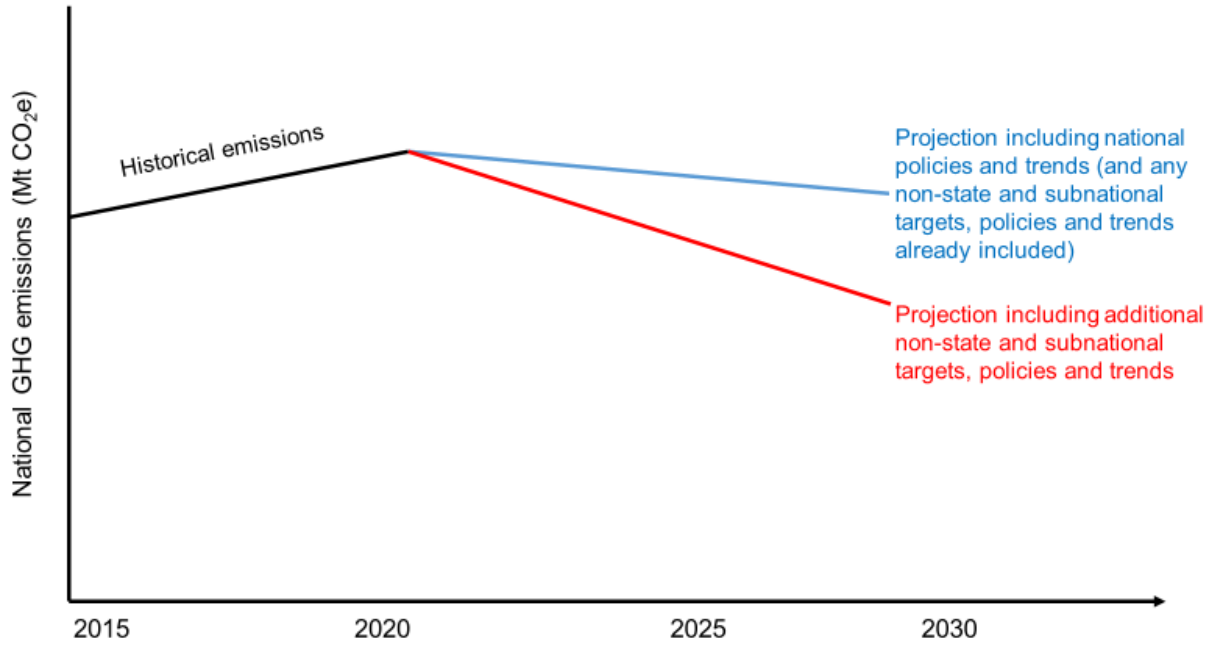
Top-down integration

Top-down integration is the process of incorporating the impact of non-state and subnational actions into national projections and scenarios. 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. 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 guidance 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).

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.

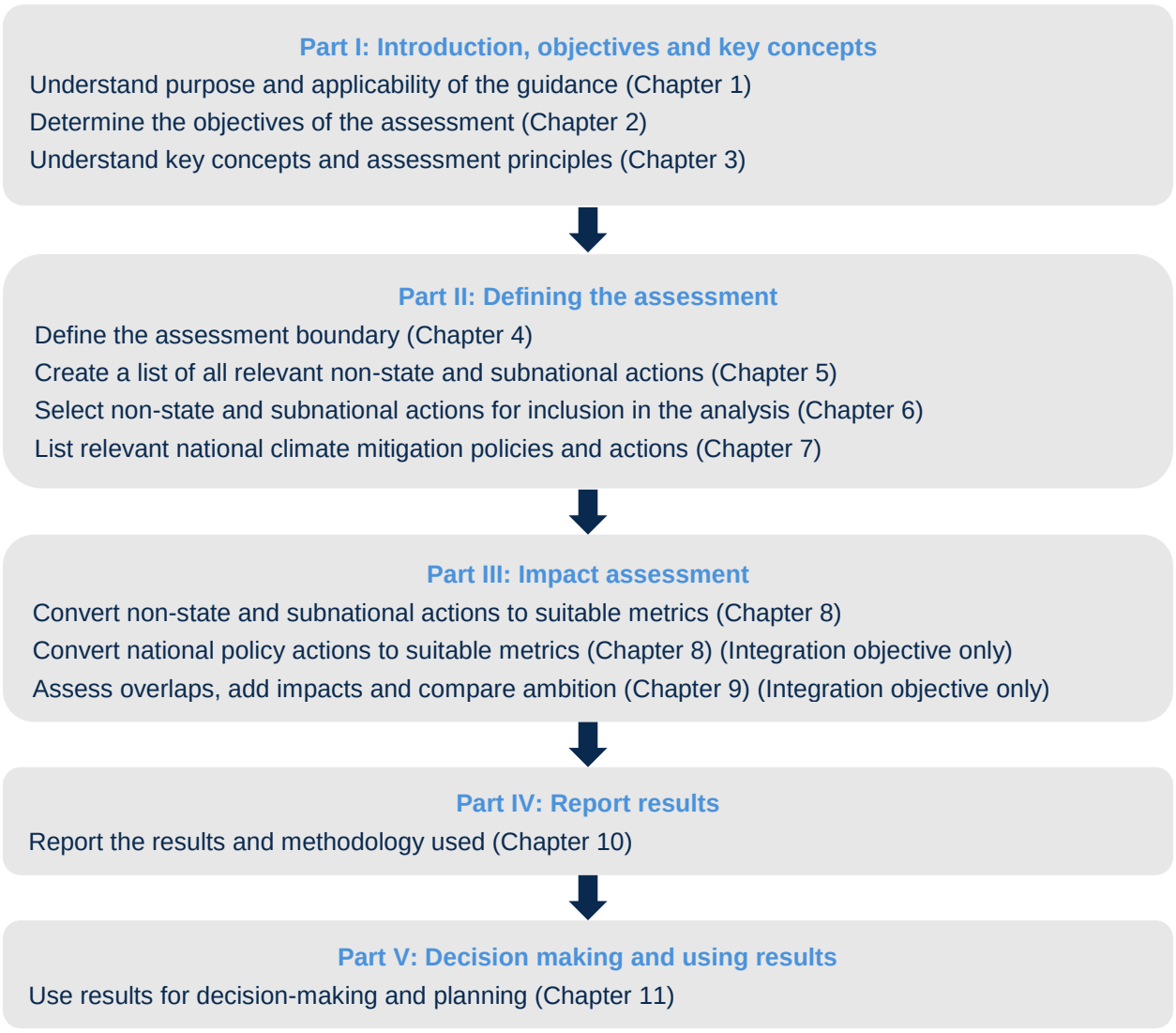
Figure 3.2: Integrating the impacts of non-state and subnational action into national GHG emissions projections



3.2 Overview of steps

This guidance is organised according to the steps a user follows in assessing the impacts of non-state and subnational action (Figure 3.3). Steps are organised by chapters. Depending on when the guidance 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. Unless specified, the step is applicable for both categories of assessment objectives – aggregating and integrating. Detailed guidance on which steps users can skip is provided in individual chapters in Part II.

Figure 3.3: Overview of key steps



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 guidance 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 guidance 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:

- 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 6) or any possible overlaps between actions (see Chapter 9)
- 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 guidance explain where stakeholder participation is recommended—for example, in creating a list and selecting relevant non-state and subnational actions to assess (Chapter 5 and 6), assessing overlaps and comparing ambition (Chapter 9), reporting results (Chapter 10) and decision making and using results (Chapter 11).

Before beginning the assessment process, 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 guidance 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. 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 Guidance* for more information, such as how to plan effective stakeholder participation (Chapter 4), identify and analyse different stakeholder groups (Chapter 5), establish multi-stakeholder bodies (Chapter 6), provide information (Chapter 7), design and conduct consultations (Chapter 8) and establish grievance redress mechanisms (Chapter 9). Appendix B summarises the steps in this guidance where stakeholder participation is recommended along with specific references to relevant guidance in the *Stakeholder Participation Guidance*.

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 Guidance* 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.[13] 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 with the analysis, especially as data availability can represent a significant challenge for many countries, this guidance 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.

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

- **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 guidance 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 guidance.[14] 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 should be recorded.

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 guidance on what approach to use and when to be cautious in the step approach outlined in part II of this guidance.

In practice, users of this guidance may encounter trade-offs between principles when developing an assessment of non-state and subnational action. For example, governments may find that achieving the

[14] 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.

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.[15]

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 guidance addresses these challenges in relevant steps in Part II. Where such a challenge may exist, the guidance 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 guidance can be found to resolve them.

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

Challenge	Description	Chapters with guidance 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 6
Overlaps, double counting and additionality of actions[16]	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.	Chapters 4, 8, 9 and 10

[15] WRI 2014b

[16] 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.

	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"[17], 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.	
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 9
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 5, 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, 6 and 9
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 5

[17] 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).

PART II: DEFINING THE ASSESSMENT

4. DEFINING ASSESSMENT BOUNDARY

This chapter provides guidance 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

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. 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.

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. By specifying the parameters of the assessment boundary, users may undertake a comprehensive assessment that includes all categories of each parameter, or a targeted assessment which may focus on a specific sector or actor group for example.

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 BAU or other scenario, 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.

Table 4.1: Examples of non-state and subnational action from the U.S.

States	Cities	Businesses
GHG Target/Cap		
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
Property Assessed Clean Energy		100% renewable energy target
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
Most recent 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

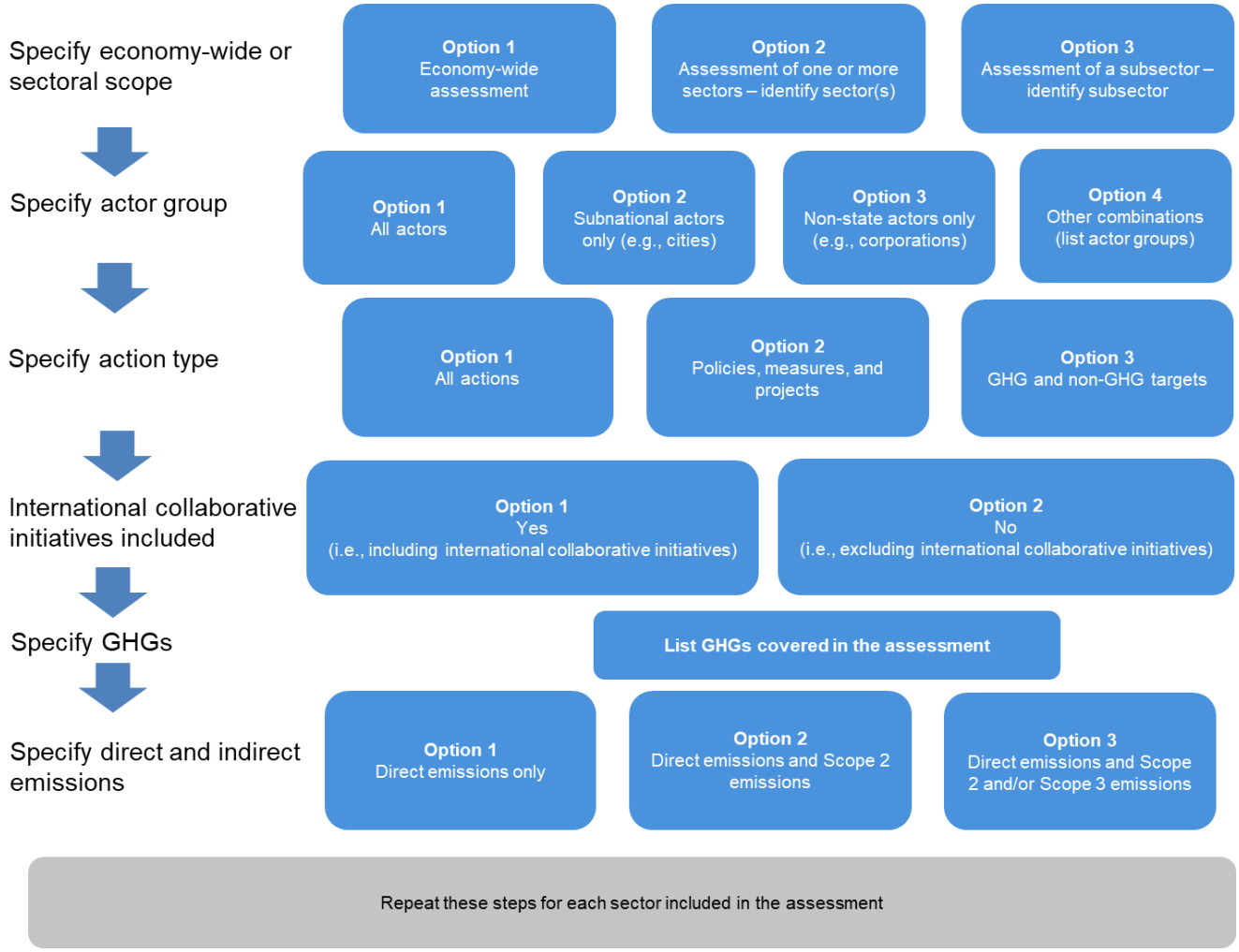
Source: (America's Pledge, 2017).

4.1 Choose which sectors and subsectors to include

Users should identify whether the assessment is economy-wide or is applicable to specific sectors. Users can consider defining sectors and sub-sectors according to IPCC categories (Figure 4.1 and Figure 4.2), or could follow the categorisation 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.[18] This will ensure that the coverage can truly be considered economy-wide.

[18] This relates to the concept of 'key source analysis' in the IPCC guidance 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 (Figure 4.1). 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 organisations
- 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
- 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, programs and activities may be more difficult to convert into quantitative GHG reduction outcomes and therefore may involve greater uncertainties. 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 minimise uncertainty.

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), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). Users can assess the impacts of non-state and subnational actions on all or a subset of GHGs, depending on data availability.

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 organisations versus cities and subnational regions.

A corporate GHG inventory (which applies to organisations of any type including businesses, government agencies, and civil society organisations) 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 categorise 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 guidance therefore suggests to follow the IPCC categories which lists GHG emissions by (direct) sources of emissions and removals by sinks (Figure 4.2),[19] but to carefully consider the effect of mitigation actions

[19] IPCC 2006a

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. 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.

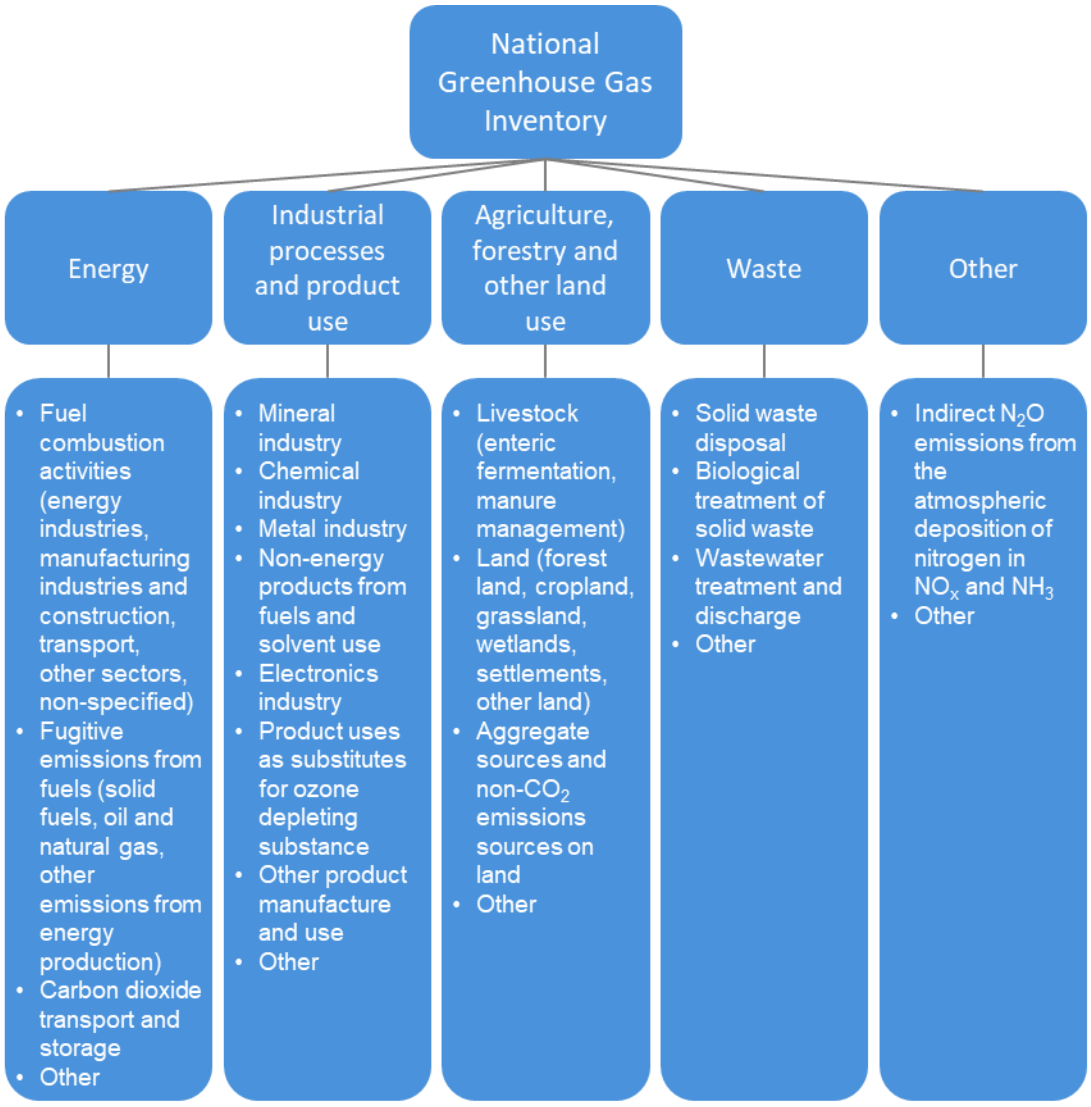
Box 4.1: Examples of determining the assessment boundary based on the objective of the assessment

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.

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

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).

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

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 Key Concepts in Chapter 3. 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 6. 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 recognise and select suitable non-state and subnational climate 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, economy-wide 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[20]. 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 (which is particularly important for non-state 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, as well as qualitative information such as the current status, or reported progress may also be required. If assessment includes all action types, users may want to also record the type of action to organise actions for later processing and to help inform a decision on whether or not 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 9.

Data availability may be a significant challenge for some users. Application of this guidance 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.

If the users' objective is to perform a comprehensive assessment, they might 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 9.

Table 5.1 provides a template for organising the collected information. To create the list, users should start with available data from national and international sources. This may include gathering any information previously used in developing climate policies or scenarios; drawing from international databases; or requesting data from data management organisations. 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 organise 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. Therefore, it is recommended that users also include information on where and how the information has been collected. Finally, users should keep in mind that the column "Action retained for further analysis" in Table 5.1 is included as a placeholder for further analysis and is to be filled in subsequent steps.

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

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

Actor	Sector(s) targeted (based on IPCC main categories or existing climate models or tools)	Geographic coverage (global, national, regional, city)	Commitment or action?	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	Install 75,000 MW of renewable energy capacity by 2020	Unclear	NAZCA	To be filled after completing the next step (see next chapter)
Safran (French multi-national company)	Industrial process and product use	Global	Commitment	Reduce operational CO2e emissions by 5% from 2015 to 2018; base year emissions: 18,920 tCO2e	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.

Prepare any necessary tables, spreadsheets and other tools to organise 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 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 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[21] 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 organisations, 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.[22]
- For initiatives, consulting the initiative's secretariat
- For 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 5.3). 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.

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

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

Box 5.3: 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 NAZCA and other major international databases on non-state and subnational action (non-state and subnational actors sign up themselves).[1] 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, 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 UNEP, 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.

Lastly, while this guidance 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.

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 5 to include in the assessment, in line with the assessment principles. It provides guidance 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 Table 5.1 that was illustrated in Chapter 5.

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 facilitate 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? • Is it a numerical target? • If not, it is still reasonably possible to convert the target into a numerical one?[23] (See also Chapter 8)
Likelihood of achievement (see Section 6.2 for more detailed guidance)	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 materialise into actions. Additional questions that 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, 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?
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.

[23] 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).

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, modelling results, risk management methods, consultation with experts and stakeholders, or other methods. Users may want to look for 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.

Table 6.2 provides guidance 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 mobilising 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: Example of determining likelihood

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.

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.[24] According to the FOF 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 is 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 Determine the magnitude of impact

Users should evaluate the potential magnitude of impact of an action. While this will already be known for actions with stated GHG emissions targets, 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

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

stakeholders, or other methods. If evidence does not exist, expert judgment should be used. Table 6.3 provides a description of the classification categories of major, moderate, or minor impact.

Table 6.3: Classifying the potential magnitude of impact

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.

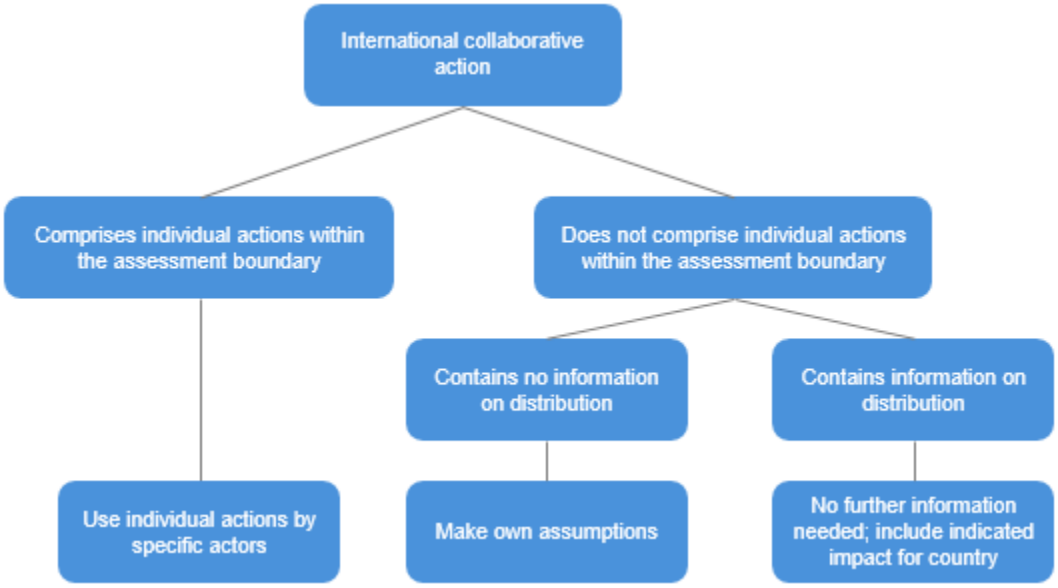
Source: Adapted from WRI 2014b.

6.4 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. Often the individual action will be more specific than the collaborative target.[25] 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 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. This chapter provides a list of assumptions users might use to distribute impacts to countries when no detailed information is provided by the initiative. However, users are advised to exercise caution when using those assumptions as emissions reductions may not be proportional to the number of countries involved and a precise distribution may not be possible. In case of doubt, it is suggested to exclude the international collaborative action until further information becomes available.

[25] 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 highly subjective and therefore use of assumptions may impact the level of conservativeness of the assessment, but may still be useful depending on the objective. The user will need to decide how important it is that international collaborative action is included in the assessment. 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 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.[26]

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

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

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.[27] In comparison, the world's afforestation rate was 5.622 Mha/year and its reforestation rate 5.348 Mha/year.[28] 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.

Companies operating globally

A special case are targets from multinational companies that lack distribution-specific details. Users should keep in mind 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 per country. In this respect, company targets can be similar to international collaborative actions. If no more detailed information (e.g., at facility level), can be obtained directly from companies, or can 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 up targets in Chapter 8. Box 6.4 illustrates some further examples.

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

[27] FAO 2015.

[28] FAO 2010.

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

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. 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. 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 5 and 6. 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 guidance 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

For a country with the relative target below a certain reference or baseline, such as 25% below business-as-usual (BAU) levels in 2030 for country A, the first step is to quantify the BAU emissions in 2030. For NDCs, some countries report the estimated BAU emission levels in the submitted (I)NDCs or

other submissions to the UNFCCC (Biennial Reports, Biennial Update Reports and National Communications). If country A reports its BAU 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 BAU emission levels, the definition of its BAU needs to be looked at to calculate the BAU emission levels. If a BAU scenario assumes a constant GHG emission intensity per GDP, the BAU emission level in 2030 can be calculated as: [BAU 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.

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

Relevant national policies and actions	(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	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' database29 might also be a useful tool, covering climate and climate-related laws in 164 countries and available online. Not resource intensive.

[29] 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/.

Look at most recent and relevant national climate reports such as Biennial Reports (BRs)/Biennial Update Reports (BURs), NDCs if applicable[30]	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. 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 organisations	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 organisations 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.[31] Resource intensive.
Other stakeholder consultations (e.g., sector experts, UNFCCC focal points, 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.[32]

[30] 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

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

[32] 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 guidance for each IPCC sector (description and conversion tables, including examples) and how to proceed for comprehensive assessments.

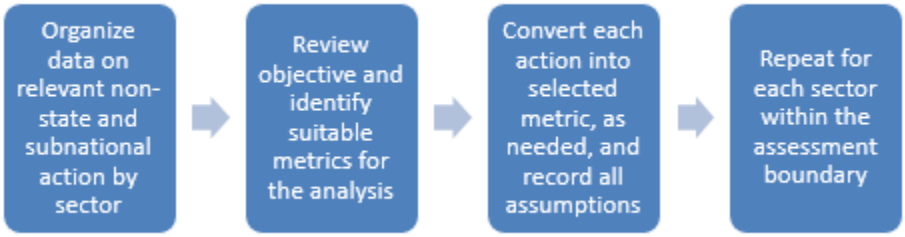
Checklist of key recommendations

- 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. 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 organised 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 is 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 guidance 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. This will mostly likely require the use of quantified emissions reductions as the primary metric. See Section 8.3 for further details on a comprehensive assessment.

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.[33] 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 and convert non-state and subnational actions to those metrics.

It is important to be able to recognise the types and characteristics of actions that may be encountered when using this guidance. 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. Please 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 5 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.

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.

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

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.[34] Across international cooperative initiatives agriculture was the third most frequently covered sector in 2015, after energy supply and transport, and is also covered under many more forestry oriented collaborative actions.[35]

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, Box 8.1 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. Box 8.2 describes an example of determining the emission reduction potential of an international cooperative action in the agriculture sector.

Table 8.1: Example 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.*[36]

[34] UNFCCC 2016; Hsu et al. 2016

[35] UNEP 2016b

[36] 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

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 sustainable food production (tonne/person) Assumptions: • Definition of sustainable food production (e.g., certified food; certified production only; type of certification)	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 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

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 mobilise 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

In line with IPCC guidance, this non-state and subnational action guidance considers energy-related emissions by sector: energy supply, industry, buildings and transport. The following sub-chapters look at each of those sectors separately and provide specific guidance 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.[37] The energy supply sector, together with

[37] Bruckner et al 2014.

the transport sector, is one of the most frequently targeted by subnational and non-state mitigation action.[38] 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 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
		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[39]) or coal first, then oil and then gas (high estimation)
		
		Assumptions:
		
		• RE electricity installed is equal to RE electricity generated
		
		• National fuel mix remains unvaried (once the change in RE has been accounted for)
		
		Data points needed (use IEA World 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.

[38] Yale University 2015.

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

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

- 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 2016 including estimates about energy demand, renewable energy under the New Policies and 450 scenarios, Available at: http://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html
- IEA's Energy Technology Perspectives 2016 report detailing energy transition pathways including relevant data about energy demand and projected CO_2 emissions, Available at: http://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.[40]

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.

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

[40] IPCC 2014a.

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 CO2e 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

- 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/TechnologyRoadmapEnergyandGHGReductionsintheChemicalIndustryviaCatalyticProcesses.pdf
- 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.[41]

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: • Total (projected) national floor area • Heating and cooling requirements	Look at projected average energy consumption of residential and commercial buildings and divide by total floor area to determine estimated future energy performance of buildings. Where available, 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 • 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 (%)	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,

[41] IEA 2016a.

	Data points needed: • Current renovation rate (%)	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

- IEA's *World Energy Outlook 2016 with data trends on buildings emissions by fuel and final energy consumption by end-use*, Available at: http://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html
- 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.[42]

The sector accounted for approximately 14.3% of global GHG emissions in 2010.[43] 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

[42] Yale University 2015.

[43] Sims et al. 2014.

inventories and would therefore be outside the scope of this guidance which focuses on national emissions.[44] 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
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

[44] IEA 2016b.

		• 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 international sources of information

- IEA's World Energy Outlook 2016 *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: http://www.iea.org/newsroom/news/2016/november/world-energy-outlook-2016.html
- 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 important 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.[45]

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. Box 8.8 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)[46] 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 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.

[45] IPCC 2014a.

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

- 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 (define assessment boundary) 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, 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

9. Assessing Overlaps, Adding Impacts and Comparing Ambition

This chapter provides guidance on how to add non-state, subnational and national climate mitigation actions, while avoiding double counting, and how to compare 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
- Harmonise the target year 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 to avoid double counting of impacts. Users should assess the relationships and interactions between actions to understand where these actions reinforce each other to achieve the same outcome and to not double count their effect at the metric or emission reduction potential level. It is a *key recommendation* to check for potential overlaps between various non-state and subnational actions in the same sector,[47] 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.

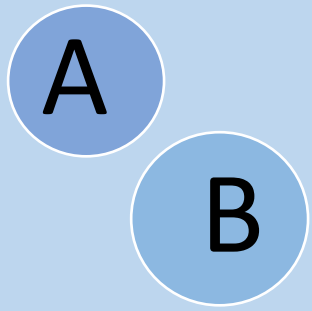
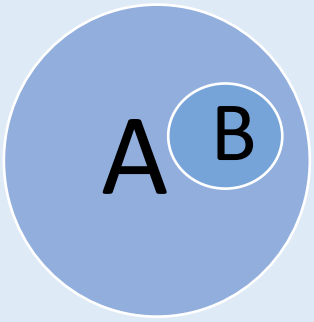
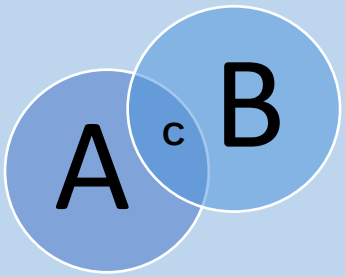
Table 9.1 specifies types of relationships between national policies and non-state/subnational actions with a specific focus on cases of double counting and how users can avoid it *(A and B stand for different non-state, subnational and/or national policies/actions, C stands for their overlap and D for the combined effect of A and B together).* 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. It should be noted that some double counting may be inevitable when actions pull in the same direction. 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. Depending on resource availability, they 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 Box 9.2 provide examples for addressing overlaps and for calculating emissions coverage overlaps among actors.

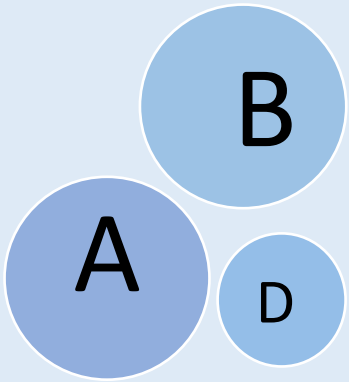
[47] This can include checking for overlaps at collaborative action level

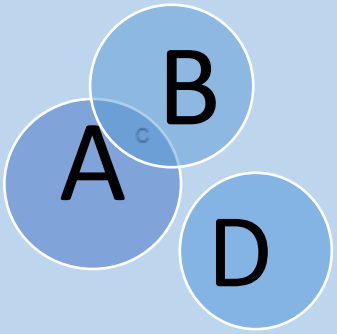
Users should also report results as well as the approach used to determine overlaps.

Table 9.1: Type of relationships between policies and non-state and subnational actions[48]

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 reducing the GHG impact of buildings), as well as actions that have different or opposing goals	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 actions of cities that are located in regions with action should entirely be excluded to avoid

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

	(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.	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. An example could be a non-state target to increase the amount of RE procured and a national	Overlap should be calculated and added or subtracted from the overall impact; combined effect should also be calculated and added.

	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.

- **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. 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 step 2.1.1.

- **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 you 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. One approach 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 of sub-national actors with commitments 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 + 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.

International cooperative action

As a third step, users should calculate overlaps of any international cooperative action included in the assessment. As noted in Chapter 6, many international cooperative actions can be excluded from the analysis if their membership have individual actions of their own included independently of the international cooperative action. 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. If in this 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.

However, cooperative initiatives should also be evaluated for their potential impact, if for example, their aim is 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 can estimate the potential impact of these additional actors and include their potential in the aggregation assessment

For international corporations with global actions, the expected impact should be disaggregated to the assessment boundary and assessed for overlaps following the procedures for non-state actors as noted above.

Users may want to categorise the actions as "primary" and "secondary," or "tier 1" and "tier 2" where 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 larger jurisdictions such as counties, cities, businesses and corporations. Actions within sectors could then be further organised by geographical location to help users identify relationships where overlaps are likely and where the necessary calculations should be made as described above.

Calculations should be repeated for all sectors and all actions and all assumptions should be recorded. If relationships or overlap are unknown, users 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.

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 that this assessment goes beyond the stated expected impact of the examined actions.

Box 9.1: Example of how to address overlaps

Province A has committed to a 30% target share of RE in their total final energy consumption by 2020, but A could use electricity imported from other provinces to meet its commitment. Province B has a renewable electricity generation goal of 30%, and they sell most of their renewables to Province A. Although Provinces A and C both meet their commitments in real and measurable ways, at the national level the amount of renewable electricity generation may be smaller than they appear on the surface and the risk of double counting is high. To parse out this kind of double counting, additional data collection and quantitative analysis is recommended. To solve this case, the user would 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.

Box 9.2: Example calculation of emissions coverage overlaps among actors

In Country A, 8 regions, 84 cities and 297 companies from different sectors have set targets to reduce overall GHG emissions. These three actor groups accounted for 940 $MtCO_2e$, 690 $MtCO_2e$ and 680 $MtCO_2e$ in 2016. The overlap estimation can be done in a number of steps.

First, there are overlaps between regions and cities. 33 cities that accounted for 570 $MtCO_2e$, or 83% of emissions from the 84 cities, were located in one of the above eight regions and none of the 33 had targets that are more ambitious than their region-level targets. It is recommended that these 33 cities' targets are excluded, meaning that the remaining 51 city targets would be counted as additional to regional targets.

Second, there are overlaps between company targets and subnational (regional and cities) targets. Users could first consider non-energy supply companies, which are energy end-users. Because companies usually do not provide information on the emissions per office or factory location, users could assume that the GHG emissions from non-energy supply companies are distributed proportionately to region- and city-level emissions. The GHG emissions from the above 8 regions and 51 cities accounted for 16% of current national total GHG emissions (excluding LULUCF). It can therefore be assumed that 16% of non-energy supply companies' targets is overlapping.

Following this, users could consider the overlaps between the direct emissions from energy supply companies and indirect emissions from regions, cities and non-energy supply companies. The 8 regions, 51 cities and the non-energy supply companies were found to account for 20% of the country's total CO_2 emissions from the energy supply sector. It can therefore be assumed that the 20% of the energy supply company targets are overlapping.

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 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 summarised as follows:

$$E_{NSA}(t) = E_R(t) + (E_C(t) - E_{C,R}(t)) + (E_B(t) - E_{B,RC}(t)) + (E_P(t) - E_{P,RCB}(t)), \quad (2)$$

where

$E_R(t)$: Sum of GHG emissions from state actors;

$E_C(t)$: Sum of GHG emissions from city actors;

$E_{C,R}(t)$: GHG emissions from city actors overlapping with U.S. state-level actions;

$E_B(t)$: Sum of GHG emissions from company actors (excluding electric utilities);

$E_{B,RC}(t)$: GHG emissions from energy end-use company actors overlapping with state- and city-level actions;

$E_P(t)$: Sum of GHG emissions from electric utilities actors;

$E_{P,RCB}(t)$: GHG emissions from electric utilities actors overlapping with state-, city-level, and energy end-use company-level actions.

If the objective of the assessment was to determine the landscape of climate action by non-state and subnational actors, and identify key sectors and action areas, the user has completed the exercise. However, it is important to note the results of the assessment so far have not accounted for potential overlap with national action and therefore may not be considered independent or additional to national action without further analysis.

9.4 Analyse aggregation results and compare ambition

Once overlaps have been determined and impacts have been aggregated, users will be able to analyse results and compare the total impact (ambition[49]) 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.

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

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

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. It is a *key recommendation* to harmonise 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 guidance 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. 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.

Users should review the results of the impact aggregation against the national level action now that potential overlaps will have been calculated.

This guidance 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.

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 (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 = 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)
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

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 business as usual scenario, current national policy scenario, or other emissions projections, 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.[50]

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

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

aggregation assessment into climate systems models that could analyse the total impact of non-state, subnational and national action and fully account for overlaps.

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.

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 guidance has provided explanation on which information users should be collecting. The recommended information to report is listed below.

General information

- The person(s)/organisation(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
- 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 5 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 scenarios)
- 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
- 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 guidance. 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.

Table 10.1: 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	

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 9.

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.

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 recognised 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

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 organised 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 incentivise 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 guidance.

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
Non-state Action Zone for Climate Action (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 20+ initiatives,	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	over 70 of which are on NAZCA)			information themselves)	
Portal on Cooperative Initiatives	International Cooperative Initiatives	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
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	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

						case-by-case basis)			
Better partnerships (CISL & Ecofys 2015)	Select five international cooperative initiatives; apply three different scenarios to analyse 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 initiatives – A way forward to close the emission gap? (Graichen et al. 2016)	Screen 174 initiatives, select those suitable for further quantitative & qualitative analysis. Assess mitigation impact of selected	Cities, regions, companies	EE, Efficient cook stoves, RE, transport, methane and other SLCPs, fluorinated gases, reduced	5,000 – 11,000	2020/2030	Calculated (overlaps with other initiatives in the same sector, across sectors, and any specific policy or INDC elements in	Reference scenario based on the full implementation of all INDCs	World (international initiatives)	https://www.umweltbundesamt.de/sites/default/files/medien/1968/publikationen/2016-11-29_discussion_p

	initiatives and break down impact on a nat. level; add impact of initiatives to estimate emission reduction beyond current pledges		deforestation and afforestation			the country not considered in the global INDC scenarios before)			aper_clean_version_final.pdf
The business end of climate change (CDP & 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 & C40 Cities 2014)	Look at 228 cities. Establish rules for standardising reporting of GHG reductions; collect GHG emission target and inventory data where available; Combine the results for all cities to provide an estimate of total city committed reduction	Cities	Overall emissions	454 (2020) – 402 (2030)	2020/2030	Not calculated	Relative to BAU (align emissions with population growth, assume emissions per capita remain constant after the study baseline year, allocate emissions equally per person as the population increases)	World (drawing from the set of predefined cities)	http://www.c40.org/researches/global-aggregation-of-city-climate-commitments-methodology
Climate Leadership at the Local Level: Global Impact of the Compact of	Based on self-reported data by 360 Compact of Mayors cities, calculate the difference	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_Fina

Mayors (Compact of Mayors 2015)	between BAU scenario and target scenario in a given year.								l_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 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).	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 for the related period.	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
Compact of States and Regions Disclosure Report 2016 (The Climate Group & 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	Cumulative savings are estimated by adopting a common base year, in this case 2010, and by projecting the level of GHG emissions	World (joined the Compact of States and Regions)	https://www.theclimategroup.org/sites/default/files/downloads/compact_report_2016_.pdf

						2014) report. The ETP 2014's 4 Degrees Scenario (4DS) reflects pre-2012 intentions by countries to cut GHG emissions and boost energy efficiency	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 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 neighboring 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	World	https://www.theclimategroup.org/sites/default/files/disclosure_update_2017_digital.pdf

							Contributions (NDCs		
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 specific city/ region sits in.	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
The business end of climate change (CDP & 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 & 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	World	https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-WP-2014-06-C40-Cities-mitigation.pdf

							urban action scenario departs: apply technologies and practices in urban areas to reduce GHG emissions, e.g. transportation.		
Implementing circular economy globally makes Paris targets achievable. (Circle Economy & 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 guidance can be found in the ICAT *Stakeholder Participation Guidance*.

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 Guidance
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 • 3.2.1 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 5 – 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 6 – 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 9 – 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[51] 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 the development of the guidance. An attempt was made to demonstrate the potential value of such datasets for a range of national policymakers. Thus, 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 guidance 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 guidance by streamlining the process for policymakers, ensuring consistency and accuracy of data, and removing tedious analyses 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 contextualising information.** While many publicly available data sources provide basic information on climate actions, it is not always easy to find the essential and contextualising 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.

[51] 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 guidance.** It is possible to integrate some aspects of the guidance 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 categorisation, while still giving them the final say on what is included in the assessment. Consistent evaluation of these aspects would also help to standardise the application of the guidance 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 represented by the Paris Agreement. Maintenance of these datasets could directly inform the UNFCCC's 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 functionality of the platform. Rich country-specific datasets could even 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 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 need to be addressed 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 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 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 categorising 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 organisations 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 comparability of 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 sufficient quantitative data is not available, understanding the impact of the actions by other means may be needed.

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.[52] It is also exploring modelling for cities to

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

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 minimise 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 commitment 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 utilisation 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 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.2.1 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 organised 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 guidance 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 guidance. 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 analyse the information available.

Online business intelligence/ analytical functionality should be embedded to offer users options for easy analysis of the data using charts and graphs. Optimally these could be saved locally or to an online workspace for later review. 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 guidance, with an understanding of the idiosyncrasies of the data reported to CDP. Next, all suitable climate actions were categorised by type (i.e. commitment/action, emissions reduction/renewable energy, etc.) and by coverage (i.e. geographic and IPCC sectoral), as prescribed in the *NSA/SNA Guidance*. 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 *NSA/SNA Guidance* 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 Table 5.1, in which each row includes a description of the action being taken and some basic contextualising 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 organised 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 localising 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 guidance. 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 guidance 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 Categorise climate actions

Actions were categorised by the following fields referenced in the guidance:

- **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 BAU

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 was 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 guidance, 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.

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.
- **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 analysed 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).

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 guidance 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.

C.4 Overview of existing global datasets

There are several sources for data on non-state and subnational actions, such as NAZCA, Covenant of Mayors, carbon*n*, 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 with conducted during the first phase of the ICAT guidance development, so figures were accurate as of July 2017.

NAZCA (Non-state Action Zone for Climate Action)

The UNFCCC's NAZCA platform, which is mentioned in the Paris Decision text, aggregates both individual and cooperative climate commitments by non-state and subnational actors (UNFCCC, 2015). All NAZCA commitments are required to be forward-looking, quantifiable, and trackable, but otherwise fall into a wide range of categories. As a data aggregator, NAZCA draws from multiple[53] sources—including several of the data sources discussed below—but presents only a basic, often incomplete, picture of the action being taken.

Currently, there are over 12,500 commitments on NAZCA from 2,500+ cities, 2,100+ companies, 450+ investors, 200+ regions, and 200+ civil society organisations. Over 8,000 of these are "individual actions" that are unique to their associated actor, and 4,400 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 commitment data, and is officially recognised as part of the process outlined in the Paris Agreement, it provides very basic, second-hand commitment information that is generally available in more detail elsewhere.

Climate Initiatives Platform (CIP)

A database of over 200 initiatives, the CIP is currently the most wide-ranging and comprehensive collection of international climate initiatives (ICIs). The CIP collects background information on each initiative, which is organised into the following categories:

- General – Includes link to website, geographical coverage, type of initiative, lead organisation
- 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 organisations
- Theme – Categorised into one of 21 themes

Portal on Cooperative Initiatives

This is a smaller collection of 60 climate-related initiatives/organisations hosted by the UNFCCC. It has basic information on the type of initiative, thematic focus, goals, activities, mitigation potential, etc. Most of the initiatives are Global in scope, with only a handful specifically focused on smaller geographic regions. However, over 40% of these are already covered by NAZCA and CIP.

Covenant of Mayors

An initiative with over 7,200 signatories, the Covenant is a substantial database of European cities' commitments and climate action plans. New signatories pledge to reduce CO_2 emissions by at least 40% by 2030 (earlier signatories may have less ambitious targets) and to adopt an integrated approach to

[53] 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.

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.

carbonn Climate Registry

It is a reporting platform for local and subnational governments run by ICLEI – Local Governments for Sustainability. Over 700 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 over 1,400 climate change mitigation and energy targets reported in 2016, cCR is a valuable data source with its global reach and some 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.

CDP

Over 5,800 companies, 500 cities, and 100 states and regions (via the Compact of States and Regions, co-run with The Climate Group) disclosed environmental data through CDP in 2016, making CDP's platform one of the richest sources of information globally on how companies and subnational governments are driving environmental change. CDP collected over 60% (5,225 in number) of the individual commitments currently featured on the NAZCA platform, including close to 90% of individual corporate commitments. These include emissions reduction, renewable energy, energy efficiency, deforestation, water resilience, and carbon pricing commitments. Additionally, companies, cities, states, and regions report information on their emissions inventory, active climate actions, and long-term approach to sustainability through CDP's questionnaires. Its coverage is greater in industrialised regions, like the North America, Western Europe, and Japan, and is growing stronger in Brazil, China, South Korea, India, Turkey, Australia, and South Africa.

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
DIE	Deutsches Institut für Entwicklungspolitik (German Development Institute)
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	Non-State Action Zone for Climate Action
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-Operation and Development

RE	renewable energy
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, organisations, 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 characterises 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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