Appendix C: Developing climate action data sets

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

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

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

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

C.1 Benefits of country-specific data sets

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

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

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

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

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

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

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

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

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

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

C.2.1 Gathering climate action data

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

Sourcing relevant data

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

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

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

Ensuring the accuracy, comparability and usability of climate action data

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

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

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

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

Covering data gaps

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

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

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

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

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

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

C.2.2 Maintaining the data set

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

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

C.2.3 The user experience

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

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

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

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

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

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

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

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

C.3 Process to develop country-specific data sets

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

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

C.3.1 Gather and input data

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

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

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

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

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

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

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

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

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

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

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

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

C.3.2 Determine suitability

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

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

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

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

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

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

C.3.3 Categorize climate actions

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

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

C.3.4 Calculate target year emissions and impact

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

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

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

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

C.3.5 Disaggregate impact

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

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

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

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

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

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

C.3.7 Additional information

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

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

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

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

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

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

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

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

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

TABLE **C.1**

Steps where stakeholder participation is recommended in the impact assessment

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

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

C.4 Overview of existing global data sets

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

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

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

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

C.4.2 Climate Initiatives Platform[71]

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

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

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

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

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

[69] UNFCCC (2015).

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

[71] https://climateinitiativesplatform.org

[72] www.covenantofmayors.eu

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

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

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

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

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

C.4.5 CDP[74]

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

[73] https://carbonn.org

[74] www.cdp.net